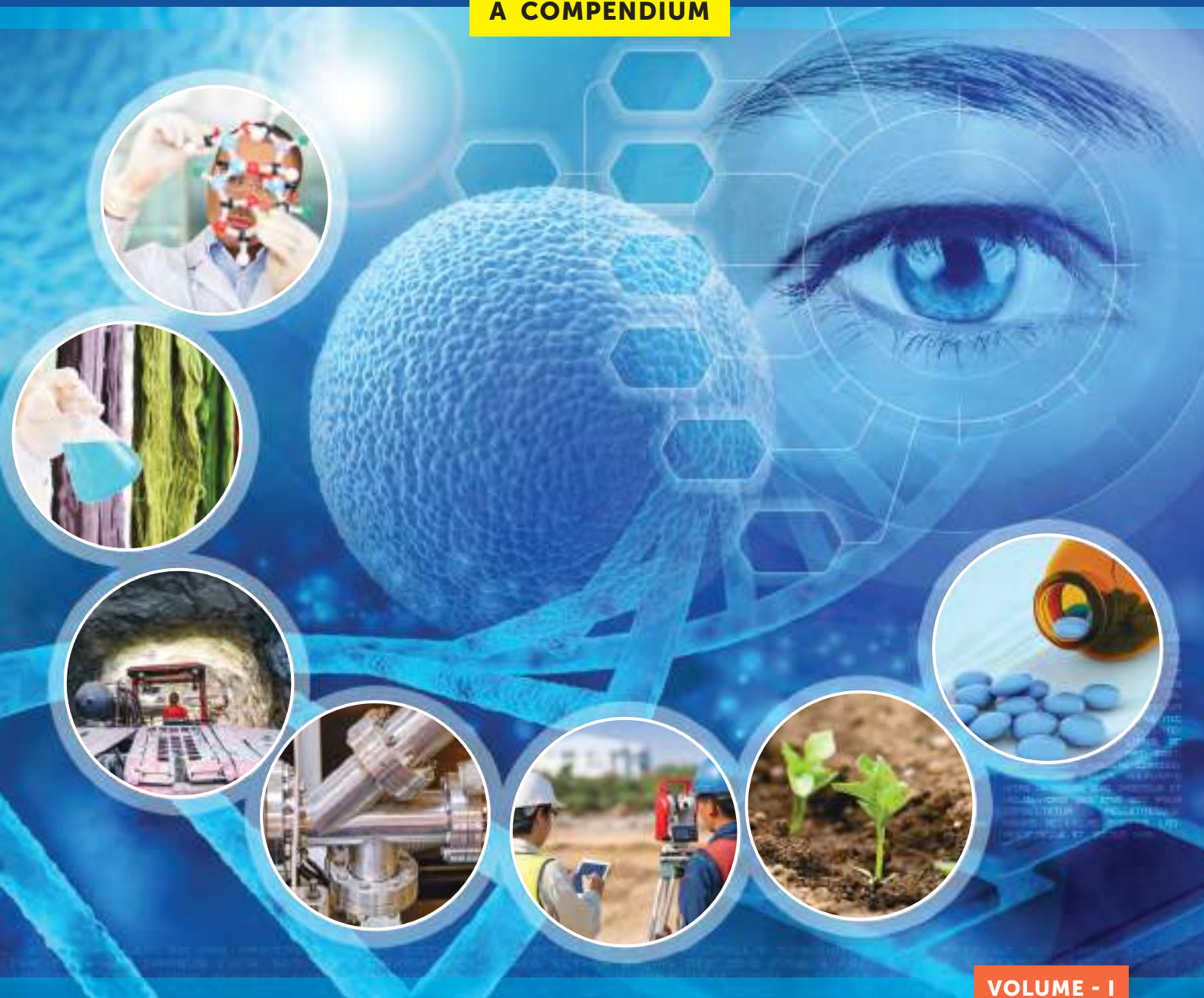


R&D PROFILE OF SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATIONS (SIROs)

A COMPENDIUM



VOLUME - I



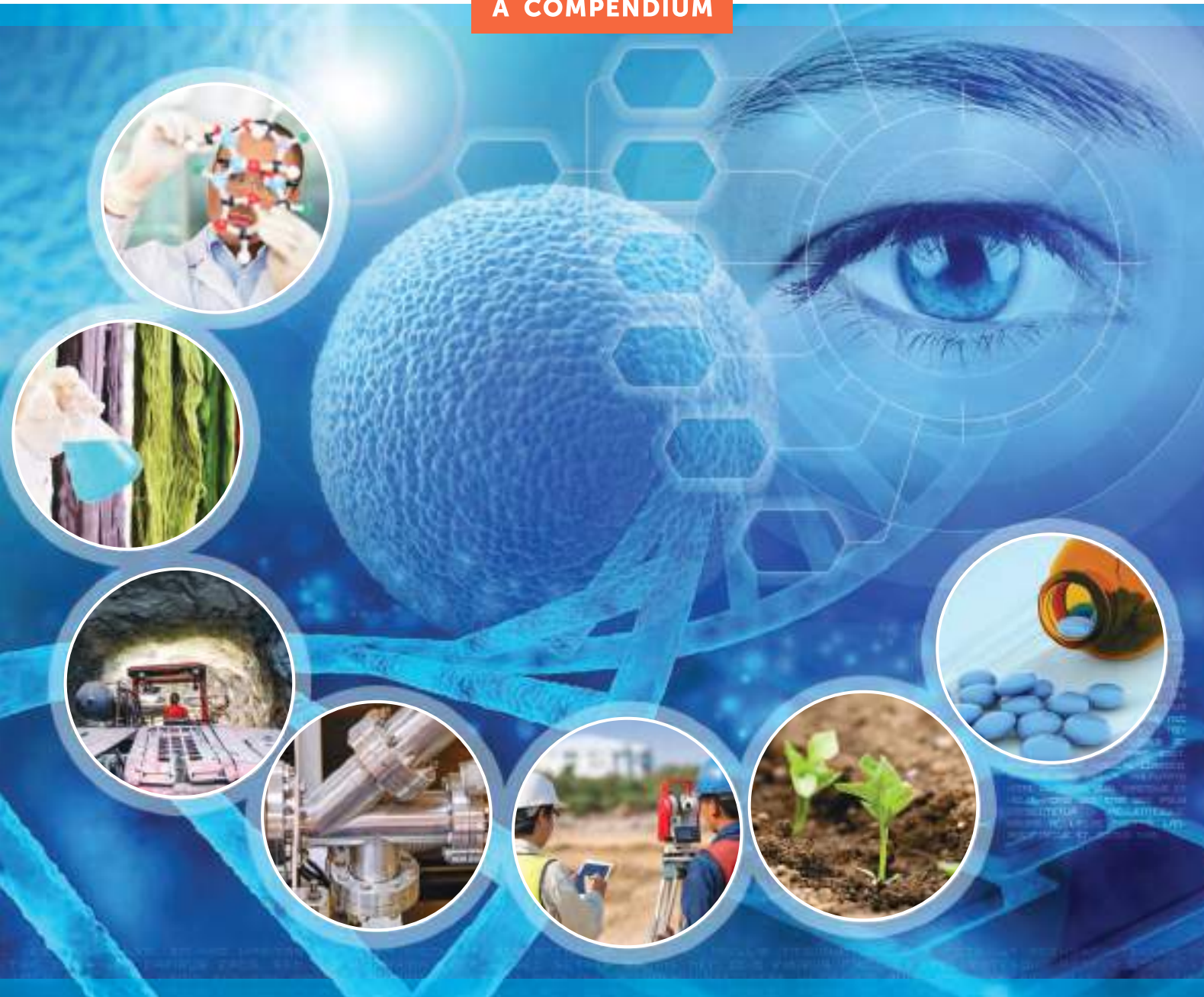
सत्यमेव जयते

Department of Scientific & Industrial Research (DSIR)
Ministry of Science and Technology, Government of India, New Delhi

JANUARY 2019

R&D PROFILE OF SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATIONS (SIROs)

A COMPENDIUM



VOLUME 1



Department of Scientific & Industrial Research (DSIR)
Ministry of Science and Technology, Government of India

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 विज्ञान और प्रौद्योगिकी मंत्रालय
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Foreword

It gives me immense pleasure to note that Department of Scientific & Industrial Research (DSIR) is supporting R&D activities of Scientific and Industrial Research Organizations (SIROs) in the areas of Natural and Applied Sciences, Medical Sciences, Agricultural Sciences and Social Sciences. The prime objective of SIROs is to catalyze S&T based interventions, for inclusive growth in the country.


SIROs are the S&T driven organizations present Pan-India. Over the years, a strong S&T infrastructure of SIROs has been created in the country covering chain of National laboratories, Institutes, Specialized R&D centers which continuously provide expertise, technically trained manpower, and technological support to both the Industry and Society.

The present study report and compendium is an effort to share the research highlights of DSIR recognized SIROs with scientific community.

I hope that this document would facilitate knowledge networking and gainful use of science and technology in addressing societal challenges.

I am glad to know that this publication also reflects the contributions made by SIROs towards National missions such as Make in India, Skill India, Clean India, Digital India, etc.

I wish SIROs grow leaps and bounds and wish them success in their endeavours.


 [Shekhar C. Mande]

New Delhi

PREFACE

DSIR recognition is the flagship programme and the only scheme in the Government system for accreditation/ benchmarking the R&D activities & infrastructure of not-for-profit sector known as Scientific and Industrial Research Organizations (SIROs). SIROs recognized by DSIR includes Industry Associations, academic institutions, R&D laboratories, Government entities, Technology Parks, and Universities/Colleges.

SIROs have been contributing immensely in the area of scientific and industrial research, design and development of indigenous technology to achieve technological self-reliance and minimize foreign inputs.

At present, there are 648 SIROs duly recognised by DSIR; of these, 270 are in the area of natural and applied sciences, 256 are in the area of medical sciences, 40 are in the area of agricultural sciences and 82 are in the area of social sciences.

DSIR has earlier published the compendium of SIROs highlighting their profiles in the year 1990. The compendium acted as a valuable reference source to various stakeholders, allowing free exchange of ideas and thoughts. The need was felt to build a deeper understanding of SIROs and conduct a detailed study on the significance and achievements of the Research programs/activities, R&D infrastructure, R&D achievements/S&T Interventions, Industrial linkages and collaborations of DSIR recognized SIROs, in different sector areas. As a result, this in-house study on SIRO scheme was initiated.

The output of the present study has been compiled in two parts: (i) Study Report on SIROs (ii) Compendium of R&D Profile of SIROs published in Two Volumes.

The study report represents the salient features of SIROs such as their zonal distribution, sharing of R&D infrastructure, R&D expenditure trends, analysis of Research projects, publications, patents & technologies developed/commercialized, etc. represented in the graphical format.

The two volumes of compendia showcase the case studies on SIROs, exhibiting a brief on their research areas & projects, R&D expenditure, R&D infrastructure including R&D personnel & equipment, technical collaborations & research achievements, etc. Efforts have also been made to showcase the R&D achievements of SIROs and disseminate their technologies across the country.

The main feature of the study is that it highlights the contributions of SIROs in various National Missions initiated by Government of India. It is hoped that this study would be a source of motivation & inspiration to other NGOs performing R&D to acquire S&T capability & obtain SIRO recognition.

DSIR is thankful to all SIROs and TERI, without whose support this study would not have been possible. I also appreciate the expert members of the Advisory Committee providing useful insights in this report.

DSIR welcomes comments/suggestions on the report.

Dr. S.K. Deshpande

Scientist-G & Head-RDI

DSIR

EXECUTIVE SUMMARY

Department of Scientific & Industrial research (DSIR) had launched a scheme of granting recognitions to non-government, not-for profit organizations as Scientific and Industrial Research Organisations (SIROs) in 1988. The key objective of this scheme is to promote their activities in the area of scientific and industrial research, design and development of indigenous technology to achieve technological self-reliance and minimize foreign inputs. The SIROs are the S&T driven organizations present Pan-India. Presently, there are 648 SIROs recognized by DSIR; of these 270 are in the area of Natural and Applied sciences, 256 are in area of Medical sciences, about 40 are in the area of Agricultural sciences and about 82 are in the area of Social sciences.

The key benefits derived from the scheme are:

- (i) It is the only scheme in the entire Government system for accreditation/ benchmarking the R&D activities & infrastructure of non-commercial sector in India.
- (ii) The SIROs recognised by DSIR are eligible for customs duty exemption and GST waiver under notification nos. 51/96-customs dated 23.07.1996; no. 24/2007-customs dated 01.03.2007; no. 43/2017-customs dated 30.06.2017; no. 45/2017-central tax (rate) & 47/2017-integrated tax (rate) dated 14.11.2017; no. 9/2018-central tax (rate), no. 09/2018-union territory tax (rate) & no. 10/2018-integrated tax (rate) dated 25.01.2018; and state tax (rate) as applicable and all notification, as amended from time to time.
- (iii) DSIR recognition makes them eligible for receiving funds for R&D from other government departments and agencies such as DST, DBT, ICMR, ICAR, etc. where recognition to the R&D centre by DSIR is a requirement.
- (iv) The SIRO recognition scheme emanates from the section 35(1)(ii)/(iii) of income tax Act, 1961, and hence attract funding for research for national and international projects. Organizations recognized as SIROs may further be entitled for notifying under section 35(1)(ii)/(iii) of income tax Act, 1961, wherein exemptions to the donor are given on funds donated for pursuing research activities.
- (v) Since the organizations recognized as SIROs are not for profit, any earnings made out by fees, products, technologies transferred, etc. is ploughed back to the organization for further research.
- (vi) The SIROs are also eligible for any other fiscal incentives announced by Government of India from time to time.

DSIR had earlier published the compendium of SIROs highlighting their profiles in the year 1990. The compendium acted as a valuable reference source to various stakeholders, allowing free exchange of ideas and thoughts. The need was felt to conduct a detailed study on the significance and achievements of the Research programs/activities, R&D infrastructure, R&D achievements/S&T Interventions, Industrial linkages and collaborations of DSIR recognized SIROs, in different sector areas.

The task of collecting, compiling, analysing & publishing the Report cum compendia was outsourced by DSIR to Tata Energy Research Institute (TERI), New Delhi. The target groups for data collection were the R&D institutes and organizations, Heads of departments of universities and Institutes recognized as SIROs. A questionnaire comprising of 19 points was designed for each of the 04 sectors and circulated to all SIROs recognized by DSIR through both offline and online mode (Annexure 1 & 2).

Regular follow-up with the institutes and organization were done to collect the data in right format. After rigorous follow-ups, the response from 595 SIROs was received; of these 251 are in the area of natural and applied sciences, 233 are in area of medical sciences, 37 are in the area of agricultural sciences and 74 are in the area of social sciences.

All information received from SIROs within stipulated time was collated and an attempt was made to measure the R&D performance and outcome of SIROs. The information was designed into case studies showcasing their research areas & projects, R&D expenditure, R&D infrastructure including R&D personnel & equipment, research achievements along with the societal or national relevance and technical collaborations, etc.

The output of the study has been compiled in two parts: (i) Study Report on SIROs (ii) Compendium of R&D Profile of SIROs published in Two Volumes.

The Study report has been compiled in three chapters. Chapter 1 gives a brief introduction about DSIR & the SIRO recognition scheme. It also gives the main highlights of the outcomes from the study. Chapter 2 deals with the objectives of the study, framework adopted, data sources, collection & data analysis highlighting the key parameters. Chapter 3 presents the Key Findings which includes the analysis on organization type, regional distribution, data on the research personnel engaged in SIROs, equipment/facilities available with SIROs and its usage, R&D expenditure trends, Knowledge creation which includes analysis of Research projects, publications, patents & technologies developed/commercialized, Knowledge transfer including details on collaborations: industrial & institutional. Many SIROs have not mentioned their R&D expenditure (also evident from R&D profiles in compendium) and hence could not include in the R&D expenditure figures.

The report contains the R&D Indicators Graphs on the following themes:

- Organizational structure
- Zonal/Regional Distribution (Subject-wise & state-wise)
- R&D manpower analysis
- SIROs research facilities user distribution
- R&D expenditure trends
- Research areas
- Research publications (National/International)
- Patents (Indian, Foreign; Filed/Granted)
- Technologies Transferred/Commercialized
- Knowledge exchange/transfer
- Collaborations- National & International; Industrial & Institutional
- Societal Relevance

SIROs are community based organizations who have linked themselves to national missions with specific mandates for carrying out societal action oriented research programmes. This publication also reflects the gainful use of science and technology for addressal of society challenges. Government of India is keen to use science and technology for national development and societal transformation. National missions such as Make in India, Skill India, Clean India, Digital India, etc. have been identified to be among nation's priorities for driving the manufacturing domain and creating appropriate skill sets among unemployed youth. The section on societal relevance has been particularly included to showcase their contributions towards National missions. Efforts have been made to present the data in the context which is relevant in today's scenario making it interesting and of practical use to diverse categories of audience and all the stake holders.

The Compendium of R&D Profile of SIROs has been brought out in two volumes: Volume I gives details of SIROs in the area of natural and applied sciences and agricultural sciences & Volume II would focusses on Medical Sciences & Social sciences area. The R&D profiles in this book show SIROs which could be Industry Associations or academic institutions or R&D laboratories or Government entities or Technology Parks or Universities/Colleges, and have registered themselves as a Trust or a Society or a Section 8 Company as per Company's Act 2013. Some important information pertaining to the Research strengths & Outcomes have been packaged briefly and presented as a box item.

SIROs are committed, qualified & self-motivated organizations working having centers of excellence in frontier areas such as textiles, wool, silk, sugar, rubber, pharmaceuticals, chemicals, renewable energy, electronics, metallurgy, automotives, gems, etc. They have created impressive infrastructural facilities for R&D including sophisticated testing facilities and laboratory equipment. Some SIROs have intended to inculcate scientific temper & create awareness, especially in the young minds. They have developed several indigenous products which are import substitutes. SIROs especially NGOs have been focussing towards sustainable development and transferred technologies to industries and/or to the society. Now, scientists and technologists have been ignited to work on societal problems/concerns through integrating science, technology and innovation. SIROs

have been trying to address the societal challenges and over a period of time have developed technological solutions across several sectors, for societal benefits.

Majority of SIROs recognized by DSIR are self-sustaining organizations which do not get grants for operation & maintenance & salary from Government. Increased private investment is necessary for translating R&D outcomes into commercial products. In India, private sector investments into R&D are significantly lower than those in developed and other emerging economies.

TERI collected data from all the SIROs and the profiles are developed based on the inputs received from the responding organizations and it is presumed that the information submitted by them is complete. Nonetheless, it is hoped that the study report & compendium would highlight the tangible outcomes, research infrastructure, patents, publications, technologies, collaborations and linkages, in different sector areas and be a useful source of information to scientists, technologists, implementing institutions, funding agencies & policy makers. This publication is also a collection of several new and different technologies which have been emerged from the work done by SIROs in the past 3 to 5 years.

We have attempted to capture and showcase the dynamism in SIROs recognised by DSIR through a detailed analysis highlighting their research infrastructure, R&D projects & research achievements. This will help us identify the areas of strengths and gaps and provide a direction to find solutions. The compendium of SIROs is a repository of information that would help in dissemination of knowledge, explore new opportunities and also encourage the R&D people associated with these SIROs. In addition, the compendia would provide useful information regarding the industrial research going on in the country by non-commercial sector and the kind of research infrastructure available. The compendia would also highlight the collaborations and linkages among SIROs and those with industries, Universities, National labs, etc and enable positive connections.

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LIST OF ABBREVIATIONS

AAS	Atomic Absorption Spectroscopy
ABGVS	Akhil Bhartiya Grameen Vikas Sanstha
ABI	Aditya Birla Insulators
ABSTC	Aditya Birla Science and Technology Company
ACIRD	Avantha Centre for Industrial Research & Development
ACS	American Chemical Society
AcSIR	Academy of Scientific and Innovative Research
AD	Alzheimer's Disease
ADA	Aeronautical Development Agency
AERF	Associated Electronics Research Foundation
AFLS	Advanced Front Lighting System
AFM	Atomic Force Microscope
AG-E	Aerogel Electrodes
AGEI	Aditya Group of Educational Institutions
AGSC	Aerogel Supercapacitor
AHRF	Asthagiri Herbal Research Foundation
AI	Artificial Inseminations
AI	Artificial Intelligence
AICRP	All India Coordinated Research Projects
AICTE	All India Council for Technical Education
AIDS	Acquired Immuno Deficiency Syndrome
AIIMS	All India Institute of Medical Sciences
AIMSCS	C R Rao Advanced Institute of Mathematics , Statistics and Computer Science
AKPS	Annapurna Krishi Prasar Seva
AMEF	Admar Mutt Education Foundation
AMS	Advanced Measurement Stations
APIs	Active Pharmaceutical Ingredients
APSSDC	AP State Skill Development Programme
ARAI	Automotive Research Association of India
ARCI	Advanced Research Centre for Powder Metallurgy and New Materials
ARF	Ayurved Research Foundation
ARL	Advanced Research Lab
ARM	Anhystertic Remnant Magnetization
ASDI	Agriculture Skill Development of India
ASPEE	ASPEE Agricultural Research and Development Foundation

ATIRA	Ahmedabad Textile Industry's Research Association
ATREE	Ashoka Trust for Research in Ecology and the Environment
BAG	Bannari Amman Group
BAIF	BAIF Development Research Foundation
BARC	Bhabha Atomic Research Centre
BBAU	Babasaheb Bhimrao Ambedkar University
BEE	Bureau of Energy Efficiency
BESCOM	Bangalore Electricity Supply Co Ltd
BFUHS	Baba Farid University of Health Sciences
BGCI	Botanical Gardens Conservation International
BHEL	Bharat Heavy Electricals Ltd.
BIDAAN	Big Data Analytics
BIRAC	Biotechnology Industry Research Assistance Council
BIS	Bureau of Indian Standards
BISS	Bengaluru Integrated System Solutions
BITS	Birla Institute of Technology and Science
BLDC	Brushless DC Motor
BNHS	Bombay Natural History Society
BNN	Bayesian neural Network
BOD	Biological Oxygen Demand
BPCL	Bharat Petroleum Corporation Limited
BRF	Bioscience Research Foundation
BRIT	Board of Radiation and Isotope Technology
BSRN	Baseline Surface Radiation Network
BTRA	Bombay Textile Research Association
BUET	Bangladesh University of Engineering and Technology
CAD	Computer Aided Design
CAMST	Centre for Advanced Materials Science and Technology
CARC	Central Advanced Research Centre
CARD	Centre for Advanced Research and Development
CBIP	Central Board of Irrigation and Power
CBR	California Bearing Ratio Test
CBRI	Central Building Research Institute
CCMB	Centre for Cellular & Molecular Biology
CCPD	Centre for Collaboration Product Development
CCRI	Central Coir Research Institute
CDAC	Centre for Development of Advance Computing
CDFD	Centre for DNA Fingerprinting and Diagnostics
CDGI	Centre for the Development of Glass Industry
C-DIT	Centre for Development of Imaging Technology
CDMA	Code Division Multiple Access

CECRI	Central Electro Chemical Research Institute
CEDAR	Centre for Ecology Development and Research
CEE	Centre for Environmental Education
CEMS	Continuous Emissions Monitoring Systems
CeNS	Centre for Nano and Soft Matter Sciences
CEPCI	The Cashew Export Promotion Council of India
CEWiT	Centre of Excellence in Wireless Technology
CFD	Centre for Entrepreneurship Development
CHEA	Central Himalayan Environment Association
CHRV	Centralized System for Heart Rate Variability
CHT	Centre for High Technology
CIBART	Centre for Indian Bamboo Resource & Technology
CIPET	Central Institute of Plastics Engineering and Technology
CIRT	Central Institute of Road Transport
C-Lab	Characterization Lab
C-MET	Centre for Materials for Electronics Technology
CMMC	Centre for Metal Matrix Composites
CMTI	Central Manufacturing Technology Institute
CNBCRD	Centre for Natural Biological Resources and Community Development
CNM	Carbon Nanomaterials
CO ₂	Carbon Dioxide
COEs	Centres for Excellence
CPCB	Central Pollution Control Board
CPCSEA	Committee for the Purpose of Control and Supervision of Experiments on Animals
CPRI	Central Power Research Institute
CRD	Centre for Research and Development
CRL	Central Research Lab
CRRI	Central Road Research Institute
CRZ	Coastal Regulation Zone
CS	Capsule Suspensions
CSC	Computer Sciences Corporation India Pvt. Ltd.
CSCP	Centre on Sustainable Consumption and Production
CSE	Centre for Science and Environment
CSERC	Chattisgarh Electricity Regulatory Commission
CSF	Cerebrospinal Fluids
CSIO	Central Scientific Instruments Organization
CSIR	Council of Scientific & Industrial Research
CSKHPKV	Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya
CSR	Corporate Social Responsibility
CSR	Consortium for Scientific Research
CSR	Auroville Centre for Scientific Research

CSST	Carmelite Sisters of St. Teresa
CST	Concentrated Solar Thermal
CSTEP	Centre for Study of Science Technology and Policy
CSW	Community for Social Works
CSWRI	Central Sheep and Wool Research Institute
CTC	Carbon Tetrachloride
CTD	Combinational Transmit Diversity
CTEVT	Council of Technical Education and Vocational Training
CTM	Compressive Strength Machine
CTPL	CSIR-Tech Pvt Ltd
CTTC	Central Tool Room and Training Centre
CVRCE	CV Raman Collee of Engineering
CWS	Centre for Wildlife Studies
CYP450	Cytochrome P450
DA	Development Alternatives
DAE	Department of Atomic Energy
DARE	Disha Academy of Research & Developoment
DART	Developmental and Reproduction Toxicity
DATE	Deep Packet Management Analysis Tuning Engine
DBT	Department of Biotechnology
DEI	Dayalbagh Educational Institute
DEISPI	Dynamic Education Information System for Planning and Improvement
DFCC	Digital Flight Control Computer
DIEV	Driving Information with Entertainment to Village
DIPP	Department of Industrial Policy and Promotion
DMLS	Direct Metal Laser Sintering
DMRL	Defence Metallurgical Research Laboratory
DNA	Deoxyribonucleic Acid
DOSK	Department of Sericulture, Government of Karnataka
DPSS	Diode Pumped Solid State
Dr BVR IPMT	Dr B V Rao Institute of Poultry Management
Dr.SACOE	Dr Sivanthi Aditanar College of Engineering of Aditanar Educational institution
DRDO	Defence Research and Development Organisation
DSI	Dayanand Sagar Institutions
DSS	Decision Support System
DST	Department of Science and Technology
DSTA	Deccan Sugar Technologists Association
EAC	Entrepreneurship Awareness Camp
ECG	Electrocardiography
ECPL	Eco Carbon Pvt. Ltd.
ECS	Environment Control System

ED XRF	Energy Dispensive X-ray Flourescence
EDBOE	Experimental Design Bureau of Oceanological Engineering
EDII	Entrepreneurship Development Centre
EEDI	Energy Efficiency Design Index
EGFR	Epidermal Growth Factor Receptor
ELISA	Enzyme Linked Immunosorbent Assay
ENSAD	Ecole Nationale Superieure Des Arts Decoratifs
EPAS	Electronic Power Assist Steering
EPF	Entomopathogenic Fungi
EPN	Infected Galleria Cadavers
EPTR	Environmental Protection Training and Research Institute
EQDC	Electronics and Quality Development Centre
ERDA	Electronic Research and Development Association
ERM	Electronic Reeling Machine
ERRC	Environmental Resources Research Centre
ESCA	Electron Spectroscopy for Chemical Analysis
ESCI	Engineering Staff College of India
ESSCI	Electronics Sector Skills Council of India
FAITHS	Foundation for Assessment and Integration of Traditional Health System
FARMER	Foundation for Agriculture Resources Management and Environmental Remediation
FBG	Fibre Bragg Grating
FCI	Food Corporation of India
FCRI	Fluid Control Research Institute
FDA	Food and Drug Administration
FE	Fatigue Analysis
FERAL	Foundation for Ecological Research, Advocacy and Learning
FESEM	Field Emission Scanning Electron Microscope
FIPPAT	Fredrick Institute of Plant Protection and Toxicology
FITT	Foundation for Innovation and Technology Transffer
FMC	Foundation for MSME Clusters
FPOs	Farmer Producer Organizations
FRAC	FICCI Research & Analysis Centre
FSM	Faecal Sludge Management
FTD	Forage Technology Demonstrations
FTIR	Fourier Transform Infrared Spectrometere
GBPNIHESD	GB Pant National Institute of Himalayan Environment & Sustainable Development
GCA	Graphics Cimpatible Adder
GCET	Geethanjali College of Engineering and Technology
GCMS	Gas Chromatograph Mass Spectrometere
GCMS-MS	Gas Chromatograph Mass Spectrometer
GEER	Gujarat Ecological Education and Research

GEF	Global Environment Facility
GEMI	Gujarat Environment Management Institute
GERMI	Gujarat Energy Research and Management Institute
GES	Gujart Ecology Society
GETCO	Gujarat Energy Transmission Co Ltd
GF AAS	Graphite Furnace Atomic Absorption Spectroscopy
GFSU	Gujarat Forensic Sciences University
GIAN	Gujarat Grassroots Innovations Augmentation Network
GIET	Gandhi Institute of Engineering and Technology
GII	Gemmological Institute of India
GIRDA	Gujarat Industrial Research and Development Agency
GIS	Geo Information System
GIT	Gandhi Institute for Technology
GITA	Gandhi Institute for Technology Advancement
GITAM	Gandhi Institute of Technology and Management
GIZ	Deutsche Gesellschaftfur Internationale Zusammenarbeit
GIZ	Gesellschaft Fur Internationale Zusammenarbeit
GLP	Good Laboratory Practice
GMRRF	G M Reddy Research Foundation
GNSS	Global Navigation Satellite Systems
GPS	Geographical Positioning System
GPS	Global Positioning Satellite
GRCP	Gokaraju Rangaraju College of Pharmacy
GRIET	Gokaraju Rangaraju Institute of Engineering and Technology
GSI	Geosynthesis Institute
GTIAF	Grassroots Technological Innovations Acquisition Fund
GTRE	Gas Turbine Research Establishment
GTTC	Government Tool Room and Training Centre
GUIDE	Gujarat Inatitute of Desert Ecology
HAPL	Haffkine Ajintha Pharmaceuticlas Limited
HASETRI	Hari Shankar Singhania Elastomer and Tyre Research Institute
HBV	Anti-hepatitis B Virus
HEMT	High Electron obility Transistor
HPCL	Hindustan Petroleum Corporation Ltd.
HPGRDC	Hindustan Petroleum Green Research and Development Centre
HPLC	High Pressure Liquid Chromatography
HPLC	High Performance Liquid Chromatography
HPTLC	High Pressure Thin Layer Chromatography
HPTLC	High-performance-thin-layer chromatography
HRI	Harish-Chandra Research Institute
HRL	Herbal Research Laboratory

HTC	Heat Transfer Coefficient
IACS	International Association of Classification Societies
IARE	Institute of Aeronautical Engineering
IARI	Indian Agriculture Research Institute
IBCS	Improved Biomass Cookstoves
ICAR	Indian Council of Agricultural Research
ICIMOD	International Centre for Integrated Mountain Development
ICP-OES	Inductively Coupled Plasma Optical Emission Spectrometer
ICP-OES	Inductive Coupled Plasma Spectrometer
ICT	Information and Communication Technology
ICUMSA	International Commission for Uniform Methods of Sugar Analysis
IDST	Institute of Defence Scientists and Technologists
IDTS	Innovative Driving Testing System
IEEMA	Indian Electrical and Electronics Manufacturers Association
IERSE	Institute of Environmental Research and Social Education
IESWM	Institute of Environmental Studies and Wetland Management
IETE	Institution of Electronics and Telecommunication Engineers
IGCAR	Indira Gandhi Centre for Atomic Research
IGS	International Geosynthetics Society
IGSTC	Indo-German Science & Technology Centre
IHRD	In-House R&D
IHT	Institute of Horticulture Technology
IIBA	International Institute of Business Analysis
IIBAT	International Institute of Biotechnology and Toxicology
IICHE	Indian Institute of Chemical Engineers
IICT	Indian Institute of Chemical Technology
IIDS	Interactive Information Dissemination System
IIFPT	Indian Institute of Food Processing Technology
IIFSR	Indian Institute of Farming System Research
IIG	Indian Institute of Geomagnetism
IIT-B	International Institute of Information Technology, Bangalore
IIMR	Indian Institute of Millet Research
IINRG	Indian Institute of Natural Resins and Gums
IIP	Indian Institute of Packaging
IISc	Indian Institute of Science
IISc Bangalore	Indian Institute of Science, Bangalore
IIT	Indian Institute of Technology
IIT B	Indian Institute of Technology, Bombay
IIT-D	Indian Institute of Technology, Delhi
IITM	Indian Institute of Technology Madras
IITs	Indian Institutes of Technology

IJIRA	Indian Jute Industries Reseach Association
IJIRA	Indian Jute Industries Reseach Association
IKGPTU	I K Gujral Punjab Technical University
ILBS	Institute of Liver and Biliary Science
ILO	International Labour Organization
IMEMS	Induction Motor Efficiency Monitoring System
IMPRINT	Impacting Research Innovation and Technology
IMR	Indian Monsoon Rainfall
INCOIS	Indian National Centre for Ocean Information Services
INFLIBNET	Information and Library Network Centre
INSA	Indian National Science Academy
INST	Institute of Nano Science & Technology
IOT	Internet of Things
IPFT	Institute of Pesticide Formulation Technology
IPIRTI	Indian Plywood Industries Research & Training Institute
IPS	Indian Planetary Society
IPS	Inverse Photo-emission Spectroscopy
IRCLASS	Indian Register Classification
IRMA	Immunoradiometric Assay
IRMRA	Indian Rubber Manufacturers' Research Association
IRS	Indian Register of Shipping
IS3	Integrated Security and Surveillance System
ISGF	India Smart Grid Forum
ISRO	Indian Space Research Organisation
ISSC	International Social Science Council
ISSPL	IR Class System and Solutions Private Limited
ITB	Institute of Tropical Biology
ITMA	Integrated Threat Management Appliances
IUCAA	Inter-University Centre for Astronomy and Astophysics
IUCN	International Union for the Conservation of Nature and Natural Resources
JASIC	Japan Automobile Standards Internationalization Center
JKLU	JK Lakshmipat University
JNCASR	Jawaharlal Nehru Centre for Advance Scientific Research
JNTU	Jawaharlal Nehru Technological University
JNU	Jawaharlal Nehru University
JPCL	Jubilant Pharmaceutical and Chemical Laboratory
JRF	Jai Research Foundation
KARE	Kalasalingam Academy of Research and Education
KBITS	Biotechnology and Information Technology Services
KET	Kelkar Education Trust
KHEL	Konceptogen Healthcare Pvt. Ltd.

KIAAR	K J Somaiya Institute of Applied Agricultural Research
KIIT	Kalinga Institute of Industrial Technology
KIIT-TBI	Kalinga Institute of Industrial Technology-Technology Business Incubator
KLIC	Kolleru Lake Information Centre
KNHPI	Kumarappa National Handmade Paper Institute
KREDL	Karnataka Renewable Energy Development Ltd
KSHIP	Karnataka State Highways Improvement Project
KSIT	Kamavari Sangha Institute of Technology
KSSRD	Karnataka State Sericulture Research and Development Institute
LCRD	Loyola Centre for Research and Development
LERC	LPG Equipment Research Centre
LIB	Lithium Ion Battery
LTC	Low Temperature Diesel Combustion
LTCC	Low Temperature Co-fired Ceramic
LTTD	Low Temperature thermal desalination
LVL	Laminated Veneer Lumber
m4agriNEI	Mobile-based Agro Advisory System for North-East India
MAFD	Magnetic Abrasive Finishing & Deburring Machine
MANTRA	Man-Made Textile Research Association
MAO	Micro Arc Oxidation
MAV	Micro Air Vehicle
MCGM	Municipal Corporation of Greater Mumbai
MCRC	Shri A M M Murugappa Chettiar Research Centre
MDF	Medium-density fibreboard
MeitY	Ministry of Electronics and Information Technology
MEMS	Micro Electro Mechanical Sensors
MFUFPCP	Multi-function Up-front Control Panel
MHM	Menstrual Hygiene Management
MLAsia	Media Lab Asia
MLR	MarriLaxman Reddy
MLR	Marri Educational Society
MMUT	Maharishi Markandeshwar University Trust
MNIT	Malaviya National Institute of Technology
MNRE	Ministry of New and Renewable Energy
MoEFCC	Ministry of Environment, Forest and Climate Change
MOF	Metal Organic Framework
MoPNG	Ministry of Petroleum & Natural Gas
MoU	Memorandum of Understanding
MPAES	Microwave Plasma Atomic Emission
MPBIFR	MP Birla Institute of Fundamental Research
MPEDA	Marine Products Export Development Authority

MPERC	Madhya Pradesh Electricity Regulatory Commission
MR	Mental retardation
MRP	Minor Research Project
MSME	Ministry of Micro, Small and Medium Enterprises
MSME	Micro, Small & Medium Enterprises
MSRUAS	M S Ramaiah University of Applied Sciences
NABARD	National Bank for Agriculture and Rural Development
NABET	National Accreditation Board for Education and Training
NABL	National Accreditation Board for Testing and Calibration Laboratories
NAFARI	National Agriculture and Food Analysis and Research Institute
NAL	National Aerospace Laboratories
NALCOs	National Aluminum Company
NASI	National Academy of Sciences, India
NASSCOM	National Association of Software and Services Companies
NATRiP	National Automotive Testing and R&D Infrastructure Project
NBIA	National Business Incubation Association
NCB	National Council for Cement and Building Materials
NCBS	National Centre for Biological Sciences
NCF	Nature Conservation Foundation
NCL	National Chemical Laboratory
NCOF	National Centre of Organic Farming
NCR	National Capital Region
NCSTC	National Council for Science and Technology Communications
NDRI	National Dairy Research Institute
NEERI	National Environmental Engineering Research Institute
NERCI	Nansen Environmental Research Centre India
NESREA	National Environmental Standards and Regulations Enforcement Agency
NFTDC	Non Ferrous Materials Technology Development Centre
NGCMA	National Good Laboratory Practice Compliance Monitoring Authority
NGO	Non-governmental Organization
NIAS	National Institute of Advanced Studies
NICER	National Institute of Cleanliness Education and Research
NICHE	Noorul Islam Centre for Higher Education
NICMAR	National Institute of Construction Management and Research
NID	National Institute of Design
NIF	National Innovation Foundation
NIL	National Institute of Technology
NINT	National Institute of Nanotechnology
NIOT	National Institute of Ocean Technology
NIPER	National Institute of Pharmaceutical Education & Research
NIST	National Institute of Science and Tehnology

NITRA	Northern india Textile Research Association
NIWE	National Institute of Wind Energy
NMEM	National Mission on Electric Mobility
NPAC	Nanoporous Activated Carbon
NPP	National Perspective Plan
NRC-IMI	Industrial Materials Institute of National Research Council of Canada
NRDC	National Research Development Corporation
NRV	Non-return Valves
NSDC	National Skill Development Corporation
NSTEDB	National Science and Technology Entrepreneurship Development Board
NTRF	National Tea Research Foundation
OAC	Open Architecture Computer
OCAC	Odisha Computer Application Centre
OEMs	Original Equipment Manufacturers
OHP	Overhead Projector Sheet
ON	Oil of Neem
ONGC	Oil and Natural Gas Corporation
OTG	On the Go
PBTI	Punjab Biotechnology Incubator
PCBs	Printed Circuit Boards
PDP	Project Definition Phase
PDPU	Pandit Deendyal Petroleum University
PERD	Pharmaceutical Education and Research Development
PFC	Power Finance Corporation
PGIMER	Postgraduate Institute of Medical Education & Research
PHFI	Public Health Foundation of India
PLA	Poly Lactic Acid
PlaPER	Plastic Pelletizer, Extruder and Recycler
PM	Particulate Matter
PMKVY	Pradhan Mantri Kaushal Vikas yojana
PM-YUVA	Pradhan Mantri Yuva Yojana
PPP	Public Private Partnership
PRIST	Ponnaiyah Ramajayam Institute of Science and Technology
PROVe	Polar Remotely Operable Vehicle
PSCST	Punjab State Council of Science & Technology
PSCST	Punjab State Council for Science and Technology
PSSC	Power Sector Skill Council
PSUs	Public Sector Undertakings
PT	Proficiency Testing
PU	Punjab University
PV	Photovoltaic

PXRD	Powder X-ray Diffractometer
PZT	Piezoelectric powder
QCI	Quality Council of India
QPM	Quality Protein Maize
QPs	Qualification Packs
R&D	Research and Development
RBEF	Ritnand Balved Education Foundation
RCAIS	Raman Centre for Applied and Interdisciplinary Sciences
RDM	Rear-deployment mechanics
RDSO	Research Designs and Standards Organization
RE	Renewable Energy
RECAPP	Regional Centre for Accelerator-based Particle Physics
RGSTC	Rajiv Gandhi Science and Technology Commission
RIA	Radioimmunoassay
RIO	Research and Interpretation Centre
RMIT	Royal Melbourne Institute of Technology
RoHS	Restriction of Hazardous Substances
ROTM	Radio on the Move
RRCAT	Raja Ramanna Centre for Avanced Technology
RRI	Raman Research Institute
RSDC	Rubber Skill Development Council
RSoP	Research Scheme on Power
RSPN	Royal Society for Protection of Nature
SAC-ISRO	Space Applications Centre-Indian Space Research Organization
SACON	Salim Ali Centre for Ornithology and Natural History
SAMEER	Society for Applied Microwave Electronics Engineering Research
SANSCO	Srinivaspura Aging, Neuro Senescence and COGnition
SAR	Synthetic Aperture Radar
SASMIRA	Synthetic & Art Silk Mills Research Association
SASTRA	Shanmugha Arts, Science, Technology & Research Academy
SBF	Simulated Body Fluid
SBI	State Bank of India
SC	Solar Scyle
SC-CO ₂	Supercritical Carbon Dioxide
SCGJ	Skill Council for Green Jobs
SCM	Soft Condensed Matter
SCR	Spatially Capture-Recapture
SEED	Society for Energy, Environment & Development
SEM	Scanning Electron Microscope
SERB	Science and Engineering Research Board
SETS	Society for Electronic Transactions and Security

SFTRRD	Science Foundation for Tribal and Rural Resource Development
SIC	Silicon Carbide
SID	Society for Innovation and Development
SIRM	Saturation Isothermal Remnant Magnetization
SiTarc	Scientific and Industrial Testing and Research Centre
SITRA	South India Textile Research Association
SOI	Silicon-on-Insulator
SPA	State Procurement Agencies
SPAs	State Procurement Agencies
SPI	Spent Pot Lining
SPRERI	Sardar Patel Renewable Energy Research Institute
SRI	Shriram Institute for Industrial Research
SRISTI	Society for Research and Initiatives for Sustainable Technologies and Institutions
SSSIHL	Sri Sathya Sai Institute of Higher Learning
STAI	Sugar Technologists Association of India
STARS	Self Triggering Accident Response System
STD	Sun Tracker Device
STGs	Small Tea Growers
STQC	Standardization Testing and Quality Certification
STRC	Space Technology Research Centre
SVPUA&T	Sardar Vallabhbhai Patel University of Agriculture and Technology
TANUVAS	Tamil Nadu Veterinary and Animal Sciences University
TCS	Tata Consultancy Services
TERI	The Energy and Resources Institute
TES	Tamper Evident Seal
TGA	Thermogravimetric Analyser
TIFAC	Technology Information Forecasting and Assessment Council
TIST	Toc H Institute of Science & Technology
TISTR	Thailand Institute of Scientific and Technological Research
TNEB	Tamil Nadu Electricity Board
TOC	Total Organic Carbon Analyzer
TPD	Temperature Programmed Desorption Analyzer
TRA	Tea Research Association
TRAs	Textile Research Associations
TREC-STEP	Tiruchirappalli Regional Engineering College - Science and Technology Entrepreneurs Park
TRIFED	Tribal Cooperative Marketing Development Federation of India Ltd
TSAMRC	Tata Steel Advanced Materials Research Centre
TSL	Tata Steel Limited
UAY	Uchhatar Avishkar Yojana
UBA	Unnat Bharat Abhiyan
UGC	University Grants Commission

ULBs	Urban Local Bodies
UNDP	United Nations Development Programme
UNEVOC	International Centre for Technical and Vocational Education and Training
UPCMM	Ultra Precision Coordinate Measuring Machine
USMEC	Udupi Shri Admar Mutt Education Council
USTM	University of Science & Technology, Meghalaya
UTM	Universal Testing Machine
UV-VIS	Ultra Violet Visible Spectroscopy
VAPT	Vulnerability Assessment and Penetration Testing
VARD	Value Addition Research & Development
VCE	Vardhaman College of Engineering
VECC	Variable Energy Cyclotron Centre
VISTAS	Vels Institute of Science, Technology and Advanced Studies
VLSI	Very-large-scale integration
VLSI	Very-large-scale integration
VSI	Vasantdada Sugar Institute
VSSC	Vikram Sarabhai Space Centre
VSSC-ISRO	Vikram Sarabhai Space Centre - Indian Space Research Organisation
VSTS	Visual Speech Training Software
WCG	Women Care Groups
WDC	World Data Centre for Geomagnetism
WET Centre	Water and Environment Technology Research Centre
X	Magnetic susceptibility
XRD	Powder X-ray Diffractometer
XRD	X-Ray Diffractometer
XRF	X-ray Fluorescence Spectrometer

SECTION
1

NATURAL & APPLIED SCIENCES



Department of Scientific & Industrial Research (DSIR)
Ministry of Science and Technology, Government of India, New Delhi



Research lab

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Recognition Status

File No.: 11/451/2005-TU-V
Initial Recognition: 2005
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 8
PGs & Graduates: 13

Research Areas

- Wildlife Species Research
- Ecosystem and Habitat Research
- Hydro-climatological & Hazard Research
- Socio-environmental Research
- Trans-boundary Research

AARANYAK

Brief Description

Aaranyak is a wildlife non-government organization based in Guwahati. It is a scientific, industrial research and frontline environmental organization of India. It works all over the eastern Himalayan region on nature conservation, natural resources management, climate change, disaster management, and livelihood enhancement of marginalized communities through research, education, and advocacy.

R&D Set-up

Aaranyak has the following research facilities for its research and development (R&D) activities:

- Wildlife Genetics Laboratory
- Geospatial Technology & Application Laboratory

Sources of income for R&D

Government and international funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 152.51

FY 2015-16 = 182.26

FY 2016-17 = 375.08

R&D Achievements

Processes developed

Rhino Genetics: DNA fingerprinting technology for individual identification of greater one-horned rhinos from dung and various other types of biological material.

Technical Collaborations

National

National Centre for Biological Sciences

(NCBS), Bengaluru; University of Science & Technology, Meghalaya (USTM); Bombay Natural History Society (BNHS); Karbi Anglong Autonomous Council; Freeland India Consultant Pvt. Ltd; Bodoland Territorial Council

International

The Royal Society for Protection of Nature (RSPN), Bhutan; International Centre for Integrated Mountain Development (ICIMOD), Nepal

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Wildlife DNA forensic analysis service and community-based flood early warning system to enhance the resilience of vulnerable communities.
- To secure community support in the conservation of biodiversity, Aaranyak has evolved pilot initiatives to support diversified livelihood options to strengthen the local economy. The strength of Aaranyak lies in integrating research and community-based activities into a coherent programme that generates knowledge and fosters innovation at the local and regional levels to achieve the true meaning of sustainable development in terms of biodiversity conservation. 🔍

Research Outcomes

- Papers published: 16
- Technologies transferred/commercialized: 1



▲ New multi-disciplinary oceanographic research vessel to undertake basin scale observations

Registered Office

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Initial Recognition: 2012
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 30
PGs & Graduates: 94

ACADEMY OF SCIENTIFIC AND INNOVATIVE RESEARCH

Brief Description

Established in 2011, through an Act of Parliament, as an 'institution of national importance' (interim operations initiated in June 2010), the Academy of Scientific and Innovative Research (AcSIR) has adopted the mandate to create and train some of the best of tomorrow's science and technology leaders through a combination of innovative and novel curricula, pedagogy, and evaluation. AcSIR focusses on imparting instruction and providing research opportunities in areas that are not routinely taught in regular academic universities in India.

R&D Set-up

The following are the research facilities provided by the organization:

- As per the provisions of the AcSIR Act, 2011, and MoU between the AcSIR and Council of Scientific and Industrial Research (CSIR), the infrastructure of CSIR is being used by students of AcSIR. Thereby, AcSIR has full and free access to the research infrastructure.
- The new multi-disciplinary oceanographic research vessel has capabilities to undertake basin scale observations and enable Indian oceanographers to take up studies not only in the seas around India, but also in any part of the Indian Ocean. It is aimed to serve as a stable platform allowing operation of sensible equipment and underway data acquisition.

Technical Collaborations

National

Public Health Foundation of India (PHFI), New Delhi; L V Prasad Eye Institute, Hyderabad, Telangana

International

University of California Advanced Solar Technologies Institute (UC Solar); Royal Melbourne Institute of Technology, Australia (RMIT)

Societal Relevance

The following R&D outcomes are of national/societal significance:

The objective of AcSIR is to disseminate advanced knowledge in science and technology, particularly in emerging inter-disciplinary and multi-disciplinary areas to create socially conscious and knowledgeable personnel. Keeping this in view, AcSIR has mandated that students aspiring to obtain a doctorate degree from the academy undertake a 6–8 weeks project concerned with societal/ rural issues under the CSIR-800 Programmes (4 credits). The aim of the societal programme is to bring aspiration of inclusive growth and improved quality of life through science and technology interventions that are socially and economically relevant.

The two major focus areas of the societal programme aim towards enhancing the income and improving quality of life of 800 million people of India. Some typical examples are as follows:

Research Areas

- Engineering Sciences
- Biological Sciences
- Chemical Sciences
- Physical Sciences
- Mathematical and Information Sciences

Research Outcomes

- Papers published: : 2,665
- Technologies transferred/
commercialized: 1

- Enhancing income of the downtrodden
- Value-added agriculture
- Waste to wealth
- Energy efficiency
- Improve quality of life
- Low cost housing
- Affordable health care
- Potable water supply
- Sustainable energy
- Means of protecting environment. 

ADAMAS INSTITUTE OF TECHNOLOGY

Brief Description

Adamas Institute of Technology was founded in 2008 under Sachis Kiron Roy Memorial Trust. The Institute imparts graduate and post graduate courses. The Institute's primary aim is to create an atmosphere where teaching and education will be totally integrated with the serious research endeavour.

R&D Set-up

The computer centre has excellent computing facilities which include latest technology-based computer systems, scanners, servers, multimedia kits, etc.

R&D Achievements

Major research projects undertaken by the organization:

- Directory for Semiconductor Chip Design
- Directory of Completed Indian Projects in Emerging Areas of Science & Technology
- Status of Ph.D degree holder in Science and Technology of West Bengal
- An empirical study on different fellowships for higher studies in basic sciences in India and comparison with other developed and developing countries

Societal Relevance

The following R&D outcomes are of national/societal significance:

They have organized several workshops/conferences and symposium such as:

- 'Celebrating Digital India Week' on July 7, 2015.
- National-level seminar on 'Mathematical Applications in Industry for Engineers' by Electrical Engineering and Mathematics departments on May 13, 2015.
- Successfully organized the 'Seminar on Big Data Analytics (BIDAAN - 2015)' by CSE and IT departments on April 24, 2015.
- Successfully organized 'Sambarthana-2015 on May 8, 2015.
- Seminar on 'Softskill & English' in February 2015.
- Initiated an awareness among students by celebrating "National Education Day" on November 11, 2014 and 'National Unity Day' on October 31, 2014
- Successfully organized the seminar on "Innovative projects and Entrepreneurship" in September 2014. [Q](#)

Registered Office

Adamas Institute of Technology,
Barasat - Barrackpore Road,
Barbaria, P.O. - Jagannathpur,
District - 24 Parganas (North),
Kolkata 700 126, West Bengal
T: 033 645 01430
E: ait@adamas.co.in
W: www.adamas.co.in

Recognition Status

File No.: 11/619/2013-TU V
Initial Recognition: 2013
Valid Until: March 31, 2017

R&D Manpower

Doctorates: 3
PGs & Graduates: 10

Research Areas

- Software development
- Semiconductor Chip Design
- Development of databases

Research Outcomes

- Papers published: 14



^ Servo controlled hydraulic actuator

ADHIYAMAAN EDUCATIONAL AND RESEARCH INSTITUTIONS

Brief Description

Adhiyamaan College of Engineering is one of the educational institutions developed by Adhiyamaan Educational and Research Institution, a trust, which was started in 1987–88. The objectives are to create sustainable teaching–learning process in all academic units that promote pedagogical innovations, to transform students by facilitating holistic personality development and sustenance of talent, to nurture higher commitment towards learning, research and creative thinking among students and faculty members. The organization holds developmental programs for furthering the pedagogic skills, research skills & industry, institute partnership activities.

R&D Set-up

Following are the research facilities provided by the organization:

- Servo-controlled hydraulic actuator
- Juno mapper
- Mobile GIS Unit
- DGPS R3 and R6
- Data acquisition system
- Dynamic signal analyser
- Pulse width modulator

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 24.20

FY 2015-16 = 72.69

FY 2016-17 = 50.11

R&D Achievements

The organization has numerous projects sponsored by UGC, DST etc. The institute has numerous start-up incubators and innovations such as: Warning systems; Sensor systems; Innovations have commercialization potential.

Major research projects undertaken by the organization:

- Development of Response evaluation System for RC frames with masonry infills under dynamic loading conditions.
- Detection of Excudated of retinal images using Neural Network clustering methods.
- Rare earth metals doped Zinc Oxide Nanocrystalline thin films and development of sensor devices for monitoring sewer gases.
- Investigation on treatment of pharmaceutical industrial waste water containing organic and inorganic pollutants by using various methods.
- Brackish water aquaculture promoting along coastal India using RS & GIS.

Technical Collaborations

National

Taneja Aerospace and Aviation Ltd, Hosur; Indian Institute of Science, Bengaluru; Raana Technologies, Hosur; Central Power Research Institute, Bengaluru; Hindustan Petroleum Corporation Ltd, Mumbai; Larson & Toubro, Chennai; Gabriel India

Registered Office

Adhiyamaan Educational and Research Institutions
MGRNagar, Krishnagiri District,
Hosur – 635109, Tamil Nadu
T: 04344-261020
E: principal@adhiyamaan.ac.in
W: www.adhiyamaan.ac.in

Recognition Status

File No.:11/709/2016-TU-V
Initial Recognition: 2016
Valid Until: March 31, 2019

R&D Manpower

PGs & Graduates: 8

Research Areas

- Soil Structure Interaction
- Structural Health Monitoring
- Ontology
- Natural Resources Management
- VLSI Design

Research Outcomes

- New crop variety developed: 1

Limited, Hosur ; Narayana Hrudayala, Bengaluru; Central Institute of Brackishwater Aquaculture, Chennai; Aatin Homes, Hosur.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- To augment agriculturists to control intensity of irrigation (agriculturists of locality)
- To spot critical areas for accident analysis (National Highway Authority of India)
- Development of village information services (decision-making system for local bodies)
- Development of control measures to avoid elephant havocs in the region (augment crop protection)
- Extending business incubation services to start ups for entrepreneurial sectors
- Development of response evaluation system of RC frames with masonry infills under dynamic loading conditions
- Development of response evaluation system to replicate soil structure interaction under dynamic loading condition. 



^ Faculty with students at engineering laboratory

ADITYA ACADEMY

Brief Description

Aditya Engineering College is part of Aditya Group of Educational Institutions (AGEI) which has been a premier promoter of quality education in the coastal districts of Andhra Pradesh for the past two decades. It majorly focuses on the research and development in the areas of glass ceramic system, image inpainting models, optical placement of capacitors and many more.

R&D Set-up

The following are the research facilities provided by the organization:

- Simulation laboratory with 45 systems
- Software MATLAB / XILINK/ AUTOCAD/IRONCAD/ EDGE CAM / ANSYS
- Siemens laboratories, CNC lab, automobile lab, air-conditioning lab, wiring lab, design lab worth ₹5 crore
- Separate R&D Cell with computing facility and space for research work

Sources of income for R&D

Self funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 40.09

FY 2015-16 = 43.12

FY 2016-17 = 45.78

R&D Achievements

Products developed

- Production of nutritional health drink from rice starch water by

Dr V Suryanarayana, Department of Chemistry, AEC

- Organic Fertilizer from solid waste by Dr V Suryanarayana, Department of Chemistry, AEC.

Processes developed

- A method for detection of degenerate structure in single degree of freedom planetary gear trains.
- Developed dual-annihilator filters of commutative BE algebras.
- Developed a method for analysis of multiple service fuzzy querying model using α -cuts.
- Developed a method for performance analysis of a matrix converter FED induction motor drive using fuzzy-based SVM Modelling.
- Developed p-laplace variational image inpainting model using Riesz fractional differential filter
- Developed a fractional order PI-based STATCOM and UPFC controllers to diminish sub-synchronous resonance.
- Developed a method for purification and identification of 20kDa protein from *Partheniumhysterophorus*.

Prototypes developed

- Developed prototype for hexacopter, funded by the Aditya Engineering College.
- Developed a tricycle at the cost of ₹3 lakh.
- Developed an all-terrain vehicle worth ₹9 lakh.
- Developed a hybrid vehicle worth ₹8.7 lakh.

Registered Office

Aditya Engineering College
Surampalem, East Godavari
District, Andhra Pradesh 533 437
T: 9866576662
E: principal@aec.edu.in
W: www.aec.edu.in

Recognition Status

File No.:11/643/2014-TU-V
Initial Recognition: 2014
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 14
PGs & Graduates: 48

Research Areas

- Glass Ceramic System
- Synthesis of Epi-cyclic Gear Trains
- Image in painting Models
- Performance Analysis of FACTs Devices
- Multiple Service Fuzzy Querying Model
- Optimal Placement of Capacitors and DGs.

Research Outcomes

- Papers published: 14

- Developed a zero-energy cooling chamber worth ₹1.5 lakh.
- Developed a prototype for digitalization of primary nutrients worth ₹0.2 lakh.

Technical Collaborations

National

Sunrise Star-up village, Visakhapatnam; Infosys Campus Connect Program, Karnataka; AP State Skill Development Corporation, Andhra Pradesh.

International

Microsoft Corporation for Ed-vantage Platinum Campus, Haryana; University of Iowa, USA

Societal Relevance

The following R&D outcomes are of national/societal significance:

Organization is involved in many national and societal missions. Diploma & B.Tech students are being trained by Siemens Lab under AP state skill development programme (APSSDC) schemes in following areas:

- Automobile laboratories
- Air-conditioning and refrigeration
- CNC laboratory
- Electrical welding lab. 🔍



^ Computerized universal testing machine

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Brief Description

The Aditya Institute of Technology and Management is a self-financing college and is registered under the Societies Registration Act, 1860. The institute currently offers undergraduate programmes in the disciplines of various undergraduate & postgraduate programmes in MBA, and six disciplines of M.Tech.

R&D Set-up

The research facilities and infrastructure available are as follows:

- R&D laboratories with state-of-the-art equipment are available
- Surveying: Total Station, Theodolite, Auto Level, Compass, GIS Workstation, GPS & Electrical Resistivity Meter
- Concrete Technology: Compressive Strength Machine (CTM) & Universal Testing Machine (UTM)
- Soil Testing: California Bearing Ratio Test (CBR Test), Shear Strength, Compaction & Atterberg limits
- Transportation Engineering: Impact Testing Machine, Crushing Value, Abrasion Testing Machine, Attrition
- Machine & Ductility Testing Machine
- Environmental Engineering: Water Analyzer
- Structural Design and Analysis Softwares: STADD Pro and AutoCAD

Sources of income for R&D

Government organizations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 23.20

FY 2015-16 = 34.29

FY 2016-17 = 18.04

R&D Achievements

Products developed

- Hybrid cycle with solar power, pedal power, and battery
- A panorama view of reinforcement details of building
- Construction of a single room with waste plastic water bottles
- Testing of earthquake resistance of a building
- Electrical Power Generation by Compressed Air
- Robotics Breakout
- Police Tracking System App
- Cure House www.curehouse.in
- Canvi 4X, Canvi 8X, www.runwaylabz.com
- Quadcopter (range 150–250 m)

Commercialization potential of products/processes developed

- 19 products commercialized

Technical Collaborations

National

NRSC, Hyderabad; Infosys – Campus Connect; Microsoft Incubation Centre; Wipro Mission 10X; EDC, New Delhi;

Registered Office

Aditya Institute of Technology and Management
K. Kotturu, Tekkali 532 201
Srikakulam, Andhra Pradesh
T: 9440195534, 08945 245666.
E: aditya_tekkali@yahoo.com
W: www.adityatekkali.edu.in

Recognition Status

File No.: 11/691/2016-TU-V
Initial Recognition: 2016
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 19
PGs & Graduates: 31

Research Areas

- Water Quality, GPS, GIS & RS
- New Trends in Construction
- Renewable Energy
- High Voltage Engineering
- IoT & Big Data
- Manufacturing/ Nano Manufacturing
- Signal-Image-Video Processing
- Control Systems & Power Electronics
- Materials
- Fuzzy Logic

Research Outcomes

- Papers published: 408
- Technologies transferred/commercialized: 14

Siemens Industry Software India Pvt. Ltd; Ramtech Industries, Hyderabad; IIIT-Hyderabad; Sravan Shipping Services Pvt. Ltd, Visakhapatnam Internshala; Micro, Small & Medium Enterprises (MSME), New Delhi; National Remote Sensing Centre, Hyderabad; TATA Consultancy Ltd, Mumbai; Hindustan Shipyard, Visakhapatnam; Engineering Staff College of India (ESCI), Hyderabad; Sir M V Institute of Engineering Skills, Bengaluru.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The idea of a Smart Village Revolution has been explored earlier as well, it was launched in 2016. The proposal of "Smart Village Revolution" aims to involve students more directly in the development of smart villages.
- Prevent distress migration from rural to urban areas, which is

a common phenomenon in India's villages due to lack of opportunities and facilities that guarantee a decent standard of living.

- Make the smart village a "hub" that could attract resources for the development of other villages in its vicinity.
- Provide easier, faster, and cheaper access to urban markets for agricultural produce or other marketable commodities produced in such villages.
- Contribute towards social empowerment by engaging all sections of the community in the task of village development.
- Create and sustain a culture of cooperative living for inclusive and rapid development.
- Organized Digital Financial Literacy Campaign.
- Organized an awareness programmes on Swachh Bharat in rural villages. 🔍



Research laboratory

ADMAR MUTT EDUCATION FOUNDATION

Brief Description

Admar Mutt Education Foundation (AMEF) is a science education establishment under the Udupi Shri Admar Mutt Education Council (USAMEC) which is a society registered under the Karnataka Societies Registration Act, 1960. The USAMEC supports and maintains educational institutions for imparting value-based education from kindergarten to postgraduation. These Institutions are located in Admar, Udupi, Padubidiri, Bengaluru, Belur, Aldur, Sangameshwarapet, and Bhadravathi in Karnataka, Mumbai, and New Delhi. The disciplines, apart from general schooling, include Science, Philosophy, Commerce, Management, Technology, etc.

R&D Set-up

The facility consists of several equipments such as:

- Atomic Absorption Spectroscopy (AAS)
- Fourier Transform Infrared Spectroscopy (FTIR)
- Ultra Violet Visible Spectroscopy (UV-VIS)
- Cold centrifuge
- Powder X-ray Diffractometer (PXRD)
- Temperature Programmed Desorption Analyzer (TPD)
- NH- 2L Kneader, F-26 Extruder, DGM Abrasion tester
- Crush strength tester
- Pervaporation unit
- Fluorescence spectrophotometer
- Type-1 Water Ice-Flaker Cold-room

- Purification System
- Sonicator
- Eppendorf Biospectrometer
- Photocatalytic Reactor, Distillation Unit

Sources of income for R&D

- Government sources, corporates

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 219.81

FY 2015-16 = 288.30

FY 2016-17 = 301.02

R&D Achievements

Products developed

- A novel catalyst and process was developed for toluene alkylation with methanol to selectively produce para-xylene. GTC Technology Inc, USA, announced the developed technology as GT-ToAlk Technology which appeared in scientific journals.
- A novel non-noble metal based zeolite catalyst was developed for aromatization of light naphtha in collaboration with the HPCL R&D Centre. A PCT patent was filed by HPCL wherein the PPISR scientists are co-inventors.

Technical Collaborations

National

Shell Technology Centre, Bengaluru; Hindustan Petroleum Green Research and Development Centre (HPGRDC); Indian Institute of Science, Bengaluru; JNCASR, Bengaluru; IIT-Ropar, Punjab;

Registered Office

Admar Mutt Education Foundation, No. 4, 16th Cross, Sadashivanagar, Bengaluru 560 080 Karnataka
T: 9008026887
E: abhalgeri@gmail.com
W: ppisr.res.in

Recognition Status

File No.: 11/389/2000-TU-V
Initial Recognition: 2000
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 21

Research Areas

- Astronomy and astrophysics
- Mesoporous Polymers
- X-ray crystallographic studies
- Nanoscience
- Quantum mechanics

Research Outcomes

- Papers published: 65
- IPRs held
 - » Patents filed: 2
 - » Patents awarded: 2

CSIR-National Chemical Laboratory,
Pune

International

Thermax Industries, Pune, CHP
Technology LLC, USA; GTC Technology
Inc, USA; University for Moncton,

Moncton, Canada; ORNL, USA,
Elettra, Trieste, Italy, UCL, London,
Taiwan; Physics Department of
Karlsruhe University. 🔍



^ Main airframe static test

AERONAUTICAL DEVELOPMENT AGENCY

Brief Description

Aeronautical Development Agency (ADA) is a society under the Department of Defence Research and Development, Ministry of Defence, Government of India to undertake, aid, promote, guide, manage, co-ordinate and execute research in aeronautical science, design and development of various types of aircraft and rotorcraft. As the first task, the ADA was entrusted with the design and development of a Multi-role Light Combat Aircraft (LCA) to meet the requirements of Indian Air Force. While progressing the task of LCA development, ADA has also been assigned the task of studies for the Project definition Phase (PDP) of the naval variant of LCA, exploitation of resources created in the LCA programme for earning revenue.

R&D Set-up

The following are the research facilities provided by the ADA:

- CAD / CAM
- Avionics rig
- Aerodynamics and performance
- Integrated flight control system
- Airframe
- Propulsion systems
- Avionics and weapon system
- Independent verification and validation
- Quality assurance and system effectiveness
- Product support
- Flight testing
- Telemetry

Sources of income for R&D

- Grants-in-aid from Government of India

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 119,794.10

FY 2015-16 = 77,117.75

FY 2016-17 = 98,883.89

R&D Achievements

Products developed

ADA has developed various Aircraft systems and sub systems of Mechanical, Avionics and Flight Control Systems, various testing equipment and Ground Handling and Ground Support Equipment. Some of the systems developed include:

- Open architecture computer (OAC)
- Multi-function Up-front control panel (MFUFCP)
- Digital flight control computer (DFCC)
- Air data computer
- All types of filters
- Landing gear uplocks
- Different types of non-return valves (NRV)
- Flight and maintenance simulators
- Iron bird for actuators testing
- Integrated test rigs for avionics and environment control system (ECS)
- Flight data debrief and analysis software tool

Registered Office

Aeronautical Development Agency, PB No. 1718, Vimanapura Post, Bengaluru 560 017 Karnataka
T: 080 2508 7274
E: pandian@jetmail.ada.gov.in
W: www.ada.gov.in/

Recognition Status

File No.:11/43/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 45
PGs & Graduates: 378

Research Areas

- Research in aeronautical science
- Design and development of aircraft and rotorcraft
- Design & development of Light Combat Aircraft

Research Outcomes

- Papers published: 19
- IPRs held
 - » Design registrations: 3

Prototypes developed

- 22 LCA Aircraft (fighter and trainer) versions, covering technology demonstrator, proto vehicles, limited series production and series production

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Indigenization, indigenous technology is the primary objectives of the programme. Private participation and initiatives such as Make in India are also included in LCA Programme.
- Digital India has been implemented in ADA. Digitization, NEFT, RTGS, online transfer have been introduced in ADA.

- National Missions such as Swachh Bharat Abhiyan, Clean Energy, have been introduced in ADA.
- LCA (Tejas) will be utilized by IAF and IN
- Micro and smart materials technology developed under NPMAS programme have extensive societal applications, in addition to strategic applications. Primarily, the societal applications are in the area of bio-medical devices for diagnostics. Devices developed under this programme include micro-chip for cardiac monitoring and lipid profile monitoring, blood analyte monitoring devices, environment monitoring and uro-pathogen monitoring. 🔍



- ^ Wet labs, one lab each for Microbiology (bio pesticides and bio fertilizers), Tissue Culture, and Molecular Biology with modern equipments.

Research Outcomes

- Papers Published: 27
- Technologies Transferred/ Commercialized: 5
- New Crop Varieties Developed & registered: 1

Registered Office

Agri Biotech Foundation,
PJTS Agricultural University
Campus, Opposite ICAR-IIOR,
Rajendranagar, Hyderabad 500
030, Telangana

T: 040-29803417, 29807011

E: agribiotechfoundation@gmail.com

W: www.abfindia.org

Recognition Status

File No.: 11/599/2013-TU V

Initial Recognition: 2013

Valid Until: March 31, 2019

R&D Manpower

Doctorates: 9

PGs/Graduates: 6

AGRI BIOTECH FOUNDATION

Brief Description

Agri Biotech Foundation, established in 2007, is an autonomous academic institute engaged in research, extension (transfer of technology), human resource development, and public engagement. It is a registered society under the Andhra Pradesh Societies Act. It evolved on the basis of successful execution of a long-term research programme called Andhra Pradesh Netherlands Biotechnology Programme (APNLBP) funded by the Government of the Netherlands between 1995 and 2010. The Agri Biotech Foundation aims at promoting application of agri-biotechnologies for sustainable development.

R&D Set up

ABF has the following research facilities and infrastructure:

- Microbiology Lab
- Molecular Biology Labs (2)
- Tissue culture Labs (2)
- Biofertilizer production unit

Sources of income for R&D

- State and Central Governments

R&D expenditure (₹ in lakhs)

FY 2014-15 = 319.94

FY 2015-16 = 271.27

FY 2016-17 = 315.44

R&D Achievements

Products and Prototypes developed

- Products: Liquid Biofertilizers

- Prototypes: Protocol for berries

Revenue earned by way of licensing Products and Services

- Products: Rs 15.00 lakhs annually
- Services: Rs 4.00 lakhs annually

Technical Collaborations


National

ICAR Institutes; CSIR Lab, DBT-sponsored Institutes, Agricultural Universities; Private entrepreneurs

International

Wageningen University, The Netherlands; Nottingham University, United Kingdom; Parma University, Italy; National Institute for Agricultural Research (INRA), France

Societal Relevance

- The training programmes organized by the Institute are connected with the overall mandate and objectives of the Skill India Mission. The usage of bio-fertilizers and bio-pesticides reduces the cost of cultivation, besides promoting climate-resilient agriculture.
- Tissue culture plants ensure reduction in cost and uniformity. 

Research Areas

- Agriculture Biotechnology



^ Nanofiber coating plant and working

AHMEDABAD TEXTILE INDUSTRY'S RESEARCH ASSOCIATION

Brief Description

The Ahmedabad Textile Industry's Research Association (ATIRA) is an autonomous non-profit association for textile research & allied industries in India. Established on December 13, 1947, and started in 1949. ATIRA undertakes S&T activities, consultancy, training, testing, and dissemination to industry in spinning, weaving, chemical processing, machine design, textile chemistry, etc.

R&D Set-up

The research facilities and infrastructure are used for ATIRA's R&D activities:

- UTM 100kN
- UTM 400kN
- HDT&VSP
- Pendulum Impact
- Drop Impact
- Barcol
- Fatigue
- Toxicity Index
- NBS Smoke Den
- Glow Wire
- Immersed Scanning System
- High Voltage Tester

The facilities in ATIRA are extensively used by industry, businessmen, entrepreneurs, and students. Roughly, about 95% of the usage of facilities in ATIRA is for industrial purposes.

Sources of income for R&D

- Grants from Government agencies
- Testing Fees
- Project Funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 2,182.55

FY 2015-16 = 1,980.62

FY 2016-17 = 1,595.14

R&D Achievements

Products developed

- MT-51 Enhancement of Cotton Seed Oil Recovery Adopting German PEFT Technology
- MT-52 Indigenous Development of Automatic Multilayer Garment Cutting Machine
- MT-54 To Evolve Construction Related Design a well as Environmental Design Parameters for both Woven & Non-woven Geo-Synthetics
- MT-57 Textile Dyeing : An Effort Towards Sustainable and Cleaner , Eco-friendly Technology
- MT-58 Development of High Strength Core and Sheath ropes using Weaving Technology
- MT-61 Development of Extra Heavy Duty Industrial Belts/ Webbing as per the market requirement
- SMC manufacturing using jute as the major reinforcing fibre & compression moulding
- GG-37 Development of 3D Hollow Woven Preforms for Mobitech Application
- MT-56 Bio preparation Technology: Enhanced sustainability in cotton & cotton containing Textile Processing

Registered Office

Ahmedabad Textile Industry's Research Association (ATIRA)
P. O. Ambavadi Vistar
Ahmedabad 380 015, Gujarat
T: 079-26307921, 26307922
E: director@atira.in
W: www.atira.in

Recognition Status

File No.: 11/82/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 2
PGs & Graduates: 79

Research Areas

- Nano Science
- Polymer Composite

Research Outcomes

- IPRs held
 - » Patents filed: 4
- Technologies transferred/commercialized: 12

- MT-59 Development of protective textiles for protection against electromagnetic radiations

Technical Collaborations

National

Space Applications Centre, Ahmedabad; National Institute of Design (NID), Ahmedabad; ITC Ltd; Hexion; iCreate; EDII; CED; NTC; IITG

International


ITC, Germany; Manchester, United Kingdom; Diffenbacher, Germany

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The organization developed an affordable & more efficient nanofiber based face mask. It helps in restricting the spread of epidemic diseases like "Swine Flu".
- Water filter cartridge: As nanofiber based portable water filter

cartridges can filter water with nominal force, it is useful for the defence personnel as well as during the time of floods when there is unavailability of drinking water.

- Natural fibre-based composite: Use of jute and cotton as a reinforcement in composite helps the jute and cotton farmers to use renewable natural resources which maintain economic balance for the growth of the country.
- The organization offers the service for the entrepreneurs/start-ups/students who are willing to develop products based on:
 - » Nano Fibre
 - » Pultruded Composite Profile
 - » Composite-based on natural fibre like jute, cotton, coir, etc.
 - » Composite-based synthetic fibre like carbon, glass, aramid, etc.
 - » Braided Composite Products. 



ALADIPATTI VAITHIALINGA NADAR PATHIRAKALI AMMAL EDUCATIONAL AND CHARITABLE TRUST

Brief Description

Since the time of inception, the Einstein College of Engineering embarked on growth in terms of courses, intake, infrastructure, and facilities. Presently, the college offers 5 BE degree courses. The college also offers 6 ME courses in Engineering and Master of Business Management. About 15 km away from Tirunelveli towards the well-known court realm, the college is situated in Sir C V Raman Nagar. The college maintains a royal existence with its marvellous infrastructure and is widely acclaimed for its meticulous planning, resource scheduling, and institutional management.

It is a trust with registration number: 349/IV/2000 dated 26/04/2000.

R&D Set-up

The following infrastructure is available at the CSE Department:

- DRDO-sponsored research lab for Image Processing and Security
- CSC (Computer Sciences Corporation), Chennai sponsored research lab on Cloud Computing and Big Data Analytics
- Teezle Telematics India Pvt Ltd, Chennai sponsored lab on Internet of Things and Mobile Application Development

All the three research labs are utilized by students of the colleges for their project development; several industrial experts are invited in a periodical

manner to conduct various workshop and hands-on training programmes.

The labs are shared with other departments, such as Electronics and Communication Engineering & Electrical and Electronics Engineering faculty members and students for inter-departmental project development.

The following equipments are available at the ECE Department:

- CPLD development board and tools
- Transistor level SPICE modelling tool (Multisim)
- CADENCE UNIVERSITY BUNDLE (FE & BE)
- Home Security System (RIDE)
- TMS 320C506747 based DSP Trainer Kit

Sources of income for R&D

- Government Sources

R&D Expenditure (₹ in lakhs)

The SIRO is maintaining separate bank accounts for R&D.

FY 2014-15 = 1418000

FY 2015-16 = 4,78,000

FY 2016-17 = 4,52,000

R&D Achievements

Products developed

- Guiding Visually Challenged with In-built RFID Walking Stick
- Tracking College Buses Using GPS and GSM Technology

Registered Office

Aladipatti Vaithialinga Nadar Pathirakali Ammal Educational and Charitable Trust, Einstein College of Engineering, Sir C V Raman Nagar, Seetharpanalur, Tirunelveli 627 012
Tamil Nadu

Recognition Status

File No.: 11/673/2015-TU-V

Initial Recognition: 2015

Valid Until: March 31, 2018

R&D Manpower

Doctorates: 10

PGs & Graduates: 17

Research Areas

- Implementing image processing in various security-related applications
- Cloud Computing and Big Data Analytics
- Internet of Things and Mobile Application Development (Android and IOS)
- Synthesis of Contrast Agents for MR Imaging in Cancer Diagnosis

- Hexanuclear Ir (III) - Dy(III) and Ir(III) – Am(III) complex
- Hexanuclear Pt (III) – Am(III) and Pt(II) – Dy(III) complex
- An Innovative Approach for Women and Children's Security-based Location Tracking System
- Nonanuclear Ir (III) - Am(III) and Ir(III) – Dy(III) complex
- Nonanuclear Pt (II) – Am(III) and Pt(II) – Dy(III) complex

Technical Collaborations

- Computer Sciences Corporation, Chennai
- Teezle Telematics India Pvt Ltd, Chennai
- Valforma Technologies Pvt Ltd, Chennai

- Enercon (India) Ltd, Mumbai
- Huphen Fabricators Pvt Ltd, Nashik
- Tessolve, Chennai
- Gencor Pacific Auto Engineering Pvt Ltd, Chennai
- Transforma Pvt Ltd, Chennai
- Seshasayee Paper and Boards Ltd, Tirunelveli
- Smack Coders Technologies Pvt Ltd, Tirunelveli

Societal Relevance

Identifying Anomalies in Thermal Camera Images – A

Visual Cryptography Approach. A Security Related Product which can be implemented in military applications. 🔍



^ Confocal Microscope (AIMT)

AMITY UNIVERSITY

Brief Description

The Ritnand Balved Education Foundation (RBEF), a non-profit organization, registered under the Societies Act, 1861, is the umbrella body for all Amity Institutions. The RBEF focusses research in environmental toxicology, nanotechnology, renewable energy, biotechnology, etc.

R&D Set-up

The following research facilities provided by the organization are available to researchers from industry, academia, and individuals.

- Fluorescence microscope
- Temperature-controlled incubator
- FluorChem E system
- Vertical autoclave
- Electrochemical workstation
- Biospectrometer
- Nikon trinocular polarizing microscope
- Gas chromatograph
- Confocal microscope
- High performance liquid chromatograph

Sources of income for R&D

- Donations
- Grant-in-aid
- International funding

R&D expenditure (₹ in lakhs)

FY 2014-15 = 551.09
 FY 2015-16 = 625.15
 FY 2016-17 = 701.80

R&D Achievements

Products developed

- Optical heating element system
- An improved hydraulically actuated close die forging machine
- A polypropylene flap for ironed clothes
- Amorphous alumino silicates derived from fly ash as functional pigment for cool coatings
- A novel method of forming flexible multi-walled carbon nanotube foil
- A device for management and/or treatment of joint inflammation
- A novel electronic LPG cylinder weighing machine
- Portable prepaid energy metre with easy recharge interface

Processes developed

- A novel scalable bottom-up method for cost-effective and high-yield synthesis of doped carbon nanosheets
- An energy efficient approach for multimedia applications in mobile Ad-hoc using variable range transmission
- A novel oral formulation for cancer therapy, loaded in a slow release matrix for targeted delivery
- Herbal nanoparticle based targeted drug delivery for alcohol intoxication

Registered Office

Amity University
 Sector 125, Gautam Budh Nagar,
 Noida 201303, Uttar Pradesh
 T: 0120 2445252
 E: principal@aiss.amity.edu
 W: www.amity.edu

Recognition Status

File No.: 11/450/2005-TU-V
 Initial Recognition: 2005
 Valid Until: March 31, 2020

R&D Manpower

Doctorates: 1550
 PGs & Graduates: 943

Research Areas

- Biotechnology and allied areas
- Nanotechnology and allied areas
- Renewable and alternative energy
- Bio control and plant disease management
- Environmental toxicology
- Spintronic materials
- Social science, Anthropology

Research Outcomes

- Papers published: : 6,441
- IPRs held
 - » Patents filed: 870
 - » Patents awarded: 866
 - » Copyright: 16

Revenue earned by way of licensing products/processes/ prototypes

By commercializing total 9 products, RBEF generated a revenue of ₹13,700,000

Technical Collaborations

National

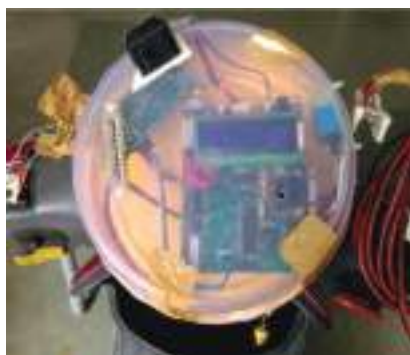
National Institute for Materials Science; Institute of Liver and Biliary Science (ILBS); Rajiv Gandhi Cancer Institute and Research Center; Central Pulp and Paper Research Institute; Indian Council of Agricultural Research; Indian Council of Medical Research

International

Kyoto University, Japan; Moscow Institute of Physics and Technology, Russia; York University, USA; National Institute for Material Science, Tsukuba, Japan; Western Carolina University, USA

Societal Relevance

Amity Skills provides end-to-end solutions by offering skills building programmes by partnering with various state and central governmental departments. 🔍



^ Design of atomized inspection vehicle for RTO

ANKUSH SHIKSHAN SANSTHA

Brief Description

Ankush Shikshan Sanstha is a registered society and was established in 2008. The institute offers courses in engineering disciplines that cater to the need of the contemporary market in terms of the public and private sectors.

R&D Set-up

The research facilities and infrastructure available at the institute comprises of following:

- Development of Dye Sensitized Solar Cells 1.IV Curve Analyzer System (Model No.PECK2401-N2)
- Solar Simulator (Model No.PEC-L01)
- Advanced Fiber Optic Communication Lab
- Elastically coupled beam apparatus
- Horizontal Shake Table
- Spectrum Analyzer (1KHZ-3GHZ)

Sources of income for R&D

Grants

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 52.20

FY 2015-16 = 77.71

FY 2016-17 = 24.70

R&D Achievements

Products developed

- Manually Operated Sprayer cum Herbicide Applicator
- Foot-operated pesticide sprayer

- Design and development of garlic peeler machine
- Foot Wearable device for Diabetic person
- Dynamic spectrum sensing and shearing module
- Automatic Fire Extinguishing System
- Multilingual Number Image Interpreter
- Digital eye

Processes developed

- Efficient Biometric Security System for SIM card Allotment
- Web System Framework and Methodology for Making Personalized e-learning
- A clamping system of a wear plate welding machine
- Design & development of brake test rig for the all disk brake operated vehicles
- Assistive Technique of Mouse Controlled Desktop Navigation for Visually Impaired
- Invisible character display using polarization of light mechanism in ATM and customizing security
- Kinetogenic unconventional skyablaze
- Automatic Live Score Updation Using Image Processing
- Configurable Secondary User Network Digital Terminal Equipment
- Implementation of Multimode Interactive device using Electro-oculography

Registered Office

Ankush Shikshan Sanstha
CRPF Gate No. 3, Hingna Road,
Digdoh Hills, Nagpur 440 016
Maharashtra
T: 9921008657, 9921008612
E: santosh.jaju@raisoni.net

Recognition Status

File No. : 11/574/2012-TU V
Initial Recognition: 2012
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 19

Research Areas

- Electrical Engineering
- Mechanical Engineering
- Civil Engineering
- Environmental Engineering

Research Outcomes

- Papers published: 21
- IPRs held
 - » Patents filed: 25
- Technologies transferred/commercialized: 4

- Secured Computerized Voting System


Commercialization potential of products/processes developed

Dedicated efforts in the direction to commercialize and implement the following technologies are underway:

- Design and modelling of vermicompost sieving machine
- Design and fabrication of lemon juice making apparatus
- Design and development of garlic peeler machine
- Tree Transplanter for Agricultural/Nursery Implementation

Societal Relevance

Projects undertaken as part of the Clean India or Digital India Mission are as follows:

- Method for efficient regeneration of potential energy of waste—water in high rise buildings
- Design and Fabrication of Road Dedusting System for Four Wheelers
- Efficient Biometric Security System for SIM card Allotment
- Secured Computerized Voting System
- GSM-based Bank Locker Security System
- Water Quality Monitoring System using IoT
- Automatic Challan System. 



^ Vembanad Community Conservation Centre

Registered Office

Ashoka Trust for Research in Ecology and the Environment (ATREE), Royal Enclave, Srirampura, Jakkur Post, Bengaluru 560064, Karnataka
 T: +91-80-23635555 (EPABX)
 E: info@atree.org
 W: www.atree.org

Recognition Status

File No.: 11/407/2001-TU-V
 Initial Recognition: 2001
 Valid Until: March 31, 2019

R&D Manpower

Doctorates: 30
 PGs & Graduates: 94

Research Areas

- Biodiversity
- Landscapes
- Ecosystems monitoring and conservation
- Forest governance
- Hydrology
- Water access and quality
- Waste management and climate change

ASHOKA TRUST FOR RESEARCH IN ECOLOGY AND THE ENVIRONMENT

Brief Description

Ashoka Trust for Research in Ecology and the Environment (ATREE) is a research institution in the areas of biodiversity conservation and sustainable development. ATREE focusses on applied science through research, education, and action that influence policy and practice on conservation of nature, management of natural resources, and sustainable development. Its mission is to generate rigorous interdisciplinary knowledge for achieving environmental conservation and sustainable development in a socially just manner. It is registered as a non-government trust.

R&D Set-up

The following are the research facilities available in the organization:

- Conservation Genetics Lab
- Water and Soil Lab
- Eco-informatics Lab
- Plant Taxonomy Lab
- Biosystematics Lab
- One Health lab

Sources of income for R&D

- Government sources
- International funding
- Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 1,604.84

FY 2015-16= 1,897.77

FY 2016-17= 1,890.33

Technical Collaborations

National

University of Agricultural Sciences; Manipal University; NCBS Bengaluru; IIHS Bengaluru; IISc Bengaluru

International

International Institute of Applied Systems Analysis, Austria; Hedmark University College, Norway

Societal Relevance

The following R&D outcomes are of national/societal significance:

Swachh Bharat and National Health Mission:

- Understanding the ecology of free-ranging dogs and their role as vectors of infectious diseases.

Clean Energy Mission:

- Greening the religious tourism in protected areas
- Roadmap to universal sanitation and access to safe domestic water

Digital India:

- India Biodiversity Portal
- Citizen Dashboards 

Research Outcomes

- Papers published: 83



^ Research facility at AERF lab

ASSOCIATED ELECTRONICS RESEARCH FOUNDATION

Brief Description

The Associated Electronics Research Foundation undertakes development and other scientific work for growth of electronics and communication engineering. The institution is actively involved in the development of Jigs and Testers in and around the National Capital Region (NCR).

It is registered under section 25 company under Companies Act, 1956.

R&D Set-up

AERF has the following research facilities and equipment for its R&D activities:

- Embedded System Design Lab
- VLSI Design Lab
- Material Appraisal Lab
- Electronics and Electrical Testing Lab
- Mechanical Inspection / Testing Lab
- Equipment include Torsion, Gauge, Memori Hi-Logger, Power metre

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 78.51

FY 2015-16 = 72.42

FY 2016-17 = 88.81

R&D Achievements

Products developed

- Enhancement of attribution of mobile computing devices through latest trends on battery technology
- Eight Way Traffic Light Control for High Density and Minimum Travel Time

- Driving Information with Entertainment to Village (DIEV) using Smart Power Solution
 - Variable DC current bias source (0-10 Amp.)
 - Design & development of review of energy sources for futuristic mobile electronic devices
 - Design & development of Image edge techniques : A review
 - Image analysis using morphology processing
 - Design & development of dual mode low power smart charger for rural areas
 - Explosive Atmosphere Compatibility Testing
 - Driving Information with Entertainment to Village (DIEV) using smart power solution
 - Design & development of enhancement of attribution of mobile computing devices through latest trends on battery technology
 - Design & development of Automatic multimode smart charger with power supply control to ensure uninterrupted power back up
 - Design & development of fast integral image computing hardware architecture for vision based techniques
 - Design & development of solar based luminaries & power systems & LED lantern
- #### Prototypes developed
- Variable DC Current Bias Source (0 to 7.5Amp.)

Registered Office

Associated Electronics
Research Foundation
B-7/2 Okhla Industrial Area
Phase II, New Delhi 110 020
T: 0120-4543789
E: info@aerfindia.com
W: www.aerfindia.com

Recognition Status

File No.: 11/8/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31,2018

R&D Manpower

PGs & Graduates: 2

Research Areas

- Applied and Natural Sciences
- Electronics & Communication

Research Outcomes

- Papers published: 4


- Variable DC Current Bias Source (0 to 10 Amp.)

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Testing of products and feedback on improving the quality &

reliability of products, for e.g. batteries, inverters, and appliances to help different industries

- Industry-oriented training of B.Tech graduates and diploma holders also help them to improve skills for better placement in the electronics & mechanical industries. 



^ Wastewater treatment plant

AUROVILLE FOUNDATION

Brief Description

Auroville Centre for Scientific Research (CSR) is an international voluntary organization working towards a sustainable future in the field of renewable energy systems (wind, solar, biomass), appropriate architecture and building technologies, waste water recycling and sanitation, and the transfer of these technologies through training programmes.

R&D Set-up

The following are the research facilities provided by the organization:

- Building technology lab
- Wastewater treatment lab
- Mechanical workshop
- Electronic lab

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 180.00

FY 2015-16 = 149.00

FY 2016-17 = 148.00

R&D Achievements

Products developed

- FC biogas plant
- Solar pumping
- Solar streetlighting
- Solar bowl
- Battery vehicles
- Vortex system

Processes developed

- Natural wastewater treatment system.

The major research outcomes reported are Ferrocement devices, building elements natural waste water treatment system and Vortex system for oxygenation of waste water. 🔍

Research Areas

- Renewable energy devices
- Water resources management building technologies
- Wastewater treatment systems
- Battery operated vehicles

Research Outcomes

- Papers published: 1
- Technologies transferred/commercialized: 1

Registered Office

CSR office Auroshilpam
Auroville 605101, Tamil Nadu
T: 04132622168
E: csr@auroville.org.in
W: www.auroville.org

Recognition Status

File No.: 11/243/1991-TU-V
Initial Recognition: 1991
Valid Until: March 31, 2018

R&D Manpower

PGs & Graduates: 13



▲ Paper and pulp analytical facilities

AVANTHA CENTRE FOR INDUSTRIAL RESEARCH & DEVELOPMENT

Brief Description

The Avantha Centre for Industrial Research & Development (ACIRD) was established in 1983 by the Avantha Group to accelerate research, design, and development activities, and the science and technology base in emerging areas. Since 2002, ACIRD has focussed its research in the pulp, paper, and allied fields. In 2009, research activities of ACIRD moved from Patiala (Punjab) to Yamuna Nagar (Haryana) in the proximity of Ballarpur Industries Ltd's pulp and paper mill.

R&D Set-up

The research facilities and infrastructure available for use in R&D are enumerated as follows:

- Pulping & Bleaching
- Stock Preparation & Papermaking
- Coating & Printing
- Nanotechnology & Advanced Biomaterials
- Environment and Resource Management
- Analytical Instruments

The facility is also extended for use by trainees for academic purposes.

Sources of income for R&D

Contribution from corporate member (BILT) and others, government-sponsored projects; analytical services; enterprise activity; and consultancy.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 253.55

FY 2015-16 = 330.05

FY 2016-17 = 349.04

R&D Achievements

Products developed

- Development of pulping and bleaching methods for utilization of banana stem for papermaking
- Development of methods to improve the washing efficiency of brown stock washer
- Development of method to improve pulp yield by lowering the cooking temperature
- Developed method to recycle prehydrolysate liquor without affecting rayon grade pulp properties
- Development of laboratory methods for testing related to pulping, bleaching, and deinking
- Developed method to improve the optical properties of gloss and matt finish grade paper
- Development of chemical/ biochemical method for in situ modification of starch for surface sizing of paper
- Development of suitable enzymatic method to reduce refining energy of mixed hardwood & mixed hardwood bamboo pulp
- Development of suitable enzymatic method to improve drainage of recycled pulps
- Development of method to increase the ash in paper while maintaining its strength
- Development of method to

Registered Office

Avantha Centre for Industrial Research & Development
Thapar Technology Campus,
Bhadson Road,
Patiala 147 004, Punjab
T: 0175-2393713
E: director@avantharesearch.org;
info@avantharesearch.org
W: www.avantharesearch.org

Recognition Status

File No.: 11/81/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 7
PGs & Graduates: 12

Research Areas

- Pulp, paper
- Environment
- Chemicals
- Biotechnology
- Nanotechnology
- Allied fields

Research Outcomes

- Papers published: 26

increase the paper strength at same ash level

- Development of method to increase the solids of coating colour
- Development of suitable bleaching sequence for mix agro and hardwood pulp
- Developed the suitable method to increase ash in paper
- Methods to control total dissolved solids in treated effluent at BGPPL Unit Bhigwan
- Developed new method for estimation of adsorbable organic halogen compounds in biosludge from pulp and paper industry


Processes developed

- Process development for enzymatic treatment of pulp for improvement in reactivity of rayon grade pulp
- Process to improve the brightness and whiteness of rayon grade pulp
- Process development for the separate treatment of E_{OP} stage wastewater
- Development of process for improving performance of ASP
- Process development for chemical treatment of wastewater of pulp and paper mill for removal of colour

- Development of process for alkaline sizing of paper using ASA
- Development of alkaline sizing process for indigenous pulps to reduce sizing cost
- Process to reduce the consumption of chlorine dioxide in bleaching for same brightness level
- Development of physico-chemical process for utilization of Nauru rock for production of phosphoric acid
- Development of digital paper for multiple application
- Process to improve the brightness and whiteness of pulp
- Thermal treatment to reduce the viscosity of black liquor

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The organization provides training & skill development.
- They also conduct awareness programmes on 'Industry-R&D Partnership for Growth and Profit' discussing their industrial pulp & paper-related problem with expert scientists and finding a solution. 



^ Wet chemistry laboratory

Registered Office

Ayurvet Research Foundation
4th Floor, Sagar Plaza, District
Centre, Laxmi Nagar, Vikas Marg
Delhi 110 092
T: 011-22455992
E: ank@ayurvet.com
W: ayurvetresearchfoundation.com

Recognition Status

File No.: 11/707/2016-TU-V
Initial Recognition: 2016
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 4
PGs & Graduates: 9

Research Areas

- Food safety & animal nutrition
- Cultivation of medicinal and aromatic plants
- Waste to wealth management
- Research on soil and water health

AYURVET RESEARCH FOUNDATION

Brief Description

The Ayurvet Research Foundation (ARF) is a public charitable trust registered under the Indian Trust Act. The basic objective of the trust is to conduct research in the areas of animal health, nutrition and diagnostics, and other areas for the welfare of animals and the community at large.

R&D Set-up

The following research facilities and infrastructure are available at the Foundation:

- Electrical Weighting Machine
- Microscope Binocular Olympus
- UL Trasonic Bath (Snicator)
- Remi Banch Centrifuge and Remi roter
- Automatic Microprocessor bomb Calorimeter
- Shimadzu UV vis spectrophotometer model
- HPLC system and accessories

Sources of income for R&D

Government

R&D expenditure (₹ in lakhs)

FY 2014-15 = 112.00

FY 2015-16 = 178.00

FY 2016-17 = 210.00

Technical Collaborations

National

U.P. Pt. Deen Dayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go Ansundhan Sansthan, Uttar Pradesh; Nanaji Deshmukh

Veterinary Science University, Jabalpur, Madhya Pradesh; Maharashtra Animal and Fishery Sciences University, Maharashtra; Lala Lajpat Rai University of Veterinary and Animal Sciences, Haryana

Societal Relevance

The developed technologies aid towards skill development under the Pradhan Mantri Kaushal Vikas Yojna (PMKY) scheme.

- Competency development of rural youth as dairy entrepreneurs.
- Training provided to farmers on benefits of organic farming and medicinal plant cultivation.
- Training programmes organized under the NABARD scheme on organic farming. [Q](#)

Research Outcomes

- Papers published: 7
- IPRs held
 - » Patents filed: 4
 - » Patents awarded: 4
- Technologies transferred/commercialized: 4



^ Medicinal chemistry

B V PATEL PHARMACEUTICAL EDUCATION AND RESEARCH DEVELOPMENT CENTRE

Brief Description

The B V Patel Pharmaceutical Education and Research Development (PERD) Centre is a multidisciplinary, postgraduate research institute, dedicated to the pursuit of excellence in the pharmaceutical sciences. It is equipped with the latest and best research and development (R&D) facilities, highly qualified scientific and technical personnel, and regular education, training, and developmental activities. Today, PERD is an internationally recognized research institute, providing the pharmaceutical industry and academia the opportunity and resources to undertake the latest in research and development.

R&D Set-up

The organization has well equipped research facilities:

- Air Compressor, Anesthesia Unit, AS-950 Intelligent Sampler, AS950-10 Intelligent Sampler, 16-Station Tablet Punching Machine, Bio Safety Cabinet, Flow Scintillation Analyzer 150 TR, Radiomatic FLO-ONE-BETA, Gel Electrophoresis Unit - LARGE, HPLC, LC-MS API 165, LC-MS/MS System API 2000, PCR, Stability Chambers, TLC Scanner 3, Upright Fluorescence Microscope, BD/TD Apparatus, Bilayer Tablet Machine, Bio Safety Cabinet, Biochemistry Analyser, Biopac, Brook Field Viscometer, Centrifuge, CH-30 Column Heater, CO₂ Desiccators, Carbon dioxide incubator

Sources of income for R&D

- Project funds
- Grants from Government agencies

R&D expenditure(₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 304.58

FY 2015-16= 272.42

FY 2016-17= 267.39

R&D Achievements

Major research projects undertaken by the organization are:

- Modulation of activity of transcription and translation factors in lung cancer by novel chemical entities: A polypharmacology approach
- Design and synthesis of Novel 7 – Aazindole Derivatives as potent Epidermal Growth Factor Receptor (EGFR) kinase inhibitor: A search for lung cancer drug
- Lipid Based Lymphotropic Drug Delivery system of Anti-retrovirals for the treatment of HIV/TB co-infection : A novel dual functionality approach
- Repositioning of clinical drugs as therapy for HPV-induced cervical cancer for minor research project (MRP).
- Development of eIF4E responsive exosome cargo for inducing apoptosis: A prospective therapy for non-small cell lung cancer.
- Bioprospecting of endophytic fungi for sennosides and L- DOPA

Registered Office

B V Patel PERD Centre
Near Sola Bridge
Sarkhej-Gandhinagar Highway
Thaltej, Ahmedabad 380 054
Gujarat
T: 079 2743 9375
E: director@perdcentre.com
W: www.perdcentre.com

Recognition Status

File No.: 11/191/1990-TU-V
Initial Recognition: 1990
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 5

Research Areas

- Pharmaceutical sciences
- Analytical chemistry
- Medicinal chemistry
- Toxicology
- Phytochemistry

Research Outcomes

- Papers published: 66
- IPRs held
 - » Patents filed: 8
- Technologies transferred commercialized: 1

- Role of thyroid hormone on inflammatory cascade of implantation special reference with hypothyroidism for minor research project (MRP)
 - Development of prototype plasma system for effective and uniform sterilization of medical devices
 - Unraveling the Molecular Mechanism of Berberine against Neuroblastoma Immunosuppressive Tumour Microenvironment
- Also organization has filed many patents such as:
- Multiplex PCR based single tube assay for unequivocal identification and detection of *Convolvulus microphyllus* and its adulterant/ allied species *Evolvulus alsinoides*
 - Novel 2-substituted thiazole compounds
 - (5-thiazolyl/thienyl)-2-thienyl methanones
 - "Minicircle DNA vector for inducing pluripotency in nucleated blood cells and other cell types"
 - Novel pyrazoles and pyrazolopyrimidinones
 - Novel imidazo 1,3,5-triazinyl thiazoles
 - "Novel pyrazolopyrimidinones or pharmaceutical acceptable salts and process for the preparation of these compounds thereof"
 - New use of 2-substituted amino-5-thiazolyl analogues against diabetes, obesity, and autoimmune diseases. 🔍



Research Laboratory

BAKUL FINECHEM RESEARCH CENTRE

Brief Description

Bakul Group of Companies India are engaged in the development and manufacture of high quality Active Pharmaceutical Ingredients (APIs), Intermediates and Specialty Chemicals.

It is a company registered as Section 8 under companies act, 2013

R&D Set-up

Bakul's R&D laboratory is well equipped with the following instruments:

- High Performance Liquid Chromatography
- Polarimeter digital
- High pressure autoclave
- Vacuum drying oven
- Laboratory drying oven
- Digital pH Meter
- Karl Fischer apparatus
- TLC + UV Chamber

Sources of income for R&D

- Grants from Government agencies
- Donations
- Foreign Contributions

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 53.72

FY 2015-16 = 48.56

FY 2016-17 = 31.69

R&D Achievements

Products developed

- Acetyl-L-cysteine
- Praziquantel

- Triacetylganciclovir
- N-7 Ganciclovir
- Zolpidic acid
- Dyphylline
- 3-Bromoacetyl-5-chloro-2-thiophene sulphonamide
- 6-Amino-1-mythyl-5-propylamino uracil
- Valacyclovir
- Mono acetyl ganciclovir

Major research projects undertaken by the organization are:

Linagliptin is a DPP-4 inhibitor developed for the treatment of Type-II diabetes. New Process was tried to make this product more economical.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Developed a low cost process for medicinal compounds that are environmentally friendly and economical, thus making medicines more affordable and reducing the reliance on import from foreign countries such as China. [Q](#)

Registered Office

Bakul Finechem Research Centre
4th Floor, Sterling Centre,
Dr Annie Besant Road,
Worli, Mumbai 400 018
Maharashtra

Recognition Status

File No.: 11/376/1999-TU-V

Initial Recognition: 1999

Valid Until: March 31, 2020

R&D Manpower

Doctorates: 1

PGs & Graduates: 4

Research Areas

- Technology development and manufacturing processes for fine chemicals
- Specialty chemicals
- Active pharmaceutical ingredients
- Pharmaceutical intermediates



^ Lab facilities

BANNARI AMMAN INSTITUTE OF TECHNOLOGY

Brief Description

The Bannari Amman Institute of Technology is established by Bannari Amman Educational-Trust and is an autonomous engineering college. It is under the roof of Bannari Amman Group (BAG), which is one of the largest industrial conglomerates in southern India with a wide spectrum of manufacturing, trading, and service activities. The institute is affiliated to Anna University.

R&D Set-up

The following are the research facilities provided by the organization:

- Impression Creep Testing Machine
- Composite Laminate Fabrication Facility/workshop
- Pin on Disk
- Subsonic Wind Tunnel
- Pressure Scanner
- Electrochemical Corrosion Set-up
- High Speed Camera
- Strength of Materials
- Special Machines Lab
- Vibration Laboratory
- Metallurgy Lab

Sources of income for R&D

- Government sources
- Donations
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 66.79

FY 2015-16 = 99.87

FY 2016-17= 129.05

R&D Achievements

Products developed

- Elephant early warning and detection system
- Outdoor LED display board 12x6 feet (under development)
- Hand-held Turmeric Grading System
- Automatic shoe polishing machine
- Automatic fish cutting machine
- Automatic chicken cutting machine
- Efficient book Dropbox for BIT Central Library
- Automatic ration product distribution system
- Design and fabrication of automatic road cleaning robot
- Modelling of remote controlled crane using pneumatic gripper

Processes developed

- BIT –Kart (Website development for commercial requirements)
- Developed an inhibitor mediated intensified biorefinery technology for the sustainable production of bioethanol by maximum cellulose recovery.

Interdepartmental prototype models developed/designed

- Design of AdBlue Sensor
- Circuit Design Automation
- Garbage Odour Detection
- Restroom Odour Detection using IoT
- Garbage Segregation

R&D Project undertaken

- Development of sensing systems to detect adulterants in bovine milk

Registered Office

Bannari Amman Institute of Technology,
Alathukombai- Post
Sathyamangalam 638 401
Erode District, Tamil Nadu
T: +91-4295-226000
E: principal@bitsathy.ac.in
W: www.bitsathy.ac.in

Recognition Status

File No.: 11/646/2014-TU-V
Initial Recognition: 2014
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 181

Research Areas

- Wind tunnel testing
- Fluid structure interaction
- Solar-powered unmanned aerial vehicle
- Biomass gasification
- Intake aero dynamics
- Composite material
- Aerodynamics
- Liquid crystals
- Bio medical
- Wildlife conservation

Research Outcomes

- Papers published: 54
- IPRs held
 - » Patents filed: 8
 - » Patents awarded: 1

- Study of diet effects using bovine urine
- Design of sensor for measurement of turgor pressure
- Design of sensor for measurement of soil moisture
 - » Automatic Agro Sprayer
 - » Smart Helmet Using Arduino
 - » Rice Mill Package Automation
 - » Liter of Light
 - » Thunderbolt-X
 - » Needle punching machine
 - » Improved coir machine
- Novel cyclic bioreactor system has been designed to reduce the pre-treatment time taken for biological method.
- Nano-impregnated conical flask reactor for alga growth
- MS Greena International – FMCG- ₹9 lakhs
- Karthi Herbals – Dia care herbal formulation- ₹10 lakhs
- Bharani Herbals – Triphala Juice- ₹7 lakhs
- My Best exports – Banana Pseudo stem candy- ₹5 lakhs
- Nidharsan Traders – Bottled Sugarcane Juice- ₹9 lakhs
- Affod – Online agri. Platform- ₹5 lakhs

Technical Collaborations

International

Pusan National University, Republic of Korea; Arva School of Fashion Surabaya, Indonesia

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Guest Lecture from Lions Club on Wild Life
- Awareness camp in local municipality for celebrating World Water Day
- Awareness Rally on the occasion of Women's Day. 🔍

Commercialization potential of products/processes developed

- Nalan Foods – Amla Concentrate- ₹15 lakhs
- Lemina Foods – Vegetable Smoothie /Vegetable Rusk- ₹6 lakhs
- Namnaa foods – Millet cookies- ₹7 lakhs



BHARATI VIDYAPEETH

Brief Description

The institutions of Bharati Vidyapeeth (BV) were accorded deemed university status in 1996 for their academic excellence. The Bharati Vidyapeeth (deemed to be university) has established academic excellence and offers programmes in innovative and emerging areas. Presently, it has 29 constituent institutions, including three research institutes dedicated exclusively to research, multi-campus, and multi-disciplinary, catering to the needs of urban and rural students, has significant achievements in research.

R&D Set-up

The following research facilities are provided by the organization:

- The University and the institute have an excellent centre for advanced research facility.
- IRSHA (Interactive Research School of Health Affairs) is developed with the exclusive objective of research.
- Facilities available at Rajiv Gandhi Institute of Biotechnology are available to all research scholars of the institute.

Sources of income for R&D

Grant from government agencies

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate bank accounts for R&D.

FY 2014-15 = 410.96

FY 2015-16 = 502.92

FY 2016-17 = 634.77

Technical Collaborations

National

Medical Colleges, Pune; Indian Institute of Tropical Meteorology, Pune; The College of Ayurved, Pune; Rajiv Gandhi Institute of Information Technology, Pune; Green Vision, Pune; Ensign Dietcare, Pune

Societal Relevance

The following R&D outcomes are of national/societal significance:

The University has taken inspiration from the Skill India Flagship Programme of Government of India, and has approved 28 skill development programs of which seven programmes are in consonance with the programmes identified by the healthcare.

The University has information resource centres (IRCs) located at the Medical College, Pune; College of Engineering, Pune; and Institute of Management and Research, New Delhi. These IRCs provide access to online versions of journals, e-books, e-journals, digital databases, and open courseware. The University is also a member of UGC-INFLIBNET/NList through which many international journals of repute can be accessed by the researchers. Further, the University has created an e-library which provides links to its digital resources.

The University encourages blended learning by using e-learning resources. As a part of Digital India initiative, the University facilitates blended learning through the following techniques:

Registered Office

Bharati Vidyapeeth
(Deemed to be University)
Bharati Vidyapeeth Bhavan, LBS
Marg, Pune 411 030, Maharashtra
T: 020 24407100, 24325701
E: bvuniversity@yahoo.co.in
W: www.bvuniversity.edu.in

Recognition Status

File No.: 11/348/1997-TU-V
Initial Recognition: 1997
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 278
PGs & Graduates: 1198

Research Areas

- Conduct interdisciplinary and socially relevant research
- Research on nutritional supplementary strategies for prevention and management of pregnancy-related complications

Research Outcomes

- Papers Published:
 - » National: 558
 - » International: 1622
- IPRs held:
 - » Patents filed: 36
 - » Patents awarded: 2

Provides access for faculty to digital content on MOOC, NPTEL, YouTube, etc., so that the faculty

can select and critically evaluate the content and embed the same in the teaching-learning process and encourages faculty to contextualize content on Open Educational Resources (OERs).

Encourages faculty to develop digital resources on their own or undertake collaborative projects for developing high quality digital learning material. The digital resources include documents, presentations, animations, audio recordings, and video clips.

Create appropriate online learning space through Learning Management System (LMS) to share the learning modules created by the faculty with students.

Facilitate synchronous and asynchronous communication between faculty and students for off-campus academic discussions as well as peer learning. 🔍

BIOSCIENCE RESEARCH FOUNDATION

Brief Description

Bioscience Research Foundation (BRF), established in 2010 as a non-governmental trust, is an integrated discovery and developing Contract Research Organization. It is a GLP-certified laboratory (NGCMA - National GLP Compliance Monitoring Authority) in India in all the departments. The facility is approved by Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA) and conforms to its guidelines on developing reliable data while maintaining a healthy balance amongst animal ethics, welfare, and experimentation.

R&D Set-up

The organization has GLP certified laboratory (NGCMA - National GLP Compliance Monitoring Authority) in India in all of the departments. The facility is approved by Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), conform to its guidelines on developing reliable data while maintaining a healthy balance between animal ethics, welfare, and experimentation. Chemistry Department is well equipped with state-of-the-art instrumentation.

The various analytical equipment included are as follows:

- HPLC (coupled with UV-Vis. / PDA Detectors); GC (coupled with FID / ECD / TCD / NPD); GC/MS; UV-Visible; Viscometer; Titrates (moisture / calomel / others)

Sources of income for R&D

- Testing fee
- Contribution from sponsors

R&D Achievements

They develop procedures for various testing services such as Acute Toxicity Studies (Oral, Dermal, Inhalation), Developmental and Reproduction Toxicity (DART) Studies, Single and Multi Generation Studies, Carcinogenicity Studies, Biocompatibility Studies, etc.

Technical Collaborations

National

Periyar Maniammai University, Tamil Nadu; Velumailu Siddha Medical College Hospital, Tamil Nadu; Dharma Ayurveda Hospital, Kerala

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Agro chemicals and pharmaceutical products.
- Transfer to the society for safe handling of agrochemicals and utilization of drugs. [Q](#)

Research Outcomes

- Papers published: 17
- Technologies transferred/commercialized: 1

Registered Office

Bioscience Research Foundation
F-5, Dual Garden, 98-99,
Mount Poonamalle Road, Porur,
Chennai 600 116, Tamil Nadu
T: 04427658298, 9840033458
E: brfchennai@gmail.com
W: www.brfchennai.com

Recognition Status

File No.: 11/630/2014-TU-V
Initial Recognition: 2014
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 4
PGs & Graduates: 8

Research Areas

- Environmental Chemistry
- Biotechnology
- Toxicology
- Genetic Toxicology
- Environmental Toxicology
- Entomology
- Pharmacology
Pharmacokinetics



^ Laboratories

BIOTECH PARK

Brief Description

The Biotech Park is the only functional biotechnology park in north India serving the state of Uttar Pradesh so as to bring biotechnology as the way of cultivating crops, leading a healthy life, and enriching skills for boosting the biotech industry. The park was set up jointly by the Department of Biotechnology, Government of India and Department of Science and Technology, Government of Uttar Pradesh, in 2002 and became fully functional in 2007. It is registered as a society.

R&D Set-up

The following are the research facilities provided by the organization:

- HPLC (with all consumables including column), HPTLC (with Linomate-5 & Saanna-3 and Reprstar3), AAS: Atomic Absorption, Spectrophotometers (UV-Vis; Nano-Drop), GLC with column, Real time PCR; Gradient PCR, Ultra Centrifuge, Biosafety Cabinet Hera Safe, Polarimeter, Flame Photometer, Table Top Centrifuge Remi, Gel Documentation System, Microscope with digital Camera, Trans illuminator, Autoclave, Muffle Furnace Apex, BOD Incubator, Millipore Water System; Millipore water (de-ionized water), Autoclaved De-Ionized Water, Deep Freezers (-20 °C); (-80 °C), Top Loading Balance Eagle, GPS System (without battery), Gel Electrophoresis, Hot Plate with mag. Stirrer C6030, Fume Hood with Heater, Conductivity Meter

Sources of income for R&D

Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2016-17= 145.70

R&D Achievements

Products developed

- Commercial isolation technique of curcuminoids from turmeric rhizomes
- Drying technique of aloe vera juice from spray dryer equipment
- Isolation technique of Lutein from marigold
- Commercial preparation of aloe vera gel
- Technique developed for preparation of rose flower concrete
- Optimization of process parameters for yield of Nagarmotha oil using steam distillation method
- Methods for analysis of bioactive constituents of curcuminoids, aloe vera powder, lutein, Nagarmotha oil, and rose flower concrete.

Technical Collaborations

National

Babasaheb Bhimrao Ambedkar University (BBAU), Lucknow; SIDBI/ BIRAC Incubator of IIT Kanpur; Shriram Institute for Industrial Research, Delhi; Dayalbagh Educational Institute (DEI), Agra

Registered Office

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Jankipuram, Kursi Road,
Lucknow 226021, Uttar Pradesh
T: 0522-236505/4012091
E: ceo@biotechpark.org.in
W: www.biotechpark.org.in

Recognition Status

File No.: 11/439/2005-TU-V
Initial Recognition: 2005
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 2
PGs & Graduates: 9

Research Areas

- Health Care & Pharma Biotech
- Agri-Biotechnology
- Environment Biotechnology
- Bioinformatics & Bioservices
- Bioenergy

Research Outcomes

- Papers published: 26

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Tissue culture raised products: The organization provides elite variety of plants raised through tissue culture and macro propagation at reasonable cost for plantation
- Rural employment generation
- Provides technical know-how for setting up poly-houses and net-houses, and techniques for hardening of tissue culture plants
- Training of farmers for macro propagation and production of algal and vermicompost fertilizers
- Provides technical aid in setting up the following:
 - » Biocontrol laboratory
 - » Plant health clinic
 - » Leaf tissue analysis laboratory
 - » Disease forecasting unit
 - » Model nursery
- Biotech entrepreneurship development. 🔍



^ Supersonic Wind Tunnels

BIRLA INSTITUTE OF TECHNOLOGY

Brief Description

BIT Mesra (located 16 kms from Ranchi, the Jharkhand state-capital) has been engaged in nurturing minds through a rich heritage of academic excellence. The institute is actively pursuing advanced research programmes which are focussed towards advancement of human knowledge and development of society. Research efforts are directed towards solving complex problems, delivering social benefits and driving economic prosperity, nationally as well as globally.

R&D Set-up

The following are the research facilities provided by the organization:

- Central Instrumentation Facility
- Building Science Lab
- Building Construction & Model Making Lab
- Concrete and Road Materials Laboratory
- Soil Mechanics Laboratory
- Surveying and Project Laboratory
- Structural Engineering Laboratory
- Environmental Engineering Laboratory
- Hydraulics Laboratory
- Bohlin Rheometer
- Dynamic Mechanical Analyser
- Laminar Flow Reactor
- Gas Chromatography
- Injection Moulding (85H)
- High Performance Liquid Chromatography
- Fused Deposition Modelling
- Solar Energy Lab
- Engineering Mechanics Lab

- Engineering Measurement Lab
- Hydrogen Lab
- Metrology and Metallurgy Lab

Sources of income for R&D

- Government sources
- International funding
- Grant-in-aid

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 195.68

FY 2015-16= 381.63

FY 2016-17= 793.96

R&D Achievements

Products developed

- Endotoxin free L-asparaginase
- Nanobiocomposite for bone regeneration
- Reb A production from PGPR
- Production of Prodigiosin from bacteria
- Intellectual Calibers and Research in E-learning: VLSI Design

Processes developed

- Dye removal from industrial waste
- Preservation of local mushroom Rugra
- Development of OCT process for retinal imaging
- An embedded fibre Bragg grating (FBG) sensing system to determine the strain information in woven E-glass fabric-reinforced epoxy composite laminates.
- A new LPG-ANN based interrogation technique for interrogating a large number of FBG sensors.
- A dual grating based superstructure fibre Bragg grating

Registered Office

Birla Institute of Technology,
Mesra, Ranchi
Jharkhand 835 215
T: 0651-2275444 Ext: 4413
E: registrar@bitmesra.ac.in
W: www.bitmesra.ac.in

Recognition Status

File No.: 11/161/1990-TU-V
Initial Recognition: 1990
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 225
PGs & Graduates: 61

Research Areas

- Engineering and Technology
- Pharmacy
- Bio-engineering
- Science
- Social Science and Management

Research Outcomes

- Papers published: 33
- IPRs held
 - » Patents filed: 46
 - » Patents awarded: 16

(SFBG) has been designed which can provide both dual-band multichannel characteristics as well as multi-parameter sensing.

- An efficient fibre-optic sensor based on a superstructure SFBG for simultaneous strain and temperature measurement has been experimentally demonstrated.
- An ultra-narrow band optical multi-channel comb filter has been designed with the combined effect of Gaussian sampling and periodic chirp which would be useful in multiplexing and optical signal processing.

Interdepartmental prototype models developed/designed

- Developed a prototype object detection system using ultrasonic waves for mining applications with SD Engineers, Ranchi.

Organization is involved in various research projects such as:

- Development of carbocyclic nucleosides as possible anti-hepatitis B virus (HBV) agents
- Evaluation of antiviral and anticancer potentials of lac exudate/ dye.
- Induced Doping of Chemically Synthesized Processable Conducting Poly – Phenylene Die Mine
- Development of highly porous nano structure metal/mixed metal oxide spheres for removal of arsenic
- Automatic Question Generation and Evaluation-based System for Instant Assessment of Learning in School Level
- Investigation on rare earth substituted layered perovskites for ferroelectric and piezoelectric application

- Development of polymer- ceramic nanocomposites with high dielectric constant
- Arsenic enrichment agricultural Soil with potential impact on crops and food security of Shibgunj, Jharkhand, India

Technical Collaborations

National


National Remote Sensing Center, ISRO, Hyderabad; Pharmaceutical Sciences and Technology; Ranbaxy/ Sun Pharma, Gurgaon; Matrix, Hyderabad; Mylan, Hyderabad; Lupin, Pune; Hetero, Hyderabad; Microtherapeutics, Chennai; Central Drug Research Institute, Lucknow; Indian Institute of Science, Education & Research, Kolkata; IIT-IISM, Dhanbad; CSIR IMMT, Bhubaneswar; IIT Delhi, etc.

International

International Centre for Integrated Mountain Development (ICIMOD), Nepal; CERTARA, Translational Science Solutions, USA; University of Torino, Italy; Universidad De Santiago De Compostela, Lugo, Spain; Prince of Songkla University, Thailand; University of Aveiro, Campus Santiago, Portugal, etc.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Awareness programme for organic farming- Healthy life, substantive increase in income of the villagers
- Health checkup camp
- Awareness programme for cashless transactions- Ten villages are literate with cashless transactions
- Awareness programme for girls' education
- Cleanliness awareness drive. 



^ Viscose pilot plant

BIRLA RESEARCH INSTITUTE FOR APPLIED SCIENCES

Brief Description

The Birla Research Institute for Applied Sciences is registered under Madhya Pradesh Societies Registration Act, 1959. The Institute was registered in 1965. It is involved in applied research in the field of wood pulping, viscose rayon, alternate cellulosic fibres, and pollution abatement.

R&D Set-up

The Institute has the following research facilities and infrastructure:

- Comprehensive laboratories and pilot plant facilities related to "Man Made cellulosic fibre" production, aimed at assisting the Indian cellulosic fibre industry to maintain its competitive edge in the market.
- Analytical equipments, such as HPLC, GC, and Viscose particles size analyzer are also available in the Institute.

Sources of income for R&D

Industries

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 177.00

FY 2015-16 = 181.00

FY 2016-17 = 190.00

R&D Achievements

New products developed/ under development

- Microdenier viscose rayon fibre (regular & screw press trials)
- Modal fibre via screw press trials
- Microdenier modal fibre

- Flame retardant viscose fibre
- Viscose fibre from high cellulose content alkali-cellulose

Processes developed

- Anti-bacterial viscose fibre
- Fibrillation reduction of lyocell fibre
- Particle / gel measurement in viscose fibre
- Fragrant viscose fibre
- Studies of viscose and fibre properties at different steep lye
- UV protective viscose fibre

Prototypes developed

- Dissolution studies of lyocell grade pulp with cotton for polymer preparation (n-mmno process)
- Innovative elements developed in products or services
- PP Microdenier Viscose fibre (via screw press and commercially adopted technology)
- PP Modal fibre from high cellulose
- Content alkali – cellulose
- PP linc liquid-based cellulosic fibre.

Technical Collaborations

National

GRASIM Industries Ltd; Birla Cellulosic; Auxichem; Dai Ichi; Indian Institute of Chemical Technology (IICT); Aditya Birla Science and Technology Company Pvt. Ltd (ABSTC)

International

AV Nackawic, Canada; Domsjö Fabriker Startside, Sweden; Sappi Global, South Africa; GP Cellulose, United States of America; Fortress Pulp, Canada; Schweighofer, Vienna

Registered Office

Birla Research Institute for Applied Sciences
Birlagram 456 331, Nagda
Madhya Pradesh
T: 07366 246765
E: bri@adityabirla.com

Recognition Status

File No.: 11/56/1988-TU-V
Initial Recognition: 1965
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 1
PGs & Graduates: 4

Research Areas

- Forest raw material utilization
- Viscose Rayon Fibre (Modified & Value added)
- Solvent Spun Fibre (Lyocell Fibre)
- Organic, Inorganic & Industrial Chemistry
- Pollution abatement studies
- Different routes to make cellulosic fibre

Research Outcomes

- IPRs held
 - » Patents filed: 96
 - » Patents awarded: 30
- Technologies transferred/commercialized: 3

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The Institute is conducting industry-oriented research work to devise new processes or improve methods of production for

achieving better product quality with least damage to environment.

- The Institute participated in the national mission of Swachh Bharat to realize the Clean India vision. 🔍



^ Sleeping driver detection system

Registered Office

Bose Institute
P-1/12 C. I. T Scheme VII M
Kolkata 700 054, West Bengal
T: 033-23550595
W: <http://www.jcbose.ac.in>

Recognition Status

File No.: 11/106/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 148
PGs & Graduates: 237

Research Outcomes

- Papers published: 665
- IPRs held
 - » Patents filed: 6
- Technologies transferred/commercialized: 6

BOSE INSTITUTE

Brief Description

Bose Institute was set up in 1917. It is an autonomous body registered under Society Act of 1860. Its current concentration of research is in the fields of Physics, Chemistry, Plant biology, Microbiology, Biochemistry, Biophysics, Bioinformatics, and Environmental Science. The Institute pioneered the concept of inter-disciplinary research in Asia and India in sync with global trends.

R&D Set-up

Research facilities and Infrastructure at Bose Institute:

- Centre for Translational Animal Research
- Central Instrument Facility
- Acharya J C Bose Biotechnology Innovation Centre.
- Bose Institute Indo-FAIR Coordination Centre

The infrastructure is shared and used by local industries, institutions and individuals.

Sources of income for R&D

Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 6,502.75

FY 2015-16 = 6,104.00

FY 2016-17 = 6,659.72

R&D Achievements

Products developed

- Drowsy Driver Detection System for drivers under drowsiness, using non-invasive sensors

Societal Relevance

Services

Bose Institute provides hands-on training on Rural Biotechnology Programmes to the scheduled tribe beneficiaries living in remote tribal villages of West Bengal at their experimental farm at Falta.

Technologies

- **Rain water harvesting tank:**
This technology helps to solve the problem of drinking water in the remote tribal villages where drinking water is not easily available.
- **Low cost concrete tank for harvesting rain water for irrigation/toilet use purpose:**
In most parts of Purulia, Bankura, Birbhum, Paschim Medinipur, Jhargram districts of West Bengal, water is not available for toilet and irrigation purposes. This low-cost concrete tank is extremely helpful in solving irrigation and toilet water problem.
- **Vermicompost pit:** The vermicompost pit unit and production technology is quite helpful in the production of vermicompost from cow dung within 15 days. This technology will be helpful for organic farming movement.
- Awareness programmes on various aspects of Rural Biotechnology Programme are being conducted at Falta Experimental Farm of the Institute as well as in the tribal villages. These awareness programmes aid in the socioeconomic development of tribal beneficiaries. 



↖ Aryabhata Building, CRRao AIMSCS

CR RAO ADVANCED INSTITUTE OF MATHEMATICS, STATISTICS, AND COMPUTER SCIENCE

Brief Description

CR Rao Advanced Institute of Mathematics, Statistics, and Computer Science (AIMSCS) is a model in co-operation with emphasis on synergy of efforts in problem solving. The main purpose of AIMSCS is to conduct, promote, and carry out research and advanced studies in Mathematics, Statistics, and Computer Science and encourage talented students both rural and urban to pursue professional and research careers in these fields. It also supports the application of research and training in Mathematics, Statistics, and Computer Science to other fields and honour those who have made significant contributions to the advancement of knowledge in these fields.

R&D Set-up

The following are the research facilities provided by the organization:

- 4 laboratories
- 3 classrooms
- 80 rooms for faculty and research staff

Sources of income for R&D

Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 2,125.00

FY 2015-16 = 2,125.00

FY 2016-17 = 5,538.00

R&D Achievements

Major projects undertaken:

- MIMO RADAR Spatial Diversity and Spatial Resolution Transmitter Waveform in Target Detection and Resolution and Identification
- NTRO Project - Research work and Training in Cryptography & Cryptanalysis with Applications
- DRDO (Phase-II)- Software Tools for SMT Solvers Based Cryptanalysis and Post Quantum Cryptology – SAG, DRDO
- Lattice-based Cryptography and Cryptanalysis (DRDO)

Technical Collaborations

National

- Sardar Patel Police University, Jodhpur, Rajasthan

Societal Relevance

- Cyber security is top of the agenda of the Government of India in view of frequent the cyber-related crimes leading to major catastrophes thereby disturbing peace and tranquility and greatly affecting the normal public life and making people insecure. As these incidents are recurring in some parts of the country, it has become challenge to Government of India, especially to security and intelligence agencies which have devised a comprehensive approach in tackling this menace. In this connection, various projects

Registered Office

CR Rao Advanced Institute of Mathematics, Statistics and Computer Science (AIMSCS), University of Hyderabad Campus, Prof CR Rao Road, Gachibowli, Hyderabad 500 046, Telangana
T: +91 40 64631799
E: director@cr Raoaimscs.res.in
W: www.crraoaimscs.org

Recognition Status

File No.: 11/490/2008-TU-V
Initial Recognition: 2008
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 12
PGs & Graduates: 19

Research Areas

- Mathematics
- Computer science and their applications

Research Outcomes

- Papers published: 188

relevant to national importance were taken up by this institute and executing to the requirement of these agencies by developing skills and training their manpower.

- Adhering and implementing Government of India policy of skill development and capacity building. As there is an acute shortage of experts in cyber security and cryptography,

there is a need to give accent to skill development and capacity building. The developed methodology is shared among the professionals and more importantly training and technical sessions are arranged for crucial security and intelligence agencies in order to strengthen skills and capacity of experts to combat this problem. 🔍



^ Cold Metal Transfer Machine with Robot

C V RAMAN COLLEGE OF ENGINEERING OF RAMAN EDUCATION SOCIETY

Brief Description

The CV Raman College of Engineering (CVRCE), an engineering and management institution was established in 1997. It promotes the highest standards of technical education in the state. The institute provides state-of-the-art technical education and also work collaboratively with technical institutes/universities/industries of national and international repute. The aim of the organization is to keep abreast with latest technological advancements to enhance the R&D activities.

R&D Set-up

CVRCE has the following research facilities and infrastructure:

- Hind HiVac, India
Roteva Rotary Vacuum Evaporator
- Equitron, India
- Arc welding machines: MIG, TIG, CMT & ROBOTIC (11 nos)
- Fronius, Austria
- Optical microscope with image analysis system Conation technologies, Pune
- Micro Hardness tester with computerized image attachment.
- Micro-mach technologies, Pune
- Ultrasonic test system, Arora Technologies, Mumbai
- Single channel acoustic emission test system
- Physical Acoustic Corporation, USA
- UV visible spectrophotometer
- DAQ and Lab view Ni compact

- Surface area analyser with accessories
- Robotic handling kit

Presently, the facilities are being used occasionally by other organizations. However, efforts are underway to encourage sharing of these facilities. In this regard, a MoU has been signed with CSIR-IMMT, Bhubaneswar.

Sources of income for R&D

Government & Industry

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 5.32

FY 2015-16 = 26.41

FY 2016-17 = 65.25

R&D Achievements

Processes developed

- Processing of high alumina iron-ore fines and thickened tailing disposal; and a product of grapheme nano particle-composite for catalytic application are under development.
- A novel method for preparation of titanium metal from pre-treated titanium dioxide has been developed.

Technical Collaborations

National

Council of Scientific and Industrial Research, New Delhi; Coolcrop; TATA Technologies Ltd; Indian Society of Heating, Refrigerating and Air conditioning Engineers (ISHRAE); C-DAC

Registered Office

CV Raman College of Engineering,
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T: +91 9040272733
E: info@cvrgi.edu.in
W: www.cvrgi.edu.in

Recognition Status

File No.: 11/657/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 10
PGs & Graduates: 140

Research Areas

- Nano material synthesis
- Molten salt electrolysis
- Parallel programming, web mining, and big data
- Electrical power systems, electrical drives and control
- Mechanical vibration, deformation processes, dynamics of MEMS
- Refrigeration and air conditioning
- Renewable energy, bio-fuel
- Food and nutraceuticals
- Expansive soils, high performance concrete
- Marine pollution, fire prevention and firefighting
- Mineral processing
- Welding technology

Research Outcomes

- Papers published: 298
- IPRs held
 - » Patents filed: 8
 - » Patents awarded: 1

International

Google Asia Pacific Pte Ltd, Singapore; Schneider Electric, France; Cyprus Maritime Academy, Cyprus; Schneider Electric; Cyprus Maritime Academy

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The main purpose of the institution's research & development is to enhance its competitiveness with innovation and new technologies and to support India, mainly Odisha, as a business location and also to support the Prime Minister's Make in India programme with implementation of research results. Under the Skill India programme of Government of India, the institute

is carrying out several career development programmes:

- Business English Certificate
- Industrial Automation, Drive & Control Technologies, Hydraulic and Pneumatic Drives, Logic Circuits & Sensor Technology
- Process Automation-Basic of Open loop System & Advance Open loop System
- ChemCAD: Simulation of Equipment in Chemical and Petrochemical Industries
- Tool Room Training
- Welding and Plumbing
- Driving and Housekeeping
- Garment & Tailoring. 



↖ Campus view

CENTRE FOR DEVELOPMENT OF IMAGING TECHNOLOGY

Brief Description

The Centre for Development of Imaging Technology (C-DIT), is engaged in the area of information and communication technology (ICT) and content development and dissemination in multimedia formats. C-DIT has been functioning as a total solutions provider to the departments and agencies under the Government of Kerala in the areas of ICT applications and in supply of holography-based security products. It is registered in 1988 under Travancore Cochin Literacy, Scientific & Charitable Society Registration Act XII of 1955.

R&D Set-up

C-DIT has the following research facilities and infrastructure:

- Fred Argon Ion multiline UV-laser
- Diode Pumped Solid State (DPSS) Laser
- He-Cd Laser; He-Ne Lasers; Diode Lasers
- Vibration free optical table
- Electronic exposure system
- Universal optical power metre
- High Vacuum Coating Unit
- Inspection microscope
- UV-Optics and Beam splitters
- US-Cleaner

These facilities are shared and are used by academia.

Sources of income for R&D

- Government of Kerala and project assistance from government agencies.

R&D expenditure (₹ in lakhs)

FY 2014-15 = 365.00

FY 2015-16 = 389.00

FY 2016-17 = 418.00

C-DIT does not maintain a separate account for its R&D activities.

R&D Achievements

Products developed

- Bhashamitram mobile application (Malayalam- Malayalam & English- Malayalam dictionaries)
- Customized an application for analysing sentences (Malayalam) by using Paniyain grammar rules that helps to develop machine translation among Indian languages.

Processes developed

- Online Sabdatharavali with pictures & sounds (Malayalam- Malayalam dictionary)

Societal Relevance

- C-DIT extends support to the e-governance initiatives of the Government of Kerala. 🔍

Research Areas

- Image processing
- Video communication
- Information technology
- Data mining
- Computational linguistics
- Photonics/Holography

Research Outcomes

- Papers published: 2

Registered Office

Centre for Development of Imaging Technology (C-DIT)
Chitranjali Hills, Thiruvallam Post
Thiruvananthapuram 695 027
Kerala

T: 0471-2383506

W: www.cdit.org

Recognition Status

File No.: 11/518/2010-TU-V

Initial Recognition: 2010

Valid Until: March 31, 2019

R&D Manpower

Doctorates: 2

PGs & Graduates: 42



^ Launch of the Karnataka Green Growth Strategy

CENTER FOR STUDY OF SCIENCE, TECHNOLOGY AND POLICY

Brief Description

The Center for Study of Science, Technology and Policy (CSTEP), one of the largest think tanks in South Asia, it has grown to become a multi-disciplinary policy research organization in the areas of energy, infrastructure, security studies, materials, climate studies, and governance.

It is registered under section 8 as a company as per Companies Act 2013.

R&D Set-up

CSTEP has the following research facilities and infrastructure:

- High end computing facilities installed with the following computational capacity:
- Cluster compute power

Cluster 1

- Master Node – 1 x Intel Xeon E5420 (Four cores per processor), Memory 4 GB
- Total – 224 Cores
- Each core with 166 GFLOPS of computing power
- Total – 3.7184 TFLOPS of computing power

Cluster 2

- Master Node – 2 x Intel Xeon X5650 (Six cores per processor)
- Total – 12 Cores
- Each core with 10.666 GFLOPS
- Total – 127.992 GFLOPS of computing power

Cluster 3

- Eight Compute Nodes – 16 x Intel Xeon X5650 (Six cores per processor)
- Total – 96 Cores
- Each core with 10.666 GFLOPS of computing power
- Total – 1.023936 TFLOPS of computing power
- GPU:
- Master Node – Tesla C1060 computing processor running at 1.296 GHz, 4GB GDDR3 512-bit.
- Compute power – 78GFLOPS
- These facilities are being used by the CSTEP for its internal research.

Sources of income for R&D

- Government Sources
- Donations
- International Funding

R&D expenditure (₹ in lakhs)

FY 2014-15 = 1,315.87

FY 2015-16 = 1,182.63

FY 2016-17 = 1,442.71

R&D Achievements

The organization has carried out several research projects such as:

- Programmatic engagement on power sector - planning RE deployment and implementation of distribution reforms
- Implementation roadmap for renewable energy-backed electric public transport system for Bengaluru and Kolkata

Registered Office

Center for Study of Science, Technology and Policy
18 & 19, 10th Cross, Mayura Street, Papanna Layout, Nagashettyhalli, RMV II Stage, Bengaluru 560 094
Karnataka
T: 080-6690-2500
E: cpe@cstep.in

Recognition Status

File No.: 11/454/2006-TU-V
Initial Recognition: 2006
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 18
PGs & Graduates: 77

Research Areas

- LPG-related equipments and devices
- Open-technology machinery and system
- Industrial and automotive applications of LPG

Research Outcomes

- Papers published: 33
- Technologies transferred/commercialized: 1

- Design and development of smart micro-grid technologies for large scale decentralized solar power applications in Indian villages - The Zero Energy Village concept
- Determination of tariff in respect of waste heat recovery treatment for power plants
- Technology policy options for low carbon energy growth of India
- Fueling Make in India: How Ethanol can be India's octane booster for economic growth
- Development of a state level integrated energy planning framework towards accelerated RE deployment in Karnataka
- Establishment of India Platform for GHG emissions estimation and analysis
- National level implications of Implementation of SDG7: Access to modern cooking fuels in India
- Green growth, low carbon and climate change resilient development for Karnataka
- Critical and in-depth analysis of the renewable energy sector in

Karnataka and recommendations for key policy and regulatory measures

Technical Collaborations


National

- Government of Karnataka
- Indian Institute of Science (IISc)
- Karnataka Renewable Energy Development Ltd (KREDL)/ Bengaluru Electricity Supply Co. Ltd (BESCOM)
- Indian Institute of Technology (BHU)
- Vanmat Technologies Pvt. Ltd

International

- Asian Institute of Technology
- Deakin University
- Practical Action South Asia Regional Officer

Societal Relevance

A technology entitled "Sanitech tool" was developed, as a design of sanitation systems for Swachh Bharat. 



▲ Cold metal transfer machine with robot

CENTRAL BOARD OF IRRIGATION AND POWER

Brief Description

The Central Board of Irrigation and Power (CBIP), a non-government organization registered in 1975 under the Societies Act 1860, was established by the Government of India in 1927. CBIP has been rendering dedicated service to professional organizations, engineers, and individuals in the country related to power, water resources, and renewable energy sectors.

R&D Set-up

The research facilities available at CBIP are as follows:

- Motor Protection Relay numeric – ASHIDA make
- Feeder Protection Relay - ASHIDA make
- Differential Relay numeric
- Differential Relay Electromagnetic
- AC High Voltage Test set
- 11KV/110V Potential Transformer
- Bucholz's Gas Relay
- Solar Modules, Inverters and Batteries
- Transformer Oil Testing Equipments in Association with ERDA

Sources of income for R&D

- Government funding from Ministry of Power, Government of India and Central Power Research Institute.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 2.84

FY 2015-16 = 1.74

FY 2016-17 = 2.44

R&D Achievements

- Central Board of Irrigation and Power (CBIP), as part of its technology forecasting activities identified geosynthetics as an important area relevant to India's need for infrastructure development.
- With the initiative of CBIP, Indian chapter of International Geosynthetics Society (IGS) has been formed. Indian chapter of IGS is involved in dissemination of knowledge through training courses and conference on geosynthetics and geosynthetics are now being increasingly used for every conceivable application in civil engineering, namely, construction of dam, embankments, canals, approach roads, runways, railway embankments, retaining walls, slope protection works, drainage works, river training works, seepage control, etc. due to their inherent qualities.
- Compilation of data on various measures taken in various hydro projects with regard to problems

Registered Office

Central Board of Irrigation and Power,
Malcha Marg, Chanakyapuri,
New Delhi 110 021
T: 011-2611 5984

E: kanjlia@cbip.org; cbip@cbip.org

W: www.cbip.org

Recognition Status

File No.: 11/67/1988-TU-V

Initial Recognition: 1988

Valid Until: March 31, 2020

R&D Manpower

Doctorates: 1

PGs & Graduates: 9

Research Areas

- Geological & geotechnical investigations
- Power, renewable energy, and water resources sectors

Research Outcomes

- Papers published: 14

faced during its construction & its mitigation methods and latest technologies and best practices in geological and geotechnical investigations of hydroelectric projects. The report will highlight the conventional methods of investigations, their limitations and suggest supplementary/new techniques with special emphasis on geological challenges in case of water conductor systems to curtail time and cost overrun taking into accounts the Himalayan terrain and its geological setup.

Technical Collaborations

National

Indian Electrical and Electronics Manufacturers Association (IEEMA); India Smart Grid Forum (ISGF); Skill


Council for Green Jobs (SCGJ); Power Sector Skill Council (PSSC); National Skill Development Corporation (NSDC); Tata Power Company.

International

GIZ-German Development Cooperation, Germany CIGRE, Paris

Societal Relevance

The following R&D outcomes are of national/societal significance:

- In line with the Skill Development Mission of the Government of India, CBIP has established a Centre of Excellence at Gurugram to provide training and develop the skill of professionals in the fields of hydro, thermal T&D, solar and power management, etc. 



^ Winning loom

CENTRAL COIR RESEARCH INSTITUTE

Brief Description

The Central Coir Research Institute (CCRI) is one of the prime research centres of the Coir Board. The Coir Board was set up by the Government of India for promoting the coir industry and started functioning from July 7, 1954. Several functions enumerated include fixing grade standards for coir products and inspection of coir fibre, coir yarn, and coir products. The Coir Board has taken various schemes under research and development, such as modernization and standardization of ratts, looms and equipment, distribution of standard ratts, looms and equipment, extension service in spinning, bleaching, dyeing, geo-textile applications, and imparting intensive training to people from the industry. These schemes contribute in improving the quality of coir and coir products; thus, improving the living styles of the people in the coir industry to a large extent.

R&D Set-up

Following are the research facilities provided by the organization:

- Gas Chromatograph Mass Spectrometere (GCMS)
- High Performance Liquid Chromatograph (HPLC)
- UV Visible Spectrometer
- Water purification system 2 unit
- Scanning electronic microscope
- Fourier Transform Infrared Spectrophotometer(FTIR)
- Color matching cabinet
- Laminar air flow chamber
- Environmental test chamber
- Thermogravimetric Analyser (TGA)
- Flame Photo Meter

Sources of income for R&D

- Grants from Ministry of Micro, Small & Medium Enterprises (MSME), Government of India

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 520.00

FY 2015-16 = 300.00

FY 2016-17= 692.50

R&D Achievements

Products developed

- Developed coir krishimitra- a urea free coir pith compost
- Developed coir reinforced injection moulded chairs
- Developed coir reinforced injection moulded pots, funnel, etc.
- Developed coir chess board and coins
- Developed coir silk yoga mat

Registered Office

Central Coir Research Institute
Coir Board Complex, Kalavoor
PO Alappuzha 688 522, Kerala
T: 0477-2258094, 2258304
E: ccricoirboard@gmail.com,
ccrikalavoor@gmail.com
W: www.ccricriindia.org

Recognition Status

File No.:11/299/1994-TU-V
Initial Recognition: 1994
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 4
PGs & Graduates: 15

Research Areas

- Modernization of production process and evolve techniques to upgrade the process of extraction of coir fibre
- Development of machinery and equipment to design and fabricate coir processing machineries of better output and reducing drudgery and physical strain of coir artisans
- Product development and diversification to improve the user areas of coir products in non-traditional fields of application
- Development of environment-friendly technologies
- Technology transfer, incubation testing and service facilities

Research Outcomes

- Papers published: 19
- Technologies transferred/commercialized: 53

- Fabricated items from coir pith and polyester resin, such as flower vase, vakkannadi, etc.
- Developed circular woven coir geo bag
- Developed coir cell geo textiles
- Coir composite doors with coir and wood combinations

Processes developed

- Composting of coir pith using *Eichornniacrasdipes* as an alternate to urea as nitrogen
- A successful cleaner, faster, and ecofriendly technology of bleaching and softening of coir using "Fibre Magic" was developed by Coir Board through laboratory research and scale up studies
- Developed a vacuum bag moulding technique for coir polyester sheets with high gloss. The glass sheets are used as the mould for sheets. Vacuum bag moulding is used for getting sheets with uniform resin distribution and without air holes.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The technologies developed by CCRI have been standardized and demonstrated to public and trainings have been conducted for disseminating the technologies. The technologies have been

transferred to the different parties on request.

- Short-term training on coir geotextiles at CCRI held during the period from May 20–24, 2013.
- A two months' trainers training programme for manufacturing handicrafts and other diversified products in the month of July 2013.
- Provided five-day training on the testing of rubberized coir to The Technical Officer, Eastern mattresses, Thodupuzha
- Provide one-day training on the production of coir moulded composites from polyester resin and coir bit fibres/ coir pith for three persons from Coir city Consortium Pollachi on July 14 at CCRI.
- Provided five-day training for two B.Tech Polymer Engineering students from MG University College of Engineering, Thodupuzha
- Provided five-day training on coir polyester moulding for three women trainees from Vanitha Service Sangam Kalavoor
- Provided five-day training on rubberized coir testing for two staff from Coir Foam Products, Polaachi from June 8, 2015 to June 12, 2015. 🔍



^ Tree water potential analysis at Tungnath timber line area, Rudraprayag

CENTRAL HIMALAYAN ENVIRONMENT ASSOCIATION

Brief Description

The Central Himalayan Environment Association (CHEA) was founded on October 2, 1981, as a non-governmental organization; the society was registered later in May 1982. CHEA is one of the earliest societies in north India which stressed on 'the environment and the livelihood of the people in the Himalayas' as its core concern. CHEA has espoused many mountain causes, engaged itself actively in scores of action-researches on human and environmental aspects and livelihood-related projects, and continues to be involved to this day.

R&D Set-up

The following are the research facilities provided by the organization:

- Laboratory facilities for soil testing
- Research and Interpretation Centre (RIO in Dehradun)

Research facilities are used by individuals as per need. Occasionally shared by external members while internally it's regularly used.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 253.69

FY 2015-16 = 170.38

FY 2016-17 = 264.06

R&D Achievements

Products developed

- The specific recipe was developed for manufacturing of Chyura

(*Diploknema butyracea*)

butter soap.

- Oak acorn seed collection, sorting, storage, and sowing methods have been undertaken since the last 4 years to standardize the techniques.

Processes developed

- The research on pine briquette making has ensured quality control by using appropriate ratio of raw material.
- The direct sowing of oak acorn after their effective sorting, grading, and storage methods resulted in germination above 75%–80%.

Interdepartmental prototype models developed/designed

- Applying geo-spatial techniques for in situ water conservation in hilly terrain for spring rejuvenation has been demonstrated with the support of GBPNIHESD (GB Pant National Institute of Himalayan Environment & Sustainable Development) in two sites.

Technical Collaborations

National

Department of Forestry and Environment Science, Kumaon University, Nainital; G B Pant National Institute of Himalayan Environment and Sustainable Development (GBPNIHESD), Kosi-Katarmal, Almora; Wildlife Institute of India (WII), Dehradun; Birbal Sahni Institute of Palaeobotany, Lucknow; Kumaon University; University of Kashmir,

Registered Office

Central Himalayan Environment Association
06 Waldorf Compound, Mallital,
Nainital 263 001, Uttarakhand
T: 5942233099
E: cheaindia@gmail.com
W: www.cheaindia.org

Recognition Status

File No.: 11/524/2011-TU-V
Initial Recognition: 2011
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 3
PGs & Graduates: 4

Research Areas

- Organic farming
- Climate change
- Forest ecology
- Ecosystem services and biodiversity
- Conservation
- Pollination services
- Watershed management
- Appropriate rural technologies

Research Outcomes

- Papers published: 1

Srinagar (Jammu & Kashmir); Market Linkage - Revti Essentials, Haldwani, Nainital

International

International Centre for Integrated Mountain Development (ICIMOD), Nepal; Deutsche Gesellschaft für Internationale Zusammenarbeit, Germany

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Active involvement of women in oak acorn collection/grading with better understanding of concept and additional income. The intensive labour work has also reduced, increasing the role of women in the intervention.
- Better understanding of Chyura butter value in terms of money through its value addition. The intervention has motivated the villagers to take up the activity for

commercial gains and fostered further improvisation of products.

- Greater awareness among communities on the different causes of fire and possible preventive measures that can be taken up.
- The leading community members are now well aware of the fundamentals of geo-hydrology and importance of scientific studies to create a structure for in situ water harvesting.
- The techniques of water harvesting through appropriate size and model of tanks are ensuring the water availability during 30–40 dry days and thus prove valuable in coping with the challenge of water scarcity.
- Biogas intervention has reduced the dependency on fuelwood by 40% from a unit. The concept is also useful in reducing the workload for women folk and providing them smokeless fuel. 🔍



^ Two station tyre test machine

CENTRAL INSTITUTE OF ROAD TRANSPORT

Brief Description

The Central Institute of Road Transport (CIRT) is registered under Societies Registration Act of 1860. It was established in 1967, with an aim to improve the public transport system in India by developing efficient management systems through research and by providing testing and consultancy activities in the field of road transportation. The Institute makes services available to public and private sectors and undertakes projects and provides testing facilities through its various laboratories. The Institute undertakes consultancy and research assignments on transport policy, transportation planning, traffic management, maintenance management, materials management, human resource management, and management information systems.

R&D Set-up

The following research facilities and infrastructure are available at the Institute:

- Optical Direct Reading Spectrometer
UV Visible Spectrometer
- Xenon Arc Weathrometer
- Carbon & Sulphur Estimation Apparatus
- Metallurgical Microscope
- Two Station Tyre Test Machine (AKRON make)
- Two Station Tyre Test Machine (BISS make)
- Dynamic Wheel Cornering Fatigue Test Machine

- Universal Tyre Testing machine
- TGA & FTIR System
- Cold Chamber
- Vacuum Oven
- Dust Spray Chamber Battery Test facility Photometry test Facility
- Test Facilities and Infrastructural facilities established at CIRT are being used by vehicle manufacturers, automotive component manufacturers, state transport undertakings, Association of State Road Transport Undertakings, Bureau of Indian Standards (BIS), and other engineering industries.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 1,186.00

FY 2015-16 = 1,510.00

FY 2016-17 = 1,585.00

R&D Achievements

Processes developed

- Establishment of test facility for performance evaluation of lubricating oil filters & diesel filters for IC engines.
- Establishment of test facility for performance evaluation of air filters for IC engines.
- Development of test facility for measurement of tyre rolling resistance
- Development of test facility for measurement of wet grip adhesion of tyres

Registered Office

Central Institute of Road Transport, Post Box No. 1897, Pune-Nasik Road, Pune 411 026 Maharashtra
T: 020-67345300
W: www.cirtindia.com

Recognition Status

File No.: 11/361/1998-TU-V
Initial Recognition: 1998
Valid Until: March 31, 2017

R&D Manpower

Doctorates: 1
PGs & Graduates: 26

Research Areas

- Certification and developmental testing for automotive vehicles
- Road transport emission inventories

Research Outcomes

- IPRs held
 - » Patents awarded: 1
- Technologies transferred/commercialized: 2

Prototypes developed

- Developed retrofitted battery operated electric bus in collaboration with M/s Impact Automotive Solutions Ltd., Under R&D pilot project of Ministry of Road Transport & Highways (MoRTH)

Commercialization potential of products/processes developed

- A system for evaluating driver is commercialized.
- PMC consultant fees ranging from ₹ 15 lakhs to ₹ 1 crore per state has been brought in place; this is at present working with two states—Rajasthan & Maharashtra.

Technical Collaborations


National

Ministry of Road Transport & Highways (MoRTH), Government of India; Ministry of Heavy Industries and Public Enterprises (MoHI&PE), Government of India; Association of State Road Transport Undertakings; State Transport Undertakings; all major vehicle & tractor manufactures, namely Tata Motors Ltd, Ashok Leyland Ltd, and M/s Scania India; M/s

Volvo India (Pvt.) Ltd; M/s John Deere India (Pvt.) Ltd; International Tractors Ltd; tyre manufacturers, wheel rim manufacturers & other automotive components manufacturer; Associations such as SIAM/ACMA/PCRA/ATMA/ITTAC, etc.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- MoRTH R&D Pilot Project for Conversion of diesel buses to electric buses is connected with Clean Energy, Make in India, Smart City Mission & Swachh Bharat.
- Development of patented product - An Innovative Driving Testing System (IDTS) is connected with Make in India & Smart City Mission.
- Training imparted to the officials of Ministry of Road Transport & Highways, State Transport Authorities, other governmental and non-governmental organizations in the areas of Central Motor Vehicle Rules, Bus Body Building, Road Safety, Road Transport Regulations, Traffic and Transport Policies, etc., is connected with Skill India. 



^ Ultra Stiff Ultra Precision Turning Machine

CENTRAL MANUFACTURING TECHNOLOGY INSTITUTE

Brief Description

Established in Bengaluru by the Government of India in 1965, the Central Machine Tool Institute (CMTI) is a research and development organization. Its main focus is on harnessing know-how in the manufacturing technology sector for practical purposes and assisting technological growth in the country. It is registered as an autonomous institute under Government of India.

R&D Set-up

The following are an outline of research facilities and infrastructure available at the institution:

- DMLS (Direct Metal Laser Sintering)
- Femto Second Laser Machine
- PVD (Magnetron sputtering)
- Interferometer (GBI)
- Ultra Precision Coordinate Measuring Machine (UPCMM)
- Scanning Electron Microscope (SEM)
- Nanoindenter
- X-RAY Diffractometer (XRD)
- Laser Confocal Microscope
- Kern Ultra-Precision CNC Machining Centre
- Hardinge CNC Hard Turning Lathe
- Agie CNC Micro Wire-EDM
- Schaublin High Precision Milling Machine with Rotary Table
- Kellenberger Universal Cylindrical Grinding Machine
- Schaublin High Precision Lathe

Sources of income for R&D

Grants from Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 3,327.00

FY 2015-16 = 3,293.00

FY 2016-17 = 3,412.00

R&D Achievements

Products developed

- Vertical planetary mixer of 2,500 litres and 3,000 litres capacity
- Accessories for mixers (bowls, spill tray)
- Electro hydraulic force exciter
- Fabrication of large size reflector plates
- Scanning tunneling microscope
- Centreless bar turning machine with single head
- High speed shuttleless rapier loom
- Ultra stiff ultra precision turning machine
- Pressure endurance tester for mems based pressure transducer
- Hydraulic actuator mechanism for cowl movement

Processes developed

- Micro needles
- Micro fluidic channels
- Hydrodynamic bearings
- DLC Anti-Reflective coating for Silicon and Germanium substrates
- CNT for super black applications
- Coating of dissimilar metals for wear resistance applications

Registered Office

Central Manufacturing Technology Institute
CMTI, Tumkur Road,
Bengaluru 560 022, Karnataka
T : 080-23372048
E: director.cmti@nic.in/
directorate.cmti@nic.in
W: www.cmti-india.net

Recognition Status

File No.: 11/69/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 5
PGs & Graduates: 75

Research Areas

- Advanced manufacturing systems and special machines
- Micro engineering and nano technology
- Advanced manufacturing technology development
- Precision manufacturing
- Metal additive manufacturing
- Smart manufacturing
- Vision systems and sensor technology development
- Development of special test systems and test protocols

Research Outcomes

- Papers published: 44
- IPRs held
 - » Patents filed: 5

- Mask for MEMS and metrology artifacts
- Cryogenic machining of tyre treads
- Micro cantilever
- Impeller casting for cryogenic engine parts
- DLC for solar panel application

Prototypes developed

- Magnetic abrasive finishing & deburring machine (MAFD) for nano finishing and micro deburring
- Micro needle array based electrode for biopotential measurement
- Digital micro mirror device based Projection Microstereolithography (PpSL) System
- Thermal error compensation software module for Machine Health Management System
- Ultra precision ultra stiff hydrostatic slide
- Spindle Test Rig
- Piezo-resistive based MEMS pressure sensor for bead seating pressure measurement

Instruments developed

- Scanning Tunnelling Microscope

Commercialization potential of products/processes developed

Following is a probable list of technologies ready for commercialization

- Magnetic Abrasive Finishing and Deburring Machine (MAFD)

- Nano Finishing and Micro Deburring
- Sphere Lapping Attachment

Technical Collaborations

National

Textile Machinery Manufacturers-Consortium; National Institute of Technology; National Aerospace Laboratories; Indian Space Research Organisation; Defence Research and Development Organisation

International

CraneField University, UK; Western Michigan University, USA; Oklahoma State University, USA; Fraunhofer, Germany

Societal Relevance

The following R&D outcomes are of national/societal significance:

- High Speed Shuttleless Rapier Loom is currently being imported. The indigenization of the loom will save foreign exchange and is useful for the textile industry.
- Ultra Stiff Ultra Precision Turning Machine can be made indigenously, hence save foreign exchange imported. The indigenization of the machine will save foreign exchange and is useful for the optical quality products. 🔍



^ Instrumentation for I_c measurement (DC) of the HTS cable at 77 K

CENTRAL POWER RESEARCH INSTITUTE

Brief Description

The Central Power Research Institute (CPRI) was established by the Government of India in 1960. The Institute was reorganized into an autonomous society in the year 1978 under the aegis of the Ministry of Power, Government of India. The main objective of setting up the Institute is to serve as a national-level laboratory for undertaking applied research in electrical power engineering, besides functioning as an independent national testing and certification authority for electrical equipment and components to ensure reliability in power systems and innovate and develop new products.

R&D Set-up

CPRI has the following research facilities and infrastructure:

- Dust chamber
- Pre-painted galvanized steel 1 mm thick with zinc coating
- 2 mm thick hot dip galvanized plan GI Sheet with zinc coating
- Take up and pay off machines
- Damp Heat Cyclic Chamber
- Semi-Automatic AC 3 phase Phantom load Source
- Electrostatic discharge simulator
- Thermal cycle walk in chamber
- Functional evaluation tool Ext. edition software among many.

Efforts have been made to encourage sharing to the extent that R&D at CPRI is taken up in a collaborative manner with the academia and industry under the RSoP and NPP scheme.

Sources of income for R&D

Grants from Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 19,997.67

FY 2015-16 = 15,277.31

FY 2016-17 = 26,504.42

R&D Achievements

Products developed

- Development of flame retardant polymer composites for insulating applications
- Dielectric nano-composites for capacitors applications
- Development of gasification reactor system for conversion of multi fuel to syngas
- Development and demonstration of 1 kW soluble lead redox flow battery system for solar energy and retrieval
- FPGA-based development of different MPPT algorithms for a stand-alone photo voltaic system using artificial intelligence
- Development of high temperature low sag nano composite core
- Development of intelligent relaying scheme for microgrids with DG penetration among other.

Processes developed

- A novel optoelectronic technique for online partial discharge monitoring of transformers

Registered Office

Central Power Research Institute
Prof. Sir C V Raman Road
Post Box No: 8066,
Sadasiva Nagar (P.O.)
Bengaluru 560 080, Karnataka

Recognition Status

File No.: 11/68/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 22
PGs & Graduates: 91

Research Areas

- Power engineering
- Generation, Transmission, Distribution, Renewables, Energy and Environment

Research Outcomes

- Papers published: 171
- IPRs held
 - » Patents filed: 60
 - » Patents awarded: 20
- Technologies transferred/commercialized: 22

- Use of synchrophasors in power system load modelling and state estimation
- Characterization of electric double layer super capacitor with CNT-conducting polymers / metal oxide composites and nano dielectrics
- Establishing novel erosive wear test facility for testing of materials used in hydro-turbine components
- A study to evolve a comprehensive test to distinguished between the qualities of primary and secondary grade electrical (CRGO) steels
- Reduction of switching transients in doubly fed induction machine used in large pumped storage plant

Studies to improve the performance of fault location algorithm for multi-location shunt fault in transmission line


Technical Collaborations

National

Indian Institute of Science (IISc), Bengaluru; Indian Institutes of Technology (IITs); Raychem; RPG Enterprises; Bharat Heavy Electricals Ltd (BHEL); Centre for Development of Advanced Computing, India CDAC

Societal Relevance

The following R&D outcomes are of national/societal significance:

- R&D under National Perspective Plan (NPP)
- Research Scheme on Power (RSoP)
- In-House R&D (IHRD)
- Uchhatar Avishkar Yojana(UAY)
- IMPRINT India Initiative. 



^ Field study

CENTRE FOR ECOLOGY DEVELOPMENT AND RESEARCH

Brief Description

The Centre for Ecology Development and Research (CEDAR) is a not-for-profit organization registered in 2006 under the Societies Act of 1860. The research activities of CEDAR essentially focus on generating, monitoring, and interpreting socio-ecological field-data that can improve the management of natural resources. Central to CEDAR's ideology is the recognition that local communities must participate in conservation. Therefore, in addition to building core research competence in forestry, ecology, and social sciences, the organization works towards strengthening links between communities and ecosystems by networking with grassroot organizations.

R&D Set-up

Research facilities and infrastructure at CEDAR are as follows:

- Soil testing laboratory and equipment for ecological research in Dehradun
- Permanent plots along a disturbance gradient in Nainital district
- The research areas are frequently accessed by the members of the organization for data collection and stakeholder meetings
- Individuals such as university students access the field network of CEDAR and the research laboratory for dissertation and internship studies
- CEDAR always encourages as well as promotes 100% sharing of

knowledge developed through research

Sources of income for R&D

- Government sources
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 58.67

FY 2015-16 = 78.58

FY 2016-17 = 106.28

Technical Collaborations

National

Forest Department, Uttarakhand; IVRI, Mukteshwar; TERI University, New Delhi

International

International Centre for Integrated Mountain Development (ICIMOD), Nepal; IDRC, Canada; Geography Department, University of Cambridge; United Nations Development Programme (UNDP). [Q](#)

Registered Office

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House No. 201/1, Phase-1,
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Recognition Status

File No.: 11/514/2010-TU-V
Initial Recognition: 2010
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 3
PGs & Graduates: 8

Research Areas

- Forest and humans
- Urbanization
- Climate change adaptation
- Wildlife, people & land use change

Research Outcomes

- Papers published: 9



Research work in the organization

Registered Office

Centre for Environment and Development Vattiyoor kavu,
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W: www.cedindia.org

Recognition Status

File No.: 11/604/2013-TU V
Initial Recognition: 1991
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 23
PGs & Graduates: 61

Research Areas

- Land and Water Resources
- Wetland Ecosystem
- Coastal and Marine Ecosystem
- Forestry and Wildlife
- Biotechnology Research
- Environmental Assessment
- Environmental Sanitation
- Health and Hygiene
- Climate Change and Energy Research,
- Solid Waste Management
- Wastewater Management
- Sustainable Livelihood Issues
- Communication and Media Research, Information, and Knowledge Management

CENTRE FOR ENVIRONMENT AND DEVELOPMENT

Brief Description

The Centre for Environment and Development (CED), established in 1993, is an autonomous research and development, training and consultancy organization, focussing on fields related to environment and development. The headquarters of CED are located at Thiruvananthapuram and the eastern regional campus at Bhubaneswar, regional centre at Hyderabad and projects in Andhra Pradesh, Jharkhand, Bihar, West Bengal, Puducherry, and Gujarat, apart from Odisha and Kerala.

It is a society NGO with registration no. 253/93.

R&D Set-up

The following research facilities and infrastructure are available in the organization:

- Environmental and Tissue Culture Lab
- Remote Sensing and GIS Lab

Sources of income for R&D

Government sources

Technical Collaborations

National

Technical collaboration with the Environment Science Department of Malayalam University, Kerala; Technical collaboration with Centurian University of Technology and Management, Bhubaneswar

International

Collaboration and MoU with Fukushi University, Nagoya, Japan; International collaboration with University of Lausanne (Switzerland)

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Swachh Bharat Mission: SWM Waste Water Management; ODF- Provided technical support for implementing Swachh Bharat Programme in the state of Odisha
- AMRUT Programme in the states of Kerala, Odisha, Himachal Pradesh, Rajasthan, etc. insofar as training and capacity building were imparted to functionaries of the urban local bodies (ULBs).
- AMRUT: Functioning as City Mission Management Units in 9 ULBs of Odisha- Providing Engineering and Planning Support to ULBs to plan and execute water supply, waste water management and open and green area planning
- National Urban Livelihood Programme- Providing planning and implementation support under National Urban Livelihood Programmes in Odisha. 🔍



^ 4G prototype

CENTRE OF EXCELLENCE IN WIRELESS TECHNOLOGY

Brief Description

The Centre of Excellence in Wireless Technology (CEWIT) provides technological leadership to the Indian wireless industry and addresses the needs of the Indian market through advanced research and development (R&D) and value creation. CEWIT works as a neutral partner to industry stakeholders and policy makers on various technological aspects of the wireless communication industry. The center's research focus areas are —millimeter wave communication; massive micro; dense network, etc.

It is an IIT Madras Society registered under the Tamil Nadu Societies Registration Act.

R&D Set-up

CEWIT's research facilities and infrastructure include:

- High end servers and workstations, PCs, and laptops, LTE prototypes, Simulator software
- The facilities are used by interns and project students from academia, especially IIT
- The equipments are fully utilized by the team and the students/ interns

Sources of income for R&D

Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 395.00

FY 2015-16 = 373.00

FY 2016-17 = 422.00

R&D Achievements

Products developed

- BWSIM- An advanced 4G/4G-Adv system level simulator for R&D in cellular technologies
- WiFiSim- Simulator for WiFi networks (L1, L2)

Prototypes developed

- LTE eNodeB and UE (L1,L2)- LTE Physical layer blocks and algorithms for Base station and UE. LTE MAC, RLC layers along with Schedulers.
- CEWIT has earned ₹112 lakh of revenue from the licenses provided to industry and academia from 2012.

Technical Collaborations

National

- Tejas Networks
- Bharath Electronics
- Nokia Networks
- Reliance Jio
- Tata Elxsi
- AltioStar Networks
- Wipro Ltd
- Aricent
- Saskaen Communications
- Tech Mahindra
- L&T Infotech
- Aricent
- Samsung
- IIT Madras, Hyderabad, Bombay, Bengaluru, Mandi, Delhi
- Thiagarajar College of Engineering, Madurai

Registered Office

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Recognition Status

File No.: 11/485/2008-TU-V
Initial Recognition: 2008
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 3
PGs & Graduates: 21

Research Areas

- Wireless communication technologies
- Broadband wireless and cellular technologies

Research Outcomes


- Papers published: 16
- IPRs held
 - » Patents filed: 82
 - » Patents awarded: 22
- Technologies transferred/commercialized: 1

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The simulator software has been provided to 10 leading academic institutes. They have been used for research by several Masters and PhD scholars in more than 12 institutes.
- The simulator software has also been used for teaching wireless courses in technological institutes.
- Technologies that can help Indian companies create and

manufacture telecom equipments are being developed.

- The standard essential patents and implementation patents help Indian equipment vendor companies develop products in India.
- Technology to provide cost-effective wireless broadband solutions for rural India is currently being developed. 



↖ Carbon aerogel base supercapacitors

CENTRE FOR MATERIALS FOR ELECTRONICS TECHNOLOGY

Brief Description

The Centre for Materials for Electronics Technology (C-MET) functions as an autonomous scientific society under the Ministry of Electronics & Information Technology (MeitY), Government of India. The activities of C-MET include development of thick film materials, polymers for electronics, specialty chemicals and glasses, ultra high purity and refractory metals, semiconductors, electronic ceramics, and fine powder processing. C-MET undertakes joint research and development (R&D), sponsored research, technology transfer and consultancy projects, and provides technical services.

The Center is Autonomous Society (Registered), and the date of registration March, 1990.

R&D Set-up

The research facilities and infrastructure available at C-MET are as follows:

- UV-VIS Spectrometer
- Spectrofluorometer
- Photo Luminescence Spectrometer
- Fourier Transform Infrared Spectrometer (FTIR)
- Scanning Electron Microscope (SEM) with EDAX
- Field Emission Scanning Electron Microscope (FESEM)
- Inductively Coupled Plasma Optical Emission Spectrometer (ICP-OES)
- X-Ray Diffractometer (XRD)
- Gas Chromatograph Mass Spectrometer (GC-MS)

- Energy Dispersive X-ray Fluorescence (ED XRF)
- Graphite Furnace Atomic Absorption spectroscopy (GF AAS)
- Microwave Digestion System for hafnium facility
- UV Visible Spectrophotometer

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 2,758.94

FY 2015-16 = 1,673.26

FY 2016-17 = 2,175.41

R&D Achievements

Products developed

- Development of Li-ion batteries: active materials synthesis, fabrication, and testing of prototype cells
- Low temperature co-fired ceramic (LTCC) packaging technology
- Hafnium sponge for strategic applications
- Silicon carbide (SiC) semi-insulating single crystal for high temperature, high voltage
- And high frequency electronic applications
- Recovery of precious metals from electronic waste: printed circuit boards (PCBs)
- Government-owned restriction of hazardous substances (RoHS) test laboratory: service to industry
- Carbon aerogel and graphene-based supercapacitors
- Development of indigenous materials for high power

Registered Office

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Recognition Status

File No.: 11/247/1992-TU-V
Initial Recognition: 1992
Valid until: March 31, 2019

R&D Manpower

Doctorates: 43
PGs & Graduates: 135

Research Areas

- Integrated electronics packaging
- Nanomaterials and devices
- Ultra high purity materials and compound semiconductors
- Materials for renewable energy
- Actuators and sensors
- E-waste management and NABL accredited restriction of hazardous substances (ROHS) facilities

Research Outcomes

- Papers published: 176
- IPRs held
 - » Patents filed: 20
 - » Patents awarded: 4
- Technologies transferred/commercialized: 3

microwave and medical applications

- Thermal sensor-based monitoring system for the early detection and screening of breast cancer

Processes developed

- Set-up for testing the hydrogen generation from water and hydrogen sulphide
- Fabrication setup for photo – patterning of circuits with 100 micron line and space
- Thin film deposition using thermal evaporation vacuum technique
- Solar cell fabrication & testing facility
- Glass melting and annealing furnaces for preparation of optical glasses
- Facility to fabricate LTCC tapes and pastes
- A state-of-the-art Hafnium metal production facility to produce 320 kg/annum for strategic applications
- Pilot plant to produce nano zinc oxide and allied materials
- Facility to produce carbon aerogel at pilot plant scale
- Facility to fabricate super capacitors using graphene and carbon aerogel
- Facility to fabricate low to high dielectric PTFE substrates using indigenous technology
- Facility to fabricate and test various microwave frequency antennas

Commercialization potential of products/processes developed

- Modified silica filler for space applications
- Quickly Rechargeable Emergency Lamp

- Process for Nano-ZnO powder
- Microwave substrates with dielectric constant 6.15 and 3.0
- Piezoceramic Compositions and Components
- Photopatternable silver and photoconductor thick film pastes for photo sensors application
- Lead Free X-Ray Absorbing Materials & Medical Apron
- Wearable device and analysis system for early detection and screening of breast cancer
- Transparent heater for defrosting applications
- Technology for Fabrication of Aerogel Electrodes (AG-E) for supercapacitor manufacturing
- Technology for making Aerogel Supercapacitors (AGSC)

Technical Collaborations

National

Biotechnology and Information Technology Services (KBITS), Government of Karnataka; E-Parisara, Bengaluru; Defence Metallurgical Research Laboratory (DMRL); Vikram Sarabhai Space Centre (VSSC); Central Pollution Control Board (CPCB)

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Recovery of precious metals from electronic waste
- Government-owned restriction of hazardous substances (ROHS) test laboratory
- Glass-based q-dot composite
- Monitoring system for the early detection and screening of breast cancer
- Development of li-ion batteries. 🔍



Some of the demonstrable devices exhibited at the prototype gallery Defogging panels; Gel display 'Projection lithography system device Graphene coated glass; Triboelectric nanogenerator

CENTRE FOR NANO AND SOFT MATTER SCIENCES

Brief Description

The Centre for Nano and Soft Matter Sciences (CeNS) is an autonomous research institute under the Department of Science and Technology, Government of India. The Centre is engaged in materials research at all relevant length scales. Specifically, the current activities are focussed on a variety of metal and semiconductor nanostructures, liquid crystals, gels, membranes, and hybrid materials. It has close interactions with many institutions and industry, in India as well as abroad.

R&D Set-up

The following are the research facilities listed below:

- Land and Building: Since its formation, the Centre is functioning in a leased building provided by Bharat Electronics with plinth area of about 900 sq. m. An additional 502 sq. m area of lab space was subsequently added for research and development (R&D) activities.
- The Centre has been provided 14 acres land by the state government where campus development activities have already commenced at Shivanapura, Bengaluru and construction of buildings for nanotechnology labs and Incubation labs are under progress.
- Nano-Soft Labs
- Characterization Lab (C-Lab)

- Device and Interfaces Lab (Di-Lab)
- Tata Steel Advanced Materials Research Centre (TSAMRC) lab

Sources of income for R&D

- Grants from Government sources
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 573.53

FY 2015-16= 1,046.88

FY 2016-17= 903.79

R&D Achievements

Products developed

- Solar cell and method thereof
- A strain sensor and method thereof
- Polymer stabilized liquid crystal device, composition, and method thereof
- Supramolecular nanofibre as electrolyte
- Compounds exhibiting chiral nematic phase

Processes developed

- A process for producing graphene-based transparent conductive electrode and the product thereof
- A process for producing graphene and application thereof
- A synergistic mixture of water and isopropyl alcohol and application thereof
- Photoactive gel exhibiting optical memory states

Registered Office

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Recognition Status

File No.: 11/280/1993-TU-V
Initial Recognition: 1993
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 18
PGs & Graduates: 34

Research Areas

- Human habitat
- Urban planning
- Transport
- City water & sanitation
- Urban equity
- Sustainable energy

Research Outcomes

- Papers published: 122
- IPRs held
 - » Patents filed: 14
- Technologies transferred/commercialized: 5

- Turbostratic graphene dispersions, coatings, and process therefore

Interdepartmental prototype models developed/designed

- Luminescence-based lead sensor
- Invisible switches
- Self-heated cover slips
- Defogging panels
- Light modulating smart window
- Fog on-demand: electrically switchable transparency
- Fast responding energy efficient anisotropic organo gels
- Protective coating for copper

Technical Collaborations

National

Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) , Bengaluru; Science and Engineering Research Board (SERB), New Delhi; Department of Science and Technology, New Delhi; Tata Steel Ltd (TSL) Project, Mumbai; Tata Steel Advanced Materials Research Centre (TSAMRC) Project, Madras; CeNS-Centre for High Technology (CHT) Project, Uttar Pradesh; Hind High Vacuum Co. Pvt. Ltd, Bengaluru

International

Indo-German Science & Technology Centre (IGSTC) ; Indo-US project (IUSSTF) initiated with three Indian (CeNS, JNCASR & IISc) and three US

institutes (Purdue, Northwestern & Notre Dame); Indo-Bulgarian research project; INSA-Hungarian Bilateral Exchange Programme


Societal Relevance

The following R&D outcomes are of national/societal significance:

Make in India

- With Tata Steel Ltd: R&D project to manufacture advanced materials
- With Hind High Vacuum Co. Pvt. Ltd: R&D project to prototype manufacturing of oxide coated metal mesh-based transparent conducting plates.
- Technology transfer agreement with Lab Engineers (India): To manufacture and commercialize Projection Lithography System.

Swachh Bharat

- With Hindustan Petroleum Corporation Ltd: R&D project to find value addition to industrial carbon waste.
- TSAMRC has embarked on pre-pilot production of a carbon nano material from industry carbon waste. 



Research facilities

CENTRE FOR SCIENCE AND ENVIRONMENT (CSE)

Brief Description

Centre for Science and Environment (CSE) is a not-for-profit public interest research and advocacy organization based in New Delhi. Established in 1980, CSE works as a think tank on environment-development issues in India, poor planning, climate shifts devastating India's Sundarbans and advocates for policy changes and better implementation of the already existing policies. CSE uses knowledge-based activism to create awareness about problems and propose sustainable solutions.

CSE is a society-NGO (non-governmental organization), registered under the Societies Act, 1860.

R&D Set-up

Following are the research facilities provided by the organization:

- AAS Main unit and accessories with computer
- GC MS and accessories with computer
- GC (Thermo) with computer/GC (Nucon) with computer
- Microwave digester
- HPLC 1260 with computer/HPLC1100
- Post column derivatizer
- Real time PCR with computer
- Gel doc with computer
- Electrophoresis unit

Sources of income for R&D

- Grants
- Donations

- Testing/training
- Others such as corpus and interest

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 1,892.23

FY 2015-16 = 3,230.91

FY 2016-17 = 3,369.00

R&D Achievements

There are many innovative elements which are mentioned such as:

- Right to Clean Air and Sustainable Mobility has achieved remarkable success in pushing for CNG in all public transport in Delhi and more recently, in pushing for better urban mobility options that have made significant impact on the city's air quality with reduction in carbon emissions from the fleet.
- The Sustainable Industrialisation Programme rates industries on energy and environment performance and publicly discloses the information. Using rating as a tool this programme has achieved remarkable results in improving the environment and energy efficiency performance of Indian industry. CSE made a strong advocacy push to ensure that the recently notified environmental standards for coal based power plants, were implemented.
- The Climate Programme actively participates in influencing international negotiations on climate change by stressing the

Registered Office

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Recognition Status

File No.: 11/374/1999-TU-V
Initial Recognition: 1999
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 20
PGs & Graduates: 72

Research Areas

- Clean air and sustainable mobility
- Climate change
- Sustainable energy and industrialization
- Sustainable water management and sanitation
- Waste management
- Food safety and toxins
- Sustainable buildings and habitat
- Renewable energy

need for an urgent agreement that is effective and equitable. CSE has advocated an ambitious and equitable global deal in which the developed world takes the lead in cutting its emissions and supports developing countries to move towards a low carbon growth path.

- Food Safety Programme created far-reaching changes in the policies and regulations governing the use of toxins such as pesticides and antibiotics. Many of the pollution research and studies are conducted at CSE's Pollution Monitoring Laboratory in Delhi, which houses state-of-art equipment. CSE's research, supported by the Pollution Monitoring laboratory, has led to important studies and advocacy on antibiotics in honey, antibiotics in chicken and on junk foods.
- Continuous Emissions Monitoring Systems (CEMS) to continuously collect, record, and report the required emissions data, is now an integral part of implementing the new thermal power standards. CSE is perhaps the only non-governmental organization in the country with the requisite knowledge and experience on CEMS.
- Waste Management Programme of CSE has been received well by central and state governments. The Ministry of Environment Forest & Climate Change, and Central Pollution Control Board invited CSE to be one of the nodal agencies for capacity building of urban local bodies (ULBs) on waste management, and support the implementation of the Municipal Rules, 2016, in the coming year.

The following major initiatives, undertaken by CSE which also contribute to national R&D policy are mentioned below:

- Right to Clean Air and Sustainable Mobility
- The Sustainable Industrialization Programme
- The Climate Programme
- Food Safety Programme
- Pollution Monitoring Laboratory in Delhi
- Continuous Emissions Monitoring Systems (CEMS)

Technical Collaborations

National

Ministry of Environment, Forest & Climate Change; Ministry of Urban Development; Ministry of External Affairs; Karnataka Pollution Control Board; NITI Aayog

International

Ministry of Energy and Minerals, Tanzania; National Environmental Standards and Regulations Enforcement Agency (NESREA), Nigeria; Zanzibar, Tanzania; Ministry of Environment and Forest, Ethiopia; Environmental Protection Agency, Ghana; The Swaziland Environment Authority, Swaziland

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Water and sanitation: Sustainable Water Management and Sanitation programme establish policy principles, innovative technologies, and implementation strategies for water and wastewater management to help lay the foundations for a water and waste

prudent society. The programme is geared to help re-invent the urban water–wastewater management system.

- CSE contributed to the development of a 'rapid assessment tool' to calculate budgets required for faecal sludge management (FSM)
- Solid waste management: The programme is geared to understand the solid waste management challenge in the country, the numbers behind it, the gaps that exist and the path towards harnessing the opportunities.

Clean Energy

- CSE's research and advocacy on mini-grids to achieve energy access through clean energy dovetails. It helps guide the implementation of new thermal power standards and strengthening new forms of pollution regulation.

- CSE research have been instrumental in framing guidelines for energy rating of air conditions.
- Food and Toxins policy: This programme helps to push the dialogue on the crisis of antibiotic resistance becoming prevalent in the country.
- National Clean Air Action Plan programme influences national- and city-level policy and action and builds regulatory capacity to enable the framing of clean air action plans to cut pollution from all sources. BS VI roadmap has been finalized; deadline enforced.
- Mild hybrids blocked: The programme has pushed for reforms in the implementation of fuel economy standards to bring stringency, accountability, effective penalties for non-compliance, and to bring a fuel economy regime where diesel does not get an advantage through mild hybrid approach. 🔍



^ Training programme

CENTRE FOR THE DEVELOPMENT OF GLASS INDUSTRY

Brief Description

The Centre for the Development of Glass Industry (CDGI) was established in 1992 as a joint venture project of the Government of India, state government of Uttar Pradesh, and the United Nations Development Programme/United Nations Industrial Development Organization.

The organization is focusing at development and adoption of new glass melting and forming technologies ensuring effective utilization of raw material and energy resources and assimilation/ adoption of the relevant energy recovery system/ technologies by the industry. Improvement in product's quality and design and introduction of new types of glass other than Soda-lime (flint/ coloured) glass.

R&D Set-up

The following are the research facilities available in the organizations are given below and these facilities are used by Industries, Individual and Academia:

- Pilot plant equipped with glass melting furnaces of capacity ranging from 2 kg to 250 kg and auxiliary furnaces and accessories for trial, testing, and training purposes
- Well-equipped physical and chemical laboratories
- Well-equipped pot development unit for making glass melting pots by ramming process
- Combustion and pollution control division

Sources of income for R&D

- Grants from Government agencies
- Project receipts
- Testing

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 178.03

FY 2015-16= 186.50

FY 2016-17= 172.50

R&D Achievements

Products developed

- Electricity-free 'glory hole' with height adjusting facility
- Development of all electric cullet re-melting day tank furnace
- PID-controlled gas-based annealing oven

Processes developed

- Batch-type process for heat treatment of red mud for making radiation shielding aggregate

Technical Collaborations

National

Kala Bhawan, Shantiniketan, Vishwabharti University, West Bengal

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Demonstration of developed glass melting practices to industry such that these have been adapted well.
- Consultancy & troubleshooting- Improved work practices and significant reduction in losses due

Registered Office

Centre for the Development of Glass Industry
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T: 9897021838
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Recognition Status

File No.: 11/408/2002-TU-V
Initial Recognition: 2002
Valid Until: March 31, 2018

R&D Manpower

PGs & Graduates: 4

Research Areas

- Glass plant operation techniques
- Furnace design and development
- Energy conservation

Research Outcomes

- Papers published: 122
- Technologies transferred/commercialized: 5

to intermittent problems which arise in manufacturing

- Process control & quality management: Enhanced productivity and remarkable improvement in quality
- Laboratory testing: Well adopted by the cluster resulting in significant improvement of quality, productivity, and consistency
- Glass Melting Day Tank Furnance: The technology has offered a wide range capacity for melting glass of single composition (100–3000 kg/ day) in small scale which previously was limited to 700 kg/ day in pot
- Gas fired single Pot Arch- Resulted in improvement of life of pot to 2 times
- Sekai Bhatthi: Paved the way of using gas and eliminating smoke through its usage.
- Gas fired glass re-melting furnace for glass beads: It is a clean and highly energy efficient technology with flexibility of partial operation, better quality production and reduced rejection. Adoption at Purdilnagar is due to lack of natural gas. 🔍



▲ CWS research team conducting preparatory work for camera-trapping

CENTRE FOR WILDLIFE STUDIES

Brief Description

The Centre for Wildlife Studies (CWS) is a non-profit trust based in Bengaluru, India. Established in 1984, CWS practices science-based conservation, with special emphasis on ecology and conservation of the tiger and other large mammals. It works in collaboration with the central and state governments in India to promote conservation of wildlife and wild lands, and is additionally supported by several international and national charities, agencies, and donors.

R&D Set-up

The following research facilities and infrastructure are available at the Centre:

- Research & Training Centre, Bengaluru
- Field Station for Research and Education at Hulikenu near Bhadra Tiger Reserve
- Field infrastructure that includes 14 4X4 field vehicles, 430 digital camera trapping devices along with theft-proof metal shells, 30 GPS units, 80 field compasses, 60 Laser Rangefinders, and other field survey equipment.

These are used by individuals, academia, NGOs, civil society, and the forest department staff.

CWS is actively encouraging research-based organizations, NGOs, and institutions to make use of their research infrastructure. In the period 2014–16, for example, students and researchers used the field station at

Hulikenu a total of 12 times as part of various training programmes conducted.

Sources of income for R&D

- International funding
- Grants from Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 400.99

FY 2015-16 = 308.25

FY 2016-17 = 363.43

R&D Achievements

Processes developed

- CWS pioneered and continues to develop the application of capture-recapture models to camera trap data for estimating abundance and density of marked animals such as tigers and leopards, which is now used by governments, NGOs, and academic institutions, nationally and internationally.
- CWS is involved closely with development and testing of Spatially Capture-Recapture (SCR) models in a Bayesian framework, as well as SCR models for continuous-time detectors, for estimating density and other population parameters in marked animal studies.
- CWS scientists, in collaboration with scientists from USGS, Oxford and ISI-Bengaluru, developed software package SPACECAP for estimating animal densities

Registered Office

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W: www.cwsindia.org/

Recognition Status

File No.: 11/393/2000-TU-V
Initial Recognition: 2000
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 5
PGs & Graduates: 33

Research Areas

- Basic and applied wildlife research
- Long-term monitoring
- Predator-prey population dynamics

Research Outcomes

- Papers published: 46

using Spatial Capture-Recapture modelling in a Bayesian framework.

- In collaboration with a scientist from the UK, CWS scientists helped develop programme EXTRACT/COMPARE to extract tiger and leopard stripe/rosette patterns and compare these with all patterns stored in a database for quick matching and structured archiving.

Technical Collaborations

National

- National Centre for Biological Sciences; Wildlife Institute of India; Oracle Corporation; Indian Statistical Institute, Bengaluru; Foundation for Research, Advocacy and Learning; Salim Ali Centre for Ornithology and Natural History; State Forest Departments of Karnataka, Kerala, Goa, Andhra Pradesh, Telangana, Maharashtra, Assam, Nagaland, Himachal Pradesh, and Uttarakhand

International

- Wildlife Conservation Society, New York; US Geological Survey – Patuxent Wildlife Research Center; US Geological Survey – Gainesville Center; University of Florida;

Oregon State University; University of Wisconsin-Madison; Duke University

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Research and conservation projects are heavily focussed on India's national animal, the tiger and its prey, and thus in line with the mandate of the state and central government agencies, such as state forest departments, the National Tiger Conservation Authority, the Ministry of Environment, Forest & Climate Change, Government of India, among others.
- The Centre played a large role in developing the protocols for annual monitoring of tiger and prey population, particularly the advanced approaches outlined in Phase IV, Section 3 of the NTCA protocols, and also contributed findings from their field research—on the tiger and many other endangered species—to national and state government agencies. 🔍



Research lab

CEPT UNIVERSITY

Brief Description

The CEPT University focusses on understanding, designing, planning, constructing, and managing human habitats. The teaching programmes at the University aim to build thoughtful professionals and its research programmes deepen understanding of human settlements. It also undertakes advisory projects to further the goal of making habitats more livable. Through its education, research, and advisory activities, CEPT strives to improve the impact of habitat professionals in enriching the lives of people in India's villages, towns, and cities.

R&D Set-up

The following are the research facilities available:

- NBO & Material Lab
- Net Zero Energy Building
- Faculty of Design Workshop
- Centers under CEPT Research & Development Foundation
- Building material and component characterization of thermal and optical properties
- Thermal comfort laboratory
- Daylighting evaluation laboratory
- Building Energy Simulation laboratory
- Building energy sensors and controls laboratory

Sources of income for R&D

- Government sources
- International funding
- Other institutions

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 1,702.88

FY 2015-16= 1,634.82

FY 2016-17= 2,032.02

R&D Achievements

Products developed

- Phase change material tiles
- Phase change material masonry blocks
- Residential environment and energy monitoring kit
- SaniTab: A mobile application for sanitation surveys
- SaniPlan: A performance improvement planning tool
- Fecal Sludge Management assessment and planning toolkit
- PSP Toolkit for Financial fecal sludge & Septage Management Urban Water Security Planning Toolkit (under development)

Processes developed

- Building energy benchmarking method
- Window Non-coplaner shading calculation
- SAN Benchmarks

Prototypes developed

- Net zero energy building

Technical Collaborations

National

Ministry of New and Renewable Energy (MNRE), Government of India;

Registered Office

CEPT University, Kasturbhai Lalbhai Campus, University Road, Navrangpura, Ahmedabad 380 009, Gujarat
T: +91-79-26302470 / 26302740
E: enquiries@cept.ac.in
W: www.cept.ac.in

Recognition Status

File No.: 11/316/1995-TU-V
Initial Recognition: 1995
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 10
PGs & Graduates: 140

Research Areas

- Human habitat
- Urban planning
- Transport
- City water & sanitation
- Urban equity
- Sustainable energy

Research Outcomes

- Papers published: 12

National Remote Sensing Centre; Space Applications Centre; Ministry of Earth Sciences, Government of India; Housing and Urban Development Corporation Ltd; Ministry of Science and Technology, Department of Science and Technology, Government of India; Ministry of Rural Development, Government of India; Airports Authority of India; Indian Council of Historical Research

International

Swiss Federal Institute of Technology Zurich, Switzerland; Technical University of Munich, Germany; Zurich University of Applied Sciences, Winterthur; Delft University of Technology, The Netherlands; Umea School of Architecture, Sweden; Academy of Fine Arts and Design, Slovakia; Deakin University, Australia; University of Melbourne, Australia; Polytechnic University of Castelo Branco, Portugal

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Support to Government of Maharashtra to implement Swachh Maharashtra Mission under Swachh Bharat Mission (SBM).
- Building Material Database India model for adaptive thermal comfort
- Formation of National Building Code
- Formation of Energy Conservation Building Code for commercial buildings
- Formation of Energy Conservation Building Code for residential buildings
- NITI Aayog Energy Efficiency Action Plan
- Initiative for Promotion of Habitat Energy Efficiency
- National Action Plan on Cooling. 



^ Saskatchewan and Gujarat developing new business synergies

Registered Office

Charutar Vidya Mandal
Vallabh Vidyanagar 388 120
District Anand, Gujarat
T: (02692) 222509
E: sandeep@charutarhealth.org
W: www.charutarhealth.org

Recognition Status

File No.: 11/360/1998-TU-V
Initial Recognition: 1975
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 180
PGs & Graduates: 95

CHARUTAR VIDYAMANDAL

Brief Description

Charutar Vidya Mandal was established in the year 1945 as a charitable trust with a prime objective of rural development through education to bring about social awakening, and social upliftment and enrichment. The organization has made its distinct identity in education sector with reference to environmental conservation, water, energy, ICT, and economy by offering numerous emerging and innovative educational programmes and by attracting students from across the globe.

R&D Set-up

The following are the research facilities provided by the organization:

- Colorimeter
- Abbe Refractometer Spectrophotometer
- Laminar Air Flow Kjeldahl Unit Microscope
- Monocular and Binocular Colony counter
- Microplate Spectrophotometer
- Wavelength-Dispersive X-ray Fluorescence Spectrometry (WD-XRF)
- Scanning Electron Microscope Transmission Electron Microscope XRD

Sources of income for R&D

- Grants from Government sources

R&D Achievements

Prototypes developed

- Arbitrary Waveform Generator using FPGA

- Audio Mixer
- Digital weighting using load cell
- Mobile charger using solar photovoltaic module
- Identification of tilt detection of flexible object
- Automatic water level control for submersible pump
- Digital Frequency Meter
- Door Locking System
- Variable regulated power supply
- UPS design
- RPM metre
- Gesture Controlled Device
- Solar Power-based Water Irrigation System
- Smart Home using Arduino and GSM
- Heart rate monitoring system for HRV analysis
- Intruder protection system
- Micro strip antenna for WLAN
- IOT-based Home Automation
- Wireless Notice Board
- Aerodynamic braking system for wind turbines
- Robotics Arm for Human Assistance
- Human Machine Interface Controlled Motorized Smart Wheelchair
- Car Security System
- Intelligent security and surveillance system for industrial applications

Societal Relevance

The following R&D outcomes are of national/societal significance:

Research Areas

- Carbon nanotubes
- Characterization of nano-inorganic materials
- Porous materials
- Nutrient dynamics
- Plant community
- Biodiversity

Research Outcomes

- IPRs held
 - » Patents filed: 6

- District-wise awareness programmes were conducted as part of project work for DST on study of water.
- Ongoing projects related to cancer and non-communicable

diseases have been disseminated through villages in and around the institution using peer educators, videos, and trained counsellors. These deal with smoking, menstruation, control of blood sugar, and blood pressure. 🔍



^ Research and development laboratory

CHENNAI MATHEMATICAL INSTITUTE

Brief Description

Chennai Mathematical Institute is a center of excellence for teaching and research in the mathematical sciences. Founded in 1989 as part of the SPIC Science Foundation, it has been an autonomous institute since 1996. They work on different research areas such as differential equations, geometry and topology, etc.

R&D Set-up

The research facilities and infrastructure available in the organization consist of library, computational servers, and many more.

Sources of income for R&D

- Government sources
- Trusts

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate bank accounts for R&D.

FY 2014-15 = 1,203.91

FY 2015-16 = 1,960.32

Technical Collaborations

National

Honeywell Technology Systems Laboratory, Bengaluru; Siemens Information Systems Ltd., Bengaluru; Emmeskay Systems Solutions Pvt. Ltd; Cybernet Software, Chennai; Department of Science & Technology; Tata Consultancy Services; Power Exchange India Ltd; Honeywell Technology Solutions Lab Pvt. Ltd; Tata Research Development and Design Centre. [Q](#)

Research Areas

- Differential equations
- Geometry and Topology
- Design and analysis of algorithms
- Computational complexity theory and computer security

Registered Office

Chennai Mathematical Institute,
H1, SIPCOT IT Park, Siruseri,
Kelambakkam 603 103

Tamil Nadu

T: 044-6748 0900

E: registrar@cmi.ac.in

W: www.cmi.ac.in

Recognition Status

File No.: 11/352/1997-TU-V

Initial Recognition: 1997

Valid Until: March 31, 2017

R&D Manpower

Doctorates: 64

PGs & Graduates: 46



^ Research facility at CMR Technical Education Society

CMR TECHNICAL EDUCATION SOCIETY

Brief Description

CMR Technical Education Society, registered under the Andhra Pradesh Societies Registration Act, 2001, is one of the premier educational institutions dedicated to impart quality education and promote excellence in academic pursuits in the field of science. Its mission is to create state-of-the-art facilities for effective teaching-learning process, pursue and disseminate knowledge-based research to meet the needs of industry and society and infuse professional, ethical, and societal values among the learning community.

R&D Set-up

The organization's research facilities are as follows:

- Ultrasonic Spray Pyrolysis
- FDM Machine
- Electro Cloud Lab Setup
- Telsa K80i7

Sources of income for R&D

Grants

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 10.15

FY 2015-16 = 26.87

FY 2016-17 = 30.90

R&D Achievements

Processes developed

- Method for enhancing security and maintaining internet of things network

- Virtual wireless network security testing platform based on wireless devices
- Device for monitoring health information and methods involved
- Device and method for intellectual processing of information in neural network
- Method involving drift correction of micromechanical gyroscope in augmented reality system on mobile

Technical Collaborations

National

C R Rao AIIMSCS; iKnowlation Research Labs Pvt. Ltd; Osmania University

International

International Technology University, California, USA. [Q](#)

Research Areas

- Nano sensors
- Solar cells
- Cognitive systems

Research Outcomes

- Papers published: 270

Registered Office

CMR Technical Education Society
Kandlakoya (V), Medchal (M&D)
Hyderabad 501401, Telangana
T:9248727220
E: director@cinrtc.ac.in
W: www.cmrtc.ac.in

Recognition Status

File No.: 11/670/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 26
PGs & Graduates: 37



^ Research facilities

COUNCIL OF PUSHPA GUJRAL SCIENCE CITY

Brief Description

The Council of Pushpa Gujral Science City (PGSC) is registered under the Societies Registration Act, 1860. It is engaged in science communication and popularization through design and development of exhibits for information dissemination in the areas of natural science and physical science, space science, health, biotechnology, among others.

R&D Set-up

The following research facilities and infrastructure are available in the organization:

- Electronic + Computer Laboratory
- Mechanical Workshop
- Science Voyage Hall – 6,000 sq. m (air conditioned)
 - » Dome theatre (large format film projection theatre), space and astronomy exhibits, planetarium, space communication centre as well as a virtual reality centre: time machine (flight simulator), laser theatre, 3D theatre, and exhibits on virtual reality and simulations.
- Basic Science Exhibits Gallery
 - » Includes exhibits based on basic science principles on the subjects of electricity, magnetism, mechanics, Mathematics, Chemistry, Physics, optics, etc.
- Health and Bio-technology Gallery
 - » In this gallery, information on the Anatomy and Physiology of the human body has been displayed.

- Science of Sports
 - » Includes virtual reality sport shows to play cricket, tennis, football, etc., where visitors can enjoy the excitement and challenges of their favourite sport without ever having to set foot on a playing surface and investigate the mechanics of sport around and indoor field.
- Science Park: The Science Park shall comprise the following components:
 - » Environment and ecology park
 - » Economic plantation with medicinal and aromatic plants, spices, fruits, agricultural products.

Sources of income for R&D

- PGSC earnings from its ticket sales and other sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 31.56

FY 2015-16 = 59.99

FY 2016-17 = 5.88

R&D Achievements

Products developed

The following process is common for development of exhibits:

- Mobile science exhibition bus
- Innovation hub
- Birds gallery
- Upgradation of virtual make over

Registered Office

Council of Pushpa Gujral Science City, Jalandhar–Kapurthala Road, Kapurthala, Punjab
T: 01822-501963-64
E: sciencecity@hotmail.com
W: www.pgsciencecity.org

Recognition Status

File No.: 11/88/2000-TU-V
Initial Recognition: 2000
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 4
PGs & Graduates: 9

Research Areas

- Natural science & physical science
- Space science
- Virtual reality
- Evolution of life
- Health & biotechnology
- Environment & ecology
- Non-conventional energy sources
- Science of sports
- Innovation hub

Research Outcomes

- Papers published: 7

Commercialization potential of products/processes developed

- Science City conceptualizes the products to display scientific principles and develop the designs in-house. The prototypes have either been fabricated in-house or from entrepreneur/commercial firms. This is the most effective way of developing the technology and its commercial exploitation.

Technical Collaborations

National

- Punjab Energy Development Agency; Ministry of Non-Conventional Energy Sources; National Rail Museum, Railway Board, Ministry of Railways, New Delhi;
- National Council of Science Museum, Ministry of Culture;
- K Gujral Punjab Technical University (IKGPTU);
- National Council for Science and Technology Communications (NCSTC), DST, Gol.
- Panjab University (PU);
- Centre for Development of Advance Computing (CDAC);
- Central Scientific Instruments Organization (CSIO);
- Punjab State Council of Science & Technology (PSCST);
- Postgraduate Institute of Medical Education & Research (PGIMER), Chandigarh;
- Institute of Nano Science & Technology (INST);
- Ministry of Environment, Forest & Climate Change (MoEFCC)

Societal Relevance

The following R&D outcomes are of national/societal significance:

Clean Energy Mission

- Climate Change Theatre
- Energy Park

Swastha Bharat Mission

- Health Gallery
- HIV/AIDS Gallery

Skill India

- **Innovation Hub:** Set up in 500 sq. m area, the hub provides facilities to nurture new ideas and help develop an inquisitive perspective in the youth. It serves as a springboard for new ideas and innovation and thus help the society and economy to face future challenges and meet rising aspirations of the growing population.

Digital India

- **Virtual and Cyber Space:** Virtual Reality & Cyber Space gallery is designed to provide fun, entertainment, and education to people of all ages and backgrounds. Herein visitors learn how emails and ATM works and also about virtual shadow control.

Make in India Mission

- Science City has indigenized several exhibits and galleries. Further, it conceptualizes the product to display scientific principles and develop the designs in-house. The prototypes were either fabricated in-house or from entrepreneurs/commercial firms.
- **Transparent Man Theatre:** The Transparent Man Exhibit was indigenously designed and fabricated at 1/5th cost of the imported exhibit. 🔍



▲ Paraffin Wax Plant at BPCL, Numaligarh Refinery

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

Brief Description

The Council of Scientific & Industrial Research (CSIR), known for its cutting edge R&D knowledge base in diverse S&T areas, is a contemporary R&D organization. Having a pan-India presence, CSIR has a dynamic network of 38 national laboratories, 39 outreach centres, three innovation complexes, and five units. CSIR's R&D expertise and experience is embodied in about 4,600 active scientists, supported by about 8,000 scientific and technical personnel. It is an autonomous body registered under the Registration of Societies Act. CSIR covers a wide spectrum of science and technology— from radio and space physics, oceanography, geophysics, chemicals, drugs, genomics, biotechnology, and nanotechnology to mining, aeronautics, instrumentation, environmental engineering, and information technology. It provides significant technological intervention in many areas with regards to societal efforts which include environment, health, drinking water, food, housing, energy, farm, and non-farm sectors. Further, CSIR's role in S&T human resource development is noteworthy.

R&D Set-up

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 477,528.05

FY 2015-16= 467,446.07

FY 2016-17= 411,124.03

R&D Achievements

Technological products commercialize by the organization are:

- CSIR-CDRI developed, characterized and standardized the crude extract derived from the terrestrial plant herbs Dalbergiasisso (CSIR-CDRI Plant Extract named as A-4744) showing osteoprotective and bone anabolic effects.
- Corrosion-resistant pozzolana cement (Inhibitors admixed Portland pozzolana cement)
- High performance moisture compatible corrosion resistant protective coating system
- Smart pH/Conductivity Transmitter
- Rural-based biotechnological production of Spirulina
- Completely packaged c-band optical amplifier for cable TV application
- Transfer of ceramic membrane based technology for removal of arsenic (including the process for media preparation) and iron from ground water
- Technology license agreement for transferring high sodium content glass bead technology (SiBNa-23)
- Development of viscosity grade Bitumen "VG-40"
- Induction Motor Efficiency Monitoring System (IMEMS)
- Economical production of highly porous metal organic framework (MOF) from zinc scrap
- Virtual intelligent technique for rehabilitation of persons with Motor Disability
- Comprehensive pipeline for diagnosis of mitochondrial diseases using next-generation sequencing technology
- Demonstration of process knowhow for enzymatic degumming and dewaxing of rice bran oil on 50 TPD commercial plant

Registered Office

Council of Scientific & Industrial Research (CSIR), Anusandhan Bhavan, 2, Rafi Ahmed Kidwai Marg, New Delhi 110 001
T: 011 2373 7889
E: dgcsir@csir.res.in
W: www.csir.res.in/

Recognition Status

File No.: 11/153/1989-TU-V
Initial Recognition: 1989
Valid Until: March 31, 2020

Research Areas

- Oceanography
- Geophysics
- Environmental engineering
- Information Technology
- Engineering Sciences
- Biological Sciences
- Chemical Sciences
- Physical Sciences
- Mathematical and Information Sciences

Research Outcomes

- Papers published: 17,149
- IPRs held
 - » Patents filed: 1290
 - » Patents awarded: 817
- Technologies transferred/commercialized: 79

- Development of process knowhow for the isolation of FFA free crystals oryzanol from oryzanol concentrate.

Technical Collaborations

National

Indian Council of Agricultural Research; Directorate of Agriculture, Kerala; Amity University, Lucknow; Lucknow University, Lucknow; Alagappa University, Tamil Nadu; Jawaharlal Nehru Tropical Botanic Garden and Research Institute Palode, Thiruvananthapuram, Kerala; Dr Y S Parmar University of Horticulture and Forestry, Nauni – Solan, Himachal Pradesh; Department of Biotechnology, Tanharil, Aizawl, Mizoram University, Mizoram; Dept. of Cell Biology & Immunology, IMTech, Chandigarh; National Institute of Animal Welfare, Haryana

International

Institute of Chemical Research of Catalonia (ICIQ); Indo-French (CNRS); Dortmund University, Germany; RMIT University, Melbourne, Australia; University of Queensland, Australia; National University of Singapore; University of Bradford, UK

Societal Relevance

The following R&D outcomes are of national/societal significance:

Make in India

- Sindhu Sadhana: Indigenously built Oceanographic Research Vessel for multi-disciplinary oceanographic research. (dedicated to the nation on July 2, 2014).
- Paraffin Wax Plant at BPCL, Numaligarh Refinery. Plant commissioned and running at full capacity.
- Hydrazine Hydrate at GACL, Vadodara
- Process development for Indian low-grade iron ores. African Natural Resources Mines Ltd, Nigeria, to set up a 1.3 million tonnes plan

Swachh Bharat Abhiyan

- Electronic nose for monitoring obnoxious constituents: Enables mandatory monitoring of odorous emissions generated from industries. Implemented at Tamil Nadu Newsprint and Papers Limited, Karur and Mysore Paper Mills, Bhadravati

Swasthya Bharat

- CSIR-HP e-Health Centers reaching foreign lands: Providing primary medical facility both for telemedicine consultations and big data biomedical discovery
- Water: CSIR technologies
- Potable water during disaster, CSIR technologies providing instant relief

Skill Development

- Launched: 30 High Tech Skill training programmes (75 by next year)
- S&T human resource development through student and research fellowships and training programmes

Smart Villages

- Mint cultivation and Mentha oil production in the country
- Krishi Shakti: An indigenous tractor for small farmers. Small (11.2 hp) diesel engine tractor suited for small and fragmented land holdings. Low cost ~ ₹2.0 lakh. CMVR Certification as an Agricultural Wheeled Tractor after rigorous trials and testing Launched on November 20, 2014: Given to 5 farmers of West Bengal. License to M/s Singha Components Pvt. Ltd, Howrah

Sakshat Bharat

- Bacterial blight resistant improved Samba Mahsuri rice. Grown in ~80,000 hectares (ha) in Andhra Pradesh, Telangana, Karnataka, and Tamil Nadu. 🔍



^ Spray pyrolyzer

DALMIA INSTITUTE OF SCIENTIFIC AND INDUSTRIAL RESEARCH

Brief Description

The Dalmia Institute of Scientific and Industrial Research was registered under Societies Registration Act XXI of 1860 in September 1971. The principal objectives of the institute are to develop super quality new and special products and improve existing products in the field of ceramics, refractories for high-temperature applications and cement. Besides conducting own fundamental and applied research, the institute accepts research projects on development of new product processes in the field of ceramics and cement from other organizations, including government, semi-government, and private sectors.

R&D Set-up

The following are the research facilities available the organization:

- Fly Ash Brick Project
- DISIR IRMA Refractory Application Center
- X-ray Diffractometer
- Universal Research Optical Microscopes with Image Analyser
- 5 Liter Planetary Mixer
- Simultaneous DTA/TG /DSC Apparatus
- Cold Crushing testing Machine up to 200 T capacity
- Laser particle size analyser
- Carbon-hydrogen analyser
- Attrition mill
- Tonipac-3000 combined compression and bending strength testing equipment

Sources of income for R&D

Government sources

R&D expenditure (₹in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 313.68

FY 2015-16 = 352.67

FY 2016-17 = 237.23

R&D Achievements

Products developed

- A study of BF slag chemistry and mineralogy with respect to its flow characteristics for optimizing BF operation
- Development of silica dusting compound for coke oven
- Development of silica insulating bricks with BD of 0.9 g/cc and CCS of 25 kg/cm²
- Exfoliation of graphite for application in MgO-C and slide gate refractory
- Characterization and beneficiation of andalusite from UP for making refractory
- Development of 90% Cr₂O₃ bricks for coke gasifier
- Development of burnt quality Al₂O₃-SiC bricks for inlet of cement rotary kiln
- Development of ZrC through plasma route for application in CC refractories
- Development of ZrB₂ through plasma route for application in CC refractories

Registered Office

Dalmia Institute of Scientific and Industrial Research
Rajgangpur 770 017,
Dist. Sundargarh, Odisha
T: +91-6624-678507
E: info@dalmiainstitute.in/
disirrgp@gmail.com
W: www.dalmiainstitute.in

Recognition Status

File No.: 11/9/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 3
PGs & Graduates: 15

Research Areas

- Industrial waste oxide
- Plasma technology
- Surface engineering

Research Outcomes

- Papers published: 14
- IPRs held
 - » Patents filed: 7
 - » Patents awarded: 3

Processes developed

- A process for making insulating bricks by using cinder of the gas producer plant
- Synthesis of nano MgO–Al₂O₃ spinel


The organization has earned revenues from commercialization of below mentioned products/processes:

- Development of zirconia insert for continuing casting of steels.
- Development of Al₂O₃–Mag spinel bricks for application in ladle.
- Development of compact fused silica bricks for glass industry.

- Development of silica insulating bricks with BD of 0.9 g/cc and CCS of 25 kg/cm².
- Development of 90% Cr₂O₃ bricks for coke gasifiers.

Technical Collaborations

National

National Institute of Technology, Rourkela; Institute of Minerals and Materials Technology, Bhubaneswar; Jagannath Institute of Technology and Management, Paralakhemundi; K S Rangasamy College of Technology, Thiruchengode; Hari Machines Ltd, Rajgangpur; OCL India Ltd 



▲ Pulse oximeter

DISHA EDUCATION SOCIETY

Brief Description

Established in 2001, the Disha Education Society, a non-governmental organization, aims to impart higher education with conscience. It is a modest attempt to facilitate the attainment of the destined goals by providing world class research, development, consultancy and extension services; since education is an integral part of the envisaged development. Disha Academy of Research & Development (DARE) has adopted innovations in education as a significant part of its activity.

R&D Set-up

Following are the research facilities provided by the organization:

- Digital Oscilloscope Tektronix
- Programmer software
- Customized medical grade flow generator
- Analog data acquisition
- Work station
- High speed data acquisition system (for spirometer and digital hearing aid)
- Diagnostic audiometer
- TI code complier studio
- PCB fabrication machines
- Spectrum analyser
- AFM

Research infrastructure is being used by industry/individuals/academia.

Sources of income for R&D

Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 14.96

FY 2015-16= 29.23

FY 2016-17= 47.00

R&D Achievements

Processes developed

- Tunable digital hearing aid
- Spirometer
- Pulse oximeter

Technical Collaborations

National

All India Institute of Medical Sciences (AIIMS), New Delhi; AIIMS, Raipur; Indian Institute of Technology, Delhi; National Institute of Technology, Raipur; University of Lucknow, Uttar Pradesh.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Usage of solar energy
Save Electricity
- Affordable ease of use at Chhattisgarh where subsidy is good. 🔍

Research Areas

- Digital hearing aid and applications of electron rich dusty plasmas
- Natural treatment of drinking water
- Solar energy park

Research Outcomes

- Papers published: : 1
- IPRs held
 - » Patents filed: 2

Registered Office

Disha Institute of Management and Technology, Satya Vihar, Vidhan Sabha-Chandrakhuri Marg, Mandir Hasaud, Raipur 492 101, Chhattisgarh
T: 0771-4231000
E: info@dishamail.com
W: www.desindia.in/

Recognition Status

File No.: 11/483/2008-TU-V
Initial Recognition: 2008
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 18
PGs & Graduates: 23



^ Field trials on faster retting of lute plants using IJIRA-SUBHRA

DOWN TOWN CHARITY TRUST

Brief Description

Down Town Charity Trust has set up Assam Down Town University. The specific research interests include pharmacy, healthcare, biological sciences advancements, etc. It has a distinguished name in the healthcare industry, serving the people of Assam and the North Eastern Region (NER) with its expertise for the last 25 years.

R&D Set-up

Most of the departments of the University, namely, Engineering, Biological Sciences, Pharmaceutical Sciences, Nursing, FND, etc., have their own infrastructure facilities, enumerated as follows, to undertake project-related activities:

- Antemantal Dummy (Full size)
- Digital Compression Testing Machine
- Impact Testing Machine
- Torsion Testing Machine
- Brinell cum rockwell Hardness Tester
- Interferential Therapy Unit
- Ultrasound
- Tens Unit
- Shortwave Diathermy Unit
- Rotary Vaccum Evaporator
- Lyophilizer
- Double Distillation Unit
- CPR Mannequins
- Single Interaosseous Infusion leg Infent
- Advance Delivery Mannequine
- Advance Airway Mannequine

- Advance Venipuncture Mannequine
- Deluxe Crisis Mannequine with ECG
- Phillips Defibrillatior
- Slit lamp AIA 11 with Motorized Stand
- Appa Applanation Tonometer
- Machine Vice Heavy duty
- T stool cutter
- Counter box and cutting Tool
- Piller Drilling

Sources of income for R&D

Fees and revenue surplus from trust funds

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 72.10

FY 2015-16 = 70.42

FY 2016-17 = 60.13

R&D Achievements

Major research projects undertaken:

- Chemical profiling of Joha and black rice of NER for Nutritional, Nutraceuticals Parameters and Aromatic Compounds
- Identification and Characterization of Banana Grown in North Eastern States
- Design and Fabrication of Portable Friction Welding Machine

Technical Collaborations

National

CSIR- North East Institute of Science and Technology, Jorhat ; Guwahati Biotech Park (National); Institute

Registered Office

Down Town charity trust
Sankar Madhab Path
Gandhi Nagar, Panikhaiti
Guwahati 781 026, Assam
T: 0376-7110711
E: dir_rsrch@adtu.in,
research@adtu.in
W: www.adtu.in.

Recognition Status

File No.: 11/566/2012-TU-V
Initial Recognition 2012
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 38
PGs & Graduates: 18

Research Areas

- Pharmaceutical Sciences
- Biological Sciences
- Allied Health Sciences
- Computer Science & Engineering

Research Outcomes

- Papers published: 146
- Technologies transferred/commercialized: 1

of Advanced Study in Science and Technology, Guwahati; Indian Tourism Development Corporation; Dr B Barooah Cancer Institute, Guwahati, Assam; National Research Development Corporation, Delhi; National Institute of Pharmaceutical Education and Research (NIPER)

International

- Limerick Institute of Technology, Ireland
- Liverpool University, United Kingdom
- Council of Technical Education and Vocational Training (CTEVT), Nepal
- Tribhuvan University, Nepal
- Asian Institute of Technology, Bangkok

Societal Relevance

The following R&D outcomes are of national/societal significance:


Swachh Bharat

In keeping with the mandate of the Swachh Bharat Abhiyan, awareness campaigns on cleanliness in 3 public spots of Guwahati City, namely,

Narengi, Bonda, and Panikhaiti have been organized during the last 3 years (2014–2016).

Skill India

A Business Incubation Centre named as 'Down Town Venture Labs' initiated by the University and supported by the Centre for Innovation Incubation and Entrepreneurship, an initiative of Indian Institute of Management, Ahmedabad, is promoting entrepreneurship culture amongst the youth. A regional-level business idea contest "Manthan" was organized in association with the Centre for Innovation Incubation and Entrepreneurship, Deutsche Gesellschaft Fur Internationale Zusammenarbeit (GIZ) GMBH, Germany, in 2015 to train young Indian entrepreneurs to take up entrepreneurship.

The Down Town Charity Trust is duly accredited by the major sector skill councils such as healthcare, hospitality, and construction, rubber, telecom, etc. 



^ FACS SELL SORTER

DR D Y PATIL VIDYAPEETH

Brief Description

Dr D Y Patil Vidyapeeth, Pune, comprising of Dr D Y Patil Medical College, Hospital, and Research Centre, Pimpri, Pune, is a non-government organization registered as a university. Its chief mission is to contribute to the socio-economic and ethical development of the nation, by providing high quality education through institutions that have a dedicated faculty and state-of-the-art infrastructure. With this mission, the University has been providing high quality education in the faculties of Medicine, Dentistry, Medical Sciences, Nursing, Biotechnology & Bioinformatics, Management, and distance learning through seven institutions.

R&D Set-up

Sources of income for R&D

- Grants from government
- Foreign contributions
- Training

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate bank accounts for R&D.

FY 2014-15 = 16.93

FY 2015-16 = 22.00

FY 2016-17 = 3.27

R&D Achievements

The number of research projects completed since 2016 are as enumerated as follows:

- Towards understanding skin cell homeostasis

- Comparative evaluation of the antibacterial effect, adhesion of gingival fibroblast and epithelial attachment to titanium, zirconia, and titanium with silver nano coatings
- Microbial & host derived biomarkers in peri implant mucositis in relation to periodontal status
- Comparative evaluation of efficacy of bioactive glass and freeze bone allograft in the treatment of periodontal infrabony defect

Technical Collaborations

National

Praj Industries Ltd, Pune; CSIR-Institute of Genomics and Integrative Biology, New Delhi; National Centre for Cell Science, Pune; Institute of Liver & Biliary Sciences (ILBS), New Delhi; Agharkar Research Institute, Pune; Chest Research Foundation, Pune; National AIDS Research Institute, Pune; National Chemical Laboratory, Pune; National Institute of Virology, Pune; National Research Center for Grapes, Pune

International

Johns Hopkins University, Maryland, Baltimore, USA; University of Skovde, Sweden; Orebro University, Sweden; Surindra Rajabhat University, Surin, Thailand; Hong Kong University, Hong Kong; Harvard Medical School Centre for Global Health Delivery, Dubai; Kampala International University, Uganda; International Team for Implantology, Switzerland; Thammasat University, Thailand;

Registered Office

Dr D Y Patil Vidyapeeth,
Sant Tukaram Nagar, Pimpri,
Pune 411018, Maharashtra
T: +91 20 2780 5000 / 2780 5001
E: info@dpu.edu.in
W: http://dpu.edu.in

Recognition Status

File No.: 11/610/2013-TU-V
Initial Recognition: 2013
Valid Until: March 31, 2017

R&D Manpower

Doctorates: 85
PGs & Graduates: 593

Research Areas

- Microbial Diversity
- Plant and Environmental Biotechnology
- Genetics and Molecular Biology
- Cancer Biology and Translational Research
- Protein Biochemistry

Research Outcomes

- Patents filed:
 - » National: 5
 - » International: 3
- Papers published:
 - » National: 728
 - » International: 1026

Virginia Commonwealth University
School Business, Richmond,
Virginia, USA

Societal Relevance

The following R&D outcomes are of national/societal significance:

Smart Campus: The installation of solar power system, currently in process, will reduce dependency on the state grid for electricity requirements of medical & dental colleges. The Water Treatment Plant is functioning in the campus to recycle the water for reuse in watering the gardens and toilets. The Vidyapeeth has subscribed to waste collection facility of the local municipal corporation for waste collection and disposal.

Clean Campus: Every campus shall participate in the Swachh Bharat Abhiyaan and achieve a clean campus that has clean toilets and systems for solid/liquid waste management. Cleanliness of the college campuses is important to the Vidyapeeth. An outsourced service provider has been appointed to keep the campus clean. Waste Collection Service of the local municipal corporation has been subscribed for collection and disposal of solid and medical waste. 🔍



^ Training centre

DR SIVANTHI ADITANAR COLLEGE OF ENGINEERING OF ADITANAR EDUCATIONAL INSTITUTION

Brief Description

Dr Sivanthi Aditanar College of Engineering (Dr. SACOE) of Aditanar Educational Institution is involved in imparting integrated education to foster research and development; evolve innovative applications of technology; and encourage entrepreneurship.

It is a society registered under the Societies Registration Act XXI of 1860.

R&D Set-up

Dr. SACOE's research facilities and Infrastructure for its R&D activities include:

- Aphelion-Dev with 3D image display and processing software
- OPTIMA (Integrated GIS & Remote Sensing Software)
- ENVI and IDL software
- Computers and GPS devices

Sources of income for R&D

- Government sources
- Grant-in-aid

R&D expenditure (₹ in lakhs)

FY 2014-15 = 178.00

FY 2015-16 = 178.00

FY 2016-17 = 285.00

Dr. SACOE maintains separate accounts for its R&D activities.

R&D Achievements

Products developed

- Automated Method for diagnosis of skin lesions using image

processing linked pattern Recognition Techniques

- Biometric Authentication Using Facial Linked Fingerprint and RF Tag in Public Distribution System

Processes developed

- Analysis of Environmental Risk Forecast in Trippur Districts
- Implementation of path planning optimization algorithm for efficient navigation of UAV
- Identification of Alzheimer disease based of Hippocampus shape and structure of brain components
- Computer-aided diagnosis of skin lesions
- Embedded Based A.C Voltage Controller for Induction Heating
- Detection of Endodontic Therapy using image Processing
- Bio Engineering Concrete-A Sustainable Solution for cracks
- Food sustenance estimation using Food Image
- Detection of Myocardial Ischemia
- Content Based Image Retrieval Using Colour, Shape, and Texture
- Intelligent Post Tsunami Damage Assessment and Monitoring of Reconstruction in Nagapattinam Area.

Technical Collaborations

National

Marlen India Pvt. Ltd; Suzlon Infrastructure Services Ltd; Blesssoft Corporation; G2G Technologies;

Registered Office

Dr Sivanthi Aditanar College of Engineering of Aditanar Educational Institution
Tiruchendur 629 215,
Thoothukudi, Tamil Nadu
T: 04639-242482
E: drsacoe@aei.edu.in,
princyengg@aei.edu.in
W: www.drsacoe.org

Recognition Status

File No.: 11/640/2014-TU-V
Initial Recognition: 1963
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 2
PGs & Graduates: 9

Research Areas

- Medical image analysis
- Analysis of remote sensing images
- Computer-aided diagnosis
- Pattern recognition

Research Outcomes

- Papers published: 33
- IPRs held
 - » Patents filed: 2
- Technologies transferred/commercialized: 7

Softsquare Solutions Pvt. Ltd; Suresoft Systems Pvt. Ltd; W2B Technologies; Thoothukudi District Tiny and Small Scale Industries Association, Tuticorin.

International

University of Nevada, Las Vegas, USA; Kingston University, London; University Medical Centre Hamburg, Germany; University of Cincinnati, Ohio, USA; University of Malaya, Malaysia.

Societal Relevance

Products like Biometric Authentication using Facial Linked Fingerprint and RF Tag in Public Distribution System provides support to the Digital India Mission while services like "Yoga for our Life" supports Swastha Bharat. 🔍



^ Online Fault Sensor Induction Motor

ELECTRICAL RESEARCH AND DEVELOPMENT ASSOCIATION

Brief Description

The Electrical Research and Development Association (ERDA), is a not-for-profit professional organization, registered under the Societies Act and a public trust formed under the Charity Commissioner of Maharashtra. It was promoted with support from the Government of India through the Council for Scientific and Industrial Research (CSIR) and grant given by the Government of Gujarat. ERDA's services are provided under three business verticals namely 'Testing & Evaluation', 'Field Services', and 'R&D and Expert Services'.

R&D Set-up

The following research facilities and infrastructure are available in the organization:

- Engineering Analysis Centre
- Power Electronics Laboratory
- Material Research Laboratory
- Material Characterization Laboratory
- Pilot Plant Facilities

Sources of income for R&D

- Government sources
- Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 6,051.75

FY 2015-16 = 6,585.35

FY 2016-17 = 8,115.20

R&D Achievements

Products developed

- Nano dielectric polymeric material
- Silver tin oxide contact material
- IE 4 class induction motor
- Solar Inverter
- Silver nano carbon contact material
- Corrosion resistance paint

Processes developed

- Efficiency Improvement Of induction motor (ie3)
- Electric stress reduction in 36 kv bushing
- Efficiency improvement of centrifugal pump
- Remaining life assessment of ip & IP turbine rotor
- (Kwu design)
- Root cause analysis of Pipe

Prototypes developed

IE 4 Class induction motor

Revenue earned by way of licensing products/processes/ prototypes, etc., developed

Total Products Commercialized:
₹65 lakhs

Commercialization potential of products/processes developed

- On line fault sensor for oil filled transformer
- Fault current limiter for LT switchgear & Appliances

Registered Office

Electrical Research and Development Association
R-336, TTC Industrial Area
Thane-Belapur Road,
MIDC, Rabale,
Navi Mumbai 400 701
Maharashtra
T: 022-27606212/13/14
E: erdarab@erda.org

Recognition Status

File No.: 11/6/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 8
PGs & Graduates: 32

Research Areas

- Advanced material
- Renewable energy
- Diagnostics
- Power systems

Research Outcomes

- Papers published: 52
- IPRs held
 - » Patents filed: 10
 - » Patents awarded: 4

- Anti-dust self-cleaning coating for solar panels
- New polymeric material for TFL starter cap
- Silver tin oxide contact material
- RTV silicone coating
- Corrosion resistance paint
- Silver nano carbon contact material for switchgear
- Electronic Ballast for TFL
- LED-based standalone rechargeable lamp
- Electronic ballast for 70 & 150 W HPSV lamps
- Martensitic low alloy steel-based hammer ring technology for ring granulators
- Pump Turbines for Standalone Power Generation in PICO Hydel Systems

Technical Collaborations

National

Wanakbori Thermal Power Station; Gujarat Narmada Valley Fertilisers Company Ltd, Bharuch; RG Motors, Surat; MGVCL, Vadodara; GAIL, Waghodia; Chhattisgarh Electricity Regulatory Commission (CSERC); Raipur & Madhya Pradesh; Electricity Regulatory Commission (MPERC);

Bhopal; Gujarat Energy Transmission Co. Ltd (GETCO), Vadodara; PA Consulting, Gurugram; Power Finance Corporation (PFC), Delhi; Central Board for Irrigation and Power, New Delhi; Indian Institute of Technology, Bombay.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- 'Make in India' by indigenized defence equipment development
- 'UJALA' by Testing of LED Lamps and luminaries
- '24X7 Power for All' by evaluation of Transmission & distribution components at ERDA
- 'Quality Control' by supporting in implementation of electrical transformer (QC) order 2015 by DH1
- 'Environment Friendly Power' by evaluation of solar lighting Systems
- 'UDAY' by improving operational efficiency of DISCOMs
- 'Smart Grid' by Smart Meter Testing
- 'SME Development' by product design & analytical evaluation of various products for SMEs. 🔍



^ Lab Facilities

ELECTRONICS AND QUALITY DEVELOPMENT CENTRE

Brief Description

The Electronics and Quality Development Centre, popularly known as EQDC, was established by the Government of Gujarat under the STQC (Standardization Testing and Quality Certification) Programme, Ministry of Communication & Information Technology, Government of India. The primary objectives of EQDC include 'Helping electronics industries in the electronics estate, and 'to provide world class services in calibration, testing, and training in quality awareness'. Application oriented R&D activities are additionally being undertaken by EQDC from varied industry groups, for quality enhancement of products/processes such as electricity generation by non-conventional energy resources, e.g. domestic wind mill, solar PV – on grid & off grid testing, etc.

R&D Set-up

- EMI/ EMC Test facility having 10 m Semi-Anechoic Chamber with 6.5 m turn table and load capacity: 5 tonne with all the equipments
- Environmental test facility
- Energy metre test facility
- IP Test facility
- Pumps and motor test facility
- Solar pumping system test facility
- Inverter test facility
- Cable test facility
- Software test facility
- IT products/ hardware test facility
- Vibration and shock test facilities

All the facilities of EQDC are used by industry, consumers, end users, interested parties, purchasers, academia, product developers/ product developing organizations, ISRO/SAC -Ahmedabad, government departments, etc.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 10.97

FY 2015-16 = 11.64

FY 2016-17 = 11.52

R&D Achievements

Products developed

- Air quality metre
- Load carrying human escort cart
- Master slave switch application using touch screen
- Automatic PV Module Solar Tracking System using Arduino lino
- RF Network Optimization of GSM network
- Accident alert with automatic dialer
- Digital LCR Meter
- Green Helmet
- Automatic Irrigation System for Sensing Soil Moisture with GSM
- Performance analysis of DC Motor controlling solar radiation-based on submersible pumps
- Live person detection robot under the debris for earthquake rescue using P1R Sensor

Registered Office

Electronics and Quality Development Centre
B 177/178, GIDC Electronics Estate, Sector 25,
Gandhinagar 382 024, Gujarat
T: +9107923287120
E: md@eqdc.in
W: eqdc.in/

Recognition Status

File No.: 11/435/2004-TU-V
Initial Recognition: 2004
Valid Until: March 31, 2019

R&D Manpower

PGs & Graduates: 15

Research Areas

- Electrical
- Electronics
- Calibration

Research Outcomes

- Papers published: 270

Societal Relevance

The following R&D outcomes are of national/societal significance:

- EQDC is contributing and participating in Swachh Bharat Abhiyan and India's commitment towards renewable energy by keeping their premises neat and clean.
- EQDC has 75 kW solar panel - grid connected installed in the terrace premises generating clean energy and comprising excellent test facility to test solar-based products. 🔍



^ Lab facilities

ENTREPRENEURSHIP DEVELOPMENT CENTRE

Brief Description

The Entrepreneurship Development Institute of India (EDII), an autonomous and not-for-profit institute, set up in 1983, is sponsored by apex financial institutions—the IDBI Bank Ltd, IFCI Ltd, ICICI Bank Ltd, and the State Bank of India (SBI). Research and project activities at EDII include entrepreneurship education and research; micro enterprise, micro finance and sustainable livelihood; social entrepreneurship and corporate social responsibility (CSR); women entrepreneurship and gender studies; and cluster competitiveness, growth and technology.

R&D Set-up

The following are the research facilities are provided by the organization:

- Ultrasonic processor
- Low temp incubator
- Autoclave
- Particle size analyser
- Leica microscope
- Gel Doc system
- Rotavapor
- Fermenter
- Inverted microscope
- Hot gun blower
- Laminar air flow

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 439.06

FY 2015-16 = 327.54

R&D Achievements

Products developed

- Bioabsorbable screws for orthopaedic knee surgeries: An indigenous cost-effective process has been developed to make the biocompatible material. The said technology is under commercialization via spin-off.
- Scaffolds for tissue regeneration have been developed using regenerated silk fibroin material.
- Hollow fibre membrane based oxygen enrichment unit has been developed to help COPD patients.
- Intra-ocular lenses based on novel technology was developed to treat cataract patients.
- Quick detection of infection due to *E.coli*: based on colour changing strips has been developed.

Commercialization potential of products/processes developed

Some of the commercialization efforts of the projects have been listed as follows:

- Orthocrafts Innovations Pvt. Ltd start-up has been created to commercialize the biomedical grade bioabsorbable polymers and products.
- Biol Med Innovations Pvt. Ltd start-up has been incorporated to commercialize the research and development (R&D) findings around regenerated silk fibroin material and scaffolds.

Registered Office

Entrepreneurship Development Center (Venture Center),
100 NCL Innovation Park,
Dr Homi Bhabha Road,
Pashan, Pune 411 008
Maharashtra
T: +91-9172232211
E: reception@venturecenter.co.in
W: www.venturecenter.co.in

Recognition Status

File No.: 11/522/2010-TU-V
Initial Recognition: 2010
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 6
PGs & Graduates: 5

Research Areas

- Developing new products and process technologies leveraging chemicals, materials, biological, and physical sciences that can be spun off as startups
- Development for characterization and testing
- Entrepreneurship and innovation ecosystem development

Research Outcomes

- Papers published: 270

- Genrich Membrane Pvt. Ltd start-up has been incorporated to commercialize the hollow fibre membrane-based oxygen enrichment unit.

Technical Collaborations

National

CSIR-National Chemical Laboratory, Maharashtra; Villgro, Chennai; National Agriculture and Food Analysis and Research Institute (NAFARI), Pune; Deenanath Mangeshkar Hospital and Research Center, Pune; Foundation for Innovation and Social

Entrepreneurship, Tata Trust, Mumbai; Tata Institute of Social Sciences; National Environmental Engineering Research Institute (NEERI), Nagpur.

Societal Relevance

The following R&D outcomes are of national/societal significance:

The Venture Center, India's largest science-business incubator specializes in knowledge intensive and inventive startups. It is also India's largest inventive enterprises incubator and is a useful contribution to the Make in India campaign. 🔍



^ Sonerilanairii (Soumya & Maya) discovered

ENVIRONMENTAL RESOURCES RESEARCH CENTRE

Brief Description

Established in 1991 as an autonomous research and development centre for sustainable natural resource management and education, the Environmental Resources Research Centre (ERRC) has emerged as a centre of excellence in research, higher education, and public interest services.

R&D Set-up

Following are the research facilities provided by the organization:

- Binocular Research Microscope with photomicrography facility
- Stereoscopic dissection microscope
- Stage and Ocular micrometers
- Spectrophotometer
- Electrophoretic apparatus
- Steel Distillation unit
- Portable Soil pH-moisture metre
- Portable Hydro-meteorology station
- Geographical Positioning System (GPS)

The laboratory, library, and herbarium (plants and pollen herbaria) are used by researchers/students from other academic institutions (colleges and university departments) and voluntary organizations. Research (and connected infrastructure) facilities are shared as stated above (70% internal and 30% external). Graduate/postgraduate students are encouraged to carry out their dissertation/project work on environment/ecology-related subjects.

Sources of income for R&D

- R&D projects
- Government funding
- Consultancy
- Advance/ Donations (internal)

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 17.52

FY 2015-16 = 11.29

FY 2016-17 = 12.29

R&D Achievements

A household water treatment technology for fluoride removal is being developed, based on Moringa oleifera, an eco-friendly natural coagulant, which is most suitable for the treatment of water containing undesirable fluoride concentrations. From 1 kg of Moringa oleifera seeds, 360 g of biodiesel is produced and 610 g of seedcake is obtained as a byproduct. Coagulation with aqueous extract of the seed cake coagulant was found to reduce the fluoride concentration of fluoridated water below 1mg/L. However, the turbidity after coagulation was very high which was removed by Terafil filtration.

Research projects undertaken:

- Palynological investigation of tropical spices and their wild allies
- Pollen as a tool in the Pharmacognosy of floral drugs and flower-based natural products
- Studies on ecological evaluation and bioassessment of Ashtamudi

Registered Office

Environmental Resources Research Centre (ERRC),
NCC Road, P.B. No. 1230,
P.O. Peroorkada,
Thiruvananthapuram 695 005
Kerala
T: +91-471-2437069
E: errcl230@jiTtail.com
W: errcindia.org/

Recognition Status

File No.: 11/214/1991-TU-V
Initial Recognition: 1991
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 3
PGs & Graduates: 7

Research Areas

- Forest and wetland ecosystems
- Coastal habitats and mangroves
- Biodiversity, endemism and rarity
- Pollen and spore biology
- Agro-forestry, urbanforestry, and greenbelts
- Conservation and sustainable development
- Global warming and climate change
- Environmental impact assessment
- Environmental management
- Environmental education

Research Outcomes

- Papers published: 22
- Technologies transferred/commercialized: 2

Lake, the second largest Ramsar site in Kerala: Restoration and remedial measures

- Study on coastal green belting and ecosystem reconstruction in the Tsunami-affected areas of Kerala
- Comprehensive Environmental Impact Assessment of Pathrakkadavu Hydro-electric Project.

Technical Collaborations

National

Centre for Environmental Education (CEE), Ahmedabad; Mahatma Gandhi University, Kottayam

International

Institute of Tropical Biology (ITB), Vietnam; Global Environment Facility (GEF), USA; University of Sri Jayewardenepura (FGS), Sri Lanka. 🔍



^ Masonry Brick from Granite Sawing Dust

ER. PERUMAL MANIMEKALAI TELUGU MINORITY EDUCATIONAL AND CHARITABLE TRUST

Brief Description

Er. Perumal Manimekalai College of Engineering, established in 2002, approved by AICTE, and affiliated to Anna University, offers students state-of-the-art facilities and the educational environment to provide quality education. The objective is to strive and achieve excellence in technical education and management with continuous applied research and development to create well groomed and responsible citizens who are dynamic, competent, innovative, eminent and delivery oriented engineers, technologists and management professionals to build strong a nation.

R&D Set-up

- The research facilities and Infrastructure available at the Institution are as follows: 3D Printing Lab
- Micro Air Vehicle(MAV) Lab
- Research Development Centre
- E-Waste Shredder Machine
- Agriculture Multi-Purpose Weeding Machine
- Nitrate Electrode
- Hydraulic Systems with PLC setup
- MATLAB 12 - Signal Processing Tool & Automative
- 8051 Micro-controller Kit
- Transfer Function of DC Servomotor Kit
- Lift Thrust Estimator for Micro Air Vehicle

Sources of income for R&D

Government

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 12.99

FY 2015-16 = 7.61

FY 2016-17 = 50.82

R&D Achievements

Products developed

- Insect trapper
- Smart vessel
- Mini crane with fixed multi pulleys
- Plasma actuation for lift control in aircraft
- Automatic vehicle locking system by using helmet
- Smart board cleaner
- Wireless acceleration and brake control system in bikes
- Smart shopping basket
- Masonry bricks with granite cutting slurry waste
- Electronic weighing jug
- Step climber for physically challenged
- Automated mobile charging app
- Smart spectacle
- Tyre burst preventer

Processes developed

- Concentrated Solar Thermal (CST) focusses sunlight into a high efficiency thermal cavity receiver which is used to heat oil to generate process heat to high temperature. The concentrator

Registered Office

Er.Perumal Manimekalai College of Engineering, NH-7, 17th KM, Hosur to Krishnagiri Highway Nallaganakothapalli, Near Koneripalli Hosur Krishnagiri, Tamil Nadu 635 117

Recognition Status

File No.: 11/677/2015-TU-V

Initial Recognition: 2015

Valid Until: March 31, 2018

R&D Manpower

Doctorates: 5

PGs & Graduates: 17

Research Areas

- Additive manufacturing
- Unmanned aerial vehicles & micro air vehicles
- Precision agriculture
- Smart farming
- Green technology
- Healthcare
- Cyber physical systems
- Artificial intelligence
- Data analytics
- Image processing

Research Outcomes

- Papers published: 167
- IPRs held
 - » Patents filed: 9
- Technologies transferred/commercialized: 4

has an in-built dual axis tracking system which follows and tracks the sun to generate the maximum solar output at all times which thereby results in high yield of output energy that can be used in various applications. The concentrator tracks the sun accurately given the fact that higher the concentration, higher is the efficiency, energy generation, and maximum fuel savings.

Commercialization potential of developed products/processes

A new company, Vitalyfe, was established in order to concentrate on developing a mobile application for doctors along with the development of small devices which allow the user to extend the service to rural areas.

Technical Collaborations

National

Indian Institute of Technology Bombay; Indian Institute of Technology Kharagpur; Tata Consultancy Services – Ion Assessment Centre; Computer Society of India; ICT Academy of Tamil Nadu; The Institution of Engineers; Society of Automotive Engineers; Madras Management Association; National HRD Network; Indian Society for Technical Education; National Institute of Design; Confederation of Indian Industry; National Association of Software and Service Companies; Campus Corporate Centre; Infosys Technologies; Wipro Technologies; National Programme on Technology Enhanced Learning – IIT Madras


International

National Agency for Finite Element Methods and Standards and Institute of Electrical and Electronics Engineers

Societal Relevance

The following R&D outcomes are of national/societal significance:

The Institution has implemented the solar power plant which is used for community cooking with steam-generated (through hot thermic oil) based cooking for more than 250 students everyday. This cuts off the fuel consumption to one-third.

- Digital India & Make in India, Skill India, Stand up India
- LoT-based precision agriculture Masonry Brick from Granite Sawing Dust
- Making designer chocolates and customized gifts through 3d printing
 - » Low-cost mechanical weeding for ragi (finger millet) and paddy fields
 - » Automatic vehicle locking system with helmet
 - » Wireless acceleration and brake control in bikes
 - » Multi-sensor controller for modern irrigation
- **Clean Energy:** Implemented Solar steam cooking using concentrated solar true parabolic dishes
- **Swacch Bharat:** Small satellite for pollution detection
- **Digital India:** Novel indicative methods for Melanoma Detection using mobile imaging technique. 



^ Research laboratory

ETERNAL UNIVERSITY OF THE KALGIDHAR TRUST

Brief Description

Eternal University, a non-governmental private university, is the first girls university offering postgraduate & doctorate courses in Kalgidhar Trust. Kalgidhar Trust has set up under the Himachal Pradesh Private University (Establishment & Regulation) Act, 2006, & Himachal Pradesh Government Act. No. 3 of 2009.

R&D Set-up

The Institute has the following research facilities and infrastructure:

- Venturimeter Test Rig
- Bernaulli's Apparatus
- Mechanical Power Hacksaw
- Redwood Viscometer
- Seybolt Viscometer
- Pensky-Marten's Flash Print Apparatus

Sources of income for R&D

Government funding

R&D expenditure (₹ in lakhs)

FY 2014-15 = 503.00

FY 2015-16 = 796.00

FY 2016-17 = 454.00

It does not maintain separate accounts for R&D activities.

R&D Achievements

Products developed

- Purified phytase enzyme from fungal sources is under development
- Biofortified wheat derivatives

- Improved local maize varieties with quality protein maize (QPM) trait
- Freeze dried wheat grass powder
- Low weight, high efficiency turbine for hydroelectricity production
- Solar water heating system
- Microbial isolates with plant growth promoting attributes
- Millets, oats-based functional food products including cookies and breads
- Cider vinegar from apple juice
- Nanoparticles with application potential in various fields
- Series of anti-cancerous and anti-bacterial chemical compounds
- Secondary metabolites isolated from medicinal plants

Processes developed

- Process for production, characterization, and purification of phytase enzyme from fungal sources
- Bioprocess for phytase application towards enhancing micronutrient dialyzability in wheat
- Wide hybridization and molecular breeding for biofortification of wheat derivatives
- Molecular breeding of local maize varieties with opaque 2 mutant
- Process of isolation, screening, and characterization of endophytic microbial isolates with plant growth-promoting attributes
- Process of selection, characterization, and utilization of nutritionally superior millets and

Registered Office

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Himachal Pradesh
T: 01799-276012
E: contact@eternaluniversity.edu.in
W: eternaluniversity.edu.in

Recognition Status

File No.: 11/552/2012-TU V
Initial Recognition: 2012
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 57
PGs & Graduates: 33

Research Areas

- Crop improvement
- Microbial biotechnology
- Renewable energy
- Functional foods
- Medicinal plants
- Nanoparticle synthesis
- Synthetic chemistry
- Public health

Research Outcomes

- Papers published: 159
- Technologies transferred/commercialized: 2
- Technologies commercialized: 7
- New crop varieties developed & registered: 45
- Consultancy services rendered: 4

oats cultivars to make functional food products, including cookies and breads

- Production process for cider vinegar from apple and sweet sorghum juice
- Synthetic pathway and characterization process for series of anti-cancerous and anti-bacterial chemical compounds
- Protocol for Agrobacterium mediated transformation of wheat
- Extraction, purification, and characterization of secondary metabolites of medicinal plants

Commercialization potential of products/processes developed

The organization is rendering consultancy services on soil testing service, Plant disease identification service, Microbial culture related services and Pilot plant facilities for processed food products preparation from cereals, fruits and vegetables and has partnered with Jivo Wellness Pvt. Ltd for commercialization of biofortified wheat derivatives, Wheat grass juice and powder, Functional food products, Phytase enzyme and its fungal source, bacterial isolates with plant growth promoting potential, Solar cooker and Solar water heating system.

Technical Collaborations


National

ICRISAT, Hyderabad; National Institute of Cleanliness Education and Research (Nicer), New Delhi; Material Transfer Agreement with ICRISAT; Indian Agricultural Research Institute, New Delhi; Material Transfer Agreement with Indian Agricultural Research Institute, Shimla

International

Bialystok University of Technology, Poland; Specific Bilateral Agreement with CIMMYT, Mexico; QAAFI, University of Queensland, Brisbane, Australia

Societal Relevance

- Functional food products with nutritionally improved quality, essentially useful for improving health of malnutrient/nutritionally deficient adolescent girls, pregnant ladies, children, and elderly people.
- Three month free computer training certificate programme for youth are key to social awareness and skill development with a major focus on farmers, women, and children of one of the most backward districts of Himachal Pradesh.
- Wheat grass juice & powder is extremely helpful for alleviation of micronutrient deficiency in rural population, including adolescent girls and children. 

FICCI RESEARCH AND ANALYSIS CENTRE

Brief Description

Gujarat Energy Research and FICCI Research & Analysis Centre (FRAC) were conceptualized and started to provide analytical services to industries; undertake research and development for quality improvement; help in providing quality to the consumers and raising the general standards of purity particularly in the small-scale sector. FRAC is dedicated exclusively to analysis and research.

R&D Set-up

Sources of income for R&D

- Grants-in-aid
- Testing Fee
- Training fee and technologies transferred

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

- FY 2014-15= 27.07

R&D Achievements

Products developed

- Badam kesar fortified milk shake
- Cookies product development
- Energy paste
- Standardization of energy food recipe
- Fruit-based product (Jam) development with fenugreek extract

- Development of preserved sugarcane juice

The major research projects of the organization are as follows:

- Development of method for new recipes as per requirement of industries
- Nutritional evaluation and labelling
- Bench marking of products for quality and performance
- Sensory evaluation for different storage studies
- Fortification studies in new developed products
- Trainings and project-related work for institutional need

Technical Collaborations

National

Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya (CSKHPKV)-Palampur (Himachal Pradesh); University. [Q](#)

Research Areas

- Food processing
- Food analysis and evaluation

Registered Office

FICCI Research and Analysis Centre, Plot 2A, Sector 8, Dwarka, New Delhi 110 077
T: +91-7042492150,
011-45333500-520, Ext. 537,521
E: info@fraclabs.org
W: www.fraclabs.org

Recognition Status

File No.:11/587/2013-TU-V
Initial Recognition: 2013
Valid Until: 2019

R&D Manpower

Doctorates: 3
PGs & Graduates: 7



^ New 1000 kN hydraulic multiplication machine

Registered Office

Fie Research Institute
22/44, Ganganagar P.O.
Near Sanjay Founders,
Station Road,
Ichalkaranji 416 116
District Kolhapur,
Maharashtra
T: +0230-2441475
E: fri@dataone.in
W: www.fri-cal.com

Recognition Status

File No.:11/20/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 1
PGs & Graduates: 11

FIE RESEARCH INSTITUTE

Brief Description

The Fie Research Institute is an autonomous and registered R&D body. It has designed, developed, and commercialized many engineering projects benefitting various industries throughout India. Many projects developed by the institute are import substitute and appreciated from time to time by the Government of India. It is also an NABL-accredited calibration and testing laboratory for force, hardness, dimensional, torque, pressure, and thermal parameters.

R&D Set-up

The following research facilities and infrastructure are available in the Institute:

- Dead weight force calibration machine with hydraulic multiplication of 1000 kN capacity
- Dead weight force calibration machine of 3 kN capacity
- Dead weight force calibration machine of 50 kN capacity
- Rockwell standardizing machine for calibration
- Master Hardness Tester, Model : MH-01
- Dead Weight Platform 200 N Capacity
- Hydraulic Multiplication type Dead Weight Force Calibration Machine of 100 kN capacity
- Vickers Standardizing Machine
- Brinell Standardizing Machine
- 3000 kN Cap. Hydraulic Multiplication System
- Advance touchscreen-based Vickers Hardness Tester with

in-built measurement system with image processing techniques

Sources of income for R&D

- Government sources, donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 120.23

FY 2015-16 = 173.49

FY 2016-17 = 149.82

R&D Achievements

Products developed

- Advanced touchscreen-based Vickers Hardness Tester Machine with built in measurement system with image processing techniques
- Advanced touchscreen-based micro controller panel for Rockwell & Rockwell Superficial Hardness Tester
- 1000 kN Open type Cross head UTM with servo controls
- Fully automatic Boom Barrier System
- Design & Development of new 1000 kN cap. Hydraulic Multiplication System
- Design & development of Long Travel Extensometer with added features
- Rockwell panel availing the facility of interfacing with USB printer
- 7 Segment display-based new panel for UTM or UTE
- Development of Touchscreen Brinell Hardness Tester
- Development of USB-based Rockwell Hardness Tester

Research Areas

- Testing & calibration
- Testing machine parts

Research Outcomes

- Papers published: 1

Societal Relevance

The following R&D outcomes are of national/societal significance:

- All the products are developed 100% in house and are import substitute. This will contribute to Digital India since all these developments are software based and are controlled digitally.
- The services of force and hardness calibration given by the institute

using indigenously developed force and hardness machine, contributes to the Make in India mission.

- The technology is developed totally in house and is import substitute. All time developments are software based, thus contributing the Digital India and Make in India mission. 🔍



^ Facility developed for water metre evaluation

Registered Office

Fluid Control Research Institute
Kanjikode, West Palakkad 678 623
Kerala
T: 0491 2569010
E: customercare@fcriindian.com
W: www.fcriindia.com

Location of R&D Units

Kanjikode, West Palakkad

Recognition Status

File No.: 11/128/1989-TU-V
Initial Recognition: 1989
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 4
PGs & Graduates: 11

Research Areas

- Applied research on Industrial Fluid flow measurement and control problems
- Research and experimental development services in engineering and technology
- Pioneering the Research in the area of flow products quality assurance

FLUID CONTROL RESEARCH INSTITUTE

Brief Description

The Fluid Control Research Institute (FCRI) has been established by the Government of India with techno-economic inputs from the United Nations Development Programme (UNDP). The institute has grown into a full-fledged quality assurance center for the core sector industry. It is a premier institute in fluids engineering in south-east Asia for research and development (R&D) on flow products, testing, and calibration of valves, flow metres, and other measuring instruments as per ISO requirements, model approval tests, software for design and selection of flow metres/valves, and specialized training programmes and more on the various facilities, namely, Water Flow Lab, Air Flow Lab, Oil Flow Laboratory, and other auxiliary laboratories.

R&D Set-up

The following research facilities and infrastructure are available at the Institute:

- Facility to carry out applied research on Gas/Water and Oil flow simulation, measurement, and control
- Computation Fluid Dynamics
- The research facilities are used by industry and academia.

Sources of income for R&D

Grant-in-aid

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 1,517.00

FY 2015-16 = 1,656.00

FY 2016-17 = 1,918.00


R&D Achievements

Research projects undertaken by the organization include the following:

- Development of foldable multi pitot probe
- Analysis of density effects on Rotary PD metre performance and calibration
- Wind turbine blade profile refinement
- An investigation into the Thermoelectric Inhomogeneity of S-type reference Thermocouples.
- Vibration studies for a group of temples along Badami-Aihole-Pattadakal Road

Technical Collaborations

National

Karnataka State Highways Improvement Project (KSHIP); Indira Gandhi Centre for Atomic Research (IGCAR); Bhabha Atomic Research Center (BARC), Mumbai; Department of Atomic Energy, Government of India; Municipal Corporation of Greater Mumbai (MCGM). 

Research Outcomes

- Papers published: 6



^ Research laboratory

Registered Office

Foundation for Agriculture
Resources Management and
Environmental Remediation
74 B, 1st Floor, Garhi,
Near East of Kailash,
New Delhi 110 065
T: 0120-4166813, 0120-4348444
E: jps.farmer@gmail.com
W: www.farmer.org.in

Recognition Status

File No.: 11/578/2012-TU V
Initial Recognition: 2012
Valid Until: March 31, 2018

Location of R&D Units

469/2, Sehkari Nagar, Near
Chiranjeev Vihar,
Ghaziabad 201 002

R&D Manpower

PGs & Graduates: 2

FOUNDATION FOR AGRICULTURE RESOURCES MANAGEMENT AND ENVIRONMENTAL REMEDIATION

Brief Description

The Foundation for Agriculture Resources Management and Environmental (FARMER), an NGO was established in 2002. Working at the national level for the welfare of farmers, this organization has also worked for the betterment of the rural youth, women, and for the overall sustainable rural development in the field of agriculture and allied industries. Nowadays, the activities of FARMER are mainly focused on western UP through training programmes related to integrated pest management, organic cultivation, quality control of agricultural inputs and soil and pesticide contamination in agricultural food produce. Another important activity is to create awareness and find out the suitable control measures for the control of white grub on sugarcane and other kharif crops. The organization was registered under the Societies Registration Act, 1860.

R&D Set-up

The organization has a research and quality-testing laboratory that provides training facilities for agricultural inputs, such as seed, biofertilizers, biopesticides, and soil for farmers at Ghaziabad.

The Equipment includes laminar flow; BOD incubator; double distillation plant; spectrophotometer; stereo microscope; biospectrophotometer; harvester apparatus; and a continuous deflection separator apparatus

Sources of income for R&D

Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 20.77

FY 2015-16 = 10.26

FY 2016-17 = 5.01

R&D Achievements

Products developed

- Entomopathogenic Nematodes (EPN) Infected Galleria Cadavers (GC) product developed for application to control white grub, termite, cutworm, and root borer on sugarcane and other kharif crops.

Processes developed

- The process of rearing Galleria mellonella is developed.
- The process, in vivo, of the multiplication of the EPN is developed.
- The process for soil application of the GC for white grub and other soil arthropods on sugarcane and other kharif crops is developed.

Prototypes developed

- A new prototype of the automation process for air conditioning of the EPN-infected GC, harvesting of the EPN from the GC and separation/deflection of the EPN from the harvested solution on a mass scale has been developed and is being scaled up.

Research Areas

- Entomopathogenic Nematodes (EPN)
- Entomopathogenic Fungi (EPF)
- White grub
- In vivo multiplication
- In vitro multiplication
- Rearing, *Galleria mellonella*

Research Outcomes

- Papers published: 5
 - » Books: 4

Instruments developed

- A light trap and pheromone trap for the white grub was developed.
- An applicator for the application of a liquid formulation of the EPN was developed.
- A low-cost fermenter for the in vitro multiplication of biofertilizers and biopesticides.
- Instruments for air conditioner.
- Harvester instruments were developed.
- Deflector instruments were developed in 2017-18

Commercialization potential of products/processes developed

The trials are being conducted at an all-India level under the AINP on soil arthropods for inclusion in the package of practices for the management of white grub, a pest of national agricultural importance. The product will be commercialized after inclusion in package of practices.

Technical Collaborations

National

Indian Council of Agricultural Research (ICAR), New Delhi; National Institute of Immunology (Nil), New Delhi; Indian Agriculture Research Institute (IARI), New Delhi; Central Potato Research Institute-Regional Station, Modipuram, Meerut; Sardar Vallabhbhai Patel University of Agriculture and Technology (SVPUA&T), Modipuram, Meerut; Indian Institute of Farming System Research (IIFSR), Modipuram, Meerut; National Centre of Organic Farming (NCOF), Ghaziabad

Societal Relevance

The following R&D outcomes are of national/societal significance:

The EPN-infected GC are effective for the control of pests, such as the white grub, termite, cutworms, and so on, thus damaging major commercial crops, such as sugarcane, potato, groundnut, soybean, maize, jowar, bajra, turmeric, ginger, and so on. Therefore, the product is of vital social relevance. The technology is easy to be adopted by rural entrepreneurs and farmers. 🔍



^ Newly designed press for making virgin coconut oil (Andaman Islands)

FOUNDATION FOR ECOLOGICAL RESEARCH, ADVOCACY AND LEARNING

Brief Description

The Foundation for Ecological Research, Advocacy and Learning (FERAL) is a non-profit trust formed in 1997 that works on the various aspects of applied research on ecological and environmental issues. Their key areas of research include wildlife conservation, ecological restoration, natural resource management. It is a non-governmental registered trust.

R&D Set-up

Land and building and area are earmarked for R&D activities, 5 acre plot has been made available by one of the trustees for the purpose of field office and setting up of demonstration of natural resources based interventions. This campus also house a training hall office and library building.

Sources of income for R&D

- Government sources
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 82.96

FY 2015-16 = 85.76

FY 2016-17 = 4.60

R&D Achievements

- Developing protocols for payments to conserve biodiversity on private land.

- Developing ecological indicators for certifying rubber estates.
- Restoring ecological connectivity across linear intrusions in the Shencottah Gap.
- The elephant in the town's commons, a participatory approach to conserve Asian elephants in a developing country (India) and to mitigate the human–elephant conflict.
- Assessing the impacts of infrastructure development on forest fragmentation and potential connectivity for large mammals in the Western Ghats.
- Assessing the socio-ecological impacts of small hydropower projects in the Western Ghats, India.

Technical Collaborations

National

Ashoka Trust for Research in Ecology and Environment, Bengaluru; Asian Nature Conservation Foundation, Bengaluru; Centre for Ecological Sciences, Indian Institute of Sciences Bengaluru; India Statistical Institute, New Delhi; National Institute of Advanced Studies

International

Juniata College, Pennsylvania, USA; Rutgers University, USA; University of Melbourne, Australia; Wildlife Conservation Society, USA

Registered Office

Foundation for Ecological Research, Advocacy and Learning,
170/3 Morattandi, Auroville Post,
Villupuram, Tamil Nadu 605 101
T: 0413-2671566
W: feral@feralindia.org

Recognition Status

File No.: 11/493/2008-TU-V
Initial Recognition: 2008
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 4
PGs & Graduates: 16

Research Areas

- Wildlife biology and conservation
- Water resources management and stream ecology
- Human wildlife conflict
- Conservation planning
- Behavioural ecology
- Landscape genetics
- Wildlife connectivity
- Coastal marine fisheries

Research Outcomes

- Papers published: 9

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Introduction to GIS, GPS, and remote-sensing using quantum GIS
- Introduction to geographical information systems and global positioning systems
- Basic hydrology and basic data analysis. 



^ A view of FEEDS Office

FOUNDATION FOR ENVIRONMENT & ECONOMIC DEVELOPMENT SERVICES

Brief Description

The Foundation for Environment & Economic Development Services (FEEDS) has undertaken series of activities, such as development of land and water resources for promotion of large cardamom, ginger, tree plantation, floriculture and agriculture, free supply of seedlings and providing technical support, training men, women and youth in raising nursery and plantation of different crops. It has also undertaken rural housing (62 houses) and low-cost sanitation (55 units) financed by the Government of India and agro-social forestry (100 ha) for beneficiaries and had provided training in cardamom cultivation and distribution of seedlings to 390 farmers. It has developed demonstration farm of gladiolus, avocado, kiwi fruits, and raised a 2 ha nursery of indigenous orchid's farm. It is a non-governmental organization registered as a society.

R&D Set-up

The research facilities and infrastructure available in the organization are as follows:

- Soil Testing Lab
- Mushroom Spawn Production Unit
- Atomic absorption spectrophotometer
- CX31 Binocular Research Microscope

Sources of income for R&D

- Department of Science & Technology

- Department of Biotechnology
- Indian Council of Agricultural Research
- Botanical Survey of India

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 207.119

FY 2015-16 = 227.426

FY 2016-17 = 740.596

R&D Achievements

Products developed

- Vermicompost: 1
- Azolla (Fresh and dry): 2
- New hybrid orchids developed: 25
- Orchids discovered: 4
- Zero energy cold chamber: 1
- Mushroom spawn: 1
- Cultivation technique: 2
- Mass-scale tissue culture propagation of commercial orchids: 2
- Anti-diabetic herbal preparation: 1
- Cultivation technique: 1
- Mass-scale tissue culture propagation of commercial orchids: 1
- Wild apple candy: 1
- Bamboo shoot pickle: 1
- Pineapple candy: 1

Processes developed

- Substrate preparation based on pH
- *In situ* field culture
- Artificial pollination - emasculation

Registered Office

Foundation for Environment & Economic Development Services (FEEDS), Hengbung, P O Kangpokpi 795 129, Manipur
T: 3871-201001
E: hkipgen2014@gmail.com

Location of R&D Units

- Hengbung, Manipur

Recognition Status

File No.: 11/606/2013-TU-V
Initial Recognition: 2013
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 12
PGs & Graduates: 36

Research Areas

- Synthesis and characterization
- Nanomaterials
- Computational fluid dynamics
- Image processing
- Wireless sensor network
- Nano concrete
- Structural engineering
- Building energy simulation

Research Outcomes

- Papers published:
 - » National/International: 21
- Technologies transferred/commercialized: Vermin composting, azolla culture, orchid cultivation

- Taxonomic, phenology, and molecular characterization
- Evaporative process
- Production of spawn
- Large-scale cultivation of commercially-viable orchids
- Development of embryo rescue, meristem culture, and PLBs
- Post-harvest technology - Wild apple candy
- Post-harvest technology - bamboo shoot pickle
- Post-harvest technology- Pineapple candy

Commercialization potential of products/processes developed

- PIA takes initiatives in establishing partnership in commercial ventures of the beneficiaries.

Consultancy services rendered

- Low-cost production technology imparted through training and demonstration
- Establishment of market linkages with potential market outlets on buy back basis
- Farm advisory service.

Technical Collaborations

National

- MoU with Nagaland University (Central University); Joint Programmes with Central Agricultural University, Imphal; Joint Programmes with Amity University; Collaboration with Institute of Bioresource & Sustainable Development (IBSD), Imphal; Training of students from Rajiv Gandhi University, Arunachal Pradesh; Development of linkages with IAAST and IIT Guwahati – under process


Societal Relevance

The following R&D outcomes are of national/societal significance:

- Hybrid orchids, vermicompost (process), value-added food (process), etc.; socially acceptable and economically viable low-cost production technology; awareness programme, such as exhibition, meeting and discussion, leaflets, radio & TV talk, rally and road shows, etc.; connectivity with national missions, such as Swachh Bharat, Clean Energy, Digital India, Make in India, Swastha Bharat, Skill India, etc.

Remarks

Under the Centre for Orchid Gene Conservation of Eastern Himalayan Region (COGCEHR)– Phase I project, the following are the innovative elements developed:

- Help save many near-extinct orchids
- 290 species belonging to 68 genera brought under cultivation in two orchidaria and in one field gene bank as an *ex-situ* conservation procedure
- Conserved 16,500 accessions of orchid *ex-situ* in two orchidaria
- A herbarium established with 452 accessories of 175 species of 50 genera
- Established seed bank for 20 native rare orchids
- 3,000 fully matured plantlets of 20 RET species of orchid produced through tissue culture
- 25 orchid hybrids of commercial importance developed in the lab with exotic parents and a total number of 1,015 plantlets produced through tissue culture. 



^ IITD Techno Park, Sonipat

FOUNDATION FOR INNOVATION AND TECHNOLOGY TRANSFER

Brief Description

The Foundation for Innovation and Technology Transfer (FITT) is an industrial interface organization. It was established at the Indian Institute of Technology Delhi (IIT Delhi) as a registered society on July 9, 1992. The mission of the FITT is to be an effective interface with the industry to foster, promote, and sustain commercialization of science and technology in the institute for mutual benefits. The role of FITT is to foster technology development, technical consultancy, collaborative R&D, professional HR developmental programmes, industry site visits, and so on.

R&D Set-up

The FITT has been established at IIT Delhi with the principal objective of ensuring outreach research results of the institute to the industry through:

- Problem solving
- Technology-updation projects
- Technology developments and transfers
- IP licensing
- Technology incubators/science parks. The FITT has sponsored the augmentation of several research facilities at the IIT Delhi, which include: The FITT advanced MEMS CAD laboratory, FITT laboratory for research in pharmaceutical biotechnology, FITT laboratories in medical textile.

Sources of income for R&D

- Technology transfer fees
- Overheads on technology development projects
- Technology dissemination programmes
- Contract research, interest on corpus

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 1,458.07

FY 2015-16 = 1,339.12

FY 2016-17 = 1,996.70

R&D Achievements

Products developed

- Design, engineering, supervision, calibration, and commissioning of a twin-cooling test cell facility
- Design and development of electromagnetic exciter for active vibration control of the rotating shaft
- Development of simulation on a model for mini power plant cycles and turbine systems for solar/geothermal applications, using ammonia water mixture and other organic fluids
- Setting-up of an Integrated Security and Surveillance System (also known as the IS3) along with the operation and maintenance of the same for three years in Noida on a pilot basis
- Setting up waterless urinals at Delhi Parks & Gardens Society

Registered Office

Foundation for Innovation and Technology Transfer (FITT)
Indian Institute of Technology
Hauz Khas, New Delhi 110 016
T: 011-26857762
E: mdfitt@gmail.com and
W: www.fitt-iitd.org

Recognition Status

File No.: 11/303/1994-TU-V
Initial Recognition: 1994
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 46
PGs & Graduates: 84

Research Areas

- Mechanical engineering
- Electrical and electronics
- Chemical engineering
- Civil engineering
- Rural technologies
- Textile technologies
- Computer science and Engineering
- Energy

Research Outcomes

- IPRs held
 - » Patents awarded: 22
- Technologies transferred/commercialized: 13

Nursery, the Government of Delhi

Processes developed

- Design and development of biogas enrichment and bottling system
- A process of generating magnetically controlled ball and smart, abrasive-laden shape for finishing intricately shaped surface in 3D
- Development of a highly efficient and economical process for therapeutic antibody fragment
- Optimization of chromatography process steps for the purification of monoclonal antibody-based therapeutics

Prototypes Developed

- UKAI flood modelling for the Surat Climate Change Trust
- CARS - Design of True Time Delay 5 bit MEMS Phase Shifter utilizing SP4DT and SPDT switch at KU band using Sitar PDK and characterization of MEMS switches and phase shifters developed at the SITAR.

Technical Collaborations

National

Biotechnology Industry Research Assistance Council (BIRAC) (DBT);


Ericsson; Power System Operation Corpn. Ltd

International

Pfizer Ltd; DeitY, MCIT; Samsung; Shell Inc.; Corning Inc.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- On-line Devanagari handwritten character recognition on a smartphone through a touch interface.
- Biogas enrichment and bottling system.
- Development of an aqua system-based process to treat the different water feeds to achieve an output of a specified quality.
- Development of energy-efficient ceiling fan blades.
- Technology development of aerated cement and concrete with solid waste utilization.
- Development of a software for climate-smart agricultural prioritization.
- City bus systems and emissions from heavy-duty vehicles. 



Research laboratory

FOUNDATION FOR LIFE SCIENCES AND BUSINESS MANAGEMENT

Brief Description

Formed under the aegis of the Foundation for Life Sciences and Business Management, a non-profit organization, Shoolini Institute of Life Sciences and Business Management (SILB) is the culmination of the lifelong dream of several internationally renowned academicians and business leaders.

R&D Set-up

Shoolini University focusses on disaster mitigation and management which is a critical issue in sustainable development. Under this, Shoolini University has received a Grant from NMHS of MoEF&CC, Government of India, Rs. 43 lakhs, to understand loss of microbial biodiversity due to forest fires. For better functionality, the research center is further nurturing various themes in its different centers namely:

Research Center in

Nanotechnology - The mission of the center is to work for the development of nanomaterials for improving the life of people in the Himalayan region with special relevance to water purification, materials synthesis for applications in defence, biomedical, and communication engineering.

Research Center in Omics - The center is involved in quality research, on issues associated with the origins and maintenance of biodiversity; educate to protect such that to provide the information needed to better manage biodiversity with the goal of minimizing the loss of

population and species; Collect and Index: Develop inventory of biodiversity through DNA bar coding as a tool for identification and species discovery; Leadership: Globalize Himalayan biodiversity through national/international collaborations. The thrust area for the center is to utilize omics – proteomics, genomics, and metabolomics for understanding and sustainable utilization of biodiversity for drug discovery for cancer and pathogens.

Research Center in Renewable Energy

- It is established to serve as a leading research center, knowledge hub in renewable energy, and meeting point for experts by encouraging the cooperation and collaboration in the research, innovation, and technological development of renewable energy with special relevance to the Himalayan Region.

Research Center in Automobile Engineering

- It is established with a vision to become a center of excellence in teaching and research for working of all the parts of the internal combustion engine and automobiles. Major objectives of this centre are – firstly, to provide the knowledge and importance of different parts of automobiles and technological advance in these; secondly, to provide the knowledge of all the latest technologies used in automobiles., and thirdly, to become a center of research for automobile technologies suitable for the Himalayas.

Research Center in Yoga - The main function of the center is to act

Registered Office

Shoolini University of Biotechnology and Management Sciences (Foundation of Life Sciences and Business Management)
Solan-Oachghat-Kumarhatti Highway, Bajol, Solan, Himachal Pradesh 173 229
T: 01792-308000
E: deanrd@shooliniuniversity.com, registrar@shooliniuniversity.com
W: www.shooliniuniversity.com

Recognition Status

File No.: 11/446/2005-TU-V
Initial Recognition: 2005
Valid Until: March 31, 2017

R&D Manpower

Doctorates: 103
PGs & Graduates: 938

Research Areas

- Materials Science
- Engineering
- Chemical Engineering
- Biochemistry, Genetics and Molecular Biology
- Toxicology and Pharmaceuticals
- Agricultural and Biological sciences
- Environmental Sciences
- Immunology and microbiology

Research Outcomes

- Papers published
 - » National: 344
- IPRs held
 - » Indian Patents filed: 103
 - » Foreign Patents filed: 4

as the confluence of ancient Indian philosophy and spirituality with modern academic programmes, awakening inner (soul) power & understanding the meaning of human existence, and encourage human and social values among young generation leading to social care. Shoolini University intends to disseminate yoga and its applications as solutions to control major social challenges of the world and promote yoga and meditation as an indigenous technique for the treatment of various irrepressible diseases.

Sources of income for R&D

Government agencies

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 168.21

FY 2015-16 = 158.21

FY 2016-17 = 195.39

R&D Achievements

Products developed

- Water purification kit
- Green tea wine
- Persimmon wine
- Pumpkin wine Tea perry
- Wild apricot vinegar (Fast method)
- Wild Fig jam
- Wild Fig Squash
- Black tea wine
- Osmotically dried Wild Fig
- Wild Fig Appetizer
- Fortified Wild Fig Squash and many more

Processes developed

- Process of biodiesel preparation from Algae

- Complete process for Persimmon wine, pumpkin wine, and probiotic pearl millet drink
- Process for the production of wild apricot vinegar
- Complete technology for the utilization of Brewers spent grain for microbial colour production
- Complete technology for the utilization of wild Himalayan fig for different product development

Prototypes developed

- Prototype for water purification kit

Technical Collaborations

National

Himachal Pradesh University; Indian Institute of Technology Roorkee; Dr Yashwant Singh Parmar University of Horticulture and Forestry; Jaypee University of Information Technology; CSIR - Biomedicine and Agriculture; Panjab University; National Institute of Technology Hamirpur; CSIR - Industry and Standards; CSIR Indian Institute of Chemical Technology; University of Delhi

International

University of Arkansas, United States; Seoul National University; Chung Yuan Christian University; University of LA Verne, USA; British Columbia Institute of Technology; Bukovinian State Medical University; Ukraine Sprott Shaw College, Canada; Ulster University Lanzhou University; China University of Suwon; South Korea Gachon University; South Korea Gwangju Institute of Science and Technology (GIST); South Korea Kabul University

Societal Relevance

- Moringa-based water purification kit was important for low and medium families of rural and urban India

- Shoolini University is situated in Bajhol near Solan, a place which receives abundant solar radiation throughout the year. The solar system is integrated with existing diesel-fired boiler which now serves as a backup system. The solar steam generation system produces 200 kg of steam daily, for cooking lunch as well as dinner for the girl's hostel, which houses ~1,000 girls.
- Solar drying is an effective method to preserve food. 🔍



^ Facility to develop innovative products

FOUNDATION FOR MSME CLUSTERS

Brief Description

Foundation for MSME Clusters (FMC) is a pioneering organization specializing in the promotion of MSMEs through a cluster and value chain-led development. Established as a trust in June 2005, the FMC has experience of working directly and indirectly with over 100,000 MSMEs in around 200 clusters in over 15 other countries across the globe. The vision was to be economically progressive, socially connected, and environmentally sustainable in a world that is spiritually rooted and interconnected and yet diverse in terms of its socio-economic systems.

R&D Set-up

The FMC has its head office in New Delhi and regional offices in 7 locations pan India.

- In addition, the FMC has a strong in-house information repository called www.clusterobservatory.in which has a pool of MSME sector-specific data on India which is accessed by the research team for undertaking various policy research works and also accessed by more than 50 countries across the globe for the same.

Sources of income for R&D

- International funding
- Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 436.20

FY 2015-16 = 378.30

FY 2016-17 = 110.90

R&D Achievements

Products developed

- **Creation of waste to wealth units:** The Department of Science & Technology, Government of India, funded a project for establishing 50 enterprises to develop paver blocks from foundry slag (a foundry waste). A technology was developed for converting foundry waste into paver blocks that has provided employment and reduced the quantity of slags.
- **Embroidery to employment:** In general, the approach of developmental organizations is to give training to artisans and expect they will get jobs/businesses. Under the project funded by the CITI Foundation, after acquiring market linkages, businesses were established. This was followed by training artisans as per the requirements of the buyer. The organization created 500 new jobs with a wage component of ₹20 lakh in one year for the embroidery artisans in Agra.
- **Cluster observatory, a knowledge hub for policy and practitioners:** The FMC has initiated and developed a national cluster observatory (see www.clusterobservatory.in/) having intensive information about clusters, cluster initiatives,

Registered Office

Foundation for MSME Clusters
USO House, USO Road, 6 Special Institutional Area, Off Shaheed Jeet Singh Marg, New Delhi
T: 91-11-40563323/24
E: info@msmefoundation.org
W: fmc.org.in/

Recognition Status

File No.: 11/595/2013-TU V
Initial Recognition: 2013
Valid Until: March 31, 2019

Research Areas

- Productivity and competitiveness
- Policy and research
- Training and capacity building
- Energy and environment

Research Outcomes

- Papers published: 3
- Technologies transferred/commercialized: 1

public schemes, and relevant institutions.

- Development of low-cost carding machine for the namdah weavers in Tonk, Rajasthan
- **OHS-model plant creation:** A detailed safety and occupational health and 5S audits being conducted in the MSME units along with handholding them in establishing the OHS methods. A business case has been established for most of the OHS activities. An OHS training manual has been created.
- Training of trainers in safety and first aid
- **Environmental Sustainability:** Detailed energy audits in energy-intensive sectors are being carried out to reduce the carbon emissions.

Technical Collaborations

National

Development Alternatives and TIT&S Bhiwani

International


Global Reporting Initiative

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Paver block, conventionally produced by mixing a controlled

amount of cement, sand, and aggregate can well be made by replacing aggregate with foundry-generated slag in its granular form. The strength of paver block thus produced out of foundry slag was found to be as per IS:5658 (Indian Standard for such material).

- The FMC along with its technology partner TIT&S Bhiwani, have developed a low-cost carding machine which will reduce dust pollution which at the same time will increase the productivity. This will improve the quality and at the same time reduce the drudgery of workers. Currently, the product is under field trial.
- Awareness on the adoption of simple operational methods with a scope for energy efficiency amongst the micro-, small-, and medium enterprises under a European Union-funded project, 'Scaling up sustainable development of MSME Clusters in India'.
- Awareness at the cluster level about financial products, capacitated BMOs, and other intermediaries to build awareness on how to access formal credit under a European Union-funded project, 'Scaling up sustainable development of MSME Clusters in India'. 



^ Research laboratory

FOUNDATION FOR REVITALISATION OF LOCAL HEALTH AND TRADITIONS

Brief Description

The Foundation for Revitalisation of Local Health Traditions (FRLHT) was established in 1991. It has nurtured and sponsored two major programmes, namely, The Institute of Ayurveda and Integrative Medicine (I-AIM), established in 2011 and The Institute of Trans-Disciplinary Health Sciences and Technology (TDU), established in 2014. The overarching objectives of the FRLHT is to engage in high-priority, transdisciplinary research that bridges Ayurveda with biomedicine, life sciences, engineering, pharmaceuticals and the social sciences, art and culture, and build new paradigms, standards, products, processes, technologies, and communication strategies. It is a trust and a non-governmental organization.

R&D Set-up

The research facilities and infrastructure of the institution are being used by the academia, industry and individuals. These include: the instrumentation unit; chemistry unit; documentation unit; preparation unit; product development unit; molecular biology unit; microbiology unit; bio-assay unit; microscopy unit; and the solvent room

Sources of income for R&D

- Government projects
- Donation
- International funding
- Other projects

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate bank accounts for R&D.

FY 2014-15 = 18.55

FY 2015-16 = 19.82

FY 2016-17 = 17.01

R&D Achievements

Products developed

- TamRas, a copper-based, low-cost device for safe drinking water has been developed, field tested, and marketed in the year 2017.

Processes developed

- Preparation of 'Tejas' for general anaemia.
- Preparation of 'Kasisa Bhasma' as per the traditional practice to treat an iron deficiency.
- Methodology developed for the identification and semi-quantification of the active markers present in medicinal plants for four plants.
- Invention of Jal-Bandhu which can purify contaminated water, thus making it fit for drinking purposes.
- Sustainable harvesting techniques for harvesting different plant parts of eight medicinal plant species.
- Inventory of medicinal and aromatic plants of Sikkim, a CDROM was released in June 2014. This has the combination of both field work and literature work. This is an improvement from all previous work.
- Search facilities in has improved

Registered Office

Foundation for Revitalization of Local Health Traditions (FRLHT)
#74/2, Jarakabande Kaval, Post Attur via Yelahanka, Bengaluru 560 064, India
T: 91 80 28568000
W: tdu.edu.in

Recognition Status

File No.: 11/384/2000-TU-V
Initial Recognition: 2000
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 29
PGs & Graduates: 38

Research Areas

- Indian traditional medicine
- Conservation of natural resources
- Integrative medicine

Research Outcomes

- Papers published in peer-reviewed journals: 48
- Technologies transferred/commercialized: 1

through the adaptation of the codeigniter technology (see envis.frlht.org).

Commercialization potential of products/processes developed

- TamRas, a copper-based, low-cost device for safe drinking water.
- A cost-effective sustainable point of use tool for microbially pure drinking water, especially in a rural area.

Technical Collaborations

National

Toyama Medicinal and Pharmaceutical University; Avesthagen - Avestha Gengraine Technologies Pvt. Ltd.; NICED - National Institute of Cholera and Enteric Diseases; Manipal Institute Of Regenerative Medicine; Sresta Natural Bioproducts Pvt Ltd; TANUVAS – Tamil Nadu Veterinary and Animal Sciences University

International

Action Africa Help International (AAH-I); KOTAHI Research Institute - University of Waikato, New Zealand; UNU-IAS - The United Nations University Institute of Advanced Studies Japan

Societal Relevance

- TamRas—a copper-based, low-cost device for safe drinking water has been developed, field tested, and marketed.
- Reintroduction of red-listed endangered medicinal plant species, such as *Embelia ribes* and *Adhathoda bedomei* to the field.
- Products to manage pregnancy anaemia – Tejas.
- Herbal-based health drinks.
- Rural women were trained in vermicomposting, nursery and propagation techniques and entrepreneurial skill development. 🔍



^ An awareness camp in progress

GANDHI INSTITUTE FOR TECHNOLOGICAL ADVANCEMENT (GITA) OF VIDYA BHARATI EDUCATIONAL TRUST

Brief Description

The Gandhi Institute for Technological Advancement (GITA) is a part of Vidya Bharati Educational Trust. Its objectives are to foster prosperity through technological development by means of education, innovation, and collaborative research, to undertake sponsored research and provide consultancy services in industrial, educational, and other relevant areas of the society etc. GITA is conducting innovative research in the areas of technology development, transportation, communications, electronics, robotics, etc.

R&D Set-up

The institution's research facilities and infrastructure are being used by the academia. These include the following:

- MODERB's lab
- Smart class
- Advance lab
- Advanced machining lab
- Advanced welding lab
- Biodiesel lab
- E-vehicle research lab
- Non-convectional machining lab
- Advanced heat-transfer lab
- Industrial skill development center
- 32 terminal Mat lab 2014 Hub,
- 1.5kW solar power plant off-grid for experimentation on hybrid power plants,
- 60 terminal soft-computing labs for software development

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 10.25

FY 2015-16 = 13.83

FY 2016-17 = 19.00

R&D Achievements

Products developed

- Automatic dishwasher
- Automatic plant irrigation
- GSM-based home automation and security system
- Micro-controller-based automatic level and flow-monitoring system
- E-vehicles, and hybrid vehicles
- Automatic road cleaner
- Home automation using Internet of things
- Vehicle tracking system
- E-auto rickshaw and car
- Home automation
- Ultrasonic movement detector
- Optimized and executive survey of physical node capture attack in a wireless-sensor network
- Fault-tolerant hierarchical interconnection network for parallel computers
- Solar car
- Humanoid robot

Processes developed

- Design, fabrication and testing a prototype of a UPS using PWM control

Registered Office

Gandhi Institute for Technological Advancement (GITA)
Badaraghunathpur, Madanpur
(via Odisha Janla),
Bhubaneswar 752 054, Odisha
T: 8260045006
E: principal@gita.edu.in
W: www.gita.edu.in

Recognition Status

File No.: 11/655/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 24
PGs & Graduates: 35

Research Areas

- Heat and mass transfer
- Metal matrix composite
- Biodiesel
- E-vehicles and hybrid vehicles
- Waste management
- Generation dispatch and power quality
- Microwave—photonics and embedded systems
- Cloud computing
- Internet of things

Research Outcomes

- Papers published: 126
- IPRs held
 - » Patents awarded: 2
- Technologies transferred/commercialized: 8

- Preparation of biodiesel
- Fabrication and testing of an under-temperature and over-temperature relay prototype
- Bio-photic device using photonic crystal fibre
- Metal matrix composite development
- Distributed data mining
- Power management in MANNET
- Making use of DC motors and solar panels
- Nano-photonic devices for a communication system

Prototypes developed

- IC engine helicopter
- Air-driven engine

Commercialization potential of products/processes developed

GITA has earned revenue of ₹3,548,000 by way of licensing products/processes and prototypes.

Technical Collaborations

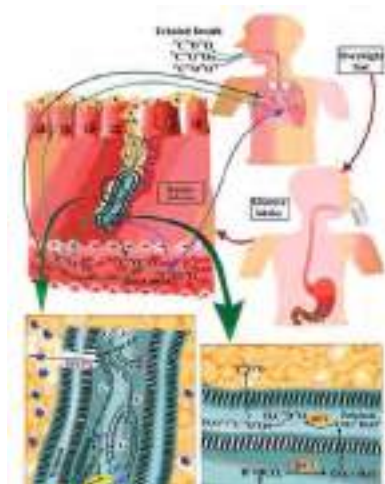
National

KEMPPI India Pvt. Ltd; OREDA, Government of Odisha; OLTRON Technology Ltd; SONALIKA TRACTOR LTD.; Oracle India Pvt. Ltd, Bengaluru; Infosys Technology, Bengaluru; Wipro Mission 10x

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Swachh Bharat Abhiyan Charity at orphanages
- Roadshow at various villages, 'Nukad Natak', at the interior parts of the state or green transport. 🔍



^ Glimpses of R&D activities in the organisation

GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

Brief Description

Gandhi Institute of Engineering and Technology (GIET) was established in the year 1997 for providing engineering education. The GIET research focusses on industrial work management through innovative technologies, energy efficient buildings, etc.

R&D Set-up

Research facilities include:

- Smart buildings, IOT lab, big data lab, 20 °C refrigerator, incubator, water bath shaker, soxhlet apparatus, electrical resistance furnace, horizontal shape chamber-type muffle furnace, electrical-resistance pit furnace, muffle furnace, etc.
- The research facilities and infrastructure of the institution are being used by the academia, industry, and individuals.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 27.93

FY 2015-16 = 11.42

FY 2016-17 = 8.54

R&D Achievements

Products developed

- Electronics choke
- Water level indicator
- Geopolymer from pond
- Al-based MMCs from colliery shale/synthesized fly ash
- Ceramic tiles from industrial waste

- Construction material from high carbon Ferro-chrome slag
- Geopolymer bricks

Processes developed

- Waste water treatment
- Smart building
- Earth air tunnel system

Some of the major research projects are:

- Development and production of wear resistant ceramic tiles from NALCO Flyash: An economic approach
- Development of metal matrix composite based on NALCO's Aluminum metal using in-situ Al_2O_3 -SiC-C and Al_2O_3 -SiC-SiO₂ composite ceramic powders, Upgradation of alumina in NALCO fly ash through bioleaching of silica and subsequent recovery of alumina through pyro/hydrometallurgical routes
- Bio mass gasifier with water spray type tar separator, An advance construction material (Geopolymer) from high carbon ferrochrome slag, multi purpose solar cooler
- A bio-process for removal of phosphorus and enrichment of manganese from manganese ore, Upgradation of alumina in NALCO fly ash through bioleaching of silica and subsequent recovery of alumina through pyro/hydrometallurgical routes, fungal degradation of azo dyes present in textile waste water and its re-use for irrigation and sustainable

Registered Office

Gandhi Institute of Engineering and Technology, Gunupur, Odisha 765 022
T: 0685-7250172
E: grkdsp@gmail.com
W: giet.edu/

Recognition Status

File No.: 11/542/2011-TU-V
Initial Recognition: 2011
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 55
PGs & Graduates: 120

Research Areas

- Bioremediation
- Enzyme technology
- Smart grid
- Internet of things
- Nanobiotechnology and fluidization engineering
- Waste water treatment, condensed matter physics, fluid dynamics
- Polymer composites

Research Outcomes

- Papers published: 86
- IPRs held 8
- Technologies transferred/commercialized: 6

development, green technology in industrial waste minimization

- Developed Al/Alloy based composites in the laboratory shows superior mechanical properties in comparison to aluminum Al-SiC, Al-Al₂O₃.
- Developed ceramic tiles are stronger, harder, and wear resistant than existing ceramic tiles. It can be used for household applications like bathroom tiles, foot path

Commercialization potential of products/processes developed

The institute has commercialized various products to Sahu Electronics,


Vision Tech Pvt. Ltd and Mini Robo Pvt. Ltd and also services like green building design with geosol associates.

Technical Collaborations

National

Environmental Technology & Management, West Bengal, University of Technology, Kolkata

Societal Relevance

- E-dustbin for waste minimization to support objectives of Swacch Bharat Mission. 



^ Solar Operated Car-EEE Student
(in house project)

GANDHI INSTITUTE OF TECHNOLOGY OF BALARAM PANDA TRUST

Brief Description

The Gandhi Institute for Technology (GIT), an ISO 9001:2008 certified institution, is a constituent college of the revered Gandhi Group of Institutions. It provides technical education and research entrepreneurship under the aegis of Balaram Panda Trust. It is affiliated to Biju Patnaik University of Technology, Odisha. The GIT focusses on research in the areas of waste management, automotive engines, energy efficiency, and fuels.

R&D Set-up

The research facilities and infrastructure of the institution are being used by the academia, industry, and individuals. These include the following:

Laboratory facilities available for research

Software available for research

- ECE LABS
- Basic electronics lab
- ME labs
- CE lab
- EEE/EE lab
- CSE /IT lab
- NANO Lab
- Basic sciences lab
- REDHAT LINUX 7.1; TURBO C++; ORACLE IOg; MATLAB; AUTOCAD; XLINX; ORCAD

Sources of income for R&D

Self- funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 22.51

FY 2015-16 = 22.81

FY 2016-17 = 27.21

R&D Achievements

Products developed

- Manufacturing and characterization of functionally graded materials
- Energy-efficient node localization in a wireless sensor network
- Iterative methods to find the roots and multiple roots of non-linear equations
- Total quality management implementation and its impact in the education sector in management institutions, a study in Odisha
- Performance analysis of an IC engine using fuel from waste plastic
- Bottling of biogas for kitchen waste

Processes developed

- An ERP system named as College Management System
- Online service for pets
- Solar operator vehicle
- Biogas plant

Commercialization potential of products/processes developed

E-commerce portal www.paclzen.com for retail marketing in 2017.

Registered Office

Gandhi Institute for Technology
B-004, Krishna Tower,
P O: Nayapalli City,
Bhubaneswar 751012, Odisha
T: 0674 2561 445
E: gift_bbsr@yahoo.co.in
W: www.gift.edu.in/

Recognition Status

File No.: 11/651/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 6
PGs & Graduates: 30

Research Areas

- Software development
- Robotics
- Internet and web technology
- Nano science and technology
- Renewable energy

Research Outcomes

- Papers published: 36
- Technologies transferred/commercialized: 3

- The web portal, 'www.palhshala360.co.in' to provide academic help to students and teachers was created in 2017
- Biogas from kitchen waste
- Fuel from waste plastic
- Online services for pets www.petslelo.com was created in 2016

Technical Collaborations

National

Central Tool Room and Training Center (CTTC), Bhubaneswar - Training on AUTICAD, CATIA, and CNC technology; Central Institute of Plastics Engineering and Technology (CIPET), Bhubaneswar - Training on AUTICAD, CATIA, and CNC Technology; Odisha Computer Application Centre (OCAC), Bhubaneswar - Training on AUTICAD, CATIA, and CNC Technology, PRO-E; Central Tool Room and Training Center (CTTC), Bhubaneswar - Training on PLC and SCADA; Innovare, Bhubaneswar - Training on MATLAB

National Aluminum Company (NALCO), Bhubaneswar: Research and Development; Aditya Birla Insulators (ABI), a unit of the Aditya Birla Group, Rishra, West Bengal: Joint Projects and Research; Central Power Research Institute, Bengaluru: Research Collaboration; M/S Udra Electronics, Rourkela, Odisha: Collaborative Research

Societal Relevance

GIT contributes to clean energy mission through:

- Biogas from kitchen waste
- Fuel from waste plastic
- Waste disposal in the hotel industry, institutions
- Digester
- Pyrolysis method
- Seminars and workshops were conducted for the above-mentioned points. 🔍



▲ AUM: Air unique quality monitoring

GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING

Brief Description

The Gayatri Vidya Parishad (GVP) College of Engineering, Visakhapatnam, a registered society, initiated operations in 1996, and has quickly established itself as one of the most preferred private engineering colleges in Andhra Pradesh. GVP is an established Scientific & Industrial Research Centre (SIRC) recognized by the Ministry of Science and Technology, Government of India.

R&D Set-up

The research facilities and infrastructure available in the organization are Photonics Laboratory, Bio Sciences Research Laboratory, Sub-Sonic Wind Tunnel Facility, and others.

Sources of income for R&D

Grants from government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 249.05

FY 2015 -16 = 228.38

FY 2016 -17 = 67.67

R&D Achievements

Products developed

- Photonics systems for OADS
- Systems for wind profiling
- System for environmental / pollution monitoring
- Structural health monitoring

Commercialization potential of products/processes developed

- AUM: Air Unique quality Monitoring
- PRANEEDHI: Photonic Reconnoitering of Acoustic Noise for Effective Eavesdropping and Highlighting Intelligence
- SAMIRA: Seeing Air in Motion: Instrumentation for Remote sensing Applications
- SARATHI: Search And Rescue Apparatus for Targeting Holistic Information
- SAVDHAN: Scan, Analyse, Validate, Discriminate, Highlight, Assess, and Neutralize
- taraNI: Technology for Air data Reckoning for Aerial Navigational Information
- VAYU: Variable Air Yielding Unit
- VEDA: Vibrational Effects – Detection Analysis
- VIDUR: Vibration Intelligence Data Unravelling Remotely

Technical Collaborations

International

- AIRBUS France

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Thousands of students and faculty have been taught, trained, and mentored across the country, in various scientific and engineering domains, and have been instrumental in the development of the following systems for

Registered Office

G V P College of Engineering Campus,
Madhurawada,
Visakhapatnam 530 048
Andhra Pradesh
T: 0891 2739211
E: director@gvpce.ac.in
W: www.gvpce.ac.in

Recognition Status

File No.: 11/536/2011-TU-V
Initial Recognition: 2011
Valid Until: March 31, 2017

R&D Manpower

Doctorates: 126
PGs & Graduates: 253

Research Areas

- Design and development of optical air data system
- Coupling sediment transport
- Neutrophic factors
- Polyunsaturated fatty acids
- Environmental monitoring
- Photonics systems
- Development of PKM-based machine tools
- Application of boots trapping techniques

Research Outcomes

- Papers published: 384

various societal applications as well as for nation building.

- Development of novel photonic technologies for the Ministry of Defence, Government of India
- Development of novel technologies for futuristic fighter aircrafts for Ministry of Defence, Government of India
- Development of bio-photonic technologies for the medical industry
- Development of fully automated subsonic wind tunnel facility for educational institutes/industries
- Development of wind profiling system for the Ministry of New and Renewable Energy, Government of India
- Development of vibration and condition monitoring system for automobile and aerospace industry
- Development of intrusion detection and traffic analysis system for highways and railways
- Development of portable platforms surf zone deployment for coastal and ocean engineering industry
- Development of novel environmental monitoring system for air quality monitoring for industry
- Development of track monitoring system for the Ministry of Railways, Government of India. 🔍



↖ Raman and FTIR spectrometer

GEMMOLOGICAL INSTITUTE OF INDIA

Brief Description

Established in 1965, under the aegis of the Gem & Jewellery Exporters' Association, Mumbai, the Gemmological Institute of India (GII) was registered as a non-profit public charitable trust. GII is known in the industry for its certification. It is the full-fledged research centre in the field of Gemmology, which is well-equipped at par with international lab and replete with wide ranging capabilities in different aspects of gemmology.

R&D Set-up

Following are the research facilities provided by the organization:

- Raman Spectroscope
- UV-Vis Absorption Spectrometer
- Fluorimeter
- LIBS-Laser Induced Break Down Spectroscopy
- FTIR Spectrometer
- Energy dispersive X-ray fluorescence (EDXRF)
- Diamond View h. Automated FTIR-HTS

Sources of income for R&D

- The Gem & Jewellery Export Promotion Council
- Diamond Exporters Association Ltd

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 70.17

FY 2015-16= 206.70

FY 2016-17= 338.79

R&D Achievements

Innovative elements developed

- Methodology developed for detection of IIb HPHT, CVD Synthetic Diamonds using their phosphorescence property
- Methodology developed for origin determination based on their chemical composition

Products developed

- Geographical origin of gemstones
- Preparation of reference standards for EDXRF & LIBS
- Methods for identification of natural and synthetic diamonds
- Detection of treatment in diamonds and gemstones

Technical Collaborations

International

Scientific and Technical Collaboration amongst National Gems & Jewellery Technology Centre, China, and GII.

Societal Relevance

The following R&D outcomes are of national/societal significance:

The institute has conducted various awareness programmes, conferences, workshops, etc., in the area of synthetic diamond detection for diamond traders and retailers. 🔍

Registered Office

Gemmological Institute of India
29, Gurukul Chambers,
187-189 Mumbadevi Road,
Mumbai 400 002, Maharashtra
T: 22-23889232, 23889234
E: gemforum@giiionline.com/lab@giiionline.com.
W: www.giiionline.com

Recognition Statu1s

File No.: 11/356/1998-TU-V
Initial Recognition: 1998
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 2
PGs & Graduates: 10

Research Areas

- Analytical methods for diamond and gemstone testing



^ PANalytical x'pert highscore plus

GITAM UNIVERSITY

Brief Description

Gandhi Institute of Technology and Management (GITAM) is a deemed to be university and was established to provide education and innovative research in the areas of biotechnology, environment, water quality, efficient technologies, etc. The objective is to promote and augment interdisciplinary research in frontier areas. Also, the University has established 10 research centres.

R&D Set-up

- **Central research lab (CRL):** The CRL is established to promote high-quality basic and applied research activities in the areas of nanotechnology, biotechnology, water quality assessment and mitigation, chemical process development for the extraction of toxic metals, invention of herbal drugs, and so on.
- **Advanced research lab (ARL):** The ARL is established to promote basic, advanced, and applied research activities in the fields of cancer biology, animal biotechnology, and environmental biotechnology. These labs are a means of translating their research findings for sustainable development of agriculture, environment, and health.

Sources of income for R&D

- Government
- Institutional funds
- Semi-governmental and private organizations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 2,017.33

FY 2015-16 = 1,846.23

FY 2016-17 = 3,026.73

R&D Achievements

Products developed

- **GITAM Trishul:** The university has developed a biopesticide which has been field tested and named 'GITAM Trishul'. This biopesticide has been highly useful to the farmers in cultivating vegetables and commercial crops and has resulted in better yields in about 2,000 acres.

Applications designed

- Bead music (www.thebeadmusic.in)
- Alloy
- Destiny literary house
- Yo Yo Youngistaan
- Digi-Health
- Farm to home
- Feminine India (see www.feminineindia.com)
- Aaguiz
- Link
- Stumagz (www.stumagz.com/)
- Loop reality
- Taparch

Registered Office

Gandhi Institute of Technology and Management (GITAM),
Gandhi Nagar, Rushikonda,
Visakhapatnam 530 045
Andhra Pradesh
T: +91-891 2840 501
E: registrar@gitam.edu
W: www.gitam.edu

Recognition Status

File No.: 11/404/2001-TU-V
Initial Recognition: 2001
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 484
PGs & Graduates: 567

Research Areas

- Agglomeration and sintering
- Process energy audit
- CDM technologies
- Proper waste management technologies
- Air pollution modelling and apportionment
- Fly ash utilization lifecycle analysis
- Environmental analytical
- Artificial intelligence

Research Outcomes

- Papers published: 2,550
- IPRs held
 - » Patents filed: 55
 - » Patents awarded: 18
- Technologies transferred/commercialized: 1

Technical Collaborations

National

HSBC Electronic Data Processing (India) Pvt. Ltd; Tata Consultancy Services Ltd, Mumbai; Hindustan Petroleum Corporation Ltd (HPCL), Mumbai; Ananth Technologies Ltd, Hyderabad; HDFC Bank, Bengaluru

International

University of Abertay Dundee, UK; The State University of New York Binghamton, USA; Central Michigan University, USA; University of Nebraska Omaha, USA; Central Michigan University, USA

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The university has developed a biopesticide which has been field tested and is named 'GITAM Trishul' with financial assistance from the NABARD. This biopesticide has been highly useful to the farmers in cultivating vegetables and commercial crops and has resulted in better yields in about 2,000 acres.
- Taparch: Footwear for visually challenged people has been developed.
- The institute conducts various programmes to inculcate the spirit of research and innovation amongst the faculty and students by way of inviting eminent persons from various organizations. 🔍



^ Initiatives to install solar power plant

GOKARAJU RANGARAJU EDUCATIONAL SOCIETY AND GOKARAJU RANGARAJU INSTITUTE OF ENGINEERING & TECHNOLOGY

Brief Description

Gokaraju Rangaraju Institute of Engineering and Technology (GRIET) was established in 1997 by Dr G Gangaraju as a self-financed institute under the aegis of Gokaraju Rangaraju Educational Society. The GRIET is approved by the All India Council for Technical Education, New Delhi, permanently affiliated to and autonomous under the Jawaharlal Nehru Technological University Hyderabad. The GRIET is committed to quality education and is known for its innovative teaching practices. Their aim is to provide an integrated learning environment to enable students to grow towards their full potential and meet the high expectations of the industry and society.

R&D Set-up

The research facilities and infrastructure of the institution are being used by the academia. These include the land and area that are evenly earmarked for different departments of the GRIET and Gokaraju Rangaraju College of Pharmacy (GRCP).

- Campus area of 36 acres is distributed into 24 acres for the GRIET and 2 acres for the GRCP.
- Built up area is 44,011 sq. m for the GRIET and 7,153 sq. m for the GRCP.
- The total area of 3,301 sq. m of the GRIET and 1,323 sq. m of the GRCP are allotted to the different departments for R&D activities.

- Instrumentation rooms have been provided with air conditioning and adequate power back up.
- Each department also has a separate seminar room with audio-visual facilities for group meetings and discussions.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 3,486.97

FY 2015-16 = 4,552.12

FY 2016-17 = 5,226.23

R&D Achievements

Products developed

- Mucoadhesive microspheres-based targeted drug delivery system for levofloxacin.
- Green approach for the simultaneous estimation of gatifloxacin and flurbiprofen by a very sensitive spectrofluorimetric method, development of biorelevant and discriminating method for the dissolution of poorly water soluble drugs, an economical stability indicating the RP HPLC method for the simultaneous analysis of ofloxacin and tinidazole

Processes developed

- Minimization of energy consumption in a mobile wireless sensor network by using the fuzzy clustering algorithm

Registered Office

Gokaraju Rangaraju Institute of Engineering & Technology
Nizampet Road, Bachupally,
Kukatpally, Hyderabad 500 090,
Telangana
T: 040 65804440
E: info@griet.ac.in
W: www.griet.ac.in

Recognition Status

File No.: 1/100/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 57
PGs & Graduates: 65

Research Areas

- Sheet metal forming
- Data mining
- Thermal engineering
- Plant biotechnology
- Industrial biotechnology
- Phytochemical investigation
- Computational chemistry
- Biopharmaceutics

Research Outcomes

- Papers published: 1

- Impact of zinc nanoparticles on morphological, biochemical and enzymatic aspects of any two leguminous crops
- Forming of Austenitic Stainless Steel 304 in superplastic region
- Comparison of the formability and texture studies of Zr alloy- 4 sheet when produced by rolling and pilgering route
- Understanding the forming behaviour of Ti-6Al-4V material between 400 °C–850 °C in a deep drawing set up

Prototypes developed

- Concentrated (focal intensified) photo voltaic solar system
- Low-cost, indigeneous smart tracker for PV panels for improved efficiency
- Non-invasive diagnostic ECG coat for detecting abnormal heart conditions
- Development of disinfectant liquid from the leaf extracts of a plant
- Production of electricity from algal hydrogen

- Development of energy-efficient sun simulator for the Indian industries

Commercialization potential of products/processes developed

- Lab-view integrated, open-circuit characteristics of the DC shunt motor
- Lab-view integrated speed control of the DC shunt motor
- Lab-view integrated short-circuit characteristics of the DC shunt motor

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Reduces environmental hazards, improvement in the health of the citizens and an associated cost reduction in medical bills
- Energy-efficiency improvement
- Pre-assessment of gadget efficiency will ensure the improvement of R&D in alternate energy devices. 🔍

GOVERNMENT TOOL ROOM AND TRAINING CENTRE

Brief Description

Government Tool Room and Training Centre (GTTC) is an autonomous society and serving industry by way of precision tooling and providing well-trained craftsmen in the area of tool and die making. The GTTC has acquired mastery in mould and die making technology and have blossomed into an epitome of precision and quality in the development and manufacturing of sophisticated moulds, dies, and tools. The GTTC is concentrating on the integrated development of the related segments of industries by way of providing international quality tools, trained personnel, and consultancy in tooling and the related areas. In the future, the focus would be more on turnkey projects in tooling, aerospace components and their assemblies, and also to the development of small- and medium-scale enterprises.

R&D Set-up

The research facilities and infrastructure of the institution are being used by the academia, industry, and individuals. These include the following:

- 3 axes to 5 axes CNC milling
- CNC turning and turnmill centres
- Non-traditional machining process of the CNC EDM and WEDM machines
- Well-equipped metrology with coordinate measuring machine, make: CARL ZEISS' latest version
- Well-equipped CAD/CAM lab: the latest version of mechanical

softwares, such as UG, Pro E, solid cam, master cam and auto cad for both modelling and machining.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 82.00

FY 2015-16 = 111.00

FY 2016-17 = 192.00

R&D Achievements

Products developed

- Anchor type polycarbonate tamper-proof plastic seals for energy metre
- Development of air-to-air refueling parts
- Development of end-fitting parts
- Rear deployment mechanism parts (RDM) for satellite

Processes developed

Earth sensor parts: LEOS, Ka ANTENNA BRACKET-01, TOP END, BOTTOM END FITTING (TTC ANTENA) for ISRO

Prototypes developed

Rear-deployment mechanics (RDM) L&T

Instruments developed

Tool pre setter instrument-GTTC

Commercialization potential of products/processes developed

- M/s ISRO- End Fittings
- M/s ADA - AIR to AIR refueling repeat order
- M/s BESCOM - Tamper proof plastic seals for energy metre
- M/s L&T - SADM & RDM Parts

Registered Office

Government Tool Room and Training Centre,
Rajaji Nagar Industrial Town,
Rajajinagar Bengaluru,
Karnataka 560 023
T: 080-23152262/ 9945870341
E: md.gtcc@gmail.com
W: www.karnataka.gov.in/gtcc/
Pages/Home.aspx

Location of R&D Units

Government Tool Room and Training Centre, Bengaluru

Recognition Status

File No.: 11/143/1989-TU-V
Initial Recognition:1989
Valid Unutil: March 31, 2020

R&D Manpower

PGs & Graduates: 5

Research Areas

- Tool & Die making
- Precision machining
- Aerospace machined parts

Research Outcomes

- Optimization manufacturing process using the latest technology and cutting tools
- Cutting down of machining time
- Training for young engineers in both modelling and machining

- M/s ISRO- BDR 2KW Tray, Anode module tray, Special screw, BASE B, Solar Panel spacers etc.
- Tool Pre setter productionization for GTTC Sub Centers

Technical Collaborations

National

Hindustan Aeronautics Ltd;
Aeronautical Development Agency;
Indian Space Research Organization;
M/s. Siemens Industry Software Ltd
and M/s. DesignTech systems Ltd

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Machining process optimization sub-assemblies are doing HAL and ADA LCA Aircrafts parts and for ISRO satellite & launching vehicle parts. 🔍



^ R&D activities in the organization

Registered Office

Gujarat Ecological Education and Research (GEER) Foundation,
Indroda Nature Park, P. O. Sector 7,
Gandhinagar 382 007, Gujarat
T: 079-23977300/311
E: dir-geer@gujarat.gov.in /geer.
info@gmail.com
W: www.geerfoundation.gujarat.gov.in

Recognition Status

File No.: 11/491/2008-TU-V
Initial Recognition: 2008
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 11
PGs & Graduates: 65

Research Areas

- Ecological research
- Agriculture–animal husbandry
- Climate change
- GIS & remote sensing

GUJARAT ECOLOGICAL EDUCATION AND RESEARCH FOUNDATION

Brief Description

The Gujarat Ecological Education and Research (GEER) Foundation is an autonomous body, set up in 1982 by the Forests & Environment Department, Government of Gujarat. The Foundation has been registered as a society under the Indian Societies Registration Act, 1860, and as a public trust under the Bombay Public Trust Act of 1950. The Foundation is governed by a Board of Governors chaired by the Hon'ble Chief Minister of Gujarat.

R&D Set-up

The organization has one central laboratory at Gandhinagar and 5 field stations at Surat, Bhavnagar, Mangrol, Jamnagar, and Mandvi comprising research facilities related to water and soil testing.

Sources of income for R&D

- Grant-in-aid
- International funding agencies.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 1,063.10

FY 2015-16 = 936.58

FY 2016-17 = 1,353.89

R&D Achievements

- A protocol for coral transplantation of the selected locally available coral species in the Gulf of Kachchh was developed.
- Decision Support System (DSS) has been developed for Biophysical

monitoring of top soil and sea water of the Gulf of Kachchh in collaboration with BISAG, GPCB, and GEC.

Technical Collaborations

Further, the GEER Foundation has signed memorandums of understanding (MoUs) with various universities, government departments, private companies, etc.

National


M/s Sun Edison Energy (India) Pvt. Ltd, Tamil Nadu; Quality Council of India (QCI), National Accreditation Board for Education and Training (NABET), New Delhi; Pandit Deendayal Petroleum University (PDPU), Gujarat; Gujarat University, Ahmedabad

International

International Union for the Conservation of Nature and Natural Resources (IUCN)

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Students of schools and colleges are exposed to different aspects of nature, wildlife, and environmental conservation.
- Eco-clubs, bird watching programmes, etc. 

Research Outcomes

- Papers published: 33
- Technologies transferred/commercialized: 2



^ Laboratory analysis

GUJARAT ECOLOGY SOCIETY

Brief Description

Gujarat Ecology Society (GES) brings out the technical facts of research in field of ecology and its allied subjects and presents the same before policymakers, managers, and the people. The organization, hence works towards the dissemination of scientific findings to the common man. It is a non-governmental trust .

R&D Set-up

The research facilities and infrastructure of the institution are being used by the students from various universities who use the facilities for their internship and dissertation works. The society has a total area about 5,600 sq. ft with a construction area of about 4,800 sq. ft

The laboratory has been established in an area of 1,000 sq. ft and is well equipped to carry out biological and chemical analysis. The following instruments are available:

- Double-walled incubators
- Spectrophotometer Hach
- Microscope with Labomed Vision 2000
- Filtration assembly - Millipore
- Vacuum pump assembly

Sources of income for R&D

Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 39.78

FY 2015-16 = 57.35

FY 2016-17 = 61.62

R&D Achievements

Process developed

- Developed a protocol for the successful restoration of spoilt mine dumps area in arid conditions of Panandhro, Kachchh.

Technical Collaborations

National

Gujarat Mineral Development Corporation Ltd, Ahmedabad

Societal Relevance

The following R&D outcomes are of national/societal significance:

The research findings are shared with the local people through awareness programmes and mainly done for the conservation of wetlands. The research findings are published in reputed journals for the scientific community. From time to time, the research findings are also published in local newspapers to create large-scale awareness amongst the different stakeholders. These involve the locals in the documentation village-level biodiversity and in creating awareness on the role of biodiversity. 

Registered Office

Gujarat Ecology Society,
3rd Floor Synergy House,
Subhanpura, Vadodara, Gujarat
T: 02652283329/41
E: info@gesindia.org
W: www.gesindia.org

Location of R&D Units

Vadodara, Gujarat

Recognition Status

File No.:11/390/2000-TU-V
Initial Recognition: 2000
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 3
PGs & Graduates: 3

Research Areas

- Biodiversity conservation
- Restoration ecology
- Dynamic system
- Coastal ecosystem
- Marine ecosystem

Research Outcomes

- Papers published: 12



↖ Environmental Researchers' Meet, 2017

GUJARAT ENVIRONMENT MANAGEMENT INSTITUTE

Brief Description

Gujarat Environment Management Institute (GEMI) is an autonomous institute set up under the aegis of Forest Department, Government of Gujarat. GEMI has now developed a full-fledged laboratory which includes testing of air, water, waste water, microbiology, and soil. The laboratory has been recognized under the Environment Protection Act, 1986.

GEMI has been registered under Societies Registration Act.

R&D Set-up

Following are the research facilities provided by the organization:

- Analytical balances & micro balance
- Autoclave
- Automatic colony counter
- Automatic potentiometric titrator
- Bacteriological incubator/ BOD incubator
- Centrifuge
- Conductivity metre (Bench top)
- Digital colorimeter
- Flame photometer
- Gas chromatograph with FID, NPD & ECD detector
- Laminar air flow
- Shakers and Magnetic stirrer
- Microscopes
- Muffle furnace
- Noise level metre
- PM2.5 samplers
- Spectrophotometer (UV Visible)
- Stack monitoring kits, Turbidity metre, Weather monitoring station

Sources of income for R&D

Government grants

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 7.75

FY 2015-16 = 14.31

FY 2016-17 = 12.06

R&D Achievements

Principle/theory developed

- Developed concept of criticality index for river monitoring

Technical Collaborations

National

Environmental Protection Training and Research Institute (EPTRI), Hyderabad; Gujarat Institute of Desert Ecology (GUIDE), Bhuj, Gujarat; Pandit Deendayal Petroleum University (PDPU), Gandhinagar, Gujarat; Birla Institute of Technology and Science (BITS), Pilani, Goa, & Hyderabad Campus; Gujarat Forensic Sciences University (GFSU), Gandhinagar, Gujarat; Shri Somnath Education and Charitable Trust, Kodinar, Gujarat; Shroff S R Rotary Institute of Chemical Technology, Ankleshwar, Gujarat. [Q](#)

Research Areas

- Research in the field of environmental protection
- Pollution control

Research Outcomes

- Papers published: 8

Registered Office

Gujarat Environment Management Institute (GEMI), Block No. 13, Third Floor, Dr Jivraj Mehta Bhavan, Sector-10 B, Gandhinagar, Gujarat 382 010
T: 079-23251051
E: secfed@gujarat.gov.in
W: fed.gujarat.gov.in

Recognition Status

File No.: 11/690/2016-TU-V
Initial Recognition: 2016
Valid Until: March 31, 2019

R&D Manpower

Doctorates : 2
PGs & Graduates: 16



^ Bamboo stick making machine

GUJARAT GRASSROOTS INNOVATIONS AUGMENTATION NETWORK

Brief Description

The Gujarat Grassroots Innovations Augmentation Network (GIAN), a non-governmental organization, is India's first technology business incubator focussing on incubating and commercializing grassroots innovations. Grassroots innovations refer to solutions generated by people at the grassroots levels to tide over persistent problems and the solutions which are either not available or not affordable by a large section of the consumer masses in developing countries such as India. The objective of GIAN is to build the value chain around these innovations with the end objective of making these available to the masses through the market mechanism or otherwise.

R&D Set-up

The following comprise the corpus of this division:

- Community Innovation Lab
- Community Food Lab
- NIF Fab. Lab
- SRISTI Food & Drug Testing Laboratory

Facilities are shared by Via Summer School, Winter School, Sattvik Food Festival, Festival of Innovation (Rashtrapati Bhavan, Delhi), IGNITE Award, MANAK Award, Community Innovation Lab, Community Food Lab.

Sources of income for R&D

- Value Addition Research & Development (VARD) projects sanctioned by other institutions

- Small Savings
- Technology Transfer

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 2,439.62

FY 2015-16= 1,678.43

FY 2016-17= 3,359.99

R&D Achievements

Products developed

- Innovative machine for making cow dung logs for eco-friendly cremation
- Bicycle sprayer
- Cotton wick making machine- Model 2
- Cow dung pot
- Cow dung pot making machine
- Cow dung logs making machine
- Cow dung collector and dispenser
- Seed dibbler
- Brick/block making machine bed sheet squizer
- Broom splitting machine
- Cotton wick making machine - Model 1
- Cow dung upla and logs making machine

Prototypes developed

- Bed sheet squizer
- Bicycle sprayer
- Broom splitting machine
- Cotton wick making machine - Model 1

Registered Office

Gujarat Grassroots Innovations Augmentation Network
Bungalow No: 1, Satellite Complex, Nr. Satellite Tower, Mansi Cross Road
Premchandnagar Road, Satellite, Ahmedabad 380 015, Gujarat
T: 079-26769686
E: gian@gian.org
W: www.gian.org/

Recognition Status

File No.: 11/410/2002-TU-V
Initial Recognition: 2002
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 1
PGs & Graduates: 5

Research Areas

- Grassroots innovations
- Technology incubation
- IPR protection
- Technology commercialization
- Agriculture (harvesting & post-harvesting) equipments
- Rural development
- Incubation center

Research Outcomes

- IPRs held
 - » Patents filed: 64
 - » Patent awarded: 15
- Technologies transferred/commercialized: 16
- New crop varieties developed and registered: 3

- Cow dung upla and logs making machine
- Brick/block making machine
- Cow dung pot making machine
- Innovative machine for making cow dung logs for eco-friendly cremation

Technical Collaborations

National

Department of Scientific & Industrial Research; Council of Scientific and Industrial Research; Society for Research and Initiatives for Sustainable Technologies and

Institutions (SRISTI); The Honey Bee Network Foundation; Indian Institute of Technology, Bombay

International

University of Technology of Troyes, France

Societal Relevance

The super sweeper is the manual-operated waste collection machine and Swachh cart, a manual operated waste collection machine, both have direct relevance to Swachh Bharat mission of Government of India. 🔍



Research Lab

GUJARAT INDUSTRIAL RESEARCH AND DEVELOPMENT AGENCY

Brief Description

Gujarat Industrial Research and Development Agency (GIRDA), a registered society, is a no-profit no loss organization. GIRDA has testing facilities for products, such as polymer, plastics, ceramics, and so on. GIRDA also carries out industrial contract R&D, research projects and has a number of plastics-processing machine for its various works.

R&D Set-up

The research facilities and infrastructure of the institution include:

- Research facilities are available for coating materials
- Thermal behaviour of polymeric materials
- These are being used by the academia and individuals

Sources of income for R&D

Government


R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

- FY 2016-17 = 902.00

R&D Achievements

Major research outcomes

- Optimization of ceric ammonium nitrate initiated graft copolymerization of acrylonitrile onto sodium salt of partially carboxymethylated sodium alginate.
- Thermal behaviour analysis of the different types of flux for magnesium melting
- Preparation and swelling behaviour of partially hydrolyzed sodium salt of partially carboxymethylated sodium alginate-g-PAN hydrogels.
- Carboxymethylsodium alginate: synthesis and characterization. 

Registered Office

Gujarat Industrial Research and Development Agency "GIRDA"
The MS University, Science College Compound, Sayajigunj, Vadodara 390 002, Gujarat
T: 0265-2791905,
E: info@girda.org.in
W: www.girda.org.in

Recognition Status

File No.: 11/700/2016-TU-V
Initial Recognition: 2016
Valid Until: March 31, 2019

R&D Manpower

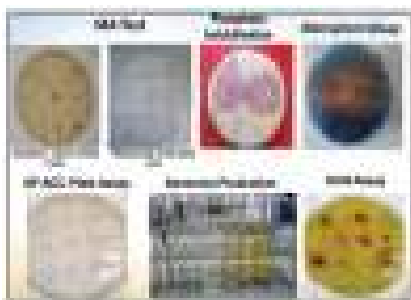
Doctorates: 2
PGs & Graduates: 3

Research Areas

- Polymeric products

Research Outcomes

- Papers published: 4



^ Functional assay for plant growth promotion

Registered Office

Gujarat Institute of Desert Ecology, Opp. Changleshwar Temple, Mundra Road, Bhuj-Kachchh, Gujarat 370 001
T: 02832-235025
E: desert_ecology@yahoo.com
W: gujaratdesertecology.com

Recognition Status

File No.: 11/418/2002-TU-V
Initial Recognition: 2002
Valid Until: March 31, 2020

R&D Manpower

Doctorates:13
PGs & Graduates:14

Research Areas

- Biodiversity assessment and conservation studies
- Regional environmental assessment and planning
- Coastal biodiversity and coastal monitoring
- Restoration of degraded ecosystems including grassland, mangroves, forests, wetlands, and so on.
- Ecological restoration of mining and industrial areas
- Impact of invasion by exotic and introduced species

GUJARAT INSTITUTE OF DESERT ECOLOGY

Brief Description

Gujarat Institute of Desert Ecology (GIDE) was established as an autonomous body and was registered as a society and a public trust. GIDE's mandate include develop benchmark database for ecosystem at Kachch and thereafter undertake continuous monitoring and trend-analysis through specific research activities; provide consultancy and training to NGOs and government officials in the principles of ecology, integrated management, and sustainable development.

R&D Set-up

The research facilities and infrastructure of the institution are being used by the undergraduate, postgraduate students, and research scholars from various universities and colleges for their research activities.

These include the following:

UV- visible spectrophotometer; kjeldahl nitrogen apparatus; dessicator; incubator; BOD incubator; magnetic stirrer; binocular microscope; digital weighing balance; flame photometer; plankton net; milliporevacumpump; autoclave; atomic absorption spectrophotometer; muffle furnace;noise metre (handheld); respirable dust sampler; fine particulate air sampler; gaseous sampler.

R&D Achievements

Products developed

- Bacterial pigments
- Bacterial derived biopolymer

Processes developed

- Process for extraction of natural pigments
- Process for extraction of natural biopolymers

Technical Collaborations

National

Central Arid Zone Research Institute, Jodhpur; Knowledge Consortium of Gujarat, Gandhinagar; SP University, VallabhVidya Nagar, Gujarat; Pandit Deendayal Petroleum University, Gandhinagar; Gujarat Environmental Management Institute, Gandhinagar, Gujarat

International

Blaustein Institutes for Desert Research, Israel; Desert Research Monitoring Control Centre, Yobe State University; Institute of Development Studies, University of Sussex, Brighton; The University of Greenwich, London, UK; Massey University, North Palmerston, New Zealand; Norwegian University of Life Sciences, Norway. [Q](#)

Research Outcomes

- Papers published: 7



^ Waste disposal at domestic level (Indian toilet & plasma)

GUJARAT ENERGY RESEARCH AND MANAGEMENT INSTITUTE

Brief Description

Gujarat Energy Research and Management Institute (GERMI) is a center of excellence in industry learning and has been set-up to develop human resource assets to cater to the petroleum and the allied energy sectors, improve the knowledge base of policymakers and technologists and provide a competitive edge to the leaders to compete in the global arena. GERMI is a fully integrated energy company having a presence in various operations, such as exploration and production, transportation of gas, and power generation, and IT services. GERMI is registered as society and a trust under the Societies Registration Act, 1860, and the Bombay Public Trust Act, 1950. GERMI has already established a specialized technology and management institute focusing on the oil and gas sector and is actively pursuing initiatives in the areas of research and alternative energy resources.

R&D Set-up

The R&D equipments available in the organization include:

- Electrical insulated gloves; reusable roof anchor with D-ring attachment; shadow analysis tool; hand-held temperature sensor; sealed maintenance free battery; proposed sheet metal roof structure; data interpretation ventre; OpendTect /petrel - seismic data interpretation, fault fracture and attribute analysis Hampson-Russell-Inversion, A VO studies;

PetroSys- mapping package; petroleum research lab; infrared thermometer; BOD incubator (EIE).

The same are being used by scientists, research fellows, summer internship students & industries.

Sources of income for R&D

- Government sources
- Industries

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2016-17 = 4.36

R&D Achievements

Products developed

- Variable rotor diameter micro wind turbine
- Modelling and simulation of compressed air energy storage
- Floating solar PV and peltier distillation system for coastal zones
- Development of low-cost structures for canal-op solar PV plant
- Development of software for solar PV and wind plant simulation

Processes developed

- Mathematical model for wind forecasting
- Performance evaluation of different solar PV module technologies
- Energy integration and poly-generation for campuses
- Design validation of solar PV plant loss parameters

Registered Office

Gujarat Energy Research and Management, Institute (GERMI) First Floor, Energy Building PDPU Campus, Raisan Village Gandhinagar 382 007, Gujarat
T: 079-27275757
E: dg@germi.res.in; information@germi.org
W: vwww.germi.org

Recognition Status

File No.: 11/471/2007-TU-V
Initial Recognition: 2007
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 9
PGs & Graduates: 47

Research Areas

- Petro graphic studies
- Rock physics and geochemical studies
- Data interpretation centre
- Seismic data enhancement
- Solar energy
- Smart micro-grids
- Environment and energy efficiency
- Bio-energy
- Waste to energy

Research Outcomes

- Papers published: 14
- IPRs held
 - » Patents filed: 1

- Drying of lignite with solar energy
- Day Ahead Scheduling of Power from Solar Power Plant
- Smart villages model
- Livelihood enhancement through RE applications in the coastal zones in Gujarat

Prototypes developed

- Demonstration of Smart - Village with 500 kW SPV
- Development of hydrophobic coating for solar PV modules
- Development of automatic cleaning machine for solar PV plant
- Design and demonstration of solar thermal airconditioning for office buildings
- Development of geothermal loop

Commercialization potential of products/processes developed

- Seis-P3 software will be commercialized after getting the copyrights

Technical Collaborations

National

National Institute for Wind Energy (NIWE); Centre for Entrepreneurship Development; Skill Council for Green Jobs; Rajiv Gandhi Proudयोगiki Vishwavidyalaya; Gujarat Energy Development Agency; Jammu and Kashmir Energy Development Agency; ONGC; Sintex Oil & Gas Ltd.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Technology development activities are linked with the objectives of the National Solar Mission and partly linked with stand-up India, Ujjwala Yojana, and so on. The software development and forecasting work of the institute is in line with government's mission and vision for Digital India.
- Creating employment by skilling the youth, benefiting the environment by deploying green energy, contributing in the Skill India Mission and the Solar PV target of the Government of India. 🔍



^ Flexing machine [used for characterization of the flex fatigue properties of rubber compound]

HARI SHANKAR SINGHANIA ELASTOMER AND TYRE RESEARCH INSTITUTE

Brief Description

Hari Shankar Singhania Elastomer and Tyre Research Institute (HASETRI) is a non-governmental organization and India's first and foremost independent research and testing centre. It fulfills the nation's need for developing newer and better technologies for elastomer and tyres. The primary goal of this institute is to foster development and evolution of new technologies for rubber and allied industries for domestic and international markets as also to develop technical manpower for the industry.

R&D Set-up

The research facilities and infrastructure of the institution are being used by the academia and individuals. These include: material research group; process and compound development group; analytical and chemical research group; tyre mechanics group; tyre testing group.

Sources of income for R&D

- Research projects
- Testing

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 1,502.30

FY 2015-16 = 3,048.15

FY 2016-17 = 2,243.32

R&D Achievements

Products developed

- High-ilica PCR tyre tread compound: improved RR, wet grip and mileage
- Cost optimization of silica-based low RR tread compound
- High butyl Inner tube for value engineering
- Bias rib tyre common breaker-outer ply compound to improve retreadability
- New retread compound for better mileage
- High-mileage tread for bias two wheeler
- High mileage taxi tread. Target: 100,000 km
- Development of sealant for puncture resistance application
- Development of winter tyre-tread compound

Processes developed

- PCR Compound development for
 - » RR (tyre label criteria B/C)
 - » Wet grip
 - » Subjective dry handling
- New bead filler compound with higher hardness for better handling of PCR tyre
- SCV bias tyre tread compound development for value engineering (upto 23% cure cycle reduction has been done; 5% mileage improvement has been reported over STD at an early exposure level.)

Registered Office

Hari Shankar Singhania Elastomer and Tyre Research Institute
Jaykaygram, PO Tyre Factory,
Kankroli, Dist. Rajsamand,
Rajasthan, 313 342
T: 0091-2952-232019
E: samar@ktp.jkmail.com
W: www.hasetri.com

Recognition Status

File No. :11/282/1993-TU-V
Initial Recognition:1993
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 6
PGs & Graduates: 63

Research Areas

- Advanced material
- Eco-friendly material
- Rubber products through simulation
- New test methods including tyre testing (indoor and outdoor)

Research Outcomes

- Papers published: 12
- IPRs held
 - » Patents filed: 7
 - » Patents awarded: 4

- Development of flange cushion compound for TBR application

Prototypes developed

- Development of winter tread
- Rationalisation of compounds
- All-season PCR tyre tread
- Knowledge catalogue generation for tyre RRC through simulation – TBR
- Knowledge catalogue generation for tyre RRC through simulation – PCR
- Material property data generation for thermal and non-linear viscoelastic model
- Fatigue crack propagation study
- Model order reduction strategies for tyre longitudinal and lateral dynamics

Technical Collaborations

National

IIT Madras; University of Calcutta; MLS University; IIT Kharagpur

International

Leibniz Institut For Polymerforschung, Dresden, Germany; Solvey, Germany; Zion Corporation, Japan; Synthos Poland; Bekaert, Brussels; Cabot Corporation, USA

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Affiliated Training Provider of Rubber Skill Development Council (RSDC) under National Skill Development Corporation (NSDC), Government of India and imparting training in the rubber sector.
- Environment-friendly technology, towards reduction in greenhouse gas emissions.
- Reduction in the fossil fuel-based raw materials in the rubber industry.
- Associated with the All India Tyre Manufacturers Association for safety awareness training. 🔍



^ Library

HARISH-CHANDRA RESEARCH INSTITUTE

Brief Description

The Harish-Chandra Research Institute (HRI) is a registered society dedicated to research in mathematics and theoretical physics. It is an aided institute of the Department of Atomic Energy, Government of India. The areas of focus in mathematics are algebra, analysis, geometry, and number theory. In physics, the areas are astrophysics, condensed matter, particle physics, quantum information, and string theory.

R&D Set-up

The following are the research facilities available at the HRI.

- Computer Center
- RECAPP (Regional Centre for Accelerator-based Particle Physics)
- High performance computing facilities

The infrastructure is used by academia members from the institute and from other individuals or research groups in India and abroad. The facilities are shared among researchers according to the availability.

Technical Collaborations

National

- IISc Bengaluru; IIT-Bombay; CMI, Chennai; Jadavpur University, Kolkata; Jawaharlal Nehru University (JNU), New Delhi; Panjab University, Chandigarh

Societal Relevance

The following R&D outcomes are of national/societal significance:

The organization is involved in national or societal missions, some of them are:

- **Sewage treatment plant:** HRI has its own sewage treatment plant, where after treatment the water is used for horticultural purposes. HRI's campus adjoins the Ganga River and they avoid river pollution by maintaining 0% effluent discharge
- **Rainwater harvesting:** Recently, HRI has installed a rainwater harvesting plant for their institute's building.
- Biogas plant
- Solar water heater for Director's residence
- All streetlights now use LED, thus, saving electricity. 🔍

Research Outcomes

- Papers published: 320

Registered Office

Harish-Chandra Research Institute, Chhatnag Road, Jhansi, Allahabad 211 019, Uttar Pradesh
T: +91-532-2567748
W: www.hri.res.in

Recognition Status

File No.:11/53/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 80
PGs & Graduates: 4

Research Areas

- Physics
- Astrophysics
- Particle physics
- Quantum information
- String theory



HYDERABAD SCIENCE SOCIETY

Brief Description

Hyderabad Science Society was established in 1948 and registered as a non-profit organization under the Societies Registration Act. The society has established laboratories for undertaking experimental work in science and technology and provides advisory and consultancy services in science and technology to other institutions, industries, and so on.

R&D Set-up

The research facilities and infrastructure of the institution are being used by the academia. These include: Biotechnology lab equipped with radiological fume hood; glove box; thermal cyler; cooling centrifuge; electrophoresis system; gel documentation system; laminar air flow; along with test and measuring instruments and lab facilities.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 19.39

FY 2016-17 = 38.23

R&D Achievements

Prototypes developed

- Rodent control using sand-blasting techniques
- Muscle wire pump
- Retrieval robot emergencies
- Zapper for treatment of HPV infection
- Drones for the control of mosquitoes in open areas
- Robotic surveillance vehicle for the Border Security Force

Technical Collaborations

National

Vasavi Hospital; Kamineni Hospital; Magna Clinic; Jesus Tripuraneni Trust; Infoyuga Health Pvt. Ltd

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Development of low-cost point of care test for the detection of human papilloma virus to identify women who are at risk of developing cervical cancer.
- Developed prototype of a robot that can help in finding victims trapped under debris after disasters. [Q](#)

Research Areas

- Robotics
- Electronic sensors
- Mechanics
- Human genetics
- Reproductive biology
- Neurodegenerative diseases
- Cancer genetics

Research Outcomes

- Papers published: 1

Registered Office

Hyderabad Science Society
12-2-460 Mehdiapatnam,
Hyderabad 500 028, Telangana
T: 04064613966
E: scisoc.hyd@gmail.com
W: www.hyderabadsciencesociety.org

Location of R&D Units

Hyderabad, India

Recognition Status

File No.: 11/580/2012-TU V
Initial Recognition: 2012
Valid Until: March 31, 2019

R&D Manpower

PGs & Graduates: 4



^ Chromatography Laboratory: Agilent HPLC, Waters LCMS/MS at Life Science Incubator, IKP Knowledge Park

Registered Office

IKP Knowledge Park
Genome Valley, Turkapally,
ShamirpetMedchal-Malkajgiri
District Hyderabad 500 101
Telangana
T: 0 40 23480006 / 23480090
E : deepanwita@
ikpknowledgepark.com
W: www.ikpknowledgepark.com

Recognition Status

File No.: 11/382/2000-TU-V
Initial Recognition: 2000
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 3
PGs & Graduates: 5

IKP KNOWLEDGE PARK

Brief Description

IKP Knowledge Park is a premier science park and incubator. It is set up with the mission to create a world-class ecosystem for fostering leading-edge innovation in the country. The IKP promotes the advancement of technology-based innovators, entrepreneurs, and small and large companies through customized space, shared equipment, incubation, mentorship, and funding.

R&D Set-up

The research facilities and infrastructure of the institution are being used by the industry, researchers and students from various academic institutions.

- The park is designed to offer infrastructure, facilities, and services to R&D companies. Hence, the entire area is earmarked for R&D activities. Currently, the 140,000 sq. ft Innovation Corridor 1 with 84,000 sq. ft of wet laboratory space is operational.
- Shared infrastructure, such as analytical facility, incubation facility, patent facilitation cell have been set up on campus.
- Gene pulsar; pH metre; incubator shaker; agarose gel electrophoresis unit; bath sonicator; spectrophotometer; polarimeter are major equipment and facility

Sources of income for R&D

- Lease rental and maintenance charges from incubatees
- Analytical service charges on use and pay basis
- Handholding services, fund raising charges from incubatees

- Grant from BIRAC for R&D on innovation clusters and IP services

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 87.15

FY 2015-16 = 98.95

FY 2016-17 = 92.89

R&D Achievements

Products developed

The following are developed:

- Crystalmorphix Technologies Pvt. Ltd: Development of EGCG Co-Crystals for improving solubility
- Excel Matrix Biological Devices Pvt. Ltd: Development of wound care products using ECM Analog Technology
- Vitas Pharma Pvt. Ltd: Combination therapy for the treatment of multidrug resistant infections caused by gram negative bacteria.
- ATGC Biotech: A unique low cost synthetic pheromone-based pest control technology
- Telluris Biotech Pvt. Ltd: Plant pest management by nematicides
- Enzibeta Biotech Pvt. Ltd: Enzyme-based production technology for Betaine
- Theranosis Life Sciences Pvt. Ltd: An innovative microfluidics-based lab-on-a-chip platform for cancer theranostics (therapy + diagnostics)
- Laxai Biopharma Pvt. Ltd: Development of Bio-similars

Research Areas

- Pharmaceuticals
- Biotechnology (biopharma, bioinformatics, industrial biotech, agri-biotech)
- Healthcare (medtech, digital health)
- Agri-related (including crop protection)

- Grasmicrobe Pvt. Ltd: Formulation and development of delivery modes of probiotics

Processes developed

- Dr Hameeda Bee: Process of the production and formulations of Iturin, lipopeptide as biofungicide.

Technical Collaborations

National

Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad;
Centre for Cellular & Molecular Biology (CCMB), Hyderabad

Collaboration with colleges for training programmes and workshops

- Bhavan's Vivekananda College of Science, Humanities & Commerce; MNR Research Foundation (sponsored by MNR Educational Trust); St. Pious X Degree & PG College for Women; St. Francis College for Women; University College Of Science, Osmania University

Societal Relevance

The following R&D outcomes are of national/societal significance:

- GPS Renewables, a start-up founded in 2011 is a bio-waste-to-energy company that has so far

successfully treated 51 lakh kg of waste to produce 5.9 lakh cu. m of biogas, mitigating 42.5 lakh kg of CO₂ equivalent of greenhouse gases and replaced 2.95 lakh kg of LPG. GPS has installations across India and in several other countries including one in Orange Country, CA, USA.

- Sohum innovation lab developed 'SOHUM newborn hearing screener'. It is a low-cost and unique device, which uses brainstem auditory evoked response, the gold standard in auditory testing to check for hearing response in a newborn. It provides early screening of infants that leads to the timely treatment and rehabilitation, as well as savings in healthcare expenses to the system.
- ATGC Biotech is an agri-biotech startup working on a unique, low-cost synthetic pheromone-based pest control technology that has successfully demonstrated a control of insect pests in cotton, pomegranate, apple and other crops. It has a strategic tie up with a US-based company and has clients in India, the US, and Europe. [Q](#)



^ Experimental physical photographs

INDIAN ACADEMY OF SCIENCES

Brief Description

The Indian Academy of Sciences was founded in 1934 by Professor C V Raman (Nobel Laureate) and was registered as a society under the Societies Registration Act of 1860 with the aim of promoting the progress and upholding the cause of science, in both pure and applied branches. The academy recognizes the special relationship of scientific creative activity with the process of education and holds that the course of discovery includes the identification and nurturing of scientific talent amongst the youth.

R&D Set-up

- The academy has established a lab facility at its Jalahalli Campus in Bengaluru to conduct experiments in physics, mainly to teach experimental oriented concepts in the same. Faculty chosen from different universities and colleges in India will make use of it as part of the experimental physics refresher course.

Sources of income for R&D

Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 0.96

FY 2015-16 = 4.25

FY 2016-17 = 0.88

R&D Achievements

- Organization publishes books, memoirs, journals, proceedings, and transactions relating to scientific researches in pure and applied branches carried out by researchers in the universities and government scientific institutions in India and the world.
- Organizes and arranges meetings and conferences for reading and discussing papers

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The academy strives to promote the progress and uphold the cause of science, both in pure and applied branches. It encourages and publishes research in the branches of science comprehended by the academy and to represent internationally the scientific work of India.
- The academy recognizes the special relationship of scientific creative activity with the process of education and holds that the course of discovery includes the identification and nurturing of scientific talent amongst the young. 🔍

Registered Office

P B No 8005, CV Raman Avenue,
RRI Campus Sadashivanagar,
Bengaluru 560 085, Karnataka
T: 080 22661203, 9008032004
E: office@ias.ac.in, exesec@ias.ac.in
W: www.ias.ac.in.

Recognition Status

File No.: 11/107/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

Research Areas

- Promotion of original research and dissemination of scientific knowledge to the community

Research Outcomes

- Papers published: 10



▲ Incubator-cum-orbital shaker with temperature controller and speed controller

INDIAN INSTITUTE OF CHEMICAL ENGINEERS

Brief Description

The Indian Institute of Chemical Engineers (IICHE), a registered society, is a confluence of professionals from academia, research institutes, and industry. It provides them the appropriate forum for joint endeavours, hand-in-hand, to work for human beings through application of chemical engineering and allied sciences. IICHE's focussed research is on nanotechnology, membrane processes, environmental management, etc.

R&D Set-up

The following are the research facilities provided by the organization:

- Incubator cum orbital shaker with temperature and speed controller
- Digital photo colorimeter with eight filters
- Digital electronic balance
- Digital pH metre
- Hand driven RO/UF module
- Distillation tower
- Inclined TUBE SETTLER
- Different glass accessories
- Bubble column

Sources of income for R&D

- Sponsorship
- Donation and grants
- Membership fees
- Examination fees
- Advertisement in institute's journal
- Interest from fixed deposits
- Dividend from UTI

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 217.04

FY 2015-16 = 232.17

R&D Achievements

- Flow of emulsion through porous media.
- Supercritical fluid extraction of natural products from various plants
- Parametric optimization and control of semi batch reactor for sulfonation process
- Hydrodynamics of tapered bubble column
- Green route synthesis of cadmium sulfide quantum dots
- Treatment of cokeoven waste water using hybrid technology
- Adsorptive removal of crystal violet dye on low-cost adsorbents in orbital shaker
- Adsorptive removal of crystal violet dye on acidic fly ash (low cost) and with mixed adsorbent in orbital shaker.

Many of the research projects undertaken have good commercial potential. The research so far has been conducted in the laboratory scale. Before we go for commercial exploitation, we are planning to re-establish the results under test parameters on pilot scale operation.

Registered Office

Indian Institute of Chemical Engineers, Dr H L Roy Building, Raja Subodh Mullick Road, Jadavpur University Campus, Kolkata 700 032, West Bengal
T: 033-24146670/24129314
E: iichehq@vsnl.com
W: www.iiche.org.in

Recognition Status

File No.: 11/57/1988-TU-V

Initial Recognition: 1988

Valid Until: March 31, 2020

R&D Manpower

Doctorates: 6

PGs & Graduates: 5

Research Areas

- Transport process
- Biotechnology/bio-processing engineering
- Nanotechnology
- Membrane processes
- Environmental management and remediation
- Process intensification and safety

Research Outcomes


- Papers published: 7

Societal Relevance

The following R&D outcomes are of national/societal significance:

- To extract valuable products from plant residues; treatment and control of effluents and pollutants; improve the efficiency of various unit operations.

All these have great social relevance because when successfully implemented, will give rise to:

- Efficiency in production and reduction of cost of the product
- Mitigating environmental degradation and protection of ecology. 



^ All-sky airglow imager

INDIAN INSTITUTE OF GEOMAGNETISM

Brief Description

The Indian Institute of Geomagnetism (IIG) is a leading institute of the country actively engaged in basic and applied research in geomagnetism and allied areas of geophysics, atmospheric and space physics, and plasma physics. The institute supports a World Data Centre for Geomagnetism (WDC, Mumbai), which is the only international centre for geomagnetic data in South Asia, and caters to the needs of space and earth scientists and researchers from various universities.

R&D Set-up

The research facilities and infrastructure of the institution are being used by the academia and individuals. These include the following:

- Geomagnetic Observatory Network in India
- CADI Ionosondes at Tirunelveli and Allahabad
- All-Sky Airglow Imagers at Tirunelveli, Kolhapur, and Allahabad
- MF Radar systems at Tirunelveli and Kolhapur
- A state-of-the-art Imaging Riometer at Maitri, the Indian Antarctic Station
- Airborne platform for measurement of horizontal electric field in the stratosphere
- Radio beacon receivers for scintillation/TEC studies

- 256 core high performance parallel processing computer system
- A state-of-the-art Environmental Geomagnetism Laboratory

The facilities of the Environmental Geomagnetism Laboratory are being used approximately 150 times per year by both internal and external users and about 15 users have registered to use the high-performance parallel processing computer system. There are about 800 registered users with the WDC, Mumbai, for assessing and downloading data files.

Sources of income for R&D

- Grant-in-aid from Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 476.95

FY 2015-16 = 770.92

FY 2016-17 = 453.31

R&D Achievements

Products developed

- Developed in-house a low-cost proton precession magnetometer (PM₁) with an accuracy of 0.1 nT.
- Developed a windows-based data logging system (nT LOGGER) for magnetic data acquisition.
- PC-based dIdD Vector Proton Precision Magnetometer developed to measure the instantaneous.
- Variation of inclination and

Registered Office

Indian Institute of Geomagnetism,
Kalamboli Highway,
New Panvel (W),
Navi Mumbai 410 218,
Maharashtra
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W: iigm.res.in

Recognition Status

File No.: 11/44/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 41
PGs & Graduates: 46

Research Areas

- Geomagnetic data-based research
- Upper atmospheric research
- Solid earth geophysics research
- Polar science research

Research Outcomes

- Papers published: 236

declination and also the total field F on a continuous basis.

- Designed a wide band pre-amplifier electronic circuit to be used as an input signal booster for the newly procured USRP model-2920.
- Development of the VHF scintillation receiver

Processes developed

- Developed a new forecast model based on the Shanon entropy for predicting the descent time of the forthcoming solar cycle (SC).
- An artificial neural network-based technique set in a Bayesian neural network (BNN) framework is proposed to assess the groundwater quality.
- The newly developed L-band scintillation technique is applied to evolve the spatio-temporal map of scintillation patches over low latitude regions of India.

Technical Collaborations

National

ONGC (Oil and Natural Gas Corporation) Ltd

Societal Relevance

The following R&D outcomes are of national/societal significance:

- A significant advancement has been made towards the scientific objectives that brings out a thorough understanding of the geophysical processes including the Sun–Earth interactions. At the same time, it opens many new scientific questions and challenges that need to be addressed, especially in the space weather and geo-seismic phenomena which can have

potential implications in modern society and technological systems. Geophysical and environmental studies are of considerable significance in terms of societal issues, such as groundwater exploration and protection from pollution and scientific aspects ranging from the past climate to present pollution levels which have a direct societal impact.

- A major outcome was delineation of groundwater potential zones at the Vanavasi Kalyan Ashram sponsored Vijaya Gopal Gandhi Primary and Secondary Ashramshala, Utekhol, in Mangaon, Maharashtra. There are 450 tribal students staying in the water scarce school premises.
- Particulate matter (PM) is an important air pollutant because of its adverse impacts on human health. Magnetic biomonitoring approach reveals the magnetic properties (Magnetic susceptibility [χ], an hysteretic remnant magnetization [ARM], and saturation isothermal remnant magnetization [SIRM]) of plant leaves and can be employed as an eco-sustainable tool for environmental management in urban and peri-urban regions.
- Combining the palaeo-rock magnetic studies with the geochemistry of rock types will help in understanding the genesis and evolution of the cratons, thereby providing an aid in the reconstruction of supercontinents which has far-reaching implications in terms of economic development. These studies are underway in the central-eastern part of India. 🔍



^ Liquid jaggery packed in laminated tubes with peelable lid

INDIAN INSTITUTE OF PACKAGING

Brief Description

The Indian Institute of Packaging (IIP) is a national apex body which was set up in 1966 by the packaging and allied industries and the Ministry of Commerce, Government of India, with the specific objective of improving the packaging standards in the country. The institute endeavours to improve the standard of packaging needed for the promotion of exports and create infrastructural facilities for the overall packaging improvement in India.

R&D Set-up

The research facilities and infrastructure of the institution include:

- The GCMS, HPLC, ICP-OES, OTR, WVTR, spectrophotometer, DSC, EDX for heavy metals, FTIR
- Walk-in-chambers for shelf life/exposure studies.

Sources of income for R&D

- Government sources
- Industry

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 966.83

FY 2015-16 = 1,018.68

FY 2016-17 = 1,124.89

R&D Achievements

Products developed

- Plastic-laminated collapsible tubes for the packaging of liquid jaggery.
- Plastic-laminated tray with peelable lid for the packaging of joynagarmoa.

- Flexible packaging for poha, chivda, and plastic tray with peelable lid for rava laddu.

Processes developed

- Minimal preservation and packaging technology developed to maintain the natural freshness of coconut water. The process involves minimal processing, such as microfiltration, microwave processing, bottling, and storage.

Technical Collaborations

National

IIT, Bombay

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Liquid jaggery (*Nolen Gur*)
- Liquid jaggery packed in plastic-laminated collapsible tubes. 🔍

Research Areas

- Applied research in packaging
- Shelf life studies of food pharmaceutical
- Basic research in packaging

Research Outcomes

- IPRs held
 - » Patents filed: 1

Registered Office

Indian Institute of Packaging
Plot No. 8, E-2 MIDC area Andheri (E), Mumbai 400093
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T : +91-22- 28219803 / 6751/9469
E : iip@iip-in.com
W: www.iip-in.com

Recognition Status

File No.: 11/74/1988-TU-V
Initial Recognition:1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 9
PGs & Graduates: 22



^ Nuclear magnetic resonance spectroscopy

Registered Office

Indian Institute of Technology
Bombay, (R&D), IRCC-SOM
Building, IIT Bombay, Powai (Post),
Mumbai, Maharashtra 400 076
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E: dean.rnd.office@iitb.ac.in
W: www.iitb.ac.in/

Recognition Status

File No.: 11/184/1990-TU-V
Initial Recognition: 1990
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 884
PGs & Graduates: 1,023

Research Areas

- Cognitive science and logic
- Protein evolution/protein folding
- Photonics, non-linear optics, lasers
- Molecular electronics
- Artificial intelligence
- Computational and experimental fluid mechanics
- Alternative energy sources
- Analysis and design of aircraft and launch vehicles

INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

Brief Description

The Indian Institute of Technology Bombay (IIT Bombay) has a comprehensive graduate programme offering doctoral degrees in science, technology, engineering, and mathematics. IIT Bombay conducts research in molecular electronics, photonics, laser, artificial intelligence, fluid mechanics, protein synthesis, renewable energy technologies, and many more areas.

R&D Set-up

The research facilities and infrastructure of the institution are available for researchers from within the institute and those visiting from external institutes. These include the following:

Bio-atomic force microscope facility; conductive atomic force microscope facility; confocal laser scanning microscope facility; laser scanning confocal facility; cryo-high resolution transmission electron microscope facility; environmental scanning electron microscope facility; scanning probe microscope facility; argon-argon geochronology facility; circular dichroism spectroscopy; flow cytometer system; preparatory ultra-centrifuge facility; climate test chamber; electrode-coating machine; elector-photo-luminescence imaging system; field emission electronic microscopy; Fourier transform infrared spectrometry fuel cell test station facility, etc.

Sources of income for R&D

- Government
- Industry
- Individuals

- Public sector
- Trusts and NGOs

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 274.27

FY 2015-16 = 258.44

FY 2016-17 = 345.58

R&D Achievements

They have completed 609 completed projects in past three years and 852 are classified as ongoing projects. They have also filed 109 PCT application.

The institute has earned the revenue of ₹121.7 lakhs during FY 2016-17 by way of licencing.

Technical Collaborations

National

Biological E; Drona Aviation Pvt. Ltd; HELLA India Automotive Pvt. Ltd Idea Cellular Ltd (KHEL); Konzeptogen Healthcare Pvt. Ltd; Nagpur Metro Rail Corp. Ltd

International

Applied Materials, USA; Exxon Mobil, USA; FCL Tech Ltd, Ireland (Facebook Inc.; Greenstone, Inc., USA; Murata Manufacturing Co., Ltd, Japan; Renesas, Tokyo. [Q](#)

Research Outcomes

- Papers published:
 - » International: 4,195
- IPRs held
 - » Patents filed: 870
 - » Patents awarded: 197
 - » Copyright: 6

INDIAN INSTITUTE OF TECHNOLOGY, DELHI

Brief Description

The Indian Institute of Technology (IIT)-Delhi endeavours to contribute to India and the world through excellence in scientific and technical education and research; serves as a valuable resource for industry and society. The mission is to generate new knowledge by engaging in cutting-edge research and to promote academic growth by offering state-of-the-art undergraduate, postgraduate, and doctoral programmes. The mission is also to identify, based on an informed perception of Indian, regional, and global needs, areas of specialization upon which the institute can concentrate.

R&D Set-up

IIT Delhi has state-of-the-art facilities for conducting R&D activities, such as:

- Electron beam lithography system
- Electron beam evaporation system

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 23,457.25

FY 2015-16 = 15,177.00

FY 2016-17 = 11,893.99

R&D Achievements

Products developed

- Design, engineering, supervision, calibration, and commissioning of a twin-cooling test cell facility
- Design and development of electromagnetic exciter for active vibration control of rotating shaft

- Technology on odour prevention device
- Development of data analytics technology for mobile marketing
- Vibration reduction in an automotive horn
- Image processing and vision application for foot scanner
- Setting-up of Integrated Security and Surveillance System (IS3) along with operation and maintenance of the same for three years in Noida on a pilot basis
- Setting up waterless urinals at Delhi Parks & Gardens Society Nursery, Govt. of Delhi
- EEG signal-based recognition module with low computational load
- Alcohol-based biofuel in Spark Ignition Engine
- Analysis modeling of coupled shear walls for non-linear force and displacement-based seismic analysis of dual structural systems in institutional building
- Development of a numerical model for the determination of mold heat flux distribution using inverse heat transfer method

Processes developed

- Design and development of biogas enrichment and bottling system
- A process of generating magnetically controlled ball and smart abrasive laden shape for finishing 3D intricate shaped surface
- Development of a highly efficient and economical process for therapeutic antibody fragment

Registered Office

Industrial Research & Development Unit, Indian Institute of Technology (IIT) Delhi
Hauz Khas, New Delhi 110 016
T : 011-26591707
E: deanrnd@admin.iitd.ac.in
W : ird.iitd.ac.in/

Recognition Status

File No.: 11/173/1990-TU-V
Initial Recognition: 1990
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 62
PGs & Graduates: 142

Research Areas

- Healthcare
- Clean Environment
- Defence
- Smart Infrastructure
- Renewable Energy

Research Outcomes

- Papers published: 5,677
- IPRs held
 - » Patents filed: 139
 - » Patents awarded: 22
- Technologies transferred/commercialized: 13

- Development of aqua-correct based processes to condition water to increase solubility of calcium and magnesium carbonates and sulphates
- Ventilation losses and ventilation behaviour under low-load / no-load conditions for application in future design of steam turbines, including advanced USC sets
- Synthesis and compiler optimization in ASIC Design
- Process development for controlling shade variation in fabrics made from acrylic yarns
- Multivariate data analysis for biopharmaceutical engineering
- Characterization of biotech therapeutic products

Prototypes developed

- Three phase induction motor for fan running on single phase A.C. mains: Phase-I – Demonstration of Concept
- UKAI Flood Modeling for Surat Climate Change Trust
- Development of physical prototypes UPSK Kit in alternative designs
- CARS - Design of True Time Delay 5 bit MEMS Phase Shifter utilizing SP4DT and SPDT switch at KU band using Sitar PDK and characterization of MEMS switches and Phase Shifters developed at SITAR.

Technical Collaborations

National

Biotechnology Industry Research Assistance Council (BIRAC, DBT Ministry of Micro, Small and Medium Enterprises (MSME); Ministry of Electronics and Information Technology, Government of India; Power System Operations Corporation Ltd ; Technology Information Forecasting and Assessment

Council (TIFAC); Oil and Natural Gas Corporation (ONGC)

International

PFIZER , USA; CCEC, Korea; Ericsson, Sweden; Samsung, South Korea; Corning Inc. , USA

Societal Relevance

The following R&D outcomes are of national/societal significance:

- IIT Delhi has been participating in rural India under the Unnat Bharat Abhiyan (UBA) by providing solutions to technical and managerial problems in village clusters across 8 districts in India. IIT-Delhi teams are working in various districts of Haryana, Jharkhand, Madhya Pradesh, Uttar Pradesh, and other states.
- IIT-Delhi is promoting industry specific need-based research under the Uchhatar Avishkar Yojana (UAY).
- IIT-Delhi is also taking initiative to develop (a) New Education Policy, and (b) Roadmap for Research to solve major engineering and technology challenges in selected domains needed by the country under the Impacting Research Innovation and Technology (IMPRINT) scheme.
- IIT-Delhi has also set up centres of excellence in bioinformatics and computational biology, biopharmaceutical technology, cyber systems and information assurance, climate modelling and research on clean air.
- IIT-Delhi is also encouraging young students to make their contribution towards society by introduction of the Discover and Learn and the Student Startup schemes. 🔍



^ Field trials on faster retting of Jute plants using IJIRA-SUBHRA

INDIAN JUTE INDUSTRIES' RESEARCH ASSOCIATION

Brief Description

The Indian Jute Industries' Research Association (IJIRA) was established in 1937 as the first co-operative research and development (R&D) organization to render services to the Indian jute industry and the government agencies who have been promoting Indian jute in the domestic market as well as exporting to other countries.

IJIRA is registered under the West Bengal Societies Registration Act, 1961 as an autonomous co-operative research organization.

R&D Set-up

The following laboratories are available with organization:

- Ecological Testing Laboratory
- Chemical Testing Laboratory
- Physical Testing Laboratory
- Biological Testing Laboratory
- Composite Laboratory
- Soil Testing Laboratory

Sources of income for R&D

- Grant-in-aid from the Government of India
- Membership fees
- Testing
- Services

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 588.93

FY 2015-16 = 606.22

FY 2016-17 = 726.39

R&D Achievements

Products developed

- 50 kg capacity light weight B.T will jute bags (580 g/bag) for packing foodgrains
- Smaller capacity jute bags for packing foodgrains
- Jute-based low-cost sanitary napkin
- Jute braided sapling bag
- Jute-thermoplastic composites

Processes developed

- Faster retting of jute plant
- Bio-chemical softening of hard root cuttings of jute fibre
- Modified RBO technology for jute processing
- Eco-friendly green sizing of jute yarn
- Eco-friendly degumming process of ramie fibre

Revenue earned by way of licensing products/processes/ prototypes

- 50 kg capacity light weight B. Twill jute bags (580g/bag) for packing food grains – Presently Food Corporation of India (FCI) and other State Procurement Agencies (SPAs) are procuring these bags for packaging rice and wheat.
- Jute-based low-cost sanitary napkins
- Modified rice bran oil technology for eco-friendly processing of jute fibre (process) –ready for commercialization

Registered Office

Indian Jute Industries' Research Association, 17, Taratala Road, Kolkata 700 088, West Bengal
T: 033 6626 9200 | 9229 | 9241
E: ijiraweb@ijira.org
W: www.ijira.org

Recognition Status

File No.: 11/319/1995-TU-V

Initial Recognition: 1995

Valid Until: March 31, 2018

R&D Manpower

Doctorates: 6

PGs & Graduates: 33

Research Areas

- Quality upgradation of jute fibre
- Technology of eco-friendly process for jute and allied fibres
- Productivity improvement in jute fibre processing
- Machinery and testing equipment design and development
- New product design and development for diversified applications of jute
- Development of jute-based technical textiles
- Development of eco-standards of jute products and its compliance

Research Outcomes

- Papers published: 9
- IPRs held: 3
- Technologies transferred/commercialized: 1

- Bio-Chemical Softening of Hard Root Cuttings of Jute – Commercialized in 6 jute mills

Technical Collaborations

International

Bangladesh University of Engineering and Technology (BUET), Bangladesh

Societal Relevance

The following R&D outcomes are of national/societal significance:

- **Social relevance of Jute-based low-cost sanitary napkins:**
The grave lack of facilities and appropriate sanitary products pushes menstruating girls out of school and adversely affects women in rural areas. Poor protection increases susceptibility to infection. Unaffordability and non-accessibility of sanitary napkins keeps a huge number of menstruating women and girls deprived of menstrual hygiene management (MHM).

Low-cost jute-based sanitary napkins developed at IJIRA can provide approximately 35 crore of menstruating women a scope for better MHM.

- **Social relevance of faster retting of jute technique:**
The faster retting technique of whole jute plants developed by IJIRA is an environment-friendly and farmer-friendly process for accelerated retting of jute plants. It yields improved quality of jute fibre (1–1.5 grade higher than that of conventionally retted jute fibres). This helps the jute growing farmers in acquiring better remuneration and takes the jute fibre forward towards manufacture of high end diversified jute products. 🔍



^ R&D activities in the organization

INDIAN JUTE MACHINERY RESEARCH & DEVELOPMENT

Brief Description

Indian Jute Machinery Research & Development is a special purpose vehicle of Ministry of Textiles, Government of India, and has been incorporated under Companies Act, 1956. The organization is involved in research in innovative and new generation jute machineries and also involved in the manufacture of special purpose machinery.

R&D Set-up

The R&D office is 6,000 sq. ft in area where researchers and designers work. The workshop covers a mechanical testing lab of 900 sq. ft and textile lab of 900 sq. ft. There are 12 licensed equipments which are used by the designers to develop new machines. The following machines are provided by the organization:

- CNC turn mill centre
- Water-jet cutting machine
- VMC 3 axis
- CNC 5 axis machine
- Milling machine
- Cylindrical grinding machine
- Instron tensile testing machine
- Twist measuring instrument

Sources of income for R&D

Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 66.88

FY 2015-16 = 41.48

FY 2016-17 = 28.06

R&D Achievements

- Draw Head: This is an attachment to the Finisher Card, replacing the age-old Roller Former. This machine takes drive from the existing Finisher Card and has suction attached to it for keeping the machine and environment clean.
- High Speed Live spindle Spinning of 108 mm pitch: This is a high speed spinning frame which runs at a speed of 5200+ rpm.
- High Speed Rigid Rapier Loom for weaving twill bags: This machine runs at 240 × 2 rpm compared to 164 rpm conventional loom. This loom is fitted with warp and weft stop motion thereby not allowing any defective cloth.

Technical Collaborations

National

Indian Jute Industries' Research Association, Kolkata; Department of Jute & Fibre Technology, Kolkata. [Q](#)

Research Areas

- New generation jute machineries

Research Outcomes

- IPRs held : 34
- Technologies transferred/ commercialized: 4

Registered Office

Indian Jute Machinery Research & Development, 14, Dr. Mohd. Ishaque Road, Kolkata 700 016, West Bengal
T: 033-22299667/7
E: rajesh@lagan.co.in

Recognition Status

File No.: 11/503/2009-TU-V
Initial Recognition: 2009
Valid Until: March 31, 2018

R&D Manpower

PGs & Graduates: 6



^ Mechanical testing lab

INDIAN PLYWOOD INDUSTRIES RESEARCH AND TRAINING INSTITUTE

Brief Description

The Indian Plywood Industries Research & Training Institute (IPIRTI) is a society and an autonomous body of the Ministry of Environment, Forest & Climate Change, Government of India. The institute was created with the vision to become an apex institution of international repute by equipping itself with the state-of-the-art technology. It also seeks to develop in-house frontline expertise to be able to carry out the necessary R&D towards advising and/or providing competitive consultancy to the academia as well as wood and other lignocellulosic-based panel industry sector regarding the conservation of natural forests through the development and adoption of efficient technologies in the field of wood and panel products from renewable fibres, including plantation timbers and bamboo while meeting the vital needs of the developing society.

R&D Set-up

The institute has multifarious infrastructure facilities for carrying out investigations and conducting experiments at laboratory levels and trials at the pilot case levels, thus simulating conditions existing in wood, plywood, and other pane-product factories that work with lignocellulosic materials. The research facilities are as follows:

- Finger-jointing and edge lamination
- Saw doctoring
- Center for bamboo development

- Maintenance workshop and carpentry shop
- Adhesive technology lab
- Formaldehyde emission test chamber
- Mechanical testing lab
- Shear/scratch tester
- Digital multi-gloss metre
- Temperature and humidity control chamber (climatic chamber)
- Timber identification and wood preservation
- Computer imaging digital microscope with image analysis software system
- Stereomicroscope with image analysis
- Software system to identify the wood samples

Sources of income for R&D

Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 1,137.00

FY 2015-16 = 920.00

FY 2016-17 = 878.00

R&D Achievements

Products developed

- Polyurethane-based bio-adhesive for the manufacturing of plywood.
- Suitability of the plantation timber *Melia dubia* for particle board manufacturing.
- Development of fire retardant particle board.

Registered Office

Indian Plywood Industries
Research and Training Institute
(autonomous body of
the Ministry of Environment,
Forest & Climate Change,
Government of India)
Post Bag No. 2273,
Tumkur Road, Yeshwanthpur PO,
Bengaluru 560 022, Karnataka
T: 080 28394231,32,33, 30534000
E: Contactus@ipirti.gov.in
W: www.ipirti.gov.in

Recognition Status

File No.: 11/101/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 8
PGs & Graduates: 15

Research Areas

- Wood composite
- Medium-density fibre (MDF) board
- Plantation timber
- Bamboo composite
- Lignocellulosic materials
- Wood-based industries

Research Outcomes

- Papers published: 34
- IPRs held
 - » Patents filed: 11
- Technologies transferred/commercialized: 8

- Development of a medium-density fibreboard (MDF) from plantation-grown timber species Casuarina-Phase II.
- Study on the suitability of Melia dubia for the manufacturing of laminated veneer lumber (LVL).
- Development of bamboo-strand lumber for housing application.

Processes developed

- Fatigue strength properties of structural panels.
- Evaluation of new-boron fixation system for wood preservation.
- Dielectrical and electrical properties of wood- and bamboo-based composite products.
- Investigation on the physical and mechanical properties of strands obtained by the disintegration of bamboo strip for the manufacturing of moulded products.
- Copperized karanj seed (*Pongamia Pinnata*) oil extractive as a protective measure in plywood manufacture.
- Study and analysis of nanocoating as fire retardant on wood panel products.
- Selection criteria and optimization of parameters of wooden frames used in fire-rated doors of different ratings.
- Development of UV and weather-resistant coating for wood-based panel products and bamboo composites.
- Development of the PUMF resin for the manufacturing of plywood.

Revenue earned by way of licensing products/processes/ prototypes (₹ in lakhs)

- Compregs : 14.40 lakh
- Blocked polyurethane resins: 12.00 lakh

- Medium-density fibre board from rice straw: 6.00 lakh
- Study on the efficacy of new, herbal wood preservative chemicals against termites: 1.50 lakh
- Evaluation of the agenda 25 EC (Fipronil) wood preservative chemical against wood borer and termites for plywood and solid wood: 10.00 lakh


Technical Collaborations

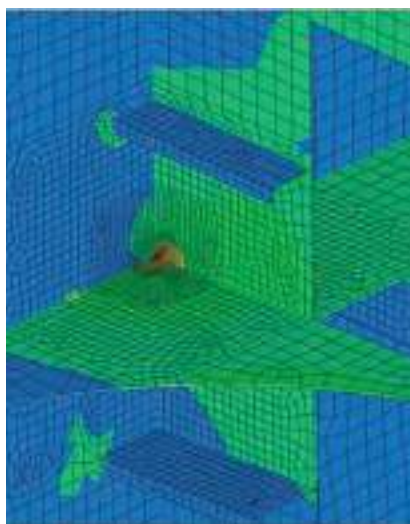
National

Institute of Forest Genetics and Tree Breeding, Coimbatore; Centre for Indian Bamboo Resource & Technology (CIBART), Gujarat; Indeutsch International, Noida; Vidhata Industries, Punjab; Shreeji Wood Craft (Pvt.) Ltd, Mumbai; MSBC Secure India, Ahmedabad, Gujarat

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Demonstration of wood-preservation techniques and treatment methods to various industries and the training imparted to many people.
- Waste generated in agricultural land can be utilized for the manufacturing of composites instead of burning which leads to health hazard by air pollution. Hence, farmers are benefitted by the same.
- Facilitate for the safe adoption in high-rise buildings. This would help us to avoid the damages caused by fire accidents in the buildings while also saving timber.
- Studies on the toxicity of pesticide manufactured by private agencies (sponsor) against termites, bores, and fungus. 



^ Fatigue analysis (FE) of critical joints in ship structures

INDIAN REGISTER OF SHIPPING

Brief Description

The Indian Register of Shipping (IRS) is an international ship classification society. It is a not-for-profit entity founded in 1975. IRS is a member of the International Association of Classification Societies (IACS), which represents classification societies worldwide. The two companies IRS and IR Class system and Solutions Pvt. Ltd (ISSPL) form the brand Indian Register Classification (IRCLASS), which provides survey, inspection, and certification services to the maritime and industrial sectors. IRCLASS is committed to promoting safe and environmentally-friendly engineering practices through its services to the business community.

R&D Set-up

The following are the research facilities provided by the organization:

- High performance computing facilities (dusters), Dell PowerEdge (60 core server), Lenovo System *3650/3550 (84 core server)
- Advanced technical software/ computational tools, e.g., StarCCM+, ANSYS, ANSYS-CFX, MOSES, SACS, Orcaflex, ShipFlow, MATLAB, etc.

Sources of income for R&D

- Survey fees
- Donations and funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 12,112.03

FY 2015-16 = 11,937.80

FY 2016-17 = 12,362.30

R&D Achievements

Products developed

- Rules for classification of steel ships
- Rules for classification of offshore structures
- Rules for classification of high speed crafts
- Rules for classification of naval ships
- Guidelines, classification notes, and technical bulletins
- Rules for floating offshore units

Processes developed

- Structural analysis for different ship types and offshore structures
- Advanced load computations
 - » Hydrodynamic loads for different ship types, offshore structures, and environment scenarios
 - » Underwater explosion loads for naval vessels
 - » Sloshing loads analysis
- Structural reliability analyses
- Risk analysis of ports, harbours, and industrial installations
- Reliability analysis of systems installed onboard ships and offshore structures

Energy efficiency of ships

- Computational fluid dynamics based computations
- Noise and vibration computations onboard ships
- Renewable energy—offshore wind turbines
- Marine casualty and failure investigations

Registered Office

Indian Register of Shipping, 52A,
Adi Shankaracharya Marg,
Opp. Powai Lake, Powai,
Mumbai 400 072, Maharashtra
T: 022 3051 9400
E: ho@irclass.org
W: www.irclass.org

Recognition Status

File No.: 11/103/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 3
PGs & Graduates: 35

Research Areas

- Classification rules of ships
- Structural analysis
- Energy efficiency
- Reliability and risk analysis

Research Outcomes

- Papers published: 8

- Software development for published rules and internal use projects

Technical Collaborations

National


Member of NRB; Indian Navy; IIT Kharagpur

International

American Chemical Society (ACS); International Social Science Council (ISSC)

Societal Relevance

The organization is involved in national or societal missions, some of them are:

- Clean Energy: Energy Efficiency Design Index (EEDI) calculations and measures for fuel saving, hull form optimization, etc.
- Make in India: Advanced analysis for Indian shipyards and ports (hydrodynamics, ship strength, risk analysis, LNG carriers)
- SAGARMALA: Risk analysis, structural analysis, manoeuvring for inland waterways infrastructure. 



^ Polyurethane booting for manipulators

INDIAN RUBBER MANUFACTURERS' RESEARCH ASSOCIATION

Brief Description

The Indian Rubber Manufacturers' Research Association (IRMRA) has been contributing successfully in the rubber and allied industries. The IRMRA is affiliated to the Ministry of Commerce and Industry, DIPP, Government of India, and has modern, state-of-the-art, scientific and analytical instruments. The association is also fully equipped with facilities for design and development, product development validation, and testing of rubbers and its allied materials. The Government of India has funded to create this state-of-the-art R&D centre to support the rubber industry and the end users to improve the quality of rubber products. The IRMRA is well known for its expertise in the fields of testing and investigations, research and products/compound development, and has diversified its activities in the new sophisticated areas, such as Nano and Latex Technologies as well as rubber engineering.

R&D Set-up

The research infrastructure for the IRMRA is well recognized by different industries across the India. The association is also involved in various academic research activities and the IRMRA scientists are closely working with other institute professionals/students. Research fellows from academia are also encouraged and allowed to use the instrumental facilities of the IRMRA. Students from IITs, NIT, and other institutes also regularly come to the IRMRA for

carrying out their internship projects.

The following are the research facilities provided by the organization:

- Mechanical Laboratory
- Chemical and Instrumentation Laboratory
- Thermal Laboratory
- Tyre testing
- Processing and Product Development Department

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 466.72

FY 2015-16= 489.41

FY 2016-17= 1189.87

R&D Achievements

Products developed

Development of special rubber products

- Special polymer ERM and Model 8 Manipulator Booting
- Machine mount
- Specialty rubber solution
- Alternate rubber mount
- Design and development of tong booting
- EPDM rubber gauntlet
- Titanium rubber mount

Processes developed

- Methodology development for rubber bellow
- Casting process development for polymer ERM and Model 8 Manipulator Booting

Registered Office

Indian Rubber Manufacturers' Research Association,
Plot No. 254/1 B, Road No. 16 V,
Wagale Industrial Estate,
Thane 400 604, Maharashtra

T: 022 6787-3200

E: info@irmra.org

W: irmra.org/

Recognition Status

File No.:11/49/1988-TU-V

Initial Recognition:1988

Valid Until: March 31, 2018

Research Areas

- Nano fillers
- Natural fillers
- Waste recycling

Research Outcomes

- Papers published: 18
- IPRs held : 1
- Technologies transferred and commercialized: 5

Prototypes developed

Development of rubber dam has been considered as a unique project in the field of interdisciplinary research in agriculture and its allied sciences.

Revenue earned by way of licensing products/processes/ prototypes

- The revenue earned by rubber dam, rubber seals, polymer booting, rubber gloves, shock, and vibration mount

Consultancy services rendered

The department has provided industrial consultancy services in the following areas to more than 60 industries through short-term projects during the year 2016-17:

- Rubber compound development
- Product development/ improvement
- Failure analysis
- Process improvement
- Indigenization
- Process qualification
- Reverse engineering/formula reconstruction
- Evaluation of raw materials
- GMP/vendor rating

Technical Collaborations

National

Tata Chemicals, ITW, BARC, ICT; Dnaynasadhana College, Thane; IIT Kharagpur, Patna & CUSAT; Universal Business School, Mumbai; IIT Bombay; National Institute Technology, Karnataka; Cochin University

International

LRCCP, Paris, France

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The rubber dam has been designed which will act as a shock absorber and waterproofing material. To control the water flow and hence it can be beneficial for the sewage system, irrigation purposes, in controlling the floods, and in the agricultural sector.
- The IRMRA is providing research opportunities to the students and encouraging industrial visits, thus creating research and new employment opportunities. 🔍



INDIAN NATIONAL SCIENCE ACADEMY

Brief Description

The Indian National Science Academy (INSA) has the objective of promoting scientific research in India and harnessing scientific knowledge for the cause of humanity and national welfare. It is a professional body under Department of Science and Technology, Ministry of Science and Technology. The foundation of the academy, earlier known as the National Institute of Sciences of India, was the outcome of joint endeavours of several organizations and individuals and the Indian Science Congress Association playing a leading role in this regard. The academy is a registered Society registered under the societies Registration Act XXI of 1860.

R&D Achievements

Projects accomplished

- Compilation of Classified Bibliographies and Assessment of Research work done in different Branches of Mathematics in the Eastern zone in India during the nineteenth and twentieth centuries.
- English translation of Yogamrtam
- The State of Ayurveda in Colonial Bengal
- Calcutta Medical College and the Rise of Hospital Medicine in India: Locating its Evolution and Epistemological Consequences
- Medicine and British Empire in South India: A Study of Psychiatry and Mental Asylums in Colonial Kerala

- History of Technological Adoption and Development: The Case of Silk Industry in Colonial India

The Academy has actively and successfully pursued the objectives since its establishment in 1935. It honours established Indian and overseas scientists by electing them as fellows and nurtures younger scientists through award of Young Scientist Medal and grants. Many programmes have been developed to utilize the expertise of superannuated fellows. From time to time, INSA brings out well considered documents on issues of national importance and is actively involved in preparing science policy documents, assisting various ministries of Government of India in consultative processes to develop action plans where science is integral to the projects. INSA also publishes well recognized scientific journals. The outreach programmes of INSA in remote areas are hugely popular. INSA fellows, teacher and young scientist awardees participate in this initiative.

Technical Collaborations

National

Global Network of Science Academies; Inter Academy Council; Academy of Sciences for the Developing World; Association of Academies and Societies of Sciences in Asia

International

International Council for Science; International Foundation for Science

Societal Relevance

The following R&D outcomes are of national/societal significance:

Registered Office

Indian National Science Academy
Bahadur Shah Zafar Marg,
New Delhi 110 002
T: 23221931 to 50
E: fmance@insa.nic.in
W: insaindia.res.in

Recognition Status

File No.: 11/23/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

Research Areas

- Science and technology for national welfare
- Around 1,746 applicants were offered the Summer Research Fellowships, out of which 1,346 (1,234 students and 112 teachers) availed of the fellowships. The aim of the course is to enhance the quality of science education at the UG/PG level.
- For the benefit of students and teachers at the undergraduate, graduate, and research level during the last two years, more than 150 workshops/lectures were organized on topics of current scientific interest throughout the country including the remote areas. 🔍



▲ Parallel Kinematic Mechanism (PKM) 6D
Robot for neurosurgery

Registered Office

Institute for Design of Electrical
Measuring Instruments
Swatantryaveer Tatyapa Tope Marg,
Chunabhathi, Sion,
Mumbai 400 022, Maharashtra
T: 022 2405 0301, 2405 0302
E: info@idemi.org
W: www.idemi.org

Recognition Status

File No.: 11/116/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

PGs & Graduates: 30

INSTITUTE FOR DESIGN OF ELECTRICAL MEASURING INSTRUMENTS

Brief Description

The Institute for Design of Electrical Measuring Instruments (IDEMI) has been established by the Government of India in 1969 as a service to the instrument industry organization. The main objective of the institute is to gear up the growth potential of indigenous instrument industry and hence, meet the ever-growing instrumentation needs of the country by augmenting productivity quality control in the industrial sector—be it in electrical, electronics or process control instruments. The institute is viewed as a nodal centre in view of its multifarious activities offered to suit various needs of the instrument industry.

R&D Set-up

The research facilities and infrastructure available in the organization are as follows:

- Electrical Calibration Laboratory (NABL-accredited)
- Electrical Testing Laboratory (ETL)
- EMI-EMC Testing Laboratory (nablaccreditation):
- Insulation Resistance and di-electric strength (hv)
- Impulse test (12 kv)
- Resistance to fire (glow wire app.), tracking test
- Resistance heat test (ball pressure), and others

Sources of income for R&D

Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 1,276.92

FY 2015-16 = 1,496.74

FY 2016-17 = 1,656.66

R&D Achievements

Products developed

- Games prototype/model developed for Nehru Planetarium, Mumbai
- Design and development of solar silk reeling machine
- 6D parallel kinetic mechanisms (pkm) for neuro surgery
- Quadrupole magnet assembly proton beam accelerator
- Design and development of solar amber charkha (16 spindle)
- Tele-presence robot development for telemedicine application
- Stator rotor crio engine parts of GSLV mark 3 model
- Development of absolute pressures sensor for Bhabha Atomic Research Centre (BARC)
- Ultrasonic flow sensor for barc
- Soil fertility goniometer
- Double crystal monochrome
- Compact Linear Frisnel Reflector (Solar Project) Steam Generator

Technical Collaborations

National

- Indian Space Research Organisation (ISRO)
- Liquid Propulsion Systems Centre (LPSC)

Research Areas

- Tool and die making
- Electro-mechanical assembly
- Design and manufacturing of press tools for sheet metal components
- Plastic moulding tools
- Pressure die casting


- Bhabha Atomic Research Centre
- Department of Science and Technology
- Indian Electrical and Electronics Manufacturers Association (IEEMA)
- Tool and Gauge Manufacturers Association (TAGMA)
- IMDA - Info-communications Media Development Authority, IMDA
- Indo-German Chamber of Commerce

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The innovative waste management solar-powered trash compactor helps keep public spaces clean and can reduce trash

collections by up to 80%. Useful for dry solid waste management, the product has been introduced by all municipal corporations and has direct relevance to the mandate of the Swachh Bharat Mission.

- Silk is a protein fibre derived from the cocoons of certain caterpillars. Silk is a good charkha fibre because it likes to be spun fine with a high twist, the machine requires electricity which is supplied through solar system. The overall system cost is very economical as compared to other machines for the same purpose. With this machine, female entrepreneurs were benefited in textile sector. It has relevance to Make in India mission. 



^ Mangrove ecosystem developed by IERSE

INSTITUTE FOR ENVIRONMENTAL RESEARCH AND SOCIAL EDUCATION

Brief Description

The Institute for Environmental Research and Social Education (IERSE) is a public, charitable, non-profit trust committed to the development of the local communities and protection of the environment in which they live. The IERSE's strategy is to conduct applied research that will lead to sustainable use of natural resources. By communicating the relevant results and scientific knowledge in a culturally sensitive and relevant manner, the IERSE is able to engage local communities for the conservation of their natural resources. The IERSE is a forum for people of all ages from all walks of life to contribute towards the protection and conservation of the natural environment.

R&D Set-up

The research facilities and infrastructure of the institution are being used by the academia. These include the following:

- Well-equipped laboratory
- Library
- Under water clip boards
- Adapter, inflatorhose, and so on
- Kompressor oil removal-co-filter

Sources of income for R&D

- Project grants
- Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 10.60

FY 2015-16 = 12.67

FY 2016-17 = 10.43

R&D Achievements

IERSE recorded about 53 species of fish and 26 species invertebrates mainly sponges, soft corals, and corals which are new to the south-west coast of India and Lakshadweep Islands.

Research projects

- Identified the octocorals and the associated fauna around the rocky reefs of Muttom in Tamil Nadu, India.
- Studied the coral and rocky reefs of the south-west coast of India.
- Conducted reef-combing work at Pallam in the Kanyakumari coast.
- Conducted underwater surveys around the Lakshadweep Islands and documented the coral resources of the region.
- Surveyed and documented the octocorals of Vembar and the Kilakarai groups of islands in the Gulf of Mannar.
- Performed reef combing around the rocky reefs of Kerala in India.
- Published a field guide for the protection and conservation of the rock lobster resources of India.

Registered Office

Institute for Environmental Research and Social Education,
150, Second Main Road,
Nesamony Nagar,
Nagercoil 629 001, Ivanyakumari
District, Tamil Nadu
T: 4652-233701
E: lazarus lasu@yahoo.com
W: www.ierse.in

Recognition Status

File No.: 11/661/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 5

Research Areas

- Protection of natural resources
- Eco-friendly fishing techniques
- Eco-friendly aquaculture
- Eco-friendly rainwater harvesting techniques
- Marine and terrestrial biodiversity
- Taxonomy and the ecology of marine fauna and flora
- Natural habitats

Research Outcomes

- Papers published: 8
- Technologies transferred/commercialized: 4

- Propagated the lobster-fattening technology amongst the fisherwomen of the Kanyakumari district, Tamil Nadu.
- Supported the Central Institute of Fisheries Technology in its eco-friendly lobster fishing gear distribution programme at the selected centres.
- Rendered local support to the Marine Products Export Development Authority (MPEDA) to implement its project, 'Participatory Management and Conservation of Lobster Resources', along the south-west coast of India.
- Documented the marine ornamental fish biodiversity of the south-west coast of India.
- Carried out fish population censuses for the threatened hump-head-wrasse, *Cheilinus undulatus*.
- Published 90 popular articles in Tamil for the protection of fisheries resources of Tamil Nadu.
- Studied the ecology and biodiversity of the Indian coral reef fishes.
- Developed an artificial reef technology and propagated it amongst the traditional fishermen of the Kerala region.
- Developed a mangrove eco-system at Rajakkamangalam, a tsunami-affected area in Tamil Nadu.
- Prepared a field guide to promote eco-tourism at Kovalam, Kerala.
- Conducted many 'Save the Seas' campaigns to create awareness amongst the public.
- Helped the local NGOs in their nature-conservation activities.
- Took active role in the MPEDA's NET FISH programme, for the conservation of the resources of marine fisheries. 🔍



^ Wetland environmental ecosystem study

INSTITUTE OF ENVIRONMENTAL STUDIES AND WETLAND MANAGEMENT

Brief Description

The Institute of Environmental Studies and Wetland Management (IESWM) was established in March 1986 with the primary objective of carrying out studies related to wetland functions and its ecology. IESWM is the only institute in the country dedicated towards research in this fragile ecosystem. Within a short span of time, the institute became well known to the state's academic circle, and, partly, to different parts of country and has frequently been referred to as the Wetland Institute.

R&D Set-up

The research facilities and infrastructure of the institution include:

- Millipore Milli-Q Water Purification System
- Rotary vacuum evaporator with thermostatic bath and cooling system
- Tabletop centrifuge
- Refrigerated centrifuge
- Homogenizer
- UV-vis-spectrophotometer spectrophotometer
- Microprocessor-controlled automatic colorimeter
- Atomic absorption spectrophotometer with graphite furnace
- Flame photometer
- Nephelometer
- Conductivity metre
- Dissolved oxygen metre
- Laminar-flow workstation autoclaves
- Bacteriological incubators
- Binocular microscope with camera attachment

- Colony counter
- Electrophoresis apparatus

Sources of income for R&D

Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 24.25


FY 2015-16 = 71.38

R&D Achievements

- Study to elucidate the significance of east Kolkata wetland in carbon sequestration to mitigate climate change.
- Determination of heavy metals from food, soil, and water in Howrah and north 24-Parganas.
- Demonstrating a model showing rooftop rainwater harvesting system and its direct use with the facility of groundwater.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The institute prepares Coastal Regulation Zone (CRZ) maps for the clearance of projects in the CRZ areas; it also prepares State Coastal Zone Management Plans.
- These research and studies help in environmental-related planning and decision making. 

Research Areas

- Aquatic (wetland and riverine) ecosystem and conservation
- Preparation of CRZ map
- Installation of rainwater harvesting system

Registered Office

Institute of Environmental Studies and Wetland Management,
Department of Environment,
Govt. of West Bengal, DD-24,
Sector-I, Salt Lake,
Kolkata 700 064, West Bengal
T: 0 2334 1020 / 0531/0239
E: director@ieswm.org
W: www.ieswm.org

Recognition Status

File No.: 11/383/2000-TU-V
Initial Recognition: 2000
Valid Until: March 31, 2018

R&D Manpower

PGs & Graduates: 10



^ Research facilities

INSTITUTE OF PESTICIDE FORMULATION TECHNOLOGY

Brief Description

The Institute of Pesticide Formulation Technology (IPFT) is an autonomous institution (under Societies Registration Act, 1860 under Department of Chemicals and Petrochemicals, Ministry of Chemicals and Fertilizers, Government of India). It was established in May 1991 and emerged as a reputed institute among the pesticide formulation and analytical research and development centres of India. IPFT has always been at the forefront of developments in pesticide formulations and analytical technologies.

R&D Set-up

The following are available for research:

- Perkin Elmer (Clarus 580 GC) content analysis of volatile compounds
- Shimadzu (GC-2010) analysis of P, S containing compounds
- Agilent (7890B) analysis of halogenated compounds
- HPLC (HPLC – 1) content analysis of non-volatile compounds
- Abels Flash Point Apparatus (AFP – 1), flash point determination
- Ro-Tap Machine (RTM – 1) Sieve Test
- Scanning Electron Microscope (SEM), surface imaging and characterization of materials

- Wet Grinding Mill, a particle size reduction using wet milling in liquid formulations, such as SC, ZW, ZC, SE, etc.

Sources of income for R&D

- Grant-in-aid from Government
- Industry-sponsored projects and other testing charges

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.


FY 2014-15 = 389.98

FY 2015-16 = 452.69

FY 2016-17 = 778.04

R&D Achievements

Products developed

- Lambda Cyhalothrin 4.9% Capsule Suspensions (CS). 

Research Areas

- Pesticide formulation development
- Pesticide residue analysis
- Bio and botanical pesticides
- Bio-efficacy and phytotoxicity

Research Outcomes

- Papers published: : 33
- IPRs held
 - » Patents filed: 4

Registered Office

Institute of Pesticide Formulation Technology, Sector – 20, Udyog Vihar, Gurugram 122 016, Haryana
 T: 0124-2348487, 2348488, 2347788; +91-8860055511
 E: director@ipft.gov.in / ipft@rediffmail.com
 W: www.ipft.gov.in

Recognition Status

File No.:11/251/1992-TU-V
 Initial Recognition: 1992
 Valid Until: March 31, 2018

R&D Manpower

Doctorates: 10
 PGs & Graduates: 11



^ Ceramic honey comb-based air heaters

INTERNATIONAL ADVANCED RESEARCH CENTRE FOR POWDER METALLURGY AND NEW MATERIALS

Brief Description

The International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), established in the year 1997, is an autonomous research and development centre of the Department of Science and Technology (DST). The ARCI's mandate is the development of high-performance materials, processes for niche markets, demonstration of technologies at the prototype/pilot scale, and the transfer of technology to the Indian industry. The activities are pursued through 11 research centers, with a focus on the development of nationally unique technologies and application-oriented programmes.

R&D Set-up

The research facilities and infrastructure of the institution are being used by the academia, industry, and individuals. These include the following:

Synthesis and fabrication facilities

- Arc discharge set-up; automated portable cold-spray unit; cathodic arc physical vapour deposition; chemical bath deposition system; chemical vapour deposition; chemical vapour synthesis

Processing facilities

- 100-tonne spark plasma sintering; attritor and planetary mill; ceramic extrusion press; 4 ceramic sintering furnace; cold isostatic press; cryo

mill; digital laboratory hot-air oven; flame spray pyrolysis; forced hot-air oven; furnace; gel/slip casting

Finishing facilities

- 3-axes ultrasonic CNC machine; 5-axes CNC machining facility; ceramic grinding and polishing machine; glass cutter; high-speed abrasive cutter

Characterization facilities

- Inverted metallurgical microscope; powder X-ray diffractometer (XRD); 3-channel potentiostat/galvanostat with RRDE; Ac/Dc soft/hard B-H loop tracer; accelerated surface area pore analyser; arc-melting unit; atomic force microscope (AFM); automated thermal cycling furnace; battery-test equipment

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 5,886.70

FY 2015-16 = 6,746.72

FY 2016-17 = 449.66

R&D Achievements

Products developed

- Development of short-wave infrared spinel domes and multi-mode spinel domes
- Preparation of a technology-foresight report on the application of nanomaterials in the downstream petroleum industry
- Perovskite solar cells, with 8.5% power-conversion efficiency and

Registered Office

International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI)
Balapur PO, Hyderabad 500 005, Telangana
T: 040-24452304
E: director@arci.res.in
W: www.arci.res.in

Recognition Status

File No.: 11/255/1992-TU-V
Initial Recognition: 1992
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 53
PGs & Graduates: 164

Research Areas

- Nanomaterials (nanostructured materials, nanocomposite coatings, carbon materials)
- Surface engineering (engineered coatings, surface laser treatment, Sol-gel nanocomposite coatings)
- Ceramic processing of materials
- Laser processing
- Alternate energy (solar energy materials, fuel cells)
- Automotive energy materials

Research Outcomes

- Papers published: 242
- IPRs held
 - » Patents filed: 116
 - » Patents awarded: 42
- Technologies transferred/commercialized: 17

moderate stability, have been fabricated and demonstrated

Processes developed

- Repair process for 10AT1567 window perspex sheet with sol-gel coating
- Coating of Cr_2O_3 -20% Al_2O_3 propeller shafts
- Development of laser-welded EMI shielded boxes
- Development of laser surface treatment process for nitrided/boronitrided test coupons size 50 mm * 50 mm

Prototypes developed

- The lithium ion battery (LIB) programme successful development of the prototype LIB module of capacity 48V, 10 Ah (480 Wh).
- Prototype supercapacitor devices with a 50-farads capacity were made with indigenously developed nano carbon material.
- Prototype brushed DC motor of capacity 24V, 35W was fabricated in collaboration with Horse Motors using indigenously developed Fe-P alloy.

Revenue earned by way of licensing products/processes/prototypes

Total Amount for the year 2016-17= ₹59.89

- Technology transfer fee
- Prototype sales
- Characterization and testing
- Contract R&D project
- Overheads from sponsored projects

Commercialization potential of products/processes developed

- Detonation spray-coating technology; ceramic honeycombs for energy-efficient air heaters; micro arc oxidation (MAO)

technology; heat pipes heat sinks; nanosilver-based textile finishes for antibacterial application; ESC-equipment manufacturing technology; nano TiO_2 -based textile finishes for self-cleaning applications; aerogel flexible sheet technology; manufacture of LWIR ZNS domes for IR seeker; manufacture of MWIR ZNS domes for IR seeker

Technical Collaborations

National

Bharat Electronics Ltd; Cyient Ltd; Hulikkal Electro (India) Pvt. Ltd; Indian Oil Corporation Ltd; Hindustan Petroleum Pvt. Ltd; Midwest Granite Pvt. Ltd

International

Corning Incorporated, USA; Industrial Materials Institute of National Research Council of Canada (NRC-IMI), Canada Nanomechanics, USA; The Boeing Company, USA; ADAMA Makhteshim Ltd, Israel; Belarusian State University of Informatics and Radio Electronics; Applied Materials, USA.

Societal Relevance

- The ARCI has developed self-cleaning and anti-bacterial coatings on textiles in line with the Swachh Bharat and Make in India missions in the country.
- Developed ceramic candle with nanosilver impregnated inside for water purification. The technology has a low-maintenance cost and can be used in rural areas where obtaining pure drinking water is highly inaccessible. This has been developed keeping in mind the Swachh Bharat mission. 🔍



^ Research laboratory

INTERNATIONAL INSTITUTE OF INFORMATION TECHNOLOGY

Brief Description

The International Institute of Information Technology, Bengaluru (IIIT-B), a deemed university, was established in 1999 with a vision to contribute to the IT world by focussing on education and research, entrepreneurship, and innovation. The institute is a registered, not-for-profit society funded jointly by the Government of Karnataka and the IT industry. Since its inception, the IIIT-B, with its unique model of education, research, and industry interaction, has grown in stature to become an institution of considerable repute in academic as well as corporate circles. The institute's mission is to build on the track record set by India in general and Bengaluru in particular, to enable India to play a key role in the global IT scenario through a world-class institute with a focus on education and research, entrepreneurship, and innovation. The institute works in partnership with the corporate sector, while retaining the freedom of an academic institution.

R&D Set-up

The research facilities and infrastructure of the institution are being used by the academia, industry, and individuals. These include the following:

- Computational Sciences Laboratory
- Centre For Data Sciences
- Web Sciences Lab
- Centre For Electronics & Embedded Systems Lab

- High-Density Electronic Systems Lab
- Information Technology and Society
- Centre For Information Technology And Public Policy
- Mathematics and basic sciences
- Centre For Complex Systems And Soft-Matter Physics
- Networking and Communication Lab
- Multimodal Perception Lab
- Software Engineering Lab
- E-Health Research Center
- Software Design Lab

Sources of income for R&D

- Government sources
- Grant-in-aid
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 643.33

FY 2015-16 = 668.39

FY 2016-17 = 644.79

R&D Achievements

Research projects

- Train the trainer programme and job-oriented IT Training (training for professionals)
- Technology incubation and Development of Entrepreneurs Scheme
- Technology in education
- INGENIUS
- Institute of Developing Economies, Japan External Trade Organization

Registered Office

International Institute of Information Technology, Bengaluru, Director, IIIT-Bengaluru, 26/c, Electronics City, Bengaluru 560 100, Karnataka
T: 080-41407708 / 41407777
E: ss@iiitb.ac.in
W: www.iiitb.ac.in

Location of R&D Units

Bengaluru, Karnataka

Recognition Status

File No.: 11/369/1999-TU-V
Initial Recognition: 2005
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 43
PGs & Graduates: 39

Major Research Areas

- Computer science
- Data sciences
- Electronic systems design
- Information technology and Society
- Mathematics and basic sciences
- Networking, communication and signal processing
- Software engineering

- Developing suitable pedagogical methods for various classes intellectual calibres and E-learning
- Honeywell IITB Cognitive Radio Project
- Development of intelligent search engine for concept extraction contextual data retrieval
- Analysis of QoS and delivery semantics of the DDS message-oriented middleware

Technical Collaborations

National


Ministry of Human Resources Development, Government of India; Ministry of Science and Technology; Government of Karnataka; Department of Electronics and Information Technology

International

European Commission; National Science Foundation, USA; TU Delft, The Netherlands; MeitY (Government of India), and the University of Twente Netherlands; The Royal Academy of Engineering, United Kingdom

Societal Relevance

The following R&D outcomes are of national/societal significance:

- E-health in collaboration with the National Institute of Mental Health and Neuro-Science and Foundation for Research in Health Systems, E-governance, and so on. 



^ ROBO-AO—a laser adaptive optics system

INTER-UNIVERSITY CENTRE FOR ASTRONOMY AND ASTROPHYSICS

Brief Description

The Inter-University Centre for Astronomy and Astrophysics (IUCAA) is an autonomous institution set up by the University Grants Commission to promote the nucleation and growth of active groups in astronomy and astrophysics in the Indian universities. The IUCAA aims to be a centre of excellence within the university sector for teaching, research, and development in astronomy and astrophysics. The IUCAA is registered as a society under the Societies Act, and as a trust (under the Bombay Public Trust).

R&D Set-up

The research facilities and infrastructure of the institution include:

- The AstroSat
- Cadmium Zinc Telluride Imager Payload Operations Centre
- Ultraviolet imaging telescope
- Virtual Observatory
- Large-Area X-ray proportional counter
- AstroSat proposal processing system
- Computing facility
- High-performance computing
- Astronomical data centre
- IUCAA girawali observatory
- The Southern African Large Telescope
- Library
- Radio Physics Laboratory
- Instrumentation Laboratory

The facilities are being used by:

- The AstroSat Support Cell
- High-performance Computing
- IUCAA Library
- Radio Physics Laboratory
- Southern African Large Telescope
- Astronomical Data Centre

The IUCAA encourages Indian university /college researchers to use the facilities. In the IUCAA's associateship programme, faculty members of the Indian Universities can visit the IUCAA to use the facilities for various durations.

Sources of income for R&D

- Government sources
- Donations
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 2,619.43

FY 2015-16 = 3,961.98

FY 2016-17 = 3,675.76

R&D Achievements

Research projects completed

- 'Advanced algorithms for the analysis of data from gravitational wave and comic microwave background experiments'
- Optimization problems in cosmic microwave background and gravitational wave data analysis'
- Indo-Ukrainian programme of Co-operation in Science and Technology Joint Project : 'Dark

Registered Office

Inter-University Centre for Astronomy and Astrophysics
Post Bag No. 4, Ganeshkhind,
Savitribai Phule Pune University
Campus, Pune 411 007,
Maharashtra
T: 020-25604100
E: nva@iucaa.in
W: www.iucaa.in

Recognition Status

File No.:11/133/1989-TU-V
Initial Recognition: 1989
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 20
PGs & Graduates:38

Research Areas

- Astronomy
- Astrophysics
- Cosmology
- Astronomical instrumentation
- Gravitational waves
- Astronomical observations

Research Outcomes

- Papers published: 159

Matter, Dark Energy and Modified Gravity'


- Indo-South African Project: 'Studies in Highly Compact Stars'
- Indo-South African Project: 'The multi-wavelength Study of Ultra-luminous X-ray Sources'
- Indo-South African Project: 'Multi-wavelength Astronomy with the Virtual Observatory'

Technical Collaborations

National

Laser Interferometer Gravitational-wave Observatory; USER

International

The Institute for Plasma Physics, Crete, The Skinakas Observatory; University of Arizona; South African Astronomical Observatory; Max Planck Institute for Solar System Research; University of Florida; Korea Institute for Advanced Study; Infosys Foundation; Resurgent Caltech. 



^ Advanced Mass Spectra Lab for Proteomics and Metabolomics and extension of facilities to young learners' training and motivation

Registered Office

Islamic Academy of Education
Yenepoya University
University Road, Deralakatte
Mangalore 575 018
Karnataka
T: 0824 2204668
E: reachus@yenepoya.org
W: www.yenepoya.edu.in

Recognition Status

File No.: 11/600/2013-TU-V
Initial Recognition: 2013

R&D Manpower

Doctorates: 46
PGs & Graduates: 6

ISLAMIC ACADEMY OF EDUCATION

Brief Description

Emboldened by the overwhelmingly positive response of the community and students; the management perceived a need to develop as a University wherein autonomy and self-reliance would place the institutions on the global map and internally motivate them to higher levels of excellence. The University maintains its social commitment through conducting free medical, eye, and dental camps, in the community. It is recognized under Section 3(A) of the UGC Act, 1956.

R&D Set-up

The research facilities and infrastructure available in the organization are as follows:

- Orbitrap fusion mass spectrometer
- AB SCIEX QTRAP 6500 - ACA/OMICS mass spectrometer
- Gel electrophoresis system
- Ultrasonic water bath
- Multimode microplate reader
- Digital power supply with digital timer
- UV-visible spectrophotometer
- Digital ultrasonic cleaner

Sources of income for R&D

- Grants from government agencies
- Donation

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 703.39
FY 2015-16 = 3257.12
FY 2016-17 = 3028.45

Technical Collaborations

National

St. Aloysius College, Jabalpur;
Raghavendra Institute of Pharmaceutical Education and Research (RIPER), Andhra Pradesh;
Zenith Clinical Services, Bengaluru;
Raihan Institute of Medical Sciences, Kottayam;
Bharat Biotech International Ltd, Hyderabad;
Institute of Bioinformatics and Applied Biotechnology, Bengaluru;
Trivandrum Institute of Digestive Diseases;
National Institute of Malaria Research, New Delhi

International

International Union Against Tuberculosis & Lung Disease (The Union), Paris, France; The University of North Carolina at Chapel Hill ("UNC-Chapel Hill"), USA; Cancer Research Malaysia; Association of Chartered Certified Accountants of Adelphi; Operation smile Italia Onlus Foundation Domenica Scopelliti; Equipo Argentino De Antropologia Forense, Argentina; Johannes Gutenberg University, Mainz Germany; Centros culturales DE Mexico, A.C., owner of Universidad Panamericana Mexico; HACETTEPE University Ankara, Turkey; Teesside University, Middlesbrough, UK

Societal Relevance

The following R&D outcomes are of national/societal significance:

- A system and method for masking and removing noise from dermoscopic and digital images for application in telemedicine in

Research Areas

- Microbiology and infectious disease
- Cell signalling, molecular biology and genetics
- Biotechnology
- Nanoscience and nanotechnology
- Genomics, proteomics, and metabolomics
- Stem cell, regenerative medicine, and tissue engineering
- Bioinformatics and biostatistics
- Community health research
- Disease biology
- Polymer science


Research Outcomes

- Papers published: 1,049
- IPRs held
 - » Patents awarded: 25

order to diagnose dermatologic lesions.

- Cell culture consultancy services and collaborations with the neighbouring institutes for resource generation and IP generation
- A portable assembly for conducting on-site dental procedures along with medical

technologies useful for advanced healthcare

- A method and apparatus for identifying mal-occlusion
- Power generation system
- Biomarkers for diagnosing oral cancer
- Development of low cost sensors-Community health screening. 

JAWAHARLAL NEHRU CENTRE FOR ADVANCED SCIENTIFIC RESEARCH

Brief Description

The Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) is a multidisciplinary research institute. The mandate is to pursue and promote world-class research and training at the frontiers of science and engineering covering broad areas ranging from materials to genetics.

R&D Set-up

The following are the research facilities provided by the organization:

- Jeol 600 MHz. NMR spectrometer
- Micro plate reader
- Electrical measurement system for IV/CV
- Low temperature manual probe station
- Chemiluminescence gel documentation system
- LabRamII Raman Spectrometer
- Optical tables, standard isolator, air compressor, table top plate
- Dr Sinter Lab Spark Plasma Sintering System SPS211Lx
- CombiflashRf+ Automated flash chromatography system
- SpectraMax i3X multimode Microplate reader
- Diode pumped solid state laser
- Labconco Benchtop freeze dry system
- Shimadzu HPLC system
- Boston HP servers, etc.
- Electrochemical workstation with biopotentiostat/galvanostat
- QX200 droplet digital PCR system & CFX touch real-time PCR
- Leica fully motorized Microtome
- Electrochemical workstation with biopotentiostat/galvanostat +bcycler
- High resolution and sensitive confocal microscope
- Modular glove box
- Typhoon FLA 7000 IPA
- Cyclic voltammetry system with electrochemical workstation

R&D Achievements

Products developed

- Transparent conductors developed based on interconnected metal wire networks with optoelectronic properties that are better than conventional oxide films. Optoelectronic devices have been fabricated, including transparent solar cells, using these networks.
- Low-cost nanomaterials in the form of alloys, intermetallics, bimetallics, core-shell, etc., were developed as the replacement for Pt and other expensive current state-of-the-art materials for

Registered Office

Jawaharlal Nehru Centre for Advanced Scientific Research,
Jakkur, Bengaluru 560 064,
Karnataka
T: 080 2208 2766
E: academic.jncasr.ac.in
W: www.jncasr.ac.in/

Recognition Status

File No.: 11/180/1990-TU-V
Initial Recognition: 1990
Valid Until: March 31, 2018

Research Areas

- Material science
- Chemistry and nano science
- Molecular biology, genetics, and neuroscience

Research Outcomes

- Papers published: 387
- IPRs held
 - » Patents granted: 13

the production of green energy in fuel cell and carbon dioxide reduction.

- Customized diagnostic Raman Spectrometer was developed with scanning ability to make a prototype for viral RNA/DNA detection from body fluids.
- Development of molecular probes detecting Alzheimer's Disease (AD)-biomarkers in cerebrospinal fluids (CSF), blood and brain samples, to be used as viable tools for early diagnosis of AD. 🔍



Research equipment available at the university

JK LAKSHMIPAT UNIVERSITY

Brief Description

Established in 2011, JK Lakshmipat University (JKLU) is located in the historic city of Jaipur, Rajasthan. The University is established through 'The Jaipur Act, 2011' by the State Legislature of Rajasthan.

R&D Set-up

Research infrastructure is being used by individuals and academia. The following are the research facilities available at the university:

- Concrete and Construction Technology Lab
- Fluid Mechanics Lab
- Geotechnical Engineering Lab
- Engineering Geology Lab
- Environmental Engineering Lab
- Royce 711 Portable TSS/ILA with 71 Sensor
- SI Analytical Lab 960 Conductivity Meter
- Multi 3410 Set 4 Portable DO Meter
- Respirable Dust Sampler Envirotech Modal APM 460
- Fine Particulate Sampler Envirotech APM 550 MFC
- Mass Transfer Operations Lab
- Chemical Reaction Engineering Lab
- Process Dynamics and Control Lab
- Mechanical Operations Lab
- Heat Transfer Lab
- Chemistry Lab
- Digital Electronics Lab

- Analog Communication Lab
- Digital Communication Lab
- Microwave Engineering Lab
- Antenna and Wave Propagation Lab

Sources of income for R&D

- Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 1,279.73

FY 2015-16 = 416.73

FY 2016-17 = 437.6

R&D Achievements

Products developed

- Development of parabolic type solar photovoltaic (PV) panel
- Development of transparent solar PV panel for windows
- Wastewater treatment using Fresnel lens and scope of small-scale electricity generation
- Home automation using ATMEGA 16 and GSM module

Technical Collaborations

National

IBM India Pvt. Ltd, Space Applications Centre (ISRO), Red Hat India Pvt. Ltd, Green First Power Ventures Pvt. Ltd, CSIR-Central Electronics Engineering Research Institute; PRIMUS TechSystems Pvt. Ltd, Institute of Engineers (India)

Registered Office

JK Lakshmipat University (JKLU)
Near Mahindra SEZ, P.O.
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T: 0141-7107504
E: director.iet@jklu.edu.in
W: www.jklu.edu.in

Recognition Status

File No.: 11/701/2016-TU-V
Initial Recognition: 2016
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 22

Research Areas


- Water and environment
- Soft computing
- Operation research
- Cloud computing
- Neural network
- Materials science
- Nanotechnology

Research Outcomes

- Papers published: 84

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Development of Parabolic Type solar PV panel is related to 'Make in India'
- Development of transparent solar PV panel for windows has direct relevance to Make in India Mission of the Government of India
- Wastewater treatment using Fresnel lens and scope of small-scale electricity generation – Swachh Bharat Mission.
- Home automation using ATMEGA 16 and GSM module-Digital India Mission of the Government of India. 



▲ K S Rangasamy College of Arts & Science

K S R EDUCATIONAL AND CHARITABLE TRUST

Brief Description

KSR Education and Charitable Trust is an organization run by volunteers who are well-established professionals and interested to see that every bit of donation reaches the needy and brilliant students, without which, they would have perished in the darkness of the social abyss. This organization locates bright and needy students from rural areas and arranges to give them financial assistance for higher studies. The trust provides food, shelter, clothing and medical aid coupled with love and affection for senior citizens.

R&D Set-up

The following are the research facilities provided by the organization:

- Special electrical machines and drive systems
- Online imaging kit with camera and software
- Carl Zeiss Inverted Phase Contrast Microscope
- Micro Centrifuge 'Tarson' Model: Spinwin MC-02
- Rotary vacuum evaporator with vacuum pump
- Fluorescent microplate reader

Sources of income for R&D

- Research projects
- Fellowships
- Conference/workshops
- DST-Inspire Camp
- Travel grant

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 160.75

FY 2015-16 = 1,916.60

FY 2016-17 = 94.36

R&D Achievements

Products developed

- Energy efficient study lamp
- Mushroom and its value added product, biofertilizers, nanobiofertilizers, active charcoal production, microbial consortia for dye degradation (bioremediation)
- The waste matter generated from wood saw waste, leaf waste, banana's pseudo stems, and the cellulosic waste.
- *Azadirachta indica* L. developed plywood for controlling noise pollution in an eco-friendly manner

Prototypes developed

- Biomaterials developed using hydroxyapatite for bone regeneration property
- Dye sensitized solar particles for energy generator, Nanohydroxyapatite-based biomaterials for bone implants

Processes developed

- Probioticated millet laddu, acoustic plywood, UV-protected sunscreen from sea weed, sodium alginate coated edible fruits
- Formulation containing microencapsulated *Lactobacillus acidophilus* with millet laddu for commercial purpose
- Hydrothermal experimental set-up designed for production of

Registered Office

K S R Educational and Charitable Trust, KSR Kalvi Nagar, Tiruchengode 637 215, Namakkal (Dt.), Tamil Nadu
T: +91-4288-274741-44
E: directorrd@ksrct.ac.in
W: ksrtrust.org/

Recognition Status

File No.:11/474/2007-TU-V
Initial Recognition: 2007
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 74
PGs & Graduates: 261

Research Areas

- Dental research
- Nanotechnology
- Nutraceutical
- Plant tissue culture
- Biofuel technology
- Bio image processing
- Bioinformatics
- Renewable energy
- Power electronics and drives
- High voltage engineering
- Control and instrumentation

Research Outcomes

- Papers published: 1,024
- IPRs held: 1
- Technologies transferred/commercialized: 14

bulk quantity of nano crystalline hydroxyapatite (nanoHAp) particles.

- Electrospinning is a facile technique to create high surface area nanofibers. It facilitates to fabricate nanofibers on an industrial scale.
- An indigenous nano gas sensor set-up for different gas sensing applications. The selected gas was introduced into the sensing chamber at concentration range from 10 to 70 ppm using an orifice-type mass flow controller.

Commercialization potential of products/processes developed

- Microbial consortia has been prepared to treat textile dye effluents
- The above products were sold directly to customers such as summer India textile, SPP paper board and Virtis Biotech, Leading etc.,

Revenue generation – ₹5.0 lakhs

- Animal house facility has been initiated to give proper service in the area of testing and evaluation of bioactive compounds.
- Advanced instruments like GC, HPLC, Fermentor, microplate reader and lyophilizer are also made as service oriented.

Revenue generation - ₹3.0 lakh

Technical Collaborations

National

Abdul Hakeem College, Vellore; TRM Biotech Pvt. Ltd, Tamil Nadu; Genewin Biotech Bengaluru; Infosys Ltd,

Bengaluru; Gajra Pai & Zhu, Chennai; National Research Development Corporation; (NRDC), New Delhi; NCLAS -NIN, Hyderabad; Periyar University, Salem; Tata Institute of Fundamental Research, Colaba, Mumbai

International

Jian HealthCare Pvt. Ltd, Singapore; Centre of Molecular and Macromolecular Studies, (Polish Academy of Sciences); Université'Auvergne, France; University of Saskatchewan, Saskatoon, Canada; University of Hyogo, Japan; Srinakharinwirot University, Bangkok, Thailand; National Institute for Nanotechnology (NINT) Innovation Centre, Canada; University of Calgary, Canada; CIC energigune - Energy Cooperative Research Centre, Spain; Edith Cowan University, Australia; University of Missouri, USA; University of Aveiro, Portugal; Chonbuk National University, South Korea; Jomo Kenyatta University of Agriculture, Nairobi, Kenya

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Calibration technician
- Providing for the developing the rural people to handle electrical, pneumatic and hydraulic equipment and servicing
- Adaptive village programme for sewage treatment, tele medicine, green initiatives in campus including MHRD - Clean campus, AICTE Clean campus. 🔍



^ Scanning electron microscope
(Carl Zeiss EVO 18)

KALASALINGAM AND ANANDAM AMMAL CHARITIES

Brief Description

Kalasalingam Academy of Research and Education (KARE), formerly Arulmigu Kalasalingam College of Engineering, was established in 1984 by the pioneering Kalasalingam AnandamAmmal Charities. The Institution has been serving the society for 34 years and it caters to the needs of students from all walks of the society. The institution continues to do indefatigable work in getting projects and research centres. It has received Department of Science and Technology funding to establish the National Center for Advance Research in Discrete Mathematics. KARE has got the state-of-the-art IRC with splendid high-end instruments for advanced research in material sciences and life sciences.

R&D Set-up

The following research facilities are provided by the organization:

- Center for Biotechnology
- Centre for Composite Materials
- Organic Synthesis Laboratory
- Developing and Designing of Special Purpose Sampling Plans under the
- Weibull Life Time Model
- Centre for Water Technology
- Studies on technologically important crystalline and amorphous solids

Sources of income for R&D

- Government funding

- Agencies
- Trust

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 57.62

FY 2015-16 = 67.35

FY 2016-17 = 43.15

R&D Achievements

Products developed

- Automatic ration dispensing system using NI LabVIEW
- Hand prosthesis for sign language manipulation designed for speech and hearing impaired people using LabVIEW
- The laboratory has recently synthesized a diverse range of metal free dyes for dye sensitized solar cells and achieved power conversion efficiency up to 8.1%.
- The group has also developed various green methodologies for the biologically important heterocycles and synthesized several chemical entities with antitubercular/antimicrobial potency.

Prototypes developed

- Smart ration dispensing system

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Smart ration dispensing system to provide a transparent public

Registered Office

Kalasalingam Academy of Research and Education,
Anand Nagar, Krishnankoil 626 126,
Tamil Nadu
T: +91 04563 – 289042/43/44/52
E: info@kalasalingam.ac.in
W: kalasalingam.ac.in

Recognition Status

File No.: 11/615/2013-TU V
Initial Recognition: 2013
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 133
PGs & Graduates: 339


Research Areas

- Automobile engineering
- Biotechnology
- Civil engineering
- Computer science and engineering
- Electrical and electronics engineering
- Electronics and communication engineering
- Instrumentation and control engineering
- Pharmaceutical biotechnology

Research Outcomes

- Papers published: 975
- IPRs held : 3

distribution system for the end-users and to avoid corruption

- An economically feasible fluoride removal unit to remove excess fluoride in groundwater (Swastha Bharat)
- An indigenously developed, economically feasible photomograph that can enhance the capabilities of the physician in the preliminary identification of thyroid related problems (Swastha Bharat)
- Biocomposite materials for the conversion of solid wastes in to reinforced composite materials (Swachh Bharat)
- A test bench to emulate the solar photovoltaic module which will help in evaluating the performance of photovoltaic modules in different conditions (Clean Energy). 



^ Ribbon mountage

KARNATAKA STATE SERICULTURE RESEARCH AND DEVELOPMENT INSTITUTE

Brief Description

The Karnataka State Sericulture Research and Development Institute (KSSRDI) is an autonomous body. Research programmes are drawn through periodical interaction with the Department of Sericulture, Government of Karnataka (DOSK) and other major end users. The organization is involved in various research projects and the findings thus generated from the research projects are taken up for frontline research, on-farm research, field trials, and demonstration trials either through main station or through sub-stations and related units of DOSK. Recommendations thus emanated are released as technologies for popularization and/or are commercialized for exploitation. They are also subjected for fine-tuning through further research.

R&D Set-up

The following research facilities are provided by the organization:

- Administration wing, laboratories, library, hostel, staff quarters, cold storage, testing laboratory, museum, conference and meeting hall

Sources of income for R&D

- Grant-in-aid from state government
- Licence fee and royalty from commercial products

- Grants from external funding organizations such as central government

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 14.51

FY 2015-16 = 12.79

FY 2016-17 = 13.60

R&D Achievements

Products developed

- Soil fertility maps of all the 30 districts of Karnataka
- Botanical formulations of Samvardhan and Suraksha green
- Care spray for the control of bacterial flacherie.
- Development of solar drier gadgets for the disposal of dead and diseased silkworms in farmed conditions
- The new mountage Thalaghattapura Ribbon Chandrike
- Indigenous silk fabric (kousheya) produced from excess PM seed cocoons

Processes developed

- A DST-funded collaboration project with BIRD-K of BAIF on empowerment of tribal women towards livelihood improvement through sustainable sericulture and associated integrated farming system practices

Registered Office

Karnataka State Sericulture Research and Development Institute, Thalaghattapura, Kanakapura Main Road, Bengaluru 560 109, Karnataka
T: 080 2843 5221, 223
E: kssrdi12@gmail.com
W: www.karnataka.gov.in

Recognition Status

File No.:11/63/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 14
PGs & Graduates: 14

Research Areas

- Mulberry and silkworm genetic resource conservation, breeding, race maintenance, evaluation and popularization
- Mulberry, silkworm disease, and pest incidence (surveillance, monitoring and advisory services)
- To economize resources and increase production, productivity, and quality (raw material/human/energy/water)

Research Outcomes

- Papers published: 138
- IPRs held : 3
- New crop variety developed: 8

- One feed per Instar Technology developed and recommended for field adoption
- New silkworm races BRO2x NP4, 932xNK2, KS10X CSR2, CSR2 X CSR 4, MH1, RP9, KS10, PM, SLKSPM, NK2, and CSR2 were screened against bacteria, Kenchu virus, and NPV to understand the degree of tolerance and recorded LC50 values
- Post authorization popularization of MH1xCSR2 was carried out in collaboration with CSRTI and NSSO and more than 1,11,000 DFLs were distributed during the period
- Technology for reeling urine stained cocoon
- Evaluation of yarn imperfections due to inferior cocoons at reeling
- Silk reeling evaluation of new race cocoons
- Design and development of Electronic Reeling Machine (ERM).

Prototypes/protocols developed

- Development of protocol for Pure Mysore race maintenance in the seed area of the Government of Karnataka
- Standardization of Italian Silk reeling machine
- 'Development of protocol for cocoon testing for CB and BV cocoons' was submitted to Government of Karnataka and approved by the government for adoption in all the government cocoon markets

Instruments developed

- Development of vacuum cocoon boiling machine for multi-end reeling units

- Development of retrofit model two-for-one twister spindles in up-twisters for twisting local silk

Technical Collaborations

National


Andhra Pradesh Sericulture Research and Development Institute, Hindupur, AP; Rashtreeya Vidyalaya College of Engineering, Bengaluru; Centre for Nano & Material Sciences, Jain University, Bengaluru; Kamavari Sangha Institute of Technology (KSIT), Kanakapura Main Road, Bengaluru

International

Member of International Sericultural Congress

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The institute has developed several farmer and silk reeler friendly technologies which are given free of cost for adoption.
- KSSRDI is recognized as one of the authorized soil testing centers under National Soil Health Mission.
- The institute conducts several onsite training programmes to all the stakeholders of the industry like farmers, chawki rearing centre owners, registered silkworm seed producers, students, and to the staff of Department of Sericulture. 



^ Skin counter-irritant ointment

KARPAGA VINAYAGA COLLEGE OF ENGINEERING AND TECHNOLOGY OF KARPAGA VINAYAGA EDUCATIONAL TRUST

Brief Description

Karpaga Vinayaga Educational Group caters various disciplines of education such as medicine, dentistry, engineering, and various para-medical courses. The group comprises Karpaga Vinayaga College of Engineering and Technology, Karpaga Vinayaga Institute of Dental Sciences, Karpaga Vinayaga Institute of Medical Sciences, Karpaga Vinayaga College of Nursing and Allied Health Sciences. It has a sprawling serene campus away from the hustle and bustle of the city but still in close proximity to the scene. All institutions boast of dedicated and well-qualified faculty, infrastructure and students from all over India and other countries. Excellent facilities, amenities, and above all quality education are provided that cater to the needs of this competitive field are provided at the college. It is registered as a trust.

R&D Set-up

The college has state-of-the-art laboratories in various departments. The college is well equipped for conducting research experiments by the faculty, scholars, and industry experts.

The following research facilities are available:

List of Equipments

- Cooling centrifuge
- Gel documentation system
- ELISA Reader
- Phase contrast microscope

- Automatic TLC sampler
- Refrigerated centrifuge
- Incubator orbit shaker
- Micro/ultrafiltration unit
- Double beam spectrophotometer
- Analytical balance
- Direct shear apparatus
- Triaxial shear apparatus
- Consolidation apparatus

The college has signed MoUs with 57 industries for exchange of research activities. Some of the industrial experts are utilizing the facilities for testing materials and analysis. Nearly 20% of the instrumental facility is utilized by industrial research workers. They come over to the campus once or twice per week and use research facilities.

Sources of income for R&D

- Project grant
- U.S. Commission Grant Program

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 32.55

FY 2015-16 = 2.50

FY 2016-17 = 14.57

R&D Achievements

Products developed

- Control Device for Mercury Emission: Electrically operated coolant cylinder filled with glass wool for the solidification of mercury vapour

Registered Office

Karpaga Vinayaga College of Engineering and Technology
GST Road, Chinna
Kolambakkam, Padalam 603
308, Madhuranthagam (Tk.),
Kanchipuram District, Tamil Nadu

Recognition Status

File No.: 11/598/2013-TU-V
Initial Recognition: 2013
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 21
PGs & Graduates: 40

Research Areas

- Medical microbiology
- Environmental toxicology
- Aquaculture
- Organic chemistry
- Signal processing
- Material sciences
- Biomedical instrumentation
- Biomaterial prototypes
- Medical image processing
- Remote sensing and GIS
- Environmental studies

Research Outcomes

- Papers published: 223
- IPRs held
 - » Patents filed: 2
- Technologies transferred/commercialized: 4

- A natural skin formulation: An ingredient of glycerine, paraffin, beeswax, and calcium hydroxide
- Cow horn manure: Microbial soil fermentation
- Pelletized feed: Probiotic feed preparation, including new strains of microbes and trash fish, vitamins, and albumins
- Reverse gear mechanism in e-bike for physically challenged people: electrically operated bikes
- Design and fabrication of a hybrid electric bike: power-generated through both conventional IC engine and electric motor in two wheelers

Technical Collaborations

National

Naturaa Farms, Gudiyatham, Vellore; Bio Vision Medical Systems, Chennai; Armats Biotek Pvt. Ltd; Elentech Engineering Services Pvt Ltd. , Chennai; RETECH Solutions (P) Ltd; Sonex Builders, Chennai; Space CADD Designers and Constructions, Chennai; GK Power Expertise Pvt. Ltd, Chennai; Diamond Engineering, Chennai

International

Michigan Technological University, USA; National Taiwan Ocean University, Taipei; PSB Academy, Singapore; Illinois Institute of Technology, USA

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Control device for mercury emission: labours working in goldsmith cottage industries and alkaline factories are prevented from the inhalation of poisonous mercury vapour at their working environment — Swachh Bharat and Make in India
- A natural skin formulation: it prevents dermatitis amongst women workers in the cashew nut industry — Swachh Bharat and Make in India
- Cow horn manure: to promote green technologies for the prevention of chemical fertilizer dumping in agricultural fields. Pollution control and crop production — Swachh Bharat
- Pelletized feed: to enhance and promote fish survival and growth and prevent the pathogenicity to the fish in the early stages
- Reverse gear mechanism in e-bikes: to facilitate comfort and safety for the physically challenged people
- Design and fabrication of hybrid electric bikes: To reduce fuel consumption and emission. 🔍



^ Glimpses of the research laboratory

KIIT UNIVERSITY

Brief Description

Kalinga Institute of Industrial Technology (KIIT) has placed much emphasis on creating enabling infrastructure and facilities for advanced research in diverse areas. It has set up a Centre for Scientific Research, the only private university in the country to establish such a centre. KIIT has also established a state-of-the-art Central Advanced Research Centre (CARC) for multidisciplinary research. Research accomplishments of the faculty and students demonstrate the positive impact of KIIT's focus on research and innovation. Faculty members of the university are actively involved in research and consultancy works attracting financial support to the tune of a few million dollars every year. KIIT actively promotes students' research and projects of its students have been appreciated at national and international forums, including being selected for the prestigious Indian Science Congress. In recent years, students' team of KIIT have emerged as a strong contender in the prestigious automobile design competitions such as BAJA SAE, aeronautical design competitions such as Aero Design West, Robotics, Civil, Electrical, and Computer Science innovation events.

R&D Set-up

The following are the research facilities provided by the organization:

- Establishment of Central Advanced Research Centre (CARC) with

sophisticated equipments for advanced research

- Centre for Innovation and Research and Functioning Research Advisory Board start-up fund for faculty members and student for research
- The university has a policy of consultancy projects and availability for PG and research fellowships state-of-the-art laboratories
- Centres for Excellence and University labs in collaboration with industry for advanced research financial and intellectual support for student research
- Student Research Centre connects students with various research and industrial labs and is mentored by industry experts and scientists
- First TBI in Odisha supported by the Department of Science and Technology, Government of India

Sources of income for R&D

- Government grants
- Projects grants from corporates and industries

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 9,041.95

FY 2015-16 = 1,078.42

FY 2016-17 = 1,156.42

Registered Office

Kalinga Institute of Industrial Technology, Bhubaneswar
751024, Odisha
T: 8114382202, 9437035188
E: registrar@kiit.ac.in
W: www.kiit.ac.in

Recognition Status

File No.:11/592/2013-TU-V
Initial Recognition: 2013
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 394
PGs & Graduates: 316

Research Areas

- Engineering
- Renewable energy
- Robotics
- Software development
- Nanotechnology
- Cyber security
- Bioinformatics

Research Outcomes

- Papers published: : 1,531
- IPRs held
 - » Patents filed: 30
 - » Patents awarded: 2
 - » Copyright: 5

R&D Achievements

Products developed

- Artificial limbs
- Wheelchairs with physiotherapy arrangements
- Electro-chemical carbonation setups
- External wall cleaning mobile bot
- Low cost dishwasher
- Grey water treatment setup
- Composite materials with different fibers and particles
- Plasma-based reduction set up
- New materials for artificial tooth

Processes developed

- Improved carbonation in fly ash and slag
- Treatment of water-containing personal care waste products

Prototypes developed

- Low-cost electrochemical machines
- Hybrid cars

Instruments developed

- Structural health monitoring setup

Principle/theory developed

- Strain energy-based approach to study damping in laminated plates
- Finite element method of higher method for solving vibration behaviour of curved cells
- Electro-chemical carbonation

Technical Collaborations

Naitonal

Schneider Electric, Haryana; National Instruments, New Delhi; National Innovation Foundation, Gujarat; SKF India Ltd, India; Siemens Ltd, India; M/s Simplex, India; Ericsson India. 



^ First functional park in North India

KIIT – TECHNOLOGY BUSINESS INCUBATOR (KIIT–TBI)

KIIT – SCHOOL OF BIOTECHNOLOGY, KIIT UNIVERSITY

Brief Description

Kalinga Institute of Industrial Technology–Technology Business Incubator (KIIT–TBI) was established in 2009 as an initiative of KIIT, deemed-to-be-university, and supported by National Science and Technology Entrepreneurship Development Board (NSTEDB), Department of Science and Technology (DST), Government of India. KIIT–TBI is a non-profit organization, aimed at providing a vibrant ecosystem for promoting innovations and entrepreneurship development. Having established as a premier university-based incubation centre, KIIT–TBI has expanded its verticals in health care, life sciences, and social incubation and has emerged as a social innovation hub.

R&D Set-up

The following are the research facilities available at KIIT–TBI:

- Primary cell culture
- Bioprocess/purification
- Analytical facility
- Molecular biology
- Biodesign/bioelectronics
- Plant tissue culture
- Food testing/certification

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 70.10

FY 2015-16 = 356.76

FY 2016-17 = 666.86

R&D Achievements

Prototypes developed

- Wastewater treatment
- Telemedicine
- Bioceramics
- Nutraceuticals
- Medical devices and diagnostics
- Agritech
- Biosimilar
- Natural products
- Therapeutics

Technical Collaborations

National

Bharat Petroleum Corporation Ltd (BPCL); Yes Bank; Wadhani Foundation; Villgro; National Innovation Foundation (NIF); Indian Patent Foundation; NASSCOM; Neotric Hub

International

Nexus; Pasadena Bio Collaborative Incubator

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Affordable diagnostic kit, prosthetic arm, medical device in DNA Life Sciences is the first DNA-based clinic and a

Registered Office

Kalinga Institute of Industrial Technology–Technology Business Incubator, Campus 11, KIIT University, School of Biotechnology Patia, Bhubaneswar 751 024, Odisha
T: 0674 272 5466
E: kiittbi@gmail.com
W: www.kiitincubator.in/

Recognition Status

File No.: 11/644/2014-TU-V
Initial Recognition: 2014
Valid Until: March 31, 2020

Research Areas

- Technology business incubation
- Startup support biotechnology
- Digital health
- Agritech

Research Outcomes

IPRs held : 94

molecular platform innovated to offer customized solutions for identification of DNA-based changes and its impact on the health and disease outcome.

- In DNA, Life Sciences has taken the first steps to personalize disease management by offering a range of DNA-based solutions to a range of clinical problems such as from

prenatal diagnostics to cancer, ageing and life style disorders.

- Santaan Fertility Center and Research Institute is working on a number of innovative research projects with focus on cost cutting and innovative use of smartphone technology to replace or outperform standard fertility lab equipment. 🔍



^ Entrepreneurship awareness camp

KISHORE MEMORIAL CHARITABLE TRUST

Brief Description

Kishore Memorial charitable trust, a missionary institution provides myriad professional education to increase the number of technical graduates who can face the challenges of this fast-changing world.

This organization work for cognitive science, photonics, bio-medical, disaster management and others.

R&D Set-up

The following are some of the research facilities and infrastructure available at the centre:

- Laboratory of cognitive science, bio-medical, photonics for different experiments based on optical fibers, learning disabilities for school going kids.
- Softwares installed: Matlab, Labview, Opti-system, Android for digital mapping, Real time software

Sources of income for R&D

- Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 50.00

FY 2015-16 = 80.00

FY 2016-17 = 100.00

R&D Achievements

Research projects undertaken by the organization are as follows:

- Clinical Decision Support System
- Implementation of the neural

network to know the cause and effect of an event


Technical Collaborations

National

IEEE Bhubaneswar sub-section

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Conducted various awareness programmes such as EAC (Entrepreneurship Awareness Camp) and various training programmes, such as, plumbing, sewing machine operator, honeybee sponsored by the government.
- Swachh Bharat at Bajapur, and Sialia village of the Khurda district. 

Registered Office

Kishore Memorial Charitable Trust,
Ramchandrapur Bazaar, Jatni,
Khurda 752 050, Odisha
T: 0674 2491300, 9238392780
E: info@sophitorium.org
W: www.sophitorium.org

Recognition Status

File No.:11/675/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 2
PGs & Graduates: 10

Research Areas

- Cognitive science,
- Photonics,
- Bio-medical
- Disaster management,
- Biblio-metric

Research Outcomes

- Papers published: 7



^ R&D equipment available in the organization

Registered Office

KMR Educational Society
MLR Institute of Technology,
Laxma Reddy Avenue, Dundigal,
Hyderabad 500 043, Telangana
T: 9949810842
E: director@mlrinstitutions.ac.in
W: www.mlrinstitutions.ac.in

Recognition Status

File No.: 11/668/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 33
PGs & Graduates: 274

Research Areas

- Image processing
- Network security
- VLSI
- Data mining
- Design and production
- Polymer composites
- Manufacturing engineering
- Marketing management
- Transparent conducting oxides
- Probability and statistics

KMR EDUCATIONAL SOCIETY

Brief Description

KMR Educational Society is running Malla Reddy Institute of Technology with the aim of providing quality education to all sections of the society. The objectives of the R&D cell at the Institute are to create centres of excellence in thrust areas of research; provide a common platform for the agglomeration of knowledge and ideas; create opportunities for students and exploit the available resources for the benefit of the industry/society, and to focus the research on open-community problems.

R&D Set-up

The MLR Institute of Technology has set up a Centre for Research & Development. It has an advisory committee from reputed institutions and the industry. Each department has several centres for excellence (COEs) and these are enumerated as follows:

- Centre of Excellence by Virtusa Polaris on Informatica
- IBM Centre of Excellence
- Centre of Excellence for Internet of Things
- Centre of Excellence for Mobile Application Development
- Centre of Excellence for BIG DATA and Cloud Computing
- Centre of Excellence for LabVIEW
- Centre of Excellence for MATLAB
- Centre of Excellence for Embedded and Robotics
- Centre of Excellence for Cadence
- Centre of Excellence for Digital Manufacturing

- Centre of Excellence for Product Life Cycle Management
- Centre of Excellence for Digital Flight Simulation Lab

Sources of income for R&D

Grant-in-aid

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 41.89

FY 2015-16 = 104.11

FY 2016-17 = 88.06

R&D Achievements

Products developed

Exploring Novel Functional Materials

Processes developed


Steganography to improve the authentication using mobile phone as a security token

Technical Collaborations

National

IIT Bombay, Mumbai; Virtusa, Polaris; IIT Madras; IIT Rourkie; VIT University; Tata Technologies; Boeing; Osmania University; National Aerospace Laboratories (NAL); IIIT Hyderabad

International

The University of New Orleans; University District of Columbia; Saint Louis University. 

Research Outcomes

- Papers published: 651
- IPRs held
 - » Patents filed: 88



^ Research facilities

KONARK INSTITUTE OF SCIENCE AND TECHNOLOGY

Brief Description

The Konark Institute of Science and Technology (KIST) provides quality techno-education in a highly disciplined environment at par with international standards. Special emphasis is given on the empowerment of students to stand up to the challenge of the present employment market. With a sprawling campus of 35 acres, the college is located at Jatni in a lush green atmosphere away from the bustle of crowded city life. The glittering buildings of the college are beautified with appropriate avenue plants, amusement parks, a yoga centre and playground along with well-equipped laboratories, classrooms, and a well-stocked library—all stand as the hallmark of excellence in education. KIST has state-of-the-art laboratories, workshops, computer centre with excellent Internet open for 24 hours, and total wireless campus. The institute is replete with a knowledge centre and library with thousands of books and journals. It is a non-governmental trust, registered in 2001.

R&D Set-up

The research facilities provided by the organization are as follows:

- Equipments
- Gas chromatography–mass spectrometry (GCMS)
- Ball Mill
- Variable frequency sonicator
- CFD simulation Lab

- Software:
- ANSYS R12
- MATLAB
- LAPVIEW

Sources of income for R&D

- Government organizations
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 1.5

FY 2015-16 = 2.8

FY 2016-17 = 0.4

R&D Achievements

Products developed

- Zero smoke biomass stove
- Integrated roaster
- Fly ash tiles
- Nano Piston
- Quinoa dehusking machine
- Water filter
- Psoriasis cream

Prototypes developed

- Micro Biomass power plant

Technical Collaborations

National

- Indian Institute of Technology, Kharagpur; Bhushan Steel and Power, New Delhi; Navabharat Ventures, Hyderabad; Sri Sri University, Odisha; Hi-Tech Medical, Odisha

Registered Office

Konark Institute of Science and Technology, Post Box No. 21, Techno Park, Jatni 752 050, Bhubaneswar, Odisha
T: 0674 2490965, 0674 2490966
E: payodharpadhi@gmail.com
W: kist.ac.in/

Recognition Status

File No.: 11/656/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 4
PGs & Graduates: 10

Research Areas

- Advanced materials including nano
- Food processing
- Energy construction material
- Agricultural equipment
- Internet of things

Research Outcomes

- IPRs held
 - » Patents filed: 10
 - » Papers awarded: 27

International

- IC2 Institute, Texas, USA; Malaysian Research and Development Organization, Malaysia

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Zero smoke stove, Quinoa processing machine, Millet processing machine, Roaster showcased in exhibition by

the Ministry of Micro, Small and Medium Enterprises, Government of India, and Internet of Things (IoT)-based pesticide sprayer. These are relevant in energy, environment, food, and agriculture.

- Fly ash tile manufacturing process and the IoT-based tea vending machine have been emphasized for the utilization of fly ash. 🔍

KUMARAPPA NATIONAL HANDMADE PAPER INSTITUTE

Brief Description

Kumarappa National Handmade Paper Institute (KNHPI) is an autonomous body under the KVIC-Ministry of Micro, Small & Medium Enterprises, Government of India, engaged in the applied research and development, consultancy, and technical services and Human resource and development for the growth of Indian handmade paper industry. The research and developmental activities of the Institute mainly emphasize on exploring various alternative raw materials available abundantly in various regions of the country.

R&D Set-up

The following are the research facilities available with the organization:

- Chemical and wet laboratory
- Physical laboratory
- Biotech laboratory
- Pilot plant
- Product development cell
- Information services
- Consultancy services
- Physical laboratory
- Wet laboratory
- Bio-tech laboratory
- Chemical laboratory

Sources of income for R&D

- Consultancy
- Paper testing
- Training
- DPR making


Technical Collaborations

National

MoU with Banasthali University, Jaipur; IIS University, Jaipur

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Relevance to handmade paper unit who are making it with the help of eco friendly method. 

Registered Office

Kumarappa National Handmade Paper Institute, A-1 Baba Kharak Singh Marg, New Delhi 110 001
T: 9413721887, 0141-2730369
E: knhpijpr@dataone.in
W: www.knhpi.org.in

Recognition Status

File No.: 11/477/2007-TU-V
Initial Recognition: 2007
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 3
PGs & Graduates: 2

Research Areas

- Evaluation of raw material for handmade paper
- Development of ecofriendly process
- Development of new machinery and equipment

LBS CENTRE FOR SCIENCE AND TECHNOLOGY

Brief Description

LBS Centre for Science and Technology is a premier institute of computer training and consultancy, registered under the Travancore-Cochin Literary, Scientific and Charitable Societies Registration Act and was established by the Government of Kerala in 1976. The main objectives of the centre would act as a link between the industries and technical institutions so as to benefit society through their mutual interactions.


R&D Set-up

Sources of income for R&D

- Plan fund support

Technical Collaborations

National

Indian Institute of Information Technology and Management, Kerala. 

Research Areas

- Fuzzy logic
- Artificial intelligence
- Big data
- Pattern recognition
- Neural networks

Research Outcomes

- Papers published: 2

Registered Office

LBS Centre for Science & Technology, Palayam, Thiruvananthapuram, Kerala
T: +91 0471-2324396
E: lbstvpm@gmail.com
W: www.lbscentre.in

Recognition Status

File No.: 11/22/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2017

R&D Manpower

Doctorates:10



▲ Mono Quartz Distillation unit

LOYOLA COLLEGE SOCIETY

Brief Description

Loyola College received the status of 'College of Excellence' by the UGC for innovative teaching and quality research activities and for holistic development. Loyola College is the only arts and sciences college that has been ranked as the top-ten colleges in the arts, sciences, and commerce in the last two decades. It is a Registered Society.

R&D Set-up

The following are the research facilities available with the organization:

- HPTLC System– CAMAG
- Spectrum Two FTIR 09991423 power cord
- Electrochemical workstation
- High-tension furnace 1000 °C
- Abet technologies sunlile class a solar simulator
- UV-visible spectrophotometer
- Double-beam atomic absorption spectrophotometer
- Wire transfer of 382.50 Euro - mark tubes
- Electrosmog RF microwave and radiation detector detex
- Everflow scientific instruments/ rotavap rotary vacuum evaporator

The research infrastructure is being shared by industries/individuals/ academia. Around 70% internal and 30% external researchers have used this facility for their research work.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 487.72

FY 2015-16 = 453.21

FY 2016-17 = 385.40

R&D Achievements

Products developed

- Wound-healing biomaterials
- Extraction of novel bioactive nanoparticles from yellow-spotted millipedes
- Synthesis of novel bioactive nanoparticles from Veitchiawinin and Thenus spp.
- Synthesis of novel bioactive solid lipid nanoparticles from coconut haustorium
- Organic template-free synthesis of Hierarchical Nano M-ZSM-5 Zeolites
- Catalysis and nanomaterials research laboratory organic template-free synthesis of Hierarchical Nano M-ZSM-5 Zeolites
- A novel and facile process to synthesize eco-friendly bio-initiator from Azadirachta indicia A. Juss

Processes developed

- For the preparation of placental membrane scaffolds
- A process for the isolation of a novel compound 'Ignaciomycin' from Streptomycessp.
- Development of a novel process technology for the production of sugar-free and non-alcoholic

Registered Office

Loyola College, Nungambakkam,
Chennai 600 034, Tamil Nadu
T: 044 2817 8291/92/93
E: loyolaprincipal@gmail.com
W: www.loyolacollege.edu

Recognition Status

File No.:11/515/2010-TU-V
Initial Recognition: 2010
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 216
PGs & Graduates: 218

Research Areas

- Insect biodiversity
- Molecular biology
- Tissue culture
- Medicinal chemistry
- Solar energy
- Photoconductors
- Metal binding protein
- Storm water drain
- Humidity and gas sensors
- Nanotechnology

Research Outcomes

- Papers published: 237
- IPRs held
 - » Patents filed: 18

pomegranate juice using immobilized *Saccharomyces cerevisiae* NCIM 3095

- Bioprocess for biosolid waste management
- A process of preparing hierarchical nanoporous-activated carbon (NPAC) using *Borassus*
- A process for the preparation of a novel compound dihydroxygymnemic triacetate from *Gymnema sylvestre*
- A process for the preparation of synergistically active herbal biscuits to treat obesity and non-alcoholic fatty liver disease

Prototypes developed

- Online prediction for vector-borne disease outbreaks

Technical Collaborations

National

King Institute, Chennai; *Times of India*; Infokites; K- Life Solutions; Loyola Academy Degree and PG College Alwal, Secunderabad; Indian Academy Degree College, Bengaluru

International

Institut Albert le Grand, France; Lille Catholic University, France; Katholische Universität Eichstätt-Ingolstadt
Wirtschaftswissenschaftliche Fakultät, Germany; Hochschule Coburg, Germany; Leuven University, Belgium; Concordia College, New York, USA; Barking and Dagenham College, East London, UK; Fu Jen Catholic University, Taiwan; Gangneung-Wonju National University; Le Moyne College, New York, USA; Cape Breton, Canada; Association of Chartered Certified Accountants, UK; Monash University, Malaysia

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Storm drain management towards the development of smart city
- Online prediction of vector-borne disease outbreaks towards digital India. 🔍



^ Tamper evident seals

LPG EQUIPMENT RESEARCH CENTRE

Brief Description

LPG Equipment Research Centre (LERC) was conceptualized by the three oil majors of India and was set up in 1990 with a purpose to develop quality equipment for usage with LPG along with suitable quality-control measures so as to ensure the safety of customers. LERC commenced its operations in April 1990 and was registered as a society under the Karnataka Societies Registration Act 1960 in January 1993. LERC is a government (joint undertaking of IOCL, BPCL, and HPCL) organization.

R&D Set-up

The following R&D facilities are available within the organization:

- Mechanical lab with sophisticated equipments, such as computerized universal tensile-testing machine, spark emission spectrometer, pressure / burst-test facility, drop-test facility, pneumatic leak test benches, and so on.
- Polymer lab with sophisticated equipment, such as ftir equipment, automated ozone cabinet, profile projector, humidity chamber, computerized-tensile testing machines, digital-measuring instruments
- Combustion lab with sophisticated equipments, such as gas chromatograph, gas flow metre, flue gas analyser
- Nine-conveyor system for the development of equipments for LPG bottling plants

- Research infrastructure is used by LERC for the development of products for use of the oil marketing companies (IOCL, BPCL, and HPCL). The research infrastructure is also being used by LERC for the evaluation of products developed by universities / individuals which are sent to LERC by the Ministry of Petroleum & Natural Gas (MoPNG), Government of India.

Sources of income for R&D

- Government sources
- Donations
- Grant-in-aid
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 591.94

FY 2015-16 = 508.70

FY 2016-17 = 635.19

R&D Achievements

Products developed

- Tamper evident seal (TES) for LPG cylinders
- Portable handheld leak testers
- FKM-based O-ring for SC valves
- FKM-based spindle gasket for SC valves
- FKM-based new design tight joint for DPR

Prototypes developed

- Detachable foot ring for LPG cylinder

Registered Office

LPG Equipment Research Centre,
Opp. ITI Main Gate,
Dooravani Nagar,
Bengaluru 560016, Karnataka
T: 080 2561 4035
E: kktakur@lerc.co.in
W: lerc.co.in

Recognition Status

File No.: 11/283/1993-TU-V
Initial Recognition: 1993
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 1
PGs & Graduates: 5

Research Areas

- LPG-related equipment and devices
- Open-technology machinery and system
- Industrial and automotive applications of LPG

Research Outcomes

- Papers published: 1
- IPRs held 1
- Technologies transferred/commercialized: 4

- SURAKSHA LPG hose in LPG domestic installation
- Cook top for mounting on LPG cylinders

Revenue earned by way of licensing products/processes/prototypes

- Royalty earned ₹3.2 crores during 2016–17
- TES for LPG cylinders: ₹30 lakh earned for technology transfer of TES to vendors during 2016–17
- Handheld Leak detector: Royalty earned ₹26 lakh during April 2016–November 2017

Technical Collaborations

National

Agnisumukh Pvt Ltd; Festo India Pvt. Ltd; Jadavpur University; DiGasPvt Ltd; Dr Nandakumar, Polymer Expert

Societal Relevance

The following R&D outcomes are of national/societal significance:

LERC is receiving products / technologies sent by MoPNG, Government of India, under the Make in India scheme for the purpose of evaluation. LERC is evaluating the products and the same is informed to MoPNG. The details of products evaluated till 2016 are as follows:

- LPG gas saving device: The innovation is a pipe which will save 25% to 30% of the LPG consumed, as claimed by the party. This can be used both for domestic as well as commercial installations.
- Novel cooking stove system using pentane: Usage of Pentane in place of LPG in areas where LPG is not easily accessible. 🔍



▲ Vision-based auto-pilot system for indoor navigation of MAV

M S RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Brief Description

MS Ramaiah University of Applied Sciences (MSRUAS) is a private university established by the act of state of Karnataka. It focusses on undergraduate and postgraduate education, research, consultancy, training, skill and leadership development. The university is sponsored by Gokula Education Foundation (Medical) Trust. The University has five verticals—academic studies; academic research; sponsored research; training, skill development and lifelong learning; and a techno centre for consultancy, product design, development and entrepreneurship development. The university has invested in advanced design, simulation, manufacturing and testing facilities.

R&D Set-up

The following are the research facilities available with the organization:

- Chemical vapour deposition system for the nano rods projects
- HP work station
- Platinum crucible, 30 ML capacity - 1EA and chemicals
- COMSOL software
- Hydraulic press with accessories for sheet metal working and testing
- Experimental set-up with all equipment and accessories to evaluate the mechanical properties of plant materials

Sources of income for R&D

- Government grants

- Donations
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 53.63

FY 2015-16 = 31.70

FY 2016-17 = 103.34

R&D Achievements

Products developed

- Automotive torque converter
- Design code development
- Design and development of autonomous micro helicopter
- Home automation products
- Thermal and CFD analysis of 5KW dc generator
- Design and development of low-cost wi-fi switch/sensor interface unit
- Design and development of cash-filling sensing and cash bag sealing technology for cash deposit machines
- Design and development of electronically actuated valve control system for water filters development of human detection and counting on embedded DSP platform

Processes developed

- Design and development of helical rotary actuator
- Design of safety helmets
- Home automation products

Registered Office

MS Ramaiah University of Applied Sciences, University House, Gnanagangothri Campus, New BEL Road, MSR Nagar, Bengaluru 560 054, Karnataka
T: 80 4536 6666
E: vc@msruas.ac.in
W: www.msruas.ac.in

Recognition Status

File No.: 11/627/2014-TU-V
Initial Recognition: 2014
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 92
PGs & Graduates: 96

Research Areas

- Engineering and technology
- Art and design
- Pharmacy
- Dental surgery
- Natural sciences
- Management and commerce

Research Outcomes

- Papers published: 640
- IPRs held
 - » Patents filed: 101
 - » Patents awarded: 14
- Technologies transferred/commercialized: 20

Prototypes developed

- Design and development of autonomous micro helicopter
- Design and development of robotic camera stabilizer mount
- Design and development of cash-filling sensing and cash bag sealing technology for cash deposit machine
- Design and development of hybrid controller for battery charging
- Design and development of wireless interface between infrared service port adapter and host device
- Non-invasive salivary glucometer
- Real-time dosimeter with tissue damage assessment device
- Design and development of female urine collection cup

Technical Collaborations

National

Mekhos Technology Services Pvt. Ltd, Karnataka; Add Technologies India Ltd, Karnataka; Filtrex Technologies Pvt. Ltd, Karnataka; Saturam Technologies, Karnataka; I-Tech Controls, Karnataka; Gas Turbine Research Establishment, Bengaluru; BiSS (Bengaluru Integrated System Solutions) Labs, Karnataka


International

Ghana Technology University College; Airforce Institute of Technology, Nigeria; Edulink International Co. Ltd; Kazan National Research Technical University, Kazan, Russia; Samara State Aerospace University, Samara,

Russia; St. Petersburg State University of Architecture & Civil Engineering, St. Petersburg, Russia; St. Petersburg State Academy of Art & Design, St. Petersburg, Russia

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Development of a secure and encrypted application layer protocol for communication in a micro-air vehicle operating environment
- Development of a high-gain conformal antenna for enhanced endurance and range in micro air Vehicle Operations
- Development of a super capacitor to replace LiPo battery for MAV propulsion
- Design and development of ducted propeller for micro air vehicles
- Design and development of centimeter-size gas turbine for micro air vehicles
- Autonomous navigation and landing of uav using machine learning
- Drag reduction using riblets on submarine hull
- Performance improvement of a ducted marine propeller through numerical investigations
- Development of a genetic optimum structural design tool for unmanned underwater vehicles. 



^ Pocket Health Care mobile application

MGR EDUCATIONAL SOCIETY

Brief Description

Dr MGR Engineering College was founded by Tmt.Kannammal Educational Trust in 1988. The objective is to make the institution as a resource centre for higher level teaching-learning process in the fields of Engineering, Dental Surgery, Medicine, Allied Health Sciences, Humanities & Sciences, Architecture, Management Studies and Education and to provide contemporary knowledge delivery of global standards, excellence in knowledge creation in emerging areas and mutually rewarding university-societal interaction.

R&D Set-up

We have equipment such as rotary tablet machine, 8 station dissolution apparatus, and all-purpose equipment such as:

- Tablet coating pan
- Brookfield viscometer
- Franz diffusion cells
- Stability chambers
- BOD incubator
- IR moisture balance
- Probe sonicator
- UV spectrophotometers
- Gel electrophoresis apparatus
- Flame photometer
- Kymographs
- Rotary evaporator
- Development laboratory

Sources of income for R&D

- In-house funds
- Donations
- Grant-in-aid
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 24.00

FY 2015-16 = 39.33

FY 2016-17 = 95.00

R&D Achievements

Processes developed

- Synthesis of antipyrine using a novel technique
- Synthesis of benzocaine from p-nitrobenzoic acid using a novel technique

Technical Collaborations

National

Pentagon Rugged Systems; MMRFIC Technologies Pvt. Ltd; My Startup Guru; Allsoft; Bodhbridge Educational Services Pvt. Ltd; Reliable Environmental Services; YGK Academy

International

ITU University

Societal Relevance

MGR Engineering College is involved in many national and societal missions. Two prominent products developed by the institute are:

Registered Office

MGR Educational Society
No. 173, Malla Reddy Gardens
Bowenpally, Secunderabad,
Telangana, India-500011
T: 9848668800, 8008500025
E: cmrcet_cgr@yahoo.com
& principal@cmrcet.org,
principalcmrit@gmail.com,
W: www.cmrcet.ac.in, www.
cmrcp.ac.in and www.cmrit.ac.in.

Recognition Status

File No.: 11/669/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 23
PGs & Graduates: 21

Research Areas

- Signal and digital image processing
- VLSI and embedded systems
- Microwave and radar engineering
- Data science and big data analytics
- Information technology and software engineering
- Power systems, electronics, and electrical drives
- Structural engineering
- Earth sciences
- Thermal engineering
- 3D printing technology
- Toxicology, pharmacological screening, and isolation of phytoconstituents
- Herbal drug formulation, bio analysis
- Novel drug delivery systems
- Dosage form design
- Analytical method development
- Bio pharmaceuticals and biotechnology.

Research Outcomes

- Papers published: 1,092
- IPRs held
 - » Patents filed: 10
 - » Patents awarded: 8

- An environment-friendly mosquito repellent which can help control epidemics such as dengue and malaria.
- A shampoo which has no side effects and promotes hair growth. 🔍

MP BIRLA INSTITUTE OF FUNDAMENTAL RESEARCH

Brief Description

The MP Birla Institute of Fundamental Research (MPBIFR) has been established as a society for undertaking research in streams of natural and applied sciences in various disciplines of science, engineering, and technology. The Society was founded solely for educational and academic purposes, with the main aim being to set up and maintain suitable infrastructure for organizing and carrying out fundamental research work.

R&D Set-up

The following are the research facilities available with the organization:

- Two-storied building for library and laboratory at Satna (MP) consisting of built-up area of 25,000 sq.ft
- Air-conditioned animal house, registered and approved by the CPCSEA for mouse breeding and experimentation. Infrastructure being used by individuals and academia.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 341.61

FY 2015-16 = 379.86

FY 2016-17 = 323.74

R&D Achievements

Herbal compounds which have been screened in laboratory are *Centella Asiatica (mandookparni)* and *Bacopa monneri (bramhi)* are

used as memory enhancers; aloe vera and henna (*mehandi*) used in cosmetics and skin-care agents; *Bauhinia variegata (kachanar)* is used as a tonic; *Momordica Charantia (karela)* is used as an anti-diabetic drug; Triphala is used to improve digestion disorder; *Cassia fistula (amaltas)*, *Tinospora Cardifolia (giloya)*, *Terminalia Arjuna (arjuna plant)*, *Tribulus Terrestris (gokharu)* and *Glycorrhiza Gabra (mulethi)* have been completed for the screening of anticarcinogenicity, antimutagenicity activities in the last year. The study is immensely important as these plants have long been used to control the various diseases, including cancer and diabetes in traditional medicine but modern medicine has not accepted these plants. The studies on *Andrographis paniculata*, *Sylvestre*, *Annona squamosa* and *Lignaria* have been undertaken.

Societal Relevance

The organization is involved in various national or societal missions, some of them are:

The major developments of India, in space sciences and the basic research in astronomy has been regularly highlighted and the impacts have been discussed in various meetings, seminars, and public outreach programmes of the MPBIFR Kolkata Centre. The tremendous achievement of ISRO in putting the Mangalyaan into the Mars orbit has been celebrated by holding state-wide programmes catalysed by the Centre. The MPBIFR, Kolkata unit

Registered Office

MP Birla Institute of Fundamental Research 9/1, R N Mukherjee Road, Kolkata 700 001, West Bengal
T: 80 - 22385956
E: Skdkol@yahoo.co.in
W: www.mpbifr-blr.in/

Recognition Status

File No.: 11/100/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 5
PGs & Graduates: 33


Research Areas

- Astronomy
- Astrophysics
- Celestial mechanics and space sciences
- Carcinogenicity
- Mutagenicity
- Biotechnology
- Microbiology

Research Outcomes

- Papers published: 35

has taken part in the nation-wide celebration of the Mars Mission on September 24, 2014, by being one of the nodal centres in India for the Rajya Sabha Television initiative of

the Government of India to inform and enthuse the general public and students about the achievement and potential of such a mission. 



^ Electric discharge machine

MADANAPALLE INSTITUTE OF TECHNOLOGY AND SCIENCE, MADANAPALLE OF RATAKONDA RANGA REDDY EDUCATIONAL ACADEMY

Brief Description

Madanapalle Institute of Technology and Science (MITS) is registered as a Society-NGO and is committed to bringing out and nurturing the talents and skills of youth in the fields of engineering and management to cater to the challenging needs of society and industry. The institute is to foster a culture of excellence in research, innovation, entrepreneurship, rational thinking, and civility by providing the necessary resources for the generation, dissemination, and utilization of knowledge. It is recognized as a PhD research centre.

R&D Set-up

The institute is well equipped with different software and equipment that are accessible to students and faculty members of all the departments. Some of them are listed below:

- Transfer function of DC motor along with motor set
- DC servo motor controller
- Process control simulator
- Hydraulic turbines
- Multi-stage and single-stage hydraulic pumps

- Fluid mechanics experimental set-ups
- Hydraulic systems such as hydraulic ram
- Equipped with two stroke

Sources of income for R&D

Grant-in-aids from DST, YS, ECRA, WOS-A, NRDMS, CSRI, UGC, AICTE, IE, and BSE

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 4,689.50

FY 2015-16 = 4,855.36

FY 2016-17 = 2,544.48

Technical Collaborations

National

BEPL Blend Steel Engineering Pvt. Ltd; Red Hat India Pvt. Ltd; PeopleCare Business Solutions Pvt. Ltd; ICAR-IIMR (Indian Institute of Millets Research); Cyient Ltd, Hyderabad; International Institute of Business Analysis (IIBA)

International

Asia University; Ming Chi University, Taiwan; SAP University Alliances, Germany

Registered Office

Madanapalle Institute of Technology and Science, Post Box No: 14, Kadiri Road, Angallu (V), Madanapalle 517325 Chittoor District, Andhra Pradesh
T: 085712 80255
E: principal@mits.ac.in
W: www.mits.ac.in/

Recognition Status

File No.: 11/625/2014-TU-V
Initial Recognition: 2014
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 16
PG & Graduates: 21

Research Areas


- Metal matrix composites
- Coating tribology
- Computational electromagnetics
- Control and power systems
- Digital signal processing
- Applied electronics
- Wireless communications
- Sensor networks
- Offshore structures and materials
- Fluid dynamics
- Solid-state electronics
- Fibre-Optics
- Nanomaterials
- Computational materials chemistry

Research Outcomes

- Papers published: 33
- IPRs held 11

Societal Relevance

The following R&D outcomes are of national/societal significance:

- MITS - NSS Unit organized by the Government of Andhra Pradesh 'Vanam-Manam (Plantation of One Crore Plants)' Programme
- MITS - NSS unit organized 'Awareness and Training Programme' on Andhra Pradesh State Government and conduct Socio-Economic Survey for Engineering Students. 



^?????

MAHARASHTRA ASSOCIATION FOR THE CULTIVATION OF SCIENCE (AGHARKAR RESEARCH INSTITUTE)

Brief Description

The Agharkar Research Institute (ARI) is an autonomous institute of the Department of Science and Technology (DST), Government of India. It was established in 1946 as the Maharashtra Association for the Cultivation of Science (MACS) and was registered under the Societies Registration Act, 1850. Later, with the expansion in research activities, the MACS Research Institute was given a separate identity. The current research and development activities of ARI span across all areas of life sciences spread over six different themes, namely biodiversity & paleobiology, bioenergy, bioprospecting, developmental biology, genetics & plant breeding, and nanobioscience.

ARI-MACS registered under the Societies Registration Act, 1860, and Bombay Public Trust Act, 1950, and grant-in-aid Autonomous Body under Department of Science & Technology (DST) Government of India.

R&D Set-up

The research facilities and infrastructure available in the organization are as follows:

- Shaker (2)
- HPLC system
- Automatic nitrogen analyser
- Microscope with Camera and Software
- FTIR spectrometer
- Microscope Nikon Trinocular
- Lyophilizer system

- G C System
- Fermentor
- Microplate reader with acce.
- Light cyler
- Gel Documentation system with software
- Fermentor (3)
- Automatic Developing Chamber 2 incl. humidity control unit and others

Sources of income for R&D

- Grant from government agencies
- Sponsored projects

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 1,765.99

FY 2015 -16 = 2,236.67

FY 2016 -17 = 2,207.66

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Wheat (10) and soyabean (7) varieties released for cultivation (disease resistant, high yielding, high protein, micronutrient rich, high oil). Besides, the state seed multiplying agencies and farmers were identified for seed multiplication.
- Device to detect water-borne pathogenic bacteria, such as *E. coli* and 3D cell culture chip, for testing the efficacy of anti-cancer therapies to reduce the use of animals in biomedical research.

Registered Office

Maharashtra Association for the Cultivation of Science (Agharkar Research Institute),
MACS G G Agarkar Road,
Pune 411 004 Maharashtra
T: 020 2532 5000
E: director@aripune.org
W: aripune.org

Recognition Status

File No.: 11/16/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 42
PGs & Graduates: 63

Research Areas

- Biodiversity and palaeobiology
- Bioenergy
- Bioprospecting
- Developmental biology
- Genetics and plant breeding
- Nanobioscience

Research Outcomes

- Papers published:
 - » National/International: 156
- IPRs held
 - » Patents filed: 2
- Technologies transferred/
commercialized: 9

- Development of kit for White Spot Syndrome Virus (WSSV) affecting the aquaculture industry.
- Probiotic oral feed adjuncts to improve poultry and human health and others. 🔍



^ PCR machine

MAHARISHI MARKANDESHWAR UNIVERSITY TRUST

Brief Description

Maharishi Markandeshwar University Trust (MMUT) established Maharishi Markandeshwar University in 2010. The university conducts research in the areas of drug formulation, wireless communication, security pattern analysis, and so on.

R&D Set-up

The following research facilities are available with the organization:

- BOD incubator
- Gel electrophoresis
- Digital tablet hardness tester, model no. SSI/HT/5291
- Digital vernier caliper
- Oscillating granulator
- Double-cone blender
- Vibro shifter (dia. 30)
- Biochemical analyser
- CODA monitor
- BOD incubator
- Ampoule filling and sealing device
- Bulk density apparatus
- Humidity control unit

Sources of income for R&D

- Donations
- Grant-in-aid
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 3,165.03

FY 2015-16 = 2,817.58

FY 2016-17 = 2,205.643

R&D Achievements

Products developed

- Formulation, development, and characterization of gastroretentive superporous hydrogel system for the delivery of drugs used in chronic ailment
- Isolation, characterization, and evaluation of hepatoprotective potential of bark extracts of *Manilkara zapota* and *Ziziphus mauritiana*
- Formulation and evaluation of both stomach and intestine drug delivery system from single-dosage formulation of tablets
- Formulation and characterization of self-nano-emulsifying drug delivery system for solubility enhancement
- Formulation, development, and characterization of novel emulsion-based system for the delivery of poorly soluble drugs
- Formulation and characterization of lipidic nano carrier for bioavailability enhancement
- Preliminary phytochemical investigation and pharmacological screening of *citrus limetta*
- Green synthesis, characterization, and biological evaluation of metal complexes of some novel 1,3,4-thiazoles derivatives
- Hypoglycemic activity of the leaves of *Trigonella foenum gracecum* in *Diabetes mellitus* associated with hypertension

Registered Office

Maharishi Markandeshwar University, 55, Model Town, Ambala City, MM University Campus, Post 133207, Mullana, Ambala, Haryana
T: 01731-304527/8059930160
E: osd@mmumullana.org
W: www.mmumullana.org

Recognition Status

File No.: 11/553/2011-TU-V
Initial Recognition: 2011
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 5
PGs & Graduates: 3

Research Areas

- Herbal drug research
- Formulation and development
- Wireless communication networks
- Antenna theory and design
- Soil testing for roads and buildings
- Research on security pattern

Research Outcomes

- Papers published: 980
- IPRs:
 - » Patents filed: 79
 - » Patents awarded: 2
 - » Copyright: 64

Processes developed

- Correlation between antihypertensive therapy and type 2 *Diabetes mellitus*
- Correlation between antihypertensive therapy and type 2 *Diabetes mellitus* in the population of Haryana
- Development of a microbial consortium for the bioremediation of Pb and Cd
- Gene bank submissions: research outcome in terms of novel strains of microorganisms and breast cancer biomarkers.

Technical Collaborations

National

Bio Instrument Technologies, Punjab; Oniosome Health Care Pvt. Ltd, Punjab; Unijules Life Sciences, Maharashtra; Systole Remedies Pvt. Ltd, Haryana; SBS BIOTECH, Sirmour, Himachal Pradesh; Crystal Pharmaceuticals, Haryana, etc.

Societal Relevance

The following R&D outcomes are of national/societal significance:

The MMUT is involved in a number of national and societal missions for environmental protection, some of them are:

- Eco-friendly concrete development for clean environment
- The invention related to the use of microbial consortium of *Aspergillus fumigatus*, *Aspergillus terreus*, and *Gamma-proteobacterium* for the effective removal of lead, coupled with agricultural residues. Hence this technology would be immensely useful for the removal of heavy metal, especially lead without any adverse effects to the environment
- Public awareness programmes for safeguarding the environment. 🔍



Research laboratory

MANGALORE UNIVERSITY

Brief Description

Mangalore University comprises 190 affiliated colleges, including two constituent colleges. The main vision of the university is to evolve as a National Center of Advanced Studies. Mangalore University constantly endeavours towards research excellence and remains committed to further enhance performance in the areas of science and technology.

R&D Set-up

The following are some of the research facilities and infrastructure available with the organization:

- Animal cell culture lab, molecular biology lab, shell museum, associated laboratory, and neurogenetics lab
- Instrumentation room, computer lab, culture facilities
- UV-visible spectro photometers with kinetic attachment, gas chromatography–mass spectrometry (GCMS), CHNS analyser and fourier-transform infrared spectroscopy, rotavapor
- Biological safety cabinet, including accessories for biological safety
- Weighing balance, deep freezer
- Network simulator: QualNet and Exats simulator, Lenovo Intel Zeon Processor, X2630 V2, 32 GBRAM, 1 TB HDD
- Thermal coating, spincoater, humidity chamber, and many more

Sources of income for R&D

- Government sources

- Donations
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 539.04

FY 2015-16= 914.32

FY 2016-17= 573.10

R&D Achievements

Products developed

- Immunoradiometric Assay (IRMA) kit for C-peptide

Processes developed

- A process for the extraction and purification of tetrandrine was developed
- A new technique of synthesizing gold nanotubes at room temperature without using any templates was developed
- Working on the development of new technologies for radon and thoron mitigation.

Instruments developed

- Radioimmunoassay (RIA) kit for C-peptide based on liquid-phase separation
- RIA kit for insulin based on magnetizable cellulose-separation system

Commercialization potential of products/processes developed

- IRMA kit for the quantification of human C-Peptide is ready for commercialization
- Transferring of the know-how to the Board of Radiation and Isotope

Registered Office

Mangalore University,
Mangalagangothri, Mangalore
574199, Karnataka
T: 0824 2287276, 0824-2287347
E: registrar@mangaloreuniversity.
ac.in
W: www.mangaloreuniversity.
ac.in

Recognition Status

File No.: 11/195/1990-TU-V
Initial Recognition: 1990
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 138
PGs & Graduates: 57

Research Areas

- Cell and tissue culture, microbial culture
- Physiology/radiation biology, human genetics, etc.
- Biodiversity, animal physiology, toxicology, neuroscience
- Polymers
- Electrochemistry

Research Outcomes

- Papers published: 147
- IPRs held
 - » Patent filed: 1

Technology (BRIT) is in progress. the BRIT is expected to produce and do the marketing for it.

Technical Collaborations

National


Central Plantation Crops Research Institute, Kasaragod and Vittal; National Research Centre for Cashew, Puttur; Indian Institute of Spices Research, Calicut; Indian Cardamom Research Institute, Kerala; Central Food Technological Research Institute, Mysore; Board of Radiation and Isotope Technology, Navi Mumbai and others

International

Nanoscience Diagnostics, Austin, Texas, USA; Max Planck Institute of Neurobiology, Germany; New York University, USA; Mount Allison University, Canada; King Mongkut's University, Thailand; and others

Societal Relevance

The following R&D outcomes are of national/societal significance:

- In addition to the university curriculum, training programmes are held in both theoretical and practical aspects of techniques, including crystallization, diffraction data collection and processing, structure solution, model building, refinement, and evaluation.
- Developed kits (products) can be used for routine sample analysis of C-peptide and insulin in human serum for the management of diabetes-related disorders as the assay covers physiological and clinical range which has direct relevance to the Swastha Bharat mission of the Government of India. 



^ Research activity (coating and lamination)

MAN-MADE TEXTILE RESEARCH ASSOCIATION

Brief Description

Man-Made Textile Research Association (MANTRA) is one of the leading Textile Research Associations (TRAs) in man-made fibres and is linked to the Ministry of Textiles, Government of India. MANTRA carries out research and developmental activities as well as provides testing and technical service facilities to the man-made fibre textiles industry in particular, and other allied industries, in general. Looking into the needs of the industry, MANTRA has undertaken research projects on areas, such as pollution control and on mechanical and wet processing.

R&D Set-up

The various laboratories at MANTRA are well-equipped with the latest equipment and facilities which are used by individuals, industries, and academicians, such as:

- Mechanical testing lab
- Chemical testing lab
- Technical textile testing lab
- Environment testing lab
- Eco laboratory testing lab
- Analytical testing lab

Various pilot plant facilities are available, such as melt spinning machine, texturizing machine (F/T and air texturing), coating machine, hot melt laminating machine, needle punch non-woven line, spunlace non-woven line, spunbond line, chemical bonding non-woven line, and many more.

Sources of income for R&D

- Government grants
- Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 42.96

FY 2015-16 = 5.97

FY 2016-17 = 29.05

R&D Achievements

Products developed

- Cost-effective filter fabrics suitable for bag filter
- Banana fabric suitable for extreme cold weather conditions by plasma technology
- Eco-friendly recyclable bio-degradable value-added technical textiles from banana yarn
- Laminated products for inflatable
- Self-lubricating nylon (SLN) parts for power loom
- Carbon tetrachloride (CTC)-free stain remover product for textile fabrics
- Software for computer colour matching system
- Economical thickener for printing
- Enzymatic technique for the weight reduction of polyester
- Coagulation treatment using modified bentonite and recycle and reuse of effluents in textile processing.

Registered Office

Man-Made Textile Research Association (MANTRA), Near Textile Market Telephone Exchange, Ring Road, Surat, Gujarat 395 002
T: 0261 232 3211
E: director@mantrasurat.org
W: www.mantrasurat.org/

Recognition Status

File No.: 11/166/1990-TU-V
Initial Recognition: 1990
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 3
PGs & Graduates: 15

Research Areas

- Textiles fibers
- Yarn fabric manufacturing and processing
- Textile dyes
- Chemicals
- Energy, and environment conservation in the textile industry

Research Outcomes

- Paper published: 1
- IPRs held
 - » Patent filed: 1

Commercialization potential of products/processes developed

The organization has earned revenue by the commercialization of the following products:

- Self-lubricating nylon parts for weaving looms: ₹35 lakhs
- CTC-free product for stain removal: ₹4 lakhs
- Colour matching software: ₹0.5 lakh

Consultancy services rendered

MANTRA provides consultancy in the field of textiles, energy, environment, and technical support to the local textile industry.

Technical Collaborations


National

Veer Narmad South Gujarat University, Gujarat; Centre for Entrepreneurship

Development (CED), Govt. of Gujarat; Sardar Vallabhabhai National Institute of Technology, Gujarat; South Gujarat Textiles Processors Association, Gujarat; Institute of Plasma Research, Gujarat

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Projects have been on water and energy conservation and improved effluent treatment and waste minimization, which are important for environment protection.
- Training programme in technical textiles (Integrated Skill Development Scheme, Ministry of Textiles) has relevance to the creation of skilled manpower. 



▲ Workshop on cultivation and identification of oral anaerobic bacteria

Registered Office

Maratha Mandal Trust,
M M Head Office, Plot No. 1007,
Mal-Maruti Extention, Opposite
Police Parade Ground,
Belgaum 590 016, Karnataka
T: 08312477682
E: mmnghids@gmail.com/
diwanpv@gmail.com
W: mmdc.edu.in/

Recognition Status

File No.: 11/684/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

R&D Manpower

Doctorates : 1
PGs & Graduates : 14

Research Areas

- Oral biology
- Immunology
- Pathology
- Novel drug discovery
- Tissue engineering
- Microbiology
- Hybrid wind diesel system

MARATHA MANDAL TRUST

Brief Description

The Maratha Mandal Trust, Belgaum, was established in 1931 by a dedicated group of individuals. The trust conducts research immunology, drug discovery, tissue engineering, hybrid system, etc.

R&D Set-up

The following research facilities are available with the organization:

- Anaerobic culture jars and accessories
- Bio photometer
- CO₂ incubator for tissue culture
- Laminar air flow with HEPA filters
- PCR thermal cyclers
- Gel electrophoresis sets
- UV transilluminator
- Western blotting equipment
- Anaerobic chamber
- UV crosslinker
- Dot blot hybridization

Sources of income for R&D

- Government funding
- Student fee

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 20.00

FY 2015-16 = 17.92

FY 2016-17 = 16.33

R&D Achievements

The organization has conducted various research projects, such as:

- Oral Microbial Culture and DNA Library

- Estimation of salivary IgA and serum IgG response to periodontal pathogens; a comparison with culture and polymerase chain reaction
- 'Detection and comparative assessment of miR-21 and miR-26a in urine and tissue samples from patients with oral squamous cell carcinoma'—A Cross Sectional Study
- 'Comparison of miRNA-181a, miRNA-181b, p16 and p53 levels between Oral Leukoplakia and Oral Squamous Cell carcinoma'—A Cross Sectional Study

Technical Collaborations

National

Tatyasaheb Kore Dental College & Research Center, Kolhapur, Maharashtra; Kamineni Institute of Dental Sciences, Narketpally, Nalgonda District, Telangana; Regional Medical Research Centre, Indian Council of Medical Research, Belgaum, Karnataka; PS3 Laboratories LLP, Hyderabad, Telangana; Centre for Liver Research & Diagnostics, Central Laboratory for Stem Cell & Regenerative Medicine, Hyderabad, Telangana, etc. 🔍

Research Outcomes

- Papers published: 34



^ R&D activities in organization

Registered Office

Marri Educational Society,
Laxma Reddy Avenue, Dundigal,
Hyderabad 500043, Telangana
T: 9652226061, 9866675818
E: director@mlrinstitutions.ac.in
W: www.mlrinstitutions.ac.in

Recognition Status

File No.: 11/682/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 33
PGs & Graduates: 274

Research Areas

- Image processing
- Network security
- Very-Large-scale integration, data mining
- Design and production
- Polymer composites
- Manufacturing engineering
- Marketing management
- Transparent conducting oxides
- Probability and statistics

MARRI EDUCATIONAL SOCIETY

Brief Description

MARRI Educational Society is running MarriLaxman Reddy (MLR) Institute of Technology which was established in the year 2005 with the aim of providing quality education to all sections of the society. The institute is approved by the All India Council for Technical Education and is affiliated to Jawaharlal Nehru Technology University, Hyderabad. The institute aims to strengthen research and developmental activities on IOT, mobile application, robotics, data analytics, polymer, digital manufacturing, etc.

R&D Set-up

The institute has set up R&D facilities for:

- Internet of things
- Mobile application development
- Big data and cloud computing
- Matlab
- Embedded and robotics
- Digital manufacturing
- Digital flight simulation lab

Sources of income for R&D

- Government agencies
- Student fee

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 41.90

FY 2015-16= 104.11

FY 2016-17= 88.06

R&D Achievements

Products and processes developed

- Exploring novel functional materials
- Steganography to improve authentication using mobile phone as a security token

Technical Collaborations

National

IIT Bombay, Maharashtra; IIT Madras, Tamil Nadu; IIT Roorkee, Uttarakhand; VIT University, Tamil Nadu, etc.

International

Saint Louis University, USA; University of New Orleans, USA; University District of Columbia, USA; Virtusa, Polaris, USA

Societal Relevance

The following R&D outcomes are of national/societal significance:

The institute has conducted several awareness programmes in different domains, for example, establishment of Industry-Institute Partnership/ Interaction Cell. 🔍

Research Outcomes

- Papers published:
 - » National: 318
 - » International: 339
- IPRs held
 - » Patents filed: 88



▲ Fluid mechanics and hydraulics laboratory

MARUTHI EDUCATIONAL SOCIETY

Brief Description

Maruthi Educational Society is running Institute of Aeronautical Engineering (IARE), since 2000. The IARE Research Centre puts in motion proactive applied research to help solve the technical and scientific problems of the industries and defence organizations. It focusses on research areas related to educational research and develops tools and techniques to address the needs of a university, faculty members, and prospective students.

R&D Set-up

The research facilities available with the organization are as follows:

- Vibration measurement and analysis system
- Softwares: CFD and Ansys
- Softwares: NASTRAN
- Wind tunnel
- Flight simulator with a dual cockpit
- Softwares: MAT Lab
- Combustion test rig
- Flight dynamics — work station and many more

R&D Achievements

Products developed

- DNA-based encryption system and method thereof to provide high secure and reliable data transmission
- A multifunctional solar-powered wireless keyboard

- Expert feedback system and method to enhance services of the Indian Railways
- High-speed blackboard cleaning apparatus and its operating method thereof
- Method and system for automated collection, segregation & processing of bio waste in train toilet
- Portable human tracking system using real time bio-signals and a method thereof
- Compact mini drafter for physically disabled users
- Di-coptorand arms mechanism thereof
- Automatic blackboard-cleaning device
- CNC machine operator stand
- Component base for CNC machine
- CNC machine fixture
- Switch plate column for CNC machine
- Train toilet commode
- Train sewerage segregating tank
- Train sewerage segregation system
- Chassis for automobiles
- Spindle assembly for automobiles

Revenue earned by way of licencing products / processes / prototypes

- A total of ₹6,00,000 has been earned by way of licencing the products developed by the IARE

Commercialization potential of products / processes developed

- Twenty products have been developed and commercialized

Registered Office

Maruthi Educational Society
Institute of Aeronautical
Engineering, Dundigal,
Hyderabad 500 043, Telangana
T: 04029705852
E: info@iare.ac.in
W: www.iare.ac.in

Recognition Status

File No.: 11/681/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 55
PGs & Graduates: 35

Research Areas

- Data mining
- Computational intelligence
- Image processing
- Remote sensing using data mining and soft computing techniques for the study of aerosol clouds
- Temperature and water vapour
- Aerosol-cloud interaction
- Satellite-probed understanding of aerosols and clouds
- Pattern recognition
- Artificial intelligence

Research Outcomes

- Papers published: 364
- IPRs held
 - » Patents filed: 20
- Technologies transferred/commercialized: 20

Technical Collaborations


National

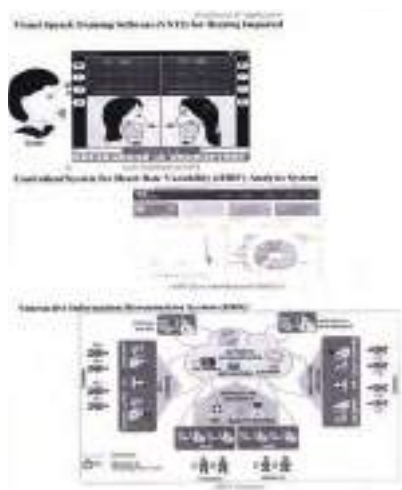
Chebrolu Engineering College, Guntur; MLR Institute of Technology, Hyderabad; MTE Industries Pvt. Ltd, Hyderabad

Societal Relevance

The following R&D outcomes are of national/societal significance:

The development of the following systems and methods are directly relevant to the Swachh Bharat Mission of the Government of India:

- A method and system for the automated collection, segregation & processing of biowaste in train toilets
- An expert feedback system and method to enhance the services of the Indian Railways. 



▲ Interactive information dissemination system (IIDS)

Registered Office

Media Lab Asia, No.2,
4th Floor, Samruddhi Venture Park,
Central MIDC Road,
Andheri (East), Mumbai 400 093
Maharashtra
T: 022-28312931
E: gcorgc@2mcdialabasia.in
W: www.medialabasia.in

Recognition Status

File No.: 11/412/2002-TU-V
Initial Recognition: 2002
Valid Until: March 31, 2017

R&D Manpower

Doctorates: 5
PGs & Graduates : 46

MEDIA LAB ASIA

Brief Description

Media Lab Asia (MLAsia) works on the paradigm of collaborative research in the task of developing relevant and sustainable technologies and culturally appropriate solutions and bringing them to the daily lives of people. MLAsia works with academic and research and developmental institutions, industry, NGOs, and the government in this endeavour.

R&D Set-up

The following three research and developmental offices are equipped with all their requisite hardware and software.

- TDD Division, Devika Tower, Nehru Place, New Delhi
- IT Research Academy, C-DOT Campus, Chattarpur, New Delhi
- PhD Cell, DIC, Electronics Niketan, CGO Complex, New Delhi

Sources of income for R&D

Grant-in-aid from the Ministry of Electronics & IT (MeitY)

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 5,972.00

FY 2015-16 = 9,594.00

FY 2016-17 = 12,996.00

R&D Achievements

Products developed

- DigiBunai™ - Bunkar (Weavers) advancement through ICT
- Visual speech training software (VSTS) for those with a hearing impairment

Processes developed

- Annapurna Krishi Prasaar Seva (AKPS)
- Mobile-based Agro Advisory System for North-East India (m4agriNEI)

Prototypes developed

- Centralized System for Heart Rate Variability (cHRV) Analysis
- Prayatna: Web-based tool for the assessment of persons with MR in the 19–35 of age bracket along with the vocational profile.

R&D Achievements

The SIRO has developed the following tools, technologies, and prototype-systems under various ITRA projects (FY 2016–17).

- A smartphone-based system for real time bus information, remote collision detection, and precollision vehicle path forensics
- An automated system to sense, analyse, conserve, and provide advice for enhancing home energy usage
- A low-cost, cuff-less, continuous blood pressure monitoring solution PPA device for a quantitative analysis of the exhalation useful for monitoring patients with chronic obstructive pulmonary disease
- A dynamically configured wireless system to establish communication amongst small radio units located on offshore fishing boats and between boat-clusters and shore
- A real time 7–30 day drought forecast and its use in the selection of crops to be planted

Research Areas

- Livelihood enhancement (agriculture, crafts, MSMEs)
- Empowerment of persons with disabilities (divyangjan)
- Healthcare
- Education
- Mobile computing, networking and applications
- IT-based innovations in water resources sustainability
- IT-based transformations in Indian agriculture and food

Research Outcomes

- Papers published: 2
- IPRs held
 - » Patents filed: 9

- A service for detecting and estimating the size of ground water resources in hard-rock aquifers of India.

Commercialization potential of products/processes developed

- DigiBunai: The application can be deployed for Banarsi saree weavers and can be customized for other weaving clusters across the country
- Chic CAD: A software design tool to assist artisans in making embroidery designs

Technical Collaborations

National

Ministries of Government of India such as Electronics & Information Technology; Ministry of Science & Technology; Ministry of Textiles; All India Institute of Medical Sciences (AIIMS), New Delhi; Indian Institute of Technology (IIT-B), Mumbai; IIT-Delhi, etc.

Societal Relevance

The following R&D outcomes are of national/societal significance:


The following products, services, and technologies aided in the national mission— 'Digital India':

- IIDS: The system deployed in the states of Andhra Pradesh, Telangana, and Meghalaya for issuing agro-advisories to farmers
- Punarjjani: A bilingual (Hindi and English) web-based tool to assist

special teachers in assessment of children (6–18 years of age) with mental retardation.

Remarks

Moreover, some of the following tools, technologies and prototype-systems being developed under the various ITRA projects (FY 2016-17) are as follows.

- A smartphone-based system for real time bus information, remote collision detection, and pre-collision vehicle path forensics.
- An automated system to sense, analyse, conserve, and provide advice for enhancing home energy usage.
- A low-cost, cuff-less, continuous blood pressure monitoring solution.
- A device for quantitative analysis of exhalation useful for monitoring patients with chronic obstructive pulmonary disease.
- A dynamically configured wireless system to establish communication amongst small radio units located on offshore fishing boats and between boat-clusters and shore.
- A real time 7–30 day drought forecast and its use in the selection of crops to be planted.
- A service for detecting and estimating the size of ground water resources in hard-rock aquifers of India. 



▲ Instrumentation and Dynamics Lab

MEPCO SCHLENK ENGINEERING COLLEGE

Brief Description

Mepco Schlenk Charities is running Mepco Schlenk Engineering College is affiliated to Anna University, Chennai. The college conducts research on areas, such as geopolymer concrete, industrial waste management, transport economics, etc.

R&D Set-up

The following are some of the research facilities available with the organization:

Scanning electron microscope, atomic force microscope, UV/Vis spectrometer, ICP spectrometer, video-based water contact angle measurement, spectrofluorometer, refrigerator high-speed centrifuge, ultra centrifuge, gas analyser, refrigerated incubator shaker, HPLC, cell culture system, CO₂ incubator, AVL smoke metre.

Sources of income for R&D

- Donations
- Grant-in-aid
- International funding
- Interest on investments
- Project funds

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 142.33

FY 2015-16= 131.23

FY 2016-17= 152.80

R&D Achievements

Products developed

Twenty-seven products have been developed by the organization, such as:

- Transforming lathe into a multi-purpose machine
- Reciprocating pneumatic fixture for holding threaded fasteners in lathe
- Friction stud welding with external cooling arrangement
- Flexible work holding device in friction welding machine
- Friction plug welding experimental set-up with an on-line heating arrangement
- Improved joint design in friction stud welding of aluminium and steel with ceramic coating at interlayer and many more

Processes developed

Seventeen processes have been developed by the organization and some of them are as follows:

- Development process of thermal insular green clay bricks using hollow silica spheres
- Low-cost guardrail and barricade system using aerated cellular concrete for the safety of the construction workers
- Determination of the transmission congestion cost for the restructured power system
- Design of power controller to improve the power quality and reliability in grid-connected renewable energy systems

Registered Office

Mepco Schlenk Engineering College, Post 626 005, Sivakasi, Virudhunagar Dist., Tamil Nadu
T: 0 4562 235000
E: msec@mepcoeng.ac.in
W: www.mepcoeng.ac.in/

Recognition Status

File No.: 11/417/2002-TU-V
Initial Recognition: 2002
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 78
PGs & Graduates: 62

Research Areas

- Geopolymer concrete
- Industrial waste materials
- Road materials
- Power quality
- Transmission congestion cost
- Controllers for STATCOM

Research Outcomes

- Papers published:
 - » National: 9
 - » International: 244
- IPRs held 4

- Design and development of controllers for voltage source converter-based STATCOM and many more

Commercialization potential of products/processes developed

The equipment mentioned below are very useful for making crackers in the fireworks industry. Also, these equipment provide as safe environment. Hence they have the potential to commercialize in and around Sivakasi:

- Machine for mixing firework chemicals
- Amorces dipping machine
- Chorsa filling chamber
- Fuse-making machine for the fireworks industry
- Automatic machine for bottom finishing of paper tube cake for the fireworks industry

Technical Collaborations

National

NI Systems (India) Pvt. Ltd, Karnataka; Biozeen, Karnataka; Cognizant Technology Solutions India Ltd, Tamil Nadu; Infosys, Karnataka; Information and Communication Technology Academy of Tamil Nadu

International

Teezle Inc. USA; Texas Instruments, USA

Societal Relevance

The following R&D outcomes are of national/societal significance:

Technology/product developed in the organization has a connection with the Clean India Mission of the Government of India. Sectors where they are relevant are industrial waste/effluent management technology, drinking water, sustainable sanitation, urban/rural solid and liquid waste management, and clean energy. 🔍



^ NERCI wet lab

NANSEN ENVIRONMENTAL RESEARCH CENTRE

Brief Description

Nansen Environmental Research Centre India (NERCI) was established in 1999 as a joint venture between Indian and Norwegian partners. The NERCI conducts basic and applied research projects in ocean and atmospheric sciences. The centre aims at improving in understanding of climate change, and its impact on monsoon, and the Indian Ocean ecosystems by using satellite data and models. It is registered as a company under Section 25 of the Companies Act.

R&D Set-up

The following are some of the research facilities and infrastructure available at the centre:

- ArcGIS version 10.1 runs natively on 64 bit Windows and Linux operating systems, providing users with high-performance web editing and map caching, on-the-fly analyses, and imagery exploitation capabilities
- PRIMER version 6, used for statistical analysis of multivariate data
- UV-visible spectrophotometer with integrated sphere—Shimadzu UV-2700 model supplied with UV-probe software working on 32-bit Windows
- Radiometer (Ocean Profiler II)—Satlantic model with additional sensors for measuring backscattering and reflectance
- Trinocular research microscope—Olympus CX21i

- Weighing balance—Shimadzu UX420H, and others

Sources of income for R&D

- International funds
- Government grants

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 203.30

FY 2015-16 = 152.34

FY 2016-17 = 69.00

R&D Achievements

Research projects

- Modelling bio-geochemical cycles in coastal oceans
- Estimating the carbon sequestration potential of mangroves in the Kunhimangalam area using remote sensing and Geographic Information System supported by field observations
- HABAQUA: Harmful algal blooms in aquaculture ecosystems, a modelling and remote sensing perspective
- Atmospheric carbon sequestration potential of trees in Kochi City under the changing environmental scenario
- Decadal to multi-decadal variability in the Indian Monsoon Rainfall (IMR) and teleconnection with Atlantic Multidecadal Oscillation

Consultancy services

The institution is involved in satellite remote sensing data analysis and

Registered Office

Nansen Environmental Research Centre India, 6A, Oxford Business Centre, 6th Floor, Sreekandath Road, Ravipuram, Kochi 682 016, Kerala
 T: 0 484 2383351
 E: nansencentre.india@gmail.com
 W: www.nerci.in/index.html

Recognition Status

File No.: 11/550/2011-TU-V
 Initial Recognition: 2011
 Valid Until: March 31, 2018

R&D Manpower

Doctorates: 3

Research Areas

- Monsoon and ocean variability, climate change, and sea level variations
- Marine ecosystem studies including algal blooms
- Coastal zone management and societal issues

Research Outcomes

- Papers published: 13

interpolation for ocean, and coastal zone applications, development, and validation of algorithms for satellite remote sensing data analysis in combination with field experiments.

Technical Collaborations

National

Indian National Centre for Ocean Information Services (INCOIS), Telangana; Cochin University of Science And Technology, Kerala; Kerala University of Fisheries and Ocean Studies, Kerala; Anna University, Tamil Nadu; Toc H Institute of Science and Technology, Arakkunnam, Kerala

International

Nansen Environmental Remote Sensing Center, University of Bergen, Norway; Centro Euro-Mediterraneo sui Cambiamenti Climatici, Italy; Plymouth Marine Lab, UK

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The centre organizes national and international workshops and seminars in the field of ocean and atmospheric sciences as well as coastal zone management
- It offers Nansen Fellowships at Cochin University of Science & Technology (CUSAT) to conduct doctoral programmes through MoUs for collaborative research
- The outreach is actively done through press and popular science lectures in colleges, schools, universities, and public forums. Awareness campaigns are also conducted as part of CSR initiatives to disseminate the research outputs of the organization. 🔍



Food analytical instruments facilities available in NAFARI

NATIONAL AGRICULTURE AND FOOD ANALYSIS AND RESEARCH INSTITUTE

Brief Description

National Agriculture and Food Analysis and Research Institute (NAFARI) is an autonomous, not-for-profit-sharing organization, registered under Section 25 of the Companies Act 1956. The institute provides services to the food processing industry, hands-on training programmes, and consultancy on products, processes, supply linkages, and legal advisory. NAFARI endeavours to apply the state-of-the-art analytical techniques and testing methods of international standards and requirements in chemical and biological testing of food and food products.

R&D Set-up

The following are the piloting research facilities available in the organization:

- Form fill and seal powder packing machine
- Hand-operated sealing machine
- Humidity chamber, bain-marie, granite wet grinder, microwave, and many more.

R&D laboratory instruments include the following:

- pH metre, centrifuge
- High-pressure liquid chromatography (HPLC) and high-pressure thin-layer chromatography (HPTLC)
- Bacteriological incubator, BOD incubator, and others.

These are used by industries, academicians, individuals, and students.

Sources of income for R&D

- Government grants
- Self-funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

R&D Achievements

Products developed

The organization has developed almost 22 products since 2014, a few of them are listed below:

- Products, such as green *chutney* and tamarind *chutney* were developed using hurdle technology and with preservatives
- Ready-to-Serve beverage from the cactus fruit
- Development of nutribar for teenage girls, especially for fighting iron deficiency
- Developed process for the preservation and standardization of Italian products and many more.

Processes developed

- Developing process to increase the shelf life of *kajukatali* by using preservatives/food additives and packaging material up to 3 months
- Developing process to prevent layer separation in *solkadhi* with 15 days shelf life and others.

Prototypes developed

- Developed method for the analysis of Aflatoxin on HPTLC
- Developed process for the fortification of rice to incorporate vitamins and minerals

Registered Office

National Agriculture and Food Analysis and Research Institute,
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W: www.nafari.org

Recognition Status

File No.: 11/663/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

R&D Manpower

PGs & Graduates: 20

Research Areas

- Product development and formulation
- Preservation techniques
- Packaging studies, legal advice, shelf life studies
- Hazard analysis and critical control points (HACCP) and food safety studies and implementation
- ISO implementation
- Food safety management systems implementation
- Food analysis, quality control/assurance, and microbial studies

Research Outcomes

- » Technologies transferred/commercialized: 40

- Developed a process for the standardization of the beverage line and the shelf life enhancement of flavour instruments have been developed.

Technical Collaborations

National

Gits Foods Products Ltd, Mumbai, Maharashtra; Pravin Masale wale, Pune, Maharashtra; Weikfield Products Co. (I) Ltd, Pune, Maharashtra; Venkateshwara Hatcheries Pvt. Ltd, Pune, Maharashtra; Chitale Bandhu Mithaiwale, Pune, Maharashtra

Societal Relevance

The following outcomes are of national/societal significance:

- NAFARI is an approved 'Training Partner' of 'FoSTaC under the Food Safety and Standards Authority of India to conduct mandatory food safety trainings and recommend certification of candidates.
- Recommendation for the setting up of business incubators under the National Manufacturing Competitiveness Programme. 



^ R&D activities in the organization

NATIONAL COUNCIL FOR CEMENT AND BUILDING MATERIALS

Brief Description

The National Council for Cement and Building Materials (NCB), an autonomous organization registered under the Societies Act, 1860, is under the administrative control of the Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry, Government of India. As a premier scientific and industrial research organization, the council has been engaged in research, technology development and transfer, and provides industrial support services, including quality control, testing, training, etc. to cement, construction, building materials, and the allied industries.

R&D Set-up

The following research facilities and infrastructure are available in the organization:

- X-ray diffractometer: Mineral and phase analysis of raw materials, clinker, cement, etc.
- X-ray fluorescence spectrometer: Elemental analysis of raw materials, clinker, cement, etc.
- Scanning electron microscope: Microstructural studies and elemental mapping of clinker, hydrated cement, concrete, etc.
- Optical microscopy: Microstructural investigations of rocks, raw materials, aggregates, clinker, etc.
- Particle size analyzer: Particle size distribution of cement and other powder samples

- Inductive coupled plasma spectrometer (ICP-OES): Determination of heavy and toxic elements in materials and industrial wastes and by-products
- C-H-N-S analyzer: Ultimate analysis of various types of fuels
- Fourier transform IR spectrometer: Analysis of materials and study of chemical reaction and many more

Sources of income for R&D

- Grant-in-aid
- Government funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 134.67

FY 2015-16 = 137.75

FY 2016-17 = 91.17

R&D Achievements

Products developed

- Nanosilica-blended ordinary Portland cement compositions with improved performance characteristics
- Industrial by-products, such as copper slag, lead-zinc slag, barium sludge, jarosite, spent pot lining (SPL) waste, as mineralizer in the manufacture of ordinary Portland cement

Processes developed

- Process for the preparation of nanosilica-blended ordinary Portland cement compositions

Registered Office

National Council for Cement and Building Materials, 34 Km Stone, Delhi-Mathura Road (NH-2) Ballabgarh 121 004, Haryana
T: 0129-2242051
E: nccbm@ncbindia.com
W: www.ncbindia.com

Location of R&D Units

- Hyderabad, Telangana
- Ahmedabad, Gujarat

Recognition Status

File No.: 11/163/1988-TU-V

Initial Recognition: 1988

Valid Until: March 31, 2019

R&D Manpower

Doctorates: 8

PGs & Graduates: 71

Research Areas

- Cement
- Construction
- Waste utilization
- Building materials

Research Outcomes

- IPRs held
 - » Patents awarded: 93
 - » Patents filed: 11

with improved performance characteristics

- Rationalizing curing conditions for improving properties of hardened geopolymeric cement
- Process for the preparation of sulphoaluminate-belite cement utilizing high magnesia/dolomitic limestone
- Development of system design for storage, handling, and firing of different types of alternate fuels/waste in cement plants

Commercialization potential of products/processes developed

- Indian standard IS: 16415-2015, composite cement-specification has been notified by the Bureau of Indian Standards (BIS)-based on the R&D outcome of the NCB.
- Indian Standard IS: 269-2015: ordinary Portland cement-specification includes industrial by-products, such as copper slag, lead-zinc slag, steel slag, and catalytic waste from petroleum refinery as performance improvers in the manufacture of ordinary Portland cement based on the NCB R&D work.
- The certified reference materials (CRM) developed and supplied by the NCB are import substitutes with application in testing laboratories, cement plants, thermal power plants, and process industries.

Technical Collaborations


International

Mewani Limestone Ltd, Tanzania;
Shivam Cement Pvt. Ltd, Nepal;
Penden Cement Authority Ltd,

Gomtu, Bhutan; National Cement Company Ltd, Kenya; Gorahi Cement Industry Pvt. Ltd, Nepal, and others.

Societal Relevance

The societal relevance of some of the research projects/activities undertaken by the NCB is as follows:

- The NCB is the first NABL-accredited proficiency testing (PT) provider in the country as per ISO 17043-2010. This has led to the domestic availability of PT services.
- Some of the important projects undertaken by the NCB in Gujarat after the devastation of the 2001 earthquakes, include damage classification of 5,000 buildings in Kutch district; Technical audit, and quality assurance of 836 panchayat buildings in the nine districts of Gujarat, sponsored by the PWD, Gujarat; supervision and certification of 564 school buildings sponsored by the Gujarat Council of Primary Education; project management and consultancy for the construction of Government/Government-aided 50 school buildings in Gujarat funded by Prime Minister's National Relief Fund and 200 primary school buildings funded by the Government of Karnataka; investigation of materials from 90 collapsed buildings in Ahmedabad and Bhuj. 



^ Installation in the form of an exhibit

NATIONAL COUNCIL OF SCIENCE MUSEUMS

Brief Description

The National Council of Science Museums is an autonomous organization under the Ministry of Culture, Government of India. Its main objectives are to portray the growth of science and technology and their applications in the industry and human welfare with a view to develop scientific attitude and temper and to create, inculcate, and sustain a general awareness amongst the people, to collect, restore, and preserve important historical objects.

R&D Set-up

The research facilities and infrastructure available are as follows:

- Exhibit development labs, electricity labs, mathematics labs
- Innovation hub, biotechnology labs, biology labs, design labs/studio
- Rapid prototyping machine (3D printer) labs, CAD lab, mechanical workshop, electrical workshop, electronics workshop

Sources of income for R&D

- Grant-in-aid
- Government funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 873.89

FY 2015-16 = 822.99

FY 2016-17 = 960.98

R&D Achievements

Products developed

- DNA helix
- Development of the complete coin gallery in Indian Museum
- Garden of Fame
- Brahmaputra: The Mighty River
- From faith to scientific understanding for Brahmaputra
- Origin & its Journey for Brahmaputra: The Mighty River
- Biodiversity for Brahmaputra: The Mighty River
- Ecology & Environment for Brahmaputra: The Mighty River
- Economic Aspect for Brahmaputra: The Mighty River
- Culture for Brahmaputra: The Mighty River
- Scientific & Educational Relevance for Brahmaputra: The Mighty River
- Unmanned Quiz Corner for Brahmaputra: The Mighty River
- 3D Video Show corner for Brahmaputra: The Mighty River
- Magnus Effect: Cricket Ball Swing
- Interactive multimedia on the 3rd umpire
- The MASTER: an exhibit on Vivekananda and his philosophy and others

Registered Office

National Council of Science Museums, 33, Block - GN, Sector - V, Bidhan Nagar, Kolkata 700091
West Bengal
T: 033 2357 9347
E: sciencecentre@ncsm.gov.in
W: www.vncsm.gov.in

Recognition Status

File No.: 11/80/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

PGs & Graduates: 6

Research Areas

- Introduction of New Scientific Ideas and Communication of Science

Research Outcomes

- IPRs held
 - » Patents awarded: 14
 - » Copyright: 2

Processes developed

- A new science show (Public Demonstration Lecture) titled 'Fire-y-tale Show' was developed
- RFID-based attendance and leave record management software was developed
- e-Ticket software was developed
- IPv6 compatible networking architecture
- High-voltage show

Prototypes developed

- Attraction and repulsion of charged bodies
- Electric lines of force
- Charge transfer
- Foil cracker
- 3D anamorphosis
- IC engine and its components
- Two-stroke and four-stroke engine and others

Societal Relevance

The following R&D outcomes are of national/societal significance:

Due to a lack of laboratories in schools, especially in the country's rural areas, it becomes extremely difficult to understand scientific concepts just by reading books. The type of teaching does not make students interested in science and instead tends to disinterest them as the concepts are difficult to comprehend. Hence a set of 17 educational kits covering topics, such as electricity, mathematics, mechanics, geography, etc. were designed and developed by the DSC Dharampur. These were made available on a commercial basis for schools on placing orders for an amount of ₹2.93 lakh only. 🔍



^ Fab Lab

NATIONAL INNOVATION FOUNDATION

Brief Description

The National Innovation Foundation–India (NIF) was set up in 2000 with the assistance of the Department of Science and Technology, Government of India. It is India's national initiative to strengthen the grassroots technological innovations and outstanding traditional knowledge. The mission of the foundation is to expand research on sustainable technologies policy and grassroots technological innovations.

R&D Set-up

- NIF has set up its fab-lab (Fabrication Laboratory) for developing engineering innovations.
- NIF has also coordinated with farmers and nearby villagers for large- scale field trials for agriculture and veterinary practices.

Sources of income for R&D

Government agencies

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 652.19

FY 2015-16 = 1,056.12

FY 2016-17 = 1,615.64

R&D Achievements

Products developed

There are almost 114 products developed since 2014, a few of them are as follows:

- Manual walnut peeler
- Borewell scanner

- Brick-making machine
- Block-and brick-making machine
- Interlocking brick-making machine
- Modified boiler
- Nutmeg desheller
- Passive weeder and others

Commercialization potential of products/processes developed

There are many products and processes which have the potential for commercialization; a few of them are walnut cracker, incense stick-making machine, biomass gasification system, multipurpose food processing machine, natural water cooler, and others.

Technical Collaborations

National

Grambharti Institute, Gujarat; Balaji Seeds and Agritech, Madhya Pradesh; University of Kashmir, Jammu and Kashmir; National Institute Technology, Jammu and Kashmir; University of Mumbai, Maharashtra; WWF-India, New Delhi

International

Cumulus-International Association of Universities and College of Art, Design and Media, Finland; Reckitt Benckiser, UK; Royal University of Bhutan; Lawrence Berkeley National Lab Institute for Globally Transformative Technologies, USA

Societal Relevance

The following R&D outcomes are of national/societal significance:

- NIF has operationalized grassroots technological innovations

Registered Office

National Innovation Foundation – India, Satellite Complex, Jodhpur Tekra, Near Mansi crossroad, Ahmedabad, Gujarat 380 015
T: 079 26753501
E: info@nifindia.org
W: www.nif.org.in

Recognition Status

File No.: 11/397/2001-TU-V
Initial Recognition: 2001
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 21
PGs & Graduates: 70

Research Areas

- Sustainable technologies
- Green grassroots innovation
- Developmental policies and programmes

Research Outcomes

- Papers published: 43
- IPRs held
 - » Patents filed: 3
 - » Trademarks registered: 5
- New crop varieties developed and registered: 5

Acquisition Fund (GTIAF), wherein it intends to acquire rights of useful grassroots technologies from innovators after paying an upfront fee and disseminate/diffuse it at low cost or no cost to other innovators, fabricators, farmers, or entrepreneurs across the country

- Value addition through research and development is a key focus of NIF and it provides a platform for the synergy between formal and

informal science and technology, institutions, and knowledge systems.

- Products and processes, such as multipurpose processing machine, sanitary napkin making machine, cotton wick making machine, incense stick machines, etc., have relevance to the Make in India Mission and Skill India Mission of the Government of India. 🔍



▲ Project activity: stakeholders' engagement

Registered Office

National Institute of Advanced Studies, Indian Institute of Science Campus, Bengaluru 560 012, Karnataka
T: 080 2218 5000
E: admin@nias.iisc.ernet.in
W: www.nias.res.in/

Recognition Status

File No.: 11/224/1991-TU-V
Initial Recognition: 1991
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 35
PGs & Graduates: 32

Research Areas

- Animal behaviour and cognition, conservation biology
- Non-linear dynamics, conflict resolution
- Sustainable development
- Urban and mobility studies, inequality
- Interdisciplinary approaches to economic issues

NATIONAL INSTITUTE OF ADVANCED STUDIES

Brief Description

National Institute of Advanced Studies (NIAS) was conceived and founded in 1988 to create an institution to conduct advanced multidisciplinary research. The chief objectives of the NIAS are to integrate the findings of scholarship in the natural and social sciences as well as technology, the humanities, and arts through multi-disciplinary research. It is registered under the Karnataka Societies Registration Act.

R&D Set-up

The following are the facilities and infrastructure available in the institute and used by academicians for research:

- Lecture-cum-discussion facilities, such as overhead and LCD projectors, digital camera, TV, VCR

Sources of income for R&D

- Government agencies
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 1,210.35

FY 2015-16 = 1,250.90

FY 2016-17 = 1,757.11

R&D Achievements

Research projects

- Study of the deceleration in electricity demand in Karnataka
- Integrating pumped hydro-storage with wind and solar energy in Karnataka

- Role of 'Student Networks' in creating environmental and socioeconomic awareness.

Technical Collaborations

National

Indian Council of Agricultural Research, New Delhi; Indian Institute of Sciences, Karnataka; Centre for Advancement of Global Health, Kerala; National Innovation Foundation, Gujarat.

International

Centre for Comparative Philosophy, Duke University, USA; George Mason University, USA; The Collège de France, the Service for Science & Technology of the French Embassy to India.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Research on climate change impact on pest outbreak cycles has relevance for the National Mission on Strategic Knowledge for Climate Change.

The institute coordinates the Global Energy Technology Watch Group (under the National Mission on Strategic Knowledge for Climate Change) that provides regular policy inputs and briefings to the Government of India. [Q](#)

Research Outcomes

- Papers published: 200



↗ Computer lab facilities at NICMAR

NATIONAL INSTITUTE OF CONSTRUCTION MANAGEMENT & RESEARCH (NICMAR)

Brief Description

The National Institute of Construction Management and Research (NICMAR), has been constituted as a non-profit organization with focus on construction management and research in India and abroad and added value to the business process by carrying out consultancy, research, and training at all levels of the construction and other allied industries. The institute is registered as a public trust under the Bombay Public Trust Act, 1950.

R&D Set-up

The R&D facilities and infrastructure are spread across the four research campuses on the institute.

NICMR has various IT hardware, softwares available for research in the campuses, such as Orell Digital English Language Lab Software, Autodesk Software – Autocad, Revit, Navisworks and others (24 Products), Microsoft Dynamics AX 2009 ERP Solution, Tally 9 ERP, and others and all these are used by industries, individuals, and academia.

Sources of income for R&D

Self-funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 242.18

FY 2015-16= 296.57

FY 2016-17= 359.37

R&D Achievements

Research projects

- Research survey on concrete products for Goa
- Study on infrastructure development for container ports in India
- Affordable housing for slum free cities on a public-private partnership (PPP) basis
- Formulation of price index to calculate the escalation in construction projects
- ISO 9001:2008 - Bridging the gap and bringing about synergy between systems application and actual implementation
- The Contribution of Construction Industry in India: An Empirical Evaluation of Economic and Financial indicators

Consultancy services rendered

Consultancy services are rendered in the fields of business strategy and policy, quality management, supply chain and logistics management, human resource management, feasibility studies, financial and management controls, and other areas.

Technical Collaborations

National

Erode Builder Educational Trust's Group of Institutions, Kangayam, Tamil Nadu; Tata Realty and Infrastructure Ltd, Mumbai, Maharashtra; The Assam Kaziranga University, Jorhat, Assam;

Registered Office

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T: 022 23530847
E: headoffice@nicmar.ac.in
W: www.nicmar.ac.in/

Location of R&D Units

- Pune, Maharashtra
- Hyderabad, Telangana
- Farmagudi, Goa
- Delhi (National Capital Region)

Recognition Status

File No.: 11/196/1990-TU-V
Initial Recognition: 1990
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 49
PGs & Graduates: 50

Research Areas

- Housing and area development
- Civic and social infrastructure
- Health, education, and welfare
- Urban development, satellite townships
- Cost-effective construction technologies
- Low-cost building materials and designs

Research Outcomes

- Papers published: : 239

Durocrete Construction Quality Rating Agency Pvt. Ltd, Pune, Maharashtra; Mushtifund Saunsta, Goa; Institute of Public Health & Hygiene, New Delhi

International

American Society of Civil Engineers, USA; ACORE Group, Dubai; AL-Moalem Institute, Manama, Kingdom of Bahrain; Caledonian College of Engineering, Muscat, Sultanate

of Oman; Microsoft Operations, Singapore

Societal Relevance

The following R&D outcomes are of national/societal significance:

The institute offers postgraduate-level training and executive development courses in specialized areas of construction and allied industries. 🔍



^ Design developed by the NID

NATIONAL INSTITUTE OF DESIGN

Brief Description

The National Institute of Design (NID) is internationally acclaimed as one of the foremost multidisciplinary institutions in the field of design education and research in the areas of industry, social, cultural, communication, etc, and related areas.

R&D Set-up

NID has well-equipped studios and workshops in its main campus in Ahmedabad, Gujarat; PG campus at Gandhinagar, Gujarat; and the R&D campus in Bengaluru, Karnataka.

Sources of income for R&D

- Donations
- Grant-in-aid
- International funding
- Project-related funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 6,826.07

FY 2015-16 = 6,878.94

FY 2016-17 = 7,450.26

R&D Achievements

Processes developed

- Design projects at the graduation and postgraduation level: The final outcomes of these projects in the form of innovative products/ applications are taken forward by the sponsoring industry/client. In a year, about 350 such projects are undertaken in various sectors of the industry and social development areas.

- Integrated Design Services (IDS): Client servicing is an integral part of NID's activity. Through IDS, the institute undertakes design consultancy projects and professionally delivers design solutions in various areas.

Products developed

- A fan designed by a student won the Best Design Award on the basis of practicality and aesthetics
- A multipurpose wearable security device
- Unique Footwear design; functioning as a sports shoe as well as sandal
- A comfortable and easy-to-carry furniture design, etc.

Commercialization potential of products/processes developed

The institute provides a platform for the students as registered products are showcased on the NDBI website for the commercial aspect.

Consultancy services rendered

Through IDS, NID undertakes design consultancy projects and professionally delivers design solutions in various areas.

Technical Collaborations

International

Ecole nationale supérieure des arts décoratifs (ENSAD), Paris, France; Konstfack University College of Art Craft & Design, Stockholm, Sweden; Politecnico di Milano, Milan, Italy; The Ontario College of Art & Design, Toronto, Canada; Hochschule, Hannover, Germany; Royal Melbourne

Registered Office

National Institute of Design,
Paldi, Ahmedabad 380 007,
Gujarat
T: 079-2662 9500, 2662 9600
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W: www.nid.edu

Location of R&D Units

- Bengaluru, Karnataka
- Ahmedabad, Gujarat

Recognition Status

File No. : 11/90/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 10
PGs & Graduates: 54

Research Areas

- Industrial design
- Communication design
- Textile and apparel design
- Lifestyle and accessory design
- IT-integrated design

Research Outcomes

- Papers published:
 - » National: 18
 - » International: 24
- IPRs held: 5
- Total products commercialized: 1


Institute of Technology (RMIT), Melbourne, Australia; The Glasgow School of Art, Glasgow, Scotland.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- 'HAPPY STREETS' Display of Creative Furniture designed by students of NID. Reusing the available scrap material, students of NID developed alternative furniture, toys, and lighting. A uniform tea cart which can occupy less space with storage and mobile was developed from scrap. Products from construction and demolition waste along with economical toilets for Swachh Bharat Abhiyan.
- NID, in collaboration with Gujarat Urban Development Company

Ltd, announced a competition for NID students to design the logo for 'Mahatma Gandhi Swachhta Mission'. NID, in collaboration with Royal Dutch Kusters Engineering, organized a 'value of money student design competition' which involved making creative products out of demonetized notes from the Reserve Bank of India.

- Participated in INNOPROM—the India–Russia Exhibition held at Ekaterinburg based on the theme 'Global Industrial Design' and 'Engineering supported by EEPC India & DIPP under the Make in India campaign.
- Czech Republic—Bruno Exhibition supported by CH & DIPP under the Make in India campaign. 



^ Polar remotely operable vehicle (PROVe)

NATIONAL INSTITUTE OF OCEAN TECHNOLOGY

Brief Description

The National Institute of Ocean Technology (NIOT) was established under the Ministry of Earth Sciences, Government of India, with the aim to develop reliable indigenous technology to solve the various engineering problems associated with the harvesting of non-living and living resources in the Indian Exclusive Economic Zone, which is about two-thirds of India's land area. The mission is to develop world-class technologies and their applications for sustainable utilization of ocean resources.

It is an autonomous society registered under the Ministry of Earth Science, Government of India.

R&D Set-up

The following research facilities are available in the institute that are used by individuals, industries, and academia:

- Hyberbaric and acoustic test facility
- Integration bay
- Test pond
- Data buoy programme facility
- Measurement laboratory
- Andaman & nicobar, science & technology centre of niot at port blair
- Research vessels for ocean research and coastal research – sagar nidhi, sagar manjusha, sagar purvi, sagar paschimi
- Sagar Sangamam Conference Centre

Sources of income for R&D

Government agencies

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 140.20

FY 2015-16 = 163.05

FY 2016-17 = 209.17

R&D Achievements

Products developed

- Autonomous ambient noise measurement system for acoustic field characterization in shallow waters
- Smart-sensor drifting buoy node with INSAT communication for meteorological and oceanographic applications
- High-sensitive broadband sonar receiver array with motion sensor for underwater-imaging applications
- Microalgal harvesting system
- Deep-water, worldclass-remotely operated vehicle
- Polar/shallow-water remotely operated vehicle
- Low-temperature thermal desalination (LTTD) for coastal power plants.

Technical Collaborations

National

Water and Stream Chemistry Lab of BARC Facilities, Kalpakkam

Registered Office

National Institute of Ocean Technology (Ministry of Earth Sciences, Govt. of India),
Velachery-Tambaram Main Road,
Pallikaranai, Chennai 600 100,
Tamil Nadu

T: 044 66783303

E: director@niot.res.in

W: www.niot.res.in

Recognition Status

File No.: 11/358/1998-TU-V

Initial Recognition: 1998

Valid Until: March 31, 2019

R&D Manpower

Doctorates: 38

PGs & Graduates: 133

Research Areas

- Ocean energy and fresh water
- Development of technologies for offshore structural components
- Development of manned and unmanned underwater vehicles
- Scientific studies and the development of technology for exploration
- Ocean science and technology for islands
- Ocean observation network
- Pre-investment activity for seafront facility
- Ocean sequestration techniques for carbon dioxide

Research Outcomes

- Papers published: 49
- IPRs held
 - » Patents filed: 11
 - » Patents awarded: 1

International

Experimental Design Bureau of Oceanological Engineering (EDBOE), Moscow, Russia; Woods Hole Oceanographic Institution, USA; Japan Agency for Marine-Earth Science and Technology, Japan; University of Edinburgh, UK

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The community-based sea cage culture was successfully initiated by the traditional fishermen of Olaikuda with the technical support of Earth System Sciences Organization NIOT.
- Average culture of *Scarus ghobban* cultured in Olaikuda, Rameswaram with specific growth rate of 0.96 g/day was achieved in the experimental cage. 🔍



▲ NanoARM gateway for IoT data acquisition and control

NATIONAL INSTITUTE OF SCIENCE AND TECHNOLOGY

Brief Description

The National Institute of Science and Technology (NIST) is an educational institute aimed at nurturing quality engineers and managers for the growth of Indian industries to develop entrepreneurs and to pursue innovative research on the emerging technologies. The NIST focus the research on nano-tech, cloud computing, VLSI (Very-large-scale integration), renewable energy, minerals, data science, etc.

It is registered as a trust under the S M Charitable Educational Trust

R&D Set-up

The following centers of excellence, which are available in this institute are providing the research facilities and infrastructure for use in R&D by industries and academicians:

- VLSI/ASIC design
- Embedded system
- Hpc and cloud computing
- COE in data science
- COE renewable energy

Sources of income for R&D

- Government funding
- Self-funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D

FY 2014-15 = 124.00

FY 2015-16 = 57.90

FY 2016-17 = 123.00

R&D Achievements

Research projects

- High-electron Mobility Transistor (HEMT) for high-frequency communication circuit
- Design of multiple input conversion system for grid-connected hybrid-generation systems
- Solar concentrator-based community cooking system
- Fabrication, characterization, and evaluation of design parameter variability of polymer nanocomposite sandwich beams with gradient cell-size honeycomb core for obtaining graded beam properties

Commercialization potential of products/processes developed

NIST has developed online information system and renewal energy products which are about to be commercialized for societal benefits.

Technical Collaborations

National

Indian Institute of Technology (IIT) Bombay, Maharashtra; IIT Kharagpur, West Bengal; IIT Madras, Tamil Nadu; IIT Bhubaneswar, Odisha; IIT Delhi, New Delhi; University of Hyderabad, Hyderabad, Telangana; National Environmental Engineering and Research Institute, Nagpur, Maharashtra

International

Institute of Atomic and Molecular Sciences, Taipei, Taiwan; Michigan

Registered Office

National Institute of Science and Technology, Palur Hills, Berhampur 761 008, Odisha
T: 6802492421

E: info@nist.edu

W: www.nist.edu

Recognition Status

File No.: 11/538/2011-TU-V

Initial Recognition: 2011

Valid Until: March 31, 2019

R&D Manpower

Doctorates: 65

PGs & Graduates: 115

Research Areas

- Very-large-scale integration
- Nanotechnology
- Cloud computing
- Low-Power FPGA design
- Controller design of various dynamic systems
- Renewable energy
- Material characterization

Research Outcomes

- Papers published:
 - » National: 6
 - » International: 87
- IPRs held
 - » Patents filed: 3


State University, USA; New Jersey Institute of Technology, USA; Stanford University, USA; University of California, USA.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The online microelectronics and VLSI engineering lab has been developed in collaboration with Indian Institute of Technology, Kharagpur, under the Laboratory-on-Demand—an initiative of

the Ministry of Human Resource Development, Government of India, under the National Mission on Education through Information and Communication Technology.

- The institute has been selected by Technology Information, Forecasting and Assessment Council, an autonomous body under the Department of Science and Technology, to set up a Centre of Excellence in 3G/4G Communication Technologies. 



▲ Modular compact rheometer system

NATIONAL INSTITUTE OF TECHNOLOGY SURATHKAL

Brief Description

The National Institute of Technology Karnataka, Surathkal is a government institute of national importance under the Ministry of Human Resource Development, Government of India. The institute aims to impart quality education and achieve excellence in research. Research is conducted in the areas of mechanics, hydraulics, engineering technologies, computational science, electronics, etc.

R&D Set-up

The institute is well equipped with all the important equipment and laboratories in the departments for R&D that are regularly used by industries and academicians. A few of them are listed below:

- Triaxial apparatus
- Marine soil investigation
- Consolidation apparatus
- Direct shear apparatus
- Ultrasonic testing kit
- Pen type pH metre
- TDS metre
- Orbital shaker scigenics
- Autoclave (vertical)
- Gel electrophoresis and several others

Sources of income for R&D

- Government agencies
- Self funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 402.11

FY 2015-16 = 852.65

FY 2016-17 = 686.42

R&D Achievements

Products developed

- Systems and methods for estimating distances using multi-resolution functions
- Annotation on media sheet indicating functionality to be performed in relation to the image on media sheet

Processes developed

- Routine measurement of samples on commercial X-ray diffractometer
- Developed an extraction process making use of reverse micelle extraction and rotating disc contactor to extract lactoferrin from whey in continuous mode
- Recovery of value-added proteins from whey using aqueous two-phase extraction. These proteins are of importance in the context of the medicinal value for various applications
- Novel formulation of probiotics has been developed which provide enhanced therapeutic value

Technical Collaborations

National

Networkers Home New Delhi; Mangalore Refinery and Petrochemicals Ltd, Karnataka; AMD India Pvt. Ltd, Bengaluru, Karnataka; Advanced Polymer Design and Development Research Laboratory (R&D Unit of CIPET) Bengaluru, Karnataka; iBuild Innovations India Pvt. Ltd, Telangana; IBM India Pvt. Ltd Bengaluru, Karnataka

Registered Office

National Institute of Technology
Karnataka, Surathkal,
PO Srinivasnagar,
Mangalore 575 025,
Karnataka
T: 0824 2474000
E: math@nitk.ac.in
W: www.nitk.ac.in

Recognition Status

File No.: 11/147/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 102

Research Areas

- Mechanics
- Hydrolics
- Engineering technology
- Computational science

Research Outcomes

- Papers published:
 - » National: 65
 - » International: 1325
- IPRs held
 - » Patents filed: 32
 - » Patents awarded: 2

International

Infineon Technologies Asia Pacific Pte Ltd, Singapore; Korea Institute of Science and Technology, Korea; Wolfram Research, Inc. USA; University of California Berkeley Mechanical Engineering (Combustion Group), California, USA; Instituto Superior Tecnico, Universidade de Lisboa, Portugal

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Innovation in transformer fault diagnosis: New, non-iterative

method is formulated for the first time which will be useful in fault diagnosis using a combined acoustic and electric method.

- Innovation in computing e-fields of a EHV substation: A simpler method to estimate the e-fields in EHV substation is demonstrated with a practical case involving occupation exposure limit.
- Information security education and awareness programmes are organized that aim at the generation of quality human resource in the area of information security. 🔍



▲ 9Nos. 200kW & 1 Nos. of 600 kW constant speed 2 Nos of 2000 kW variable speed (DFIG & Syn.Gen) wind turbines

Registered Office

National Institute of Wind Energy
Under the Ministry of New and Renewable Energy, Government of India
Velachery - Tambaram
Main Road, Pallikaranai,
Chennai 600 100
T: +91 44 22463981
E: dg.niwe@gov.in
W: niwe.res.in

Recognition Status

File No.: 11/378/2000-TU-V
Initial Recognition: 2000
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 3
PGs & Graduates: 33

NATIONAL INSTITUTE OF WIND ENERGY

Brief Description

National Institute of Wind Energy (NIWE), an autonomous R&D institution under the Ministry of New and Renewable Energy (MNRE), Government of India, serves as a technical focal point for wind power development. The NIWE is the only research institute in all Asia-Pacific countries to promote and accelerate the pace of utilization of wind energy to enhance growth of wind turbine installation.

R&D Set-up

Research facilities and infrastructure available in the organization are being used by the researchers, academia, industry, and individuals. The following are the major equipment that exist in the organization:

- 200 kW Micon
- 600 kW Suzlon
- 2000 kW Kenersys
- 2000 kW INOX
- 75 kW SPV Hybrid with 200 kW micon wind turbine
- Small wind (HAAWT and VAWT Type), SPV system, and battery storage

Sources of income for R&D

Grant-in-aid

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 2,361.2

FY 2015-16 = 1,460.3

FY 2016-17 = 1,913.2

R&D Achievements

Products developed

- Setting up of the world's largest SRRRA station network for measuring real-time, high-resolution data on solar and weather parameters.
- Setting up of four advanced measurement stations (AMS) and inclusion in the BSRN global network for climate change studies
- Availability of bankable and investor grade solar and meteorological parameters for the benefit of the solar industry, policy makers, and R&D activities.
- Indian Solar Radiation Atlas— the availability of solar parameters anywhere in the country.
- Setting up of three calibration laboratories.

Processes developed

- The testing and forecasting unit has developed the following process:
 - » To optimize the performance of the wind turbines using nacelle-mounted LIDAR
 - » To simplify the data-acquisition capability through embedded technology
 - » The NIWE is in the process on establishing a Centre for Excellence in Wind & Solar Power Forecasting. As a part of the Centre for Excellence, the NIWE has developed

Research Areas

- Wind blade
- Generators and grid integration of wind turbines
- Hybrid systems
- Wind resource assessment
- Condition monitoring
- Energy storage
- Renewable forecasting
- Wind turbine noise measurement
- Solar radiation
- Aerosol data collection
- Virtual power plant concepts

Research Outcomes

- Papers published: 12

an Indigenous wind power forecasting model version 1.0.

- QC procedures and protocols based on the BSRN standards
- Generation of automatic reports on solar and meteorological parameters for all 121 SRRA stations.

Services for Commercialization

In partnership with M/s.Vortex, Spain, the NIWE has commercialized wind power-forecasting services. Besides, following developed products are also commercialized and the NIWE has earned revenue

- Solar radiation resource assessment (₹3,34,75,000)
- Calibration of solar sensors (₹7,35,000)
- Wind power forecasting for the entire state of Tamil Nadu (₹2,44,50,000)
- Wind Resource Assessment (₹25,55,81,357)

Technical Collaborations

National

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), New Delhi; Gujarat Energy Research and Management Institute (GERMI), Gandhi Nagar; Prathyusha Engineering College, Thiruvallur; S.A. Engineering College, Chennai; St.Xaviers Catholic College of Engineering, Nagarcoil; Saveetha Engineering College, Sriperumbudur; National Institute of Technology (NIT), Goa; Indian Institute of Social Welfare and Business Management, Kolkata

International

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Germany.

Successful completion of an Inter-laboratory comparison with the NREL, USA, in power curve measurements as per the requirements of IEC 61400-12-1.

Successful completion of the Indo-Spanish project on the Development of the India-specific forecasting model.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Wind measurement data and wind atlas SRRA data and solar radiation atlas.
- Measurement of dedicated wind and solar radiation resource assessment for the renewable society on an individual mode or as academia and stakeholders for the development of wind and solar power plant, thereby the development of a region which directly benefits to the local society.
- Wind power forecasting for the entire state of Tamil Nadu. The forecasting service is helping the Indian grid managers to handle the variable generation. The entire wind industry benefiting benefit due to more evacuation of green energy and the project is helping in reducing of CO₂ emissions. 🔍



Research scholars working in the department of chemical sciences

NATIONAL TEA RESEARCH FOUNDATION

Brief Description

The National Tea Research Foundation (NTRF), jointly set up by tea board, Tea Industry, and National Bank for Agriculture and Rural Development, provide funds for innovative research on all aspects of tea throughout the country in different renowned research institutes and universities.

The foundation promotes, develops, and encourages scientific research work connected with cultivation, production, processing, machinery, marketing, packaging of tea and allied products. It is a non-governmental organization registered under the societies Registration Act.

R&D Set-up

The research facilities and infrastructure are being undertaken for the execution of the study with the partner institutes, universities, medical colleges, etc. The R&D equipment include:

- PCR with gel documentation, cold micro-centrifuge, non-expendable equipment
- Burkard air sampler for pollen, impulse oscillometer, burkard air sampler for fungal spores, optical microscope with camera attachment
- Workstation with molecular modelling and visualization softwares
- Micro pipettes, non-expendable equipment, Biopac MP-45 two channel
- Cold centrifuge, traps, tullgren and berlese funnel

- Operant conditioning apparatus, carbon dioxide incubator, and many more.

Sources of income for R&D

Government agencies

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 124.09

FY 2015-16 = 191.56

FY 2016-17 = 262.15

R&D Achievements

Products developed

- Indigenous herbal products developed for pest management
- Application of PGPR bio-inoculants in tea garden for higher productivity and for maintaining soil health
- Developed recombinant garlic leaf lectin which is found to have pesticide and fungicide function against tea pest and pathogens

Processes developed

- Developed a suitable technology for the preparation of eco-friendly municipal solid waste compost from locally available municipal solid waste

Technical Collaborations

National

Calcutta University, West Bengal; Darjeeling Tea Research & Development Centre, West Bengal; Jadavpur University, West Bengal; ICAR-National Research Centre on Plant Biotechnology, Delhi; Tea Board of India, West Bengal

Registered Office

National Tea Research Foundation (NTRF), The Secretary, National Tea Research Foundation, C/o Tea Board, 14, B. T. M Sarani, 9th Floor, Kolkata 700 001, West Bengal
T: 33-2234-1687
E: ntrf.india@gmail.com
W: www.ntrfindia.org/

Recognition Status

File No.: 11/337/1997-TU-V
Initial Recognition: 1997
Valid Until: March 31, 2017

R&D Manpower

Doctorates: 32
PGs & Graduates: 26

Research Areas


- Crop improvement
- Natural resource management
- Plant protection
- Quality and post-harvesting technology
- Tea and health
- Socio-economic aspects

Research Outcomes

- Papers published: 173
- IPRs held
 - » Patents filed: 1

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Ergonomic assessment of working postures assumed by workers engaged in tea cultivation
- Occupational mobility of the plantation sector labours
- A productive improvement-linked study on women tea pluckers of Eastern India with special consideration to their working comfort, welfare, and health status. 



^ Mobile-operated alert beacon alerting the local people about the presence of elephants in an estate colony in Valaparai, Tamil Nadu

NATURE CONSERVATION FOUNDATION

Brief Description

Nature Conservation Foundation (NCF) is a non-governmental organization. Research at the NCF contributes to the knowledge and conservation of India's unique wildlife heritage with innovative research and imaginative solutions. The NCF works in a range of wildlife habitats, from coral reefs and tropical rainforests to the high mountains of the Himalaya. The NCF research also addresses human Use of resources resource-use and its impacts on wild species and ecosystems. It designs conservation strategies and are implemented in collaboration with local communities. While promoting wildlife conservation, the NCF programmes also strive to safeguard livelihood and developmental options for local communities.

R&D Set-up

Most of the research work undertaken by the NCF is field - based in remote locations. In places where long-term research projects are based, laboratory research, and other subsequent facilities are made available either directly or through other partners. The research facilities are used by the individual researchers and academia.

Sources of income for R&D

- Government
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 421.00

FY 2015-16 = 477.00

FY 2016-17 = 678.00

R&D Achievements

Some of the major research outcomes in the NCF are enumerated below:

- Research on the population dynamics of predators and prey and its implications for human-carnivore interactions found that the snow leopard density was a positive linear function of the density of wild ungulates—the preferred prey— and showed no discernible relationship with livestock density.
- Human-induced rapid environmental change and its impacts on coral reefs and seagrasses in the Lakshadweep research have found that reefs respond in at least three different ways to catastrophic events, depending on the species composition and exposure to monsoon waves.

Technical Collaborations

National

National Institute of Advanced Studies, Bengaluru; Indian Institute of Science, Bengaluru; National Centre for Biological Sciences, Bengaluru; Laboratory for the Conservation

Registered Office

Nature Conservation Foundation,
3076/5 4th Cross, Gokulam Park,
Mysore 570002, Karnataka
T : 0821 2515601
W : ncf-india.org

Recognition Status

File No.: 11/585/2013-TU-V
Initial Recognition: 2013
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 20
PGs & Graduates: 35

Research Areas

- Wildlife science, conservation biology, human ecology
- Conservation education and citizen science
- Ecological restoration, human-wildlife coexistence, conservation policy

Research Outcomes

- Papers published: : 78

of Endangered Species Centre for Cellular and Molecular Biology, Hyderabad; Ashoka Trust for Research in Ecology and the Environment, Bengaluru; Azim Premji University, Bengaluru; Centre for Wildlife Studies, Bengaluru; WIPRO Ltd, Bengaluru; ICICI Prudential Life Insurance Co Ltd; Wildlife Conservation Society

International

International Snow Leopard Trust, USA; Center of Advanced Studies of Blanes, Spain; International Crane Foundation, USA; Mediterranean Institute for Advanced Studies, Spain; University of Aberdeen, UK; IUCN Species Survival Commission

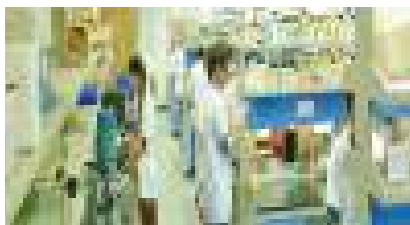
Societal Relevance

The following R&D outcomes are of national/societal significance:

- The NCF has been jointly responsible for the implementation of the management plan of the upper Spiti landscape under the Project Snow Leopard with the Ministry of Environment, Forest and Climate Change. The implementation

directly affected 25 villages in the Lahaul Spiti District of Himachal Pradesh.

- Hornbill nest monitoring has resulted in the protection and survival of 60 hornbill chicks. There has been increase support and awareness for hornbill conservation in the Pakke region in Arunachal Pradesh. From three villages, there is now have the support of 14 villages in hornbill nest monitoring work.
- In Season Watch, children from roughly 300 schools are engaged in monitoring the seasonality of flowering, fruiting, and leafing of trees, and how the seasonal changes are being altered through the years. In Bird Count India, some 5,000 people have been reached who uploaded their observations of birds onto the eBird portal.
- Partnered with the Tamil Nadu Forest Department to implement an ecological restoration of the degraded areas in Anamalai Tiger Reserve landscape, including the removal and monitoring of invasive alien species. 🔍



^ Research laboratory

NIRMA UNIVERSITY

Brief Description

The NIRMA University in Ahmedabad, Gujarat, was established in 2003. NIRMA University has strong research divisions which focus on innovative and applied research on engineering and technology, pharmaceutical sciences, health and basic sciences, architecture, planning and design, etc. Further, the university also conducts research in management, commerce, and law.

R&D Set-up

The research facilities and infrastructure available in the university are used by industries, students, researchers, and the academia.

While research facilities are attached to various faculties in the university, some of the major equipment available for use are as follows:

- IRNSS receiver
- Automatic gas fire furnace
- Lab scale atmospheric gas-solid catalytic reactor
- Rockwell cum brinell hardness tester
- RCPT apparatus
- Electronic data acquisition system
- Profoscope (rebar locator)
- Resistivitymeter (resipode)
- Micro controller-based compression testing machine with auto pece controller
- 16 Channel DAQ
- High-end fpga kit for software defined radio consist of (a)zynq software-defined radio – II eval

kit (B) FPGA mezzanine card for wireless communications

Sources of income for R&D

Government grant

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 107.33

FY 2015-16 = 154.42

FY 2016-17 = 280.25

R&D Achievements

Products developed

- Developed copolymer-based superdisintegrant
- Development and characterization of mouth freshener using natural agents

Processes developed

- Piezoelectric powder (PZT) based passive damping surface coating
- Dynamic testing of structures through shock table
- Radiometric calibration of RISAT-1 images
- Image quality assessment of RISAT-1 images
- To develop low cost mapping methodology
- Identification of road material and distress using hyperspectral data
- Evaluation of mechanical and durability properties of fly ash and rice husk base geopolymer concrete

Registered Office

Nirma University
Sarkhej–Gandhinagar Highway,
Ahmedabad 382 481
Gujarat
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W: www.nirmauni.ac.in

Recognition Status

File No.: 11/621/2013-TU-V
Initial Recognition: 2013
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 163
PGs & Graduates: 197

Research Areas

- VLSI design and technology
- Energy, environment, and sustainability
- Data sciences
- Robotics and automation
- Design and synthesis of new chemical entities
- Targeted drug delivery systems
- Herbal drugs and nutraceuticals
- Therapeutic targets for the treatment of cancer
- Infectious diseases and cancer
- Metabolic disorders
- Agriculture and environmental biotechnology
- Urban design and regional planning

Research Outcomes

- Papers published:
 - » National: 35
 - » International: 192
- IPRs held
 - » Patent filed: 6
 - » Patent awarded: 16

Technical Collaborations

National


Central Building Research Institute (CBRI), Roorkee; Mitsubishi Electrical India Pvt. Ltd; Dr. Fixit Institute of Structural Protection and Rehabilitation, Eco Carbon Pvt. Ltd (ECPL); Space Applications Centre-Indian Space Research Organization (SAC-ISRO); Infosys Ltd among others

International

Beiersdorf, Germany; HOF University, Germany; Charter Institute of Arbitrators, UK; Wyoming University, USA; INI Design Studio; Escola Da Cidade – Faculdade De Arquitetura, Sao Paulo, Brazil

Societal Relevance

The following R&D outcomes are of national/societal significance:

- A mobile app was developed by our and faculty members for the 'Akshaypatra Foundation' for food quality management.
- Energy conservation management practices were formed and implemented for the food processing unit at the Akshay Patra Foundation, Ahmedabad, to reduce the energy consumption and effective utilization of instruments.
- Awareness programme on human rights, especially for the students of Institute of Pharmacy. 



^ R&D activities in the university

NITTE UNIVERSITY

Brief Description

A B Shetty Memorial Institute of Dental Sciences, later renamed as NITTE, is a non-governmental organization registered as a deemed university under the UGC. The university was established in 2008. The NITTE is a centre of excellence. Its main thrust areas for research are rapid diagnostics and novel biomarkers, microbiome and clinical disorder, neurosciences, herbal medicines, medicinal chemistry, drug design and discovery, infectious biology, pathogenesis, antimicrobial resistance, biocontrol, toxicology, biotechnology, tissue culture and biosensors, and stem cell research.

R&D Set-up

The research facilities and infrastructure available in the organizations and are used by individuals and academicians as have been listed below:

- Central Research Lab KSHEMA is equipped to study clinical biochemistry, cytogenetics, radioprotection, fat metabolism, immunology, microbiology, and so on.
- Center for Advanced Neurological Research to study genetics, multiple sclerosis, and biomarkers.
- Leela Narayan Shetty Centre for Neurosciences and Research for diagnosis and treatment of neurological disorders, nerve conduction, neuro rehabilitation, and so on.

- Leela Narayan Shetty Centre for Cancer Research facility for radiotherapy planning and other clinical research.
- Center for Animal Research and Experimentation laboratory to provide advanced animal care facility; also, to study pharmacology, toxicology, and quality control tests.

Sources of income for R&D

Grant-in-aid

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 382.55

FY 2015-16 = 1073.86

FY 2016-17 = 186.18

R&D Achievements

Products developed

- Pomegranate herbal mouthwash for managing radiation-induced oral mucositis in patients with head and neck cancer.
- Moldsil PW (Silicone compound) for whole-organ plastination developed and customized from crude silicone.
- Consortium of bacteriophages to control vibriosis by *Vibrio parahaemolyticus* used in biocontrol in aquaculture farms.
- Spontaneous phytoremediation of soil contaminated with chromium using *Tectaria coadunata*.

Registered Office

NITTE, University Enclave,
Medical Sciences Complex,
Deralakatte, Mangalore 575 018,
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W: www.nitte.edu.in

Recognition Status

File No.: 11/548/2011-TU-V
Initial Recognition: 2011
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 53

Research Areas

- Rapid diagnostics and novel biomarkers
- Microbiome
- Neurosciences
- Herbal medicines
- Drug design and discovery
- Toxicology and biotechnology
- Stem cell research

Research Outcomes

- Papers published:
 - » National: 668
 - » International: 250

Technical Collaborations

National

Central Plantation Crops Research Institute; Board of Research in Nuclear Sciences.

International

Penn State University, USA; Wake Forest University, USA; University of Minnesota, USA; University of Miyazaki, Japan; National University of Singapore; University of Santo Thomas, The Philippines; Catholic University, South Korea; Sabaragamuwa University, Sri Lanka; Christ Church University, UK; Plymouth University, UK; Ghent University, Belgium; University Paul Sabatier, France; University of Gothenburg, Sweden; Goethe University, Germany; Cleft Children International, Switzerland; University of Wollongong, Australia.

Societal Relevance

The following R&D outcomes are of national/societal significance:

Some of the major technology and products were developed as an outcome of NITTE University research are of high societal value in terms of advanced health care and cost-effective use of technology-based treatments.

- The elbow guard has been developed to prevent thumb/finger sucking habit in children is an extra oral appliance which is used in normal and disabled children. This product has shown

success amongst all children, including the mentally challenged by reducing the thumb/finger sucking habits.

- Oroxyllumindicum stem bark extract is a novel anti-cancer agent for the treatment of oral squamous cell carcinoma. It is a cost-effective herbal product used in the treatment of oral cancers.
- Moldsil PW (Silicone compound) for whole organ plastination technology is developed to meet the requirement of whole organ plastination. It has shown satisfactory results and is cost effective as compared to other products available commercially.
- The techno-based product 'Consortium of bacteriophages to control Vibriosis by *Vibrio parahaemolyticus*' is used in the biocontrol of Vibriosis in aquaculture farms and in the storage of seafood. This product would provide a safe economical biocontrol measure in commercial use.
- 'Effective removal of cadmium from contaminated water sources using non-living, microparticulate biomass of a fern, *Tectariacoelocladia*' is an eco-friendly and economic process used for the removal of cadmium from heavy-metal contaminated water. 🔍



^ EV Motors Design, Assembly & Testing

NON FERROUS MATERIALS TECHNOLOGY DEVELOPMENT CENTRE

Brief Description

The Non Ferrous Materials Technology Development Centre (NFTDC) is an autonomous and self-financing R&D institution under the aegis of the Ministry of Mines, Government of India, dedicated to the development of advanced materials and Innovative processes and engineering design, analysis, and electronics, instrumentation and control leading to component and systems development and integration.

R&D Set-up

The NFTDC research facilities and infrastructure are as follows:

- X-ray diffractometer: mineral and phase analysis of raw materials, clinker, cement, etc.
- X-ray fluorescence spectrometer: elemental analysis of raw materials, clinker, cement, etc.
- Scanning electron microscope: microstructural studies and elemental mapping of clinker, hydrated cement, concrete, etc.
- Optical microscopy: microstructural investigations of rocks, raw materials, aggregates, clinker, etc.
- Particle size analyzer: particle size distribution of cement and other powder samples
- Inductive coupled plasma spectrometer (ICP-OES): determination of heavy and

toxic elements in materials and industrial wastes and by-products

- C-H-N-S Analyser: Ultimate analysis of various types of fuels
- Fourier transform ir spectrometer: analysis of materials and study of chemical reaction and many more.

Sources of income for R&D

- Grant-in-aid
- Project funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 1,921.39

FY 2015-16 = 2,548.90

FY 2016-17 = 2,903.09

R&D Achievements

Products developed

- End-to-end process technology for the manufacturing of electric vehicle motors & controllers and establishment of the centre of excellence for EV electric drives
- Advanced induction motors based on cu die cast rotors at 0.8 To 2 kw for e2w; 3.0 - 4.5 Kw for e3w, 4 kw to 12.5 Kw for e4 w; 40 kw, 67 kw and 120 kw for e-bus; design and development of next generation syn-rel motors
- Pilot plant: rare earth metal extraction; 5tpy: samarium (TRL7)
- Pilot plant: purification of rare earth oxides based on IREL raw materials
- (TRL 7) and many more.

Registered Office

Non Ferrous Materials Technology Development Centre (NFTDC),
PO Kanchanbagh,
Hyderabad 500 058, Telangana
T: 040-2434 2300
E: finance@nftdc.res.in
W: www.nftdc.res.in

Recognition Status

File No.: 11/198/2007-TU-V
Initial Recognition: 2007
Valid Until: March 31, 2018

R&D Manpower

Doctorates:11
PGs & Graduates:105

Research Areas

- Automotive
- Aeronautical and Aerospace
- Biomedical and health care
- Energy systems
- Manufacturing sector
- Metallurgical and process industrials

Research Outcomes

- IPRs held
 - » Patents filed: 1

Technical Collaborations

National

Indian Institutes of Technology (IITs), Indian Space Research Organisation (ISRO), Defence Research and Development Organisation (DRDO), and Navratna companies, such as NALCO, BHEL as well as original equipment manufacturers (OEMs), such as Tata Motors

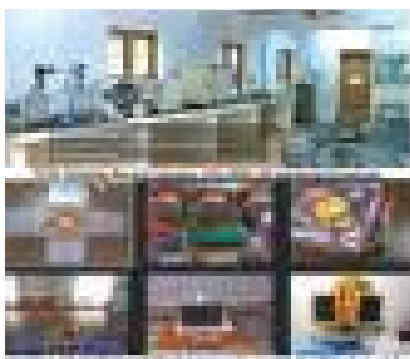
International

University of Cambridge; ITER; NFTDC is partner in Indo-US, Indo-UK and Indo-EU consortiums

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The NFTDC supports several national programmes of ISRO and is an import substitute for many of the R&D labs in India.
- Towards Skill India, the NFTDC is in collaboration with Deshya Technologies Pvt. Ltd
- The NFTDC is offering various online courses for the electrical and electronics streams. It also provides practical laboratory training for these students. 🔍



▲ Nanotechnology research laboratory of this SIRO with sophisticated instruments (above)
Two views of the satellite named NIUSAT designed and developed by this SIRO (below)

Registered Office

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T: +(91) 4651250266
E: info@niceindia.com
W: www.niuniv.com

Recognition Status

File No.: 11/457/2006-TU-V
Initial Recognition: 2006
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 118
PGs & Graduates: 160

NOORUL ISLAM EDUCATIONAL TRUST

Brief Description

Noorul Islam Centre for Higher Education (NICHE), formerly known as Noorul Islam College of Engineering, is a private co-educational institution in Tamil Nadu, India. The research centre for biological sciences of Noorul Islam University was started for promoting R&D programmes in the newly emerging and challenging areas of biological sciences and its interdisciplinary subjects. The other research centre is the Center for Advanced Materials Science and Technology (CAMST) has undertaken research on fundamental materials to applied material and includes the development, evaluation, application, and understanding of these, specifically polymers, biomaterials, nanomaterials, electronic materials, composites, etc. It is now run by the NICHE Society.

R&D Set-up

The following research facilities/ infrastructure are available with the institute:

- CNC machine
- Universal testing machine
- Micro hardness tester and wear testing machine
- Hydraulic press
- 3D printed technology
- Computational fluid dynamics research facilities
- Electronic balance
- pH metre

- Muffle furnace
- Constant temperature bath
- Distilled water plant
- Magnetic stirrers
- Electrochemical analyzer CHI 604
- UV-visible spectrophotometer systronics
- FT IR affinity-1 shimadzu
- Gel documentation system Genei Merck (Readington, NJ, USA)
- Rotovap Superfit (Superfit Continental Pvt. Ltd, Mumbai, Maharashtra)
- Incubator Technico, etc.

Sources of income for R&D

- Revenue from institution
- Project grants from the Government of India

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 115.04

FY 2015-16 = 117.99

FY 2016-17 = 64.53

R&D Achievements

Products developed

The following five innovation, already patented, are to be commercialized

- Artificial vision implant device avid
- Sun tracker device (STD)
- A process, system, and configuration for the desalination of sea water
- Smart food feeder for stroke/ coma/elderly bedridden patients
- Hand finger operated system

Research Areas

- Advanced material science and technology
- Networking
- Power and energy
- Communication systems
- Advanced computing
- Biological sciences
- Satellite technology
- Nanotechnology
- Advanced manufacturing technology
- Graph theory

Research Outcomes

- Papers published:
 - » National: 45
 - » International: 2
- IPRs held
 - » Patents filed: 16
 - » Patents awarded: 4
 - » Copyright: 753

for the sound production of characters in languages useful for speed

New services developed

- The two services, namely, material testing and sample characterization, developed by civil engineering and nanotechnology departments, respectively, are ready to be commercialized

Technical Collaborations

National

Nihongo Sochi, Pune; IBM India (P) Ltd, Bengaluru; Infosys Technologies Ltd, Bengaluru; Connectivity of R&D outcomes with National/

Societal missions; ICT Academy of Tamil Nadu; AISER Workforce Development Company, Chennai; Technical Development & Manufacturing Company, Trivandrum; BulheadAerodesign, Cochin; i-Nurture Education Solution Pvt. Ltd, Bengaluru; APM Wind Energy Plantation Pvt. Ltd, Thirunelveli; Yokogawa India Ltd, Bengaluru.

International

Liverpool John Moores University, England; Providence University, Taiwan; UniversitiTeknologi MARA, Malaysia; University of Medicine and Dentistry, New Jersey; Doctors Academy, UK; Indo-European Centre, Vistula University, Warsaw, Poland. 🔍



↗ Electronic drape metre

NORTHERN INDIA TEXTILE RESEARCH ASSOCIATION

Brief Description

Northern India Textile Research Association (NITRA) was jointly set up by the textile industry and Ministry of Textiles, Government of India to undertake research projects in textile product development, machine design, instrument development, and process development. NITRA promotes and fosters scientific research studies for the extension of knowledge related to or connected with textile. NITRA is registered under the Societies Registration Act, 1860.

R&D Set-up

The research facilities available in the organization are as follows:

- Plant machinery comprise double-roller ginning machine, carding machine, draw frame, speed frame, compact spinning ring frame, parallel winding machine, rotor spinning machine, automatic power loom, circular knitting machine-inter lock, and several others
- Research laboratories include physical quality evaluation laboratory, chemical quality evaluation laboratory, heat and flame testing laboratory, polymer and technical textile laboratory, environment laboratory, and eco laboratory.
- Testing facilities for garments protective textiles, automotive textiles, etc.

Sources of income for R&D

- Grant-in-aid
- Donations

- Foreign contribution
- Testing
- Consultancy and training

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 619.55

FY 2015-16 = 735.46

FY 2016-17 = 921.31

R&D Achievements

Products developed

- Development of FR-coated blackout fabric
- Development of stretchable knitted fabric
- Development of fire-retardant multi-layered-self-stitched fabric
- Designing a compressed air monitoring system to optimize energy consumption in a textile mill
- Development of specialty embroidery yarn for application in stretchable fabrics, such as knitted fabrics
- Development of a suitable work-wear for workers of oil and gas industry and many more

Processes developed

- Comparing comfort properties of hollow polyester and polyester-blended fabrics for sportswear
- Comparing the dyeing behaviour of hollow polyester and polyester yarns and their blends
- Study of dyeing behaviour of various inherent FR fibres

Registered Office

Northern India Textile Research Association, Sector 23,
Raj Nagar, Ghaziabad 201 002
Uttar Pradesh
T: 0120-2786434
E: mail@nitratextile.org
W: www.nitratextile.org/

Recognition Status

File No.: 11/70/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 4
PGs & Graduates: 31

Research Areas

- Fibre
- Spinning
- Weaving
- Knitting
- Garment manufacturing technologies
- Textile effluents treatment

Research Outcomes

- Papers published: 18
- IPRs held
 - » Patents filed: 5

- Creating FR properties using locally available chemicals in cotton fabrics
- To explore the possibility and application of corn husk in textiles and many more

Instruments developed

- Compressed air monitoring system to optimize the energy consumption in a textile mill
- Electronic drape metre based on the image analysis technique
- Smoothness tester for textile sheeting material

Commercialization potential of products/processes/developed

NITRA has commercialized the below mentioned technologies:

- M/s Dinu Technologies, Coimbatore for NITRA Electronic Drape Meter: Revenue earned ₹175,000
- M/s GD Industries, Kolkata for the transfer of technology to produce a seamless low-cost jute carry bags: revenue earned ₹500,000.
- Textile Sector Skill Council, New Delhi for the Technology transfer of fabric defect analysis: revenue earned ₹250,000.

Technical Collaborations

National

Indian Institute of Technology Delhi, New Delhi; National Institute of

Fashion Technology, Delhi; University of Delhi; Ordnance Factories Institute of Learning, Uttar Pradesh; Anna University, Tamil Nadu; Uttar Pradesh Textile Technical Institute, Uttar Pradesh; Govind Ballabh Pant Agricultural University, Pantnagar, Uttarakhand

International

Bolton University, UK; Manchester Metropolitan University, UK; M/s West Yorkshire Materials Testing Services, UK

Societal Relevance

The following R&D outcomes are of national/societal significance:

- NITRA Electronic Drape Meter is a digital and indigenous equipment for evaluating the drape of a fabric, and has a direct relevance to Digital India and Make in India.
- Technology to produce seamless, low-cost jute carry bags for the weavers community the provides value-added benefits to the community
- Technology transfer of Fabric defect analysis is used to train the weavers working in unorganized and decentralized sector. Through this, textile and apparel industries will have a better system for analysis of fabric defects. 🔍



^ R&D activities in the organisation

PANDIT DEENDAYAL PETROLEUM UNIVERSITY

Brief Description

Pandit Deendayal Petroleum University (PDPU) has been established by Gujarat Energy Research & Management Institute as a private university through the State Act enacted on April 4, 2007. The university offers programmes to address the need for trained human resources in the domains of science, technology, management, and humanities. The office of research and sponsored programmes offers support for internally funded grants, pre-award and post-award support for externally funded grants, and offer education and support information on grant compliance and the responsible conduct of research.

R&D Set-up

The PDPU campus is spread over an area measuring 30,500 square metres in Raisan, Gandhinagar. The university has laboratory facilities for various disciplines. These facilities are available for project investigators and research associates to carry out research activities in the campus.

The following are some of the equipment/facilities used in research:

- Optical pyrometer
- CO₂ laser system
- Chemical laboratory equipment
- Chromatograph and mass spectrometer
- System for sputtering application
- Ranging road with chain and tape and digital planimeter
- Triaxial test apparatus (new)
- Uniphos envirotrack
- Electronics digital balance with PH metre and conductivity metre etc.

Sources of income for R&D

Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 2,078.11

FY 2015-16 = 3,98.61

R&D Achievements

Products developed

- Low-concentration photovoltaic system developed under the GEDA-funded project
- Economic construction material— composite concrete using hyposludge and copper slag

Processes developed

- ATIG welding with filler wire for 304LN
- Narrog gap—metal cored arc welding
- Development of friction stir welding technology of 6061 Al alloy—1 mm, 3 mm, 6.3 mm, 13 mm thick plates

Registered Office

Pandit Deendayal Petroleum University, PDPU Campus, Knowledge Corridor, Raisan, Gandhinagar 382 007, Gujarat
T: +91 2327 5308
E: sunil.gangwani@pdpu.ac.in
W: www.pdpu.ac.in

Recognition Status

File No.: 11/534/2011-TU-V
Initial Recognition: 2011
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 87
PGs & Graduates: 185

Research Areas

- Engineering and technology
- Petroleum engineering
- Solar energy
- Geothermal energy
- Chemical engineering
- Civil engineering
- Computer science & engineering
- Electrical engineering
- Industrial and management
- Humanities and social sciences
- Inter-disciplinary
- Pure sciences

Research Outcomes

- Papers published: 581
- IPRs held
 - » Patents filed: 8

- New optimization algorithm was developed known as 'Teaching learning-based optimization'
- Process of annealing of thin film oxide and sulphide thin films under controlled atmosphere
- Development of floating LNG regasification and allied system, etc.

Technical Collaborations

National

Reliance Industries Ltd; Kalpataru Power Transmission Ltd, Gandhinagar; GSPC Group Companies; Department of Chemistry, IIT Kanpur; Sintex industries Ltd

International

Neurogen Corporation, Branford, USA; NIT, Nagoya, Japan. 🔍



^ Infrared telescope

PHYSICAL RESEARCH LABORATORY

Brief Description

Physical Research Laboratory is a unit of Department of Space, Government of India. It was established in M G Science College with support from the Karmkshetra Educational Foundation and the Ahmedabad Education Society. The research focus was on cosmic rays and the properties of the upper atmosphere and research in theoretical physics and radio physics. The centre is now conducting work on theoretical physics, radio physics, laser physics, quantum optics, quantum information, astronomy planetary exploration, etc.

R&D Set-up

The research facilities and infrastructure of the institution are being used by the academia. These include the following:

- Nano secondary ion mass spectrometer.
- Electron-probe micro analyser
- Nobel gas mass spectrometer
- X-ray fluorescence spectrometer (XRF)
- Laser ablation - inductively coupled plasma mass spectrometry mass spectrometer
- Benchtop X-ray diffractometer
- Workshop machinery (mechanical-CNC turning centre, vertical machining centre, EDM-spark and wire-cut lathe drill machine
- Isotope geochemistry accelerator mass spectrometer) (facility for cosmogenic radionuclide analysis)

- Isotope ratio mass spectrometers
- Facility for the analysis of stable isotopes in hydrology, aquatic systems, and paleoclimate studies
- Facility for studying aerosol chemistry
- Thermal Ionization mass spectrometer and quadrupole ICPMS
- Facility for solid Earth geochemistry studies
- Alpha, beta, and gamma counters and liquid scintillation detectors
- Facility for analysing radioactive nuclides
- Oceanographic sampling and analytical instruments
- Facility for oceanographic studies
- Isotope geochemistry
- Plasma mass spectrometer
- Thermal ionization mass spectrometer
- Seafast high-resolution inductively coupled plasma
- Multi-application solar telescope

Sources of income for R&D

Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 830.93

FY 2015-16 = 1,150.60

FY 2016-17 = 1,744.46

Registered Office

Physical Research Laboratory,
Navrangpura,
Ahmedabad 380 009, Gujarat
T: 07926314855
E: director@prl.res.in
W: www.prl.res.in

Recognition Status

File No.: 11/99/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 67
PGs & Graduates: 81

Research Areas

- Astronomy and astrophysics
- Atomic, molecular, and optical physics
- Geosciences
- Planetary sciences
- Space and atmospheric sciences
- Theoretical physics
- Solar physics

Research Outcomes

- Papers published:
 - » International: 570

R&D Achievements

Products/process/developed

- Multi-application solar telescopic is now operational
- A low-order adaptive optics system and stokes polarimeter has been developed in-house
- The PARAS spectro graph has made significant discovery of a very rare three-body eclipsing binary system.

- A facility for hand x-ray focussing optics has been initiated
- Work on the design and development of payloads for future planetary and space mission is under progress.

Technical Collaborations

National

IIT Gandhinagar, Gujarat University. 🔍



^ R&D plot anchored with grassroots farmer expert

PRAGYA

Brief Description

Pragya is a non-governmental development organization established in 1995. Initiated in the global south, Pragya's current operations span India, Nepal, sub-saharan Africa, UK, and USA. PRAGYA works for the appropriate development of vulnerable communities and sensitive ecosystems of the world. They offer an array of developmental services for the isolated and underserved communities and building their capacity to further their development. Pragya supports reform of programmes and policies, and advise, and train development actors in order to spur development action in these regions.

R&D Set-up

Pragya has the following basic facilities:

- 15,000 sq. ft-floor space
- ICT facilities
- Workspace and furniture
- Laboratory with laminar air flow bench (horizontal)
- Double-distillation unit
- Autoclave (horizontal and vertical)
- Seed germinator unit SGI0s
- Olympus Clinical Microscope CH20i - binocular
- Olympus clinical microscope CH20I - Trinocular
- ICT enabled data recording / office space in remote locations; mini portable weather station ;
- Digital weather stations ; soil testing kit ; soil moisture cum ph metre ; seed moisture metre; snow gauge ; sunshine recorders; water testing kit ; non-Invasive anaemia detection kit etc

Sources of income for R&D

- Donations
- Grant-in-aid

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 29.94

FY 2015-16 = 68.39

FY 2016-17 = 86.30

R&D Achievements

Products developed

- Health surveillance kits for pregnant women and infants
- Digital agri-enterprise facilitation service
- Digital crop advisory
- Dms digital resource director

Processes developed

- Women care groups (WCG)
- Nutrition surveillance system
- Agri-advisors for extension facilities to farmers
- Mountain agricultural assistance service

Technical Collaborations

National

Earth Matters Foundation; CMS India; UN Solution Exchange; Biosense; Jodo Gyan; Dolphin UF; Porta Cabin; Tata BP Solar; Dabur; TRIFED

International

Whitley Fund for Nature; Manchester Metropolitan University (UK); Hamburg University of Applied Sciences (Germany); Botanical Gardens Conservation International (BGCI), Pragya UK

Registered Office

Pragya
83, Sector 44 Institutional Area
Gurgaon 122003
T: +91 124 2839000
E: info@pragya.org
W: www.pragya.org

Recognition Status

File No.: 11/586/2013-TU-V
Initial Recognition: 2013
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 2
PGs & Graduates: 34

Research Areas

- Application research and technology dissemination
- Monitoring and evaluation studies
- Policy research and advocacy

Research Outcomes


- Papers published: 7
- IPRs held
 - » Copyright: 10
- Technologies transferred/commercialized: 16

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Health surveillance kits for pregnant women and infants including non-invasive anaemia-detection kits.
- Dynamic Education Information System for Planning and Improvement (DEISPI) was developed on the basis of a detailed consultation with governmental educational officers across 135 EB districts. The system is simple to implement and use and is designed to integrate closely with the existing educational framework.
- Health kiosk equipped with easy-to-use medical knowledge packages for emergency care and

common ailments of the target area, in a digitized forms as well as information on health care and diagnostic facilities are available in the area.

- Pragma has introduced village-level systems for the surveillance of health and nutritional status of the target groups. These have been anchored with the women's groups and the local, educated women as nutritionists, headed/supervised by the government-mandated village health worker (ASHA).
- Pragma has set up its third solar wind hybrid system in Shyaso village, Kinnaur, Himachal Pradesh, as part of its efforts to enhance the energy access in the Himalaya and to improve the quality of life in rural households. 



^ A view of the centre for research and development

PRIST UNIVERSITY

Brief Description

Ponnaiyah Ramajayam Institute of Science and Technology (PRIST) University is a non-governmental organization registered as a trust. This university chiefly works in the following areas: alternative renewable energy, biodiversity and conservational biology, bioinformatics, clinical microbiological research, drug discovery for kidney stone reduction, arthritis, heart attack and stroke, brain health, liver protective, diabetes, wound healing, wound sealing, biomarkers for major diseases, stem cell biology, tissue culture, and so on. The university also conducts research in the areas of effluent treatment, laser applications, metabolic engineering, nanomaterials synthesis, optical sensors, solar cell, and so on.

R&D Set-up

The Centre for Research and Development (CRD) hosts research facilities and infrastructure available in the organization, comprises several laboratories, such as bioinformatics, biotechnology, microbiology, biochemistry, plant tissue culture and a common wet lab that consists of chemistry, physics, environmental engineering. These labs are well equipped with advanced instruments which are used by individuals and academicians.

Beside research, the CRD also provides consultancy services to its clients for promoting further research. Consultancy services available at the CRD are of two types:

- Research support training technology support covering alternative energy models, animal feed formulations, animal breeding, aquaculture, biofertilizers, disease-free plantations, effluent treatment, embedded systems, organic farming, solar panel construction and process automation, and so on.
- The CRD also helps in incubation and entrepreneurship- development initiatives through seeding, incubation, technology development, patenting, commercialization, and marketing.

Sources of income for R&D

- Grant-in-aid
- Project-based funds

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 402.04

FY 2015-16 = 406.51

FY 2016-17 = 85.65

R&D Achievements

Products developed

- Tabletop portable mini-friction welding machine

Registered Office

Ponnaiyah Ramajayam Institute of Science and Technology (PRIST) University, Trichy Thanjavur Highway, Vallam, Thanjavur, Tamil Nadu 613 403
E: chancellor@prist.ac.in
W: www.prist.ac.in

Recognition Status

File No.: 11/489/2008-TU-V
Initial Recognition: 2011
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 98

Research Areas

- Drug discovery and development
- Energy and environmental engineering
- Biomolecular engineering
- Materials and manufacturing
- Crystal growth and thin films
- Statistics and data mining

Research Outcomes

- Papers published: 416
- IPRs held
 - » Patents filed: 4

- Diagnostic Kit for the detection of microbial keratitis
- A process of preparing activated de-oiled cakes of karanja for the treatment of textile wastewater.
- Microorganism and the method of producing lactic acid with high yield and high concentration.
- Method of treatment of aqueous dye-solutions using bio-waste products, such as raw Karanja and Jatropha cake.
- Implementation of smart-theft control system for vehicle security and abstention of car accidents.
- Method for the production of 3-hydroxypropionic acid from glycerol by cultivating recombinant E.
- A process for the preparation of low-cost, mosquito-repellent coils
- Development of sensor-based estimator for coliform content in drinking water.
- Recombinant microorganisms with vitamin B-12 synthesis capability and preparation method of 3-hydroxypropionic acid.

Technical Collaborations

National

World Noni Research Foundation, Government of India; Indian Council


of Medical Research; Defence Research and Development Organization.

International

Hanyang University, South Korea; South Dakota School of Mines and Technology; Pusan National University, South Korea; The University of Information Technology and Management in Rzeszow, Poland; and others

Societal Relevance

The following R&D outcomes are of national/societal significance:

- A biofilter for the complete treatment of sewage.
- Leachate characterization and modelling applied to Puducherry Municipal corporation.
- Two projects related to societal development have been submitted to the DBT. These are as follows:
 - » Rejuvenating rural livelihoods through mushroom cultivation in the Thanjavur District, Tamil Nadu.
 - » Sustainable rural livelihoods through vermicomposting in the coastal zone of the Thanjavur district, Tamil Nadu. 



PSG & SONS CHARITY

Brief Description

PSG Son's and Charity is a non-governmental organization registered as a trust in 1926. While the trust started with education-oriented perspectives, research soon became an integral part of its activities. The organization PSG pioneered in the usage of computer technology in industries for designing new products. Its major research areas are robotics, textiles, flexible electronics, artificial intelligence, control systems, power system, electrical machines, life sciences, biological physical chemical environmental mathematical statistical nutrition food science, and health care.

R&D Set-up

The organization has well-equipped laboratories for research in an academic environment which is used extensively by students, researchers, and faculty members. The research facilities and infrastructure available in the organizations are bet sorptometer, fog tester, abrasion tester, limiting oxygen tester, x-ray diffractometer, martindale abrasion tester, filter and media testing, ultra-low temperature freezer, ultra right hand glove, high-pressure laboratory unit, multipurpose coating and laminating machine, semi-c conductor device analyzer, Apex SLR HDP ICP systems and Accessories, DLS nano PSA and zeta potential analyser, and so on.

Registered Office

PSG Son's and Charity
PB No. 1609, Peelamedu
Coimbatore 641 004, Tamil Nadu
T: 0422 3933333
E: charity@psgtech.edu
W: www.psgsonscharities.org/

Recognition Status

File No.: 11/520/2010-TU-V
Initial Recognition: 2010
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 260
PGs & Graduates: 13

Sources of income for R&D

- Grant-in-aid
- Foreign contributions
- Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 12,927.65

FY 2015-16 = 25,178.66

FY 2016-17 = 21,331.11

R&D Achievements

Products developed

- Ammonia gas sensor for breath analyser
- Retinoblastoma screening device from patients' serum-cancer screening chameleon fabrics
- Elector spinning machine
- Spray tester
- Nanofibrous facemask
- Ball milling equipment
- Ammonium ion sensing for marine operations
- Nanofilter for water purification

Processes developed

- Microorganism-based effluent treatment for zinc removal
- Microorganism-based effluent treatment for nickel and chromium removal

Prototypes developed

- High-end ICU ventilator
- Breath analyser
- Bio-reactor plant for effluent treatment

Research Areas

- Innovative smart textiles
- Flexible electronics
- Health care
- Energy systems
- Sensors, mechanical, and electronics
- Biotechnology, biomedical, textiles
- Instrumentation, robotics, computer applications

Research Outcomes

- Papers published: 117
- IPRs held
 - » Patents filed: 4

Technical Collaborations

National

Pricol Ltd, Pune; Salzer Electronics Ltd, Coimbatore; Titan Automation, Hosur; Intellectual Ventures Pvt. Ltd; MC Craftsman Machinery Pvt. Ltd, Coimbatore; Bhabha Atomic Research Centre, Mumbai; Lakshmi Life Sciences; Shivasakthi Textile Processing Mills (P) Ltd; Uurmi Systems Pvt. Ltd; Hella Engineering, Chennai.

International

ZahoranskyAG, Germany; Festo AG & Co., Germany

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Some of the projects done at PSG Son's and Charity has a wide-reaching significance, such as SERB-design and development of low-cost intelligent wheelchair for the severely disabled/elderly people.
- Under the Make-in India programme, the organization works towards research-based technology transfer for industrial application. 🔍



^ R&D activities in PBTi

PUNJAB BIOTECHNOLOGY INCUBATOR

Brief Description

The Punjab Biotechnology Incubator (PBTi) is a state government undertaking registered as a 'Society for Biotechnology Incubator' under the Societies Registration Act, 1961. It is professionally governed by the Governing Council of the Society under the chairmanship of Chief Secretary, Government of Punjab. Its main mission is to provide incubation services to translate research ideas into commercially viable technologies through quality testing and contract research services in agriculture, food, and environment and its allied sectors.

R&D Set-up

The PBTi facilities are broadly divided into two sections—chemical and Biology—which are further divided into labs depending upon the following activities:

- Chemical section
 - » Analytical lab
 - » Elemental Analysis lab
 - » Food and Feed lab
 - » Soil, Water, and Agri-Input lab
 - » Environment lab
- Biology section
 - » Molecular biology lab
 - » Microbiology lab

The different sections of the PBTi are equipped with hi-end equipment to meet the requirement of different research and development (R&D) activities, such as gas chromatograph mass spectrometer (GCMS-MS),

gas chromatography system, liquid chromatography mass spectrometer, fourier transformer infrared spectrometer system, etc.

Sources of income for R&D

- Grant-in-aid
- International funding
- Government agencies
- Pvt. partnerships

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 312.74

FY 2015 -16 = 140.98

R&D Achievements

Processes developed

- Multi-residue analysis in fruits, vegetables, and their products by GCMS-MS
- Proline and Methyl Glyoxal in Honey
- Trihalomethanes in water
- Arsenic species (As^{+3} & As^{+5}) in rice By LC-ICP-MS
- Estimation of C4 sugar in honey by EA-IRMS
- Multi-residue analysis in honey by GCMS-MS as per EU Regulations
- Estimation of Iodine in food stuffs by ICP-MS
- Screening (qualitative analysis) of different foods and food products (that is, cereals, bakery, fruits and vegetables and spices) for genetic modifications P35S & TNOS by RT-PCR

Registered Office

Punjab Biotechnology Incubator,
SCO- 7 & 8, Phase-V,
Mohali 160059, Punjab
T: 0172-5020891
E: pbt2005@yahoo.com
W: www.pbtlabs.com

Recognition Status

File No.: 11/448/2005-TU-V
Initial Recognition: 2005
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 4
PGs & Graduates: 12

Research Areas

- Food (safety and quality)
- Agriculture
- Environment and allied sectors

Research Outcomes

- Papers published:
 - » International: 3

- Multi-residue analysis in rice by GCMS-MS as per EU regulations and others.

Consultancy services rendered

In one of the ongoing projects, the PBIT provides consultancy services for the designing and procurement of modular laboratories' furniture in the Food and Drug Testing Laboratory of FDA, Punjab.

Technical Collaborations

National

Department of Water Supply & Sanitation, Government of Punjab; Department of Punjab Health & Family Welfare, FDA Punjab; National Bureau of Animal Genetic Resources, Karnal; Glaxo SmithKline Consumer Health Care; Nestle India Ltd, Gurugram; Abbott Nutrition Abbott Healthcare Pvt. Ltd, Mumbai; Monsanto Holdings India (Pvt.) Ltd; AECOM Asia Company Ltd Gurugram; Punjab Agricultural University, Ludhiana; Baba Farid University of Health Sciences (BFUHS), Faridkot; Central University of Punjab, Bathinda;

National Institute of Pharmaceutical Education & Research (NIPER)


International

United Nations Environment Programme

Societal Relevance

The following R&D outcomes are of national/societal significance:

The PBTI provides contractual R&D services to government bodies, institutes, and industries/corporate houses. Farmers and farmer groups and exporters are using the services of the PBTI for the commercialization of their products.

The PBTI conducts various trainings/ seminars/ workshops in the area of food, safety, and quality and environment sectors in collaboration with public- as well as private-sector organizations. A few programmes have been conducted in collaboration with the Food Safety & Standard Authority of India, Ministry of Environment, Forest & Climate Change, Government of India; Bureau of Indian Standards, etc. 



^ Post-harvest processing of bio resources

PUNJAB STATE COUNCIL FOR SCIENCE & TECHNOLOGY

Brief Description

The Punjab State Council for Science & Technology (PSCST) was established under the aegis of the Department of Science Technology & Environment, Punjab. It serves as the technical secretariat of the state department on matters related to Science, Technology & Environment. Research activities of the council are focussed on technological development and demonstrator and extramural research.

The council is an autonomous organization registered as a state government undertaking.

R&D Set-up

Sources of income for R&D

- Grants
- Project funds and consultancy

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 938.31

FY 2015-16 = 759.56

R&D Achievements

Products developed

- Production of natural vinegar

Processes developed

- Energy audit activities
- Scientific evaluation of water-purification systems
- Upscaling energy-efficient production in small-scale steel industry

- Energy conservation and furnace modifications in stainless steel mills
- Utilization of paddy straw as fuel in brick kilns
- Processing of selected aromatic crops
- Demonstration and promotion of technological options that are economically visible for sustainable livelihood generation
- Value addition through post-harvest processing of bio-resources
- Development and validation of microbial consortium as-single window delivery system for growth and promotion of summer mungbean in the rice to wheat system in Punjab
- Copepods as bio-control agents of mosquito larvae in the standing water bodies of Punjab

Prototypes developed

- Technological up-gradation in MSMEs
- Sustainable livelihood generation to local communities in the Kandi area of Dhar Block, District Pathankot through field demonstration of cultivation and processing of selected aromatic crops
- Promotion of mulberry sericulture, natural vinegar production, and value addition of locally available bio-resources using low-cost polyhouse solar driers
- Value addition of locally available bio-resources using low-cost polyhouse solar dryer

Registered Office

Punjab State Council for Science & Technology, MGSIPA Complex, Sector-26, Chandigarh 160 019
T: 01722795001
E: tc@punjab.gov.in
W: www.pscst.gov.in/

Recognition Status

File No.: 11/373/1999-TU-V
Initial Recognition: 1999
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 8
PGs & Graduates: 19

Research Areas

- Environment
- Biotechnology
- Industrial pollution control
- Science communication
- Health
- Energy

Research Outcomes

- Papers published: 3

- Cultivation and value addition through post-harvest processing of bio-resources in the Shivalik belt.

Technical Collaborations

National

Ministry of Environment, Forest and Climate Change, Government of India; National Academy of Sciences, India, Uttar Pradesh; National Bank for Agricultural and Rural Development, New Delhi; The Energy and Resources Institute (TERI), New Delhi; WWF (India), New Delhi

International

United Nations Development Programme; United Nations Educational, Scientific and Cultural Organization; GIZ; Wetland International South Asia

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The council is the regional agency for Punjab and Chandigarh for the 'National Environment Awareness Campaign' scheme initiated by the Ministry of Environment and Forests, Government of India
- Under the Eco-literacy Water campaign', the council takes up activities such as organization of district-level workshops, development of software in the form of posters, pamphlets, distribution of water testing kits, film and a kit on Water Literacy, etc.
- PSCST has taken the lead in setting up the Regional Centre for Expertise network on Education for Sustainable Development for the region. 🔍



▲ Low-cost technology for dilution of groundwater through artificial recharge

RAJA BALWANT SINGH COLLEGE

Brief Description

Raja Balwant Singh College aims to stay abreast with the latest in innovation, education, knowledge, and research and development for mentoring rural and urban students so as to serve society better. The objective is to create, generate, and disseminate quality education and provide state-of-the-art infrastructure in research, instrumentation demonstration, and advice to students and farmers for career settlement and development.

The college is a government-aided institute affiliated to Dr A P J Abdul Kalam Technical University, Lucknow, and Dr B R Ambedkar University, Agra.

R&D Set-up

The institution has various research facilities available for the R&D work, such as advance computing facility, reprographic facility, animal house, seismological and space research lab, agricultural farms, and other agriculture inputs. These are regularly used by academicians. The research equipment include the following:

- Atomic Absorption Spectrophotometer
- Gas Chromatograph
- UV-VIS Spectro Photometer
- Karl Fischer Titrator
- RF Sputtering set up
- Keilhetey source metre and multimeter
- Search coil magnetometers, and others

Sources of income for R&D

- Government agencies
- Project funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15: 642.41

R&D Achievements

Products/processes developed

- Refining of manual groundnut decorticator developed by the Central Institute of Agricultural Engineering
- Bioremediation technology for black-crust removal from stone surfaces
- Precomposting of waste by microbial inoculants followed by vermicomposting through the development of innovative vermicompost models for rural and urban women beneficiaries
- Bioprocess for removal of organic deposits from stone surfaces
- Electronic soil-testing kit and mini lab for rural areas
- Cost-effective technology on bioethanol production from wastes
- Nanoherbal drug against drug-resistant microbial pathogens
- Nanoherbal bandages for healing wounds using aloe vera, nanosilver, and cotton bandage.

Registered Office

Raja Balwant Singh College,
Raja Balwant Singh Road,
Khandari, Agra, Uttar Pradesh
T: 0 562 2520 075
E: rbscagra_2007@rediffmail.com
W: www.rbscollegeagra.edu.in

Recognition Status

File No.: 11/478/2007-TU-V
Initial Recognition: 2007
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 14
PGs & Graduates: 9

Research Areas

- Ion-solid interaction
- Nanotechnology and biotechnology
- Compound synthesis
- Thin film deposition
- Seismology

Major research outcomes

- Papers published: : 200
- IPRs held
 - » Patents filed: 2

Technical Collaborations

National


Biolink Overseas Co., Uttar Pradesh;
Indian Institute of Technology
Bombay, Maharashtra;
Jalma Institute, Uttar Pradesh

International

University of Floreence, Italy; Bakh
Institute, Russia

Societal Relevance

The following R&D outcomes are of
national/societal significance:

- Development of the soil health card
- Waste management by effective microorganisms and Bokashi technology
- Helped developed weak farmers into service provides of vermicompost-based supplements. This has happened in two districts of Uttar Pradesh
- Petha waste management through vermi technology has been used by 300 beneficiaries in the districts of Agra, Mathura, and Mainpuri. 



^ Class 1000 - UV exposure system

RAJALAKSHMI ENGINEERING COLLEGE

Brief Description

Rajalakshmi Engineering College is a research-focussed technical institution affiliated to the Anna University, Chennai, and was established under the aegis of the Rajalakshmi Educational Trust. The institution aims to promote research and development in technology and management for the benefit of society.

R&D Set-up

The following are the research facilities and infrastructure available in the college and are used by industries, individuals, and academicians:

- Solid works, MATLAB, lab view
- Camera DALSA GENIE M1024 1/3" GIGE Mono
- Line scan camera
- Smart camera with integrated strobe lighting
- Conveyor with speed control and encoder
- Lenses and lens accessories
- High-intensity strobe lights
- Lights, filters and optical references
- Clean rooms of ISO 6 & ISO 7 facility for MEMS Fabrication
- Thermo-compression system
- DC/RF sputtering unit
- High-resolution optical microscope
- Fluorescence spectrophotometer
- Acoustic calibrator
- Oxygen plasma chamber
- Design softwares, such as coventorware, intellisuite

- Tanner EDA tool
- Star CCM and Star CD software
- Hyper works, optical microscope
- Laminar flow cabinet
- Spectrofluorometer

Sources of income for R&D

- Government agencies
- Donations
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 373.93

FY 2015 -16 = 336.30

FY 2016 -17 = 287.55

R&D Achievements

Products developed

- Micro-electro-mechanical sensors (mems) accelerometer-based on SOI substrate for use in the analysis of stator blades of gas turbines
- MEMS acoustic transducer-based on polyimide membrane
- Micro-fluidic device using PDMS based on soft-lithography process
- Micro-tweezer, MEMS accelerometer, MEMS gyroscope, and MEMS heater structure were developed and fabricated successfully
- Metal-embossing technology for micro-fluidic device on glass substrate
- Technology for a low-cost microphone
- Soft-lithography process for micro-fluidic devices

Registered Office

Rajalakshmi Engineering College,
Rajalakshmi Nagar, Thandalam,
Chennai 602 105, Tamil Nadu
T: 0 44 2644 2472
E: cityoffice@rajalakshmi.edu.in
W: www.rajalakshmi.org

Recognition Status

File No.: 11/494/2008-TU-V
Initial Recognition: 2008
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 57
PGs & Graduates: 76

Research Areas

- Micro-electrico-mechanical systems (MEMS) and Micro-fluidics
- Machine vision applied to industrial quality control
- Sustainable green construction materials
- Computational fluid dynamics
- Energy-storage materials
- Composite-materials technology
- Bio-medical devices development
- Environmental biotechnology
- Clinical research
- Big data analytics
- Power electronics and drives
- Wireless communication
- Embedded system

Research Outcomes

- Papers published:
 - » National: 32
 - » International: 414
- IPRs held
 - » Patents filed: 21

- Detection of fetal abnormality through thermography

Prototypes developed

- Laboratory prototype to detect the URIC acid level in the human body using EIS Bio-sensors
- Visual concept map-based learning environment for children with hearing Impairment
- Powered lower-limb exoskeleton for hemiplegic patients
- Automated tool for the early diagnosis of diabetic retinopathy
- H₂S detection sensors
- Sports wheel chair for para-athletic game playing
- Paper-based microfluidic kit for the detection of metal impurities

Commercialization potential of products/processes developed

The following are the services developed which are ready for commercialization:

- MEMS accelerometer based on a silicon-on-insulator (SOI) substrate
- Technology and processes for a micro-fluidic device based on soft-lithography for lab-on-chip applications
- Machine vision-based quality inspecting systems for blister packs in the pharma industry
- Geo-polymer aerated concrete
- Corrosion-resistant concretes
- Interactive teaching aid for autistic children

Technical Collaborations

National

Solid State Physics Laboratory, New Delhi; Defence Research & Development Organization, New Delhi; Ministry of Defence, Govt. of India; Research Centre IMARAT, Telangana; Combat Vehicles Research & Development Establishment, Tamil Nadu; National Research Development Corporation, New Delhi

International

University of Pardubice, Czech Republic; University of the Highlands & Islands; University of Worcester, England; XSEED ITEM, Maple Valley, USA; University of Wolverhampton, UK; University of Regina, Canada; University of Sunderland, UK

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Technologies developed, such as MEMS accelerometer, micro-tweezer, MEMS gyroscope, and the micro-fluidic device have a direct relevance to the Make in India Mission
- Technologies developed, such as sintered fly-ash brick and artificial light-weight aggregate have relevance to the Swachh Bharat Mission
- The web-based tool for enhancing the learning process of hearing impairment has direct relevance to the Digital India Mission of the Government of India. 🔍



↗ Pneumatic transport of dry solids

Registered Office

Raajdhani Engineering College,
Near Mancheswar Railway
Station, Bhubaneswar 751 017,
Odisha
T: 0674 2972892
E: rec_bbsr@yahoo.co.in
W: www.rec.ac.in

Recognition Status

File No.: 11/620/2013-TU-V
Initial Recognition: 2013
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 6
PGs & Graduates: 2

Research Areas

- Manufacturing and materials engineering
- Non-conventional energy
- Civil engineering
- Data science and engineering

RAJDHANI ENGINEERING COLLEGE OF SAMRIDDHI EDUCATIONAL TRUST

Brief Description

Raajdhani Engineering College, Bhubaneswar, is committed for creating, sustaining, and improving the scientific and technological learning process through the established quality management system, and compliance to statutory and regulatory requirements. The college is affiliated to Biju Patnaik University of Technology, Government of Odisha.

It is registered as a trust in the name of Samriddhi Educational Trust.

R&D Set-up

The following are the research facilities and infrastructure available in the organization, which are regularly used by individuals and academicians:

- PIN-ON-DISK-wear-testing machine
- Pneumatic transport of dry solids
- Direct shear test-testing machine
- Tri-axial-testing machine
- Compressive testing machine
- Universal testing machine
- Conventional lathe, shear, milling, planner
- Unconfined compression-testing machine and others

Sources of income for R&D

Internal and external funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 26.00

FY 2015 -16 = 28.00

FY 2016 -17 = 30.00

R&D Achievements

Products/processes developed

- Stone grinder manual-drilling machine for green fancying
- Teaching methodology
- Roti-making machine in a minimum space
- Furnace for rural mass
- Solar drier for paddy and corns

Technical Collaborations

National

NICO Ventures Pvt. Ltd, West Bengal; PM-YUVA (Pradhan Mantri Yuva Yojana), Uttar Pradesh

International

Evergreen Forum, New Jersey, USA

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Solar drier for paddy has been developed for adding value in paddy and protection from the harmful impact of solar radiation as per the geographical position of the area of application.

The furnace has been developed for the rural masses with technological addition to existing *chullah* to reduce the carbon dioxide and monoxide emission and improve the energy efficiency. 🔍

Research Outcomes

- Papers published: 11



^ A view of glass ceramics laboratory

RAJEEV GANDHI MEMORIAL COLLEGE OF ENGINEERING AND TECHNOLOGY (RGM CET) OF PARAMESWARA EDUCATIONAL ACADEMY

Brief Description

Rajeev Gandhi Memorial College of Engineering and Technology is registered as a self-financed engineering college and is a non-governmental organization. The college was established under the trust mainly works in the contemporary research areas of nanotechnology, usage of big data analytics in deriving research output, power electronics, renewable sources of energy, thin-film technologies and so on Parameswara Educational Academy.

R&D Set-up

Some of the research facilities and infrastructure available in the organization are as follows:

- Hydraulic and hydraulic machinery laboratory
- Fluke metre power analyser
- Yokogawa DSO (DL 9000 Oscilloscope)
- Yokogawa calibrator
- Rockwell automation PLC station
- Computerized IC engine test rig
- Composite material-testing laboratory

Source of income for R&D

- Internal funding
- Grant-in-aid

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15= 93.45

FY 2015 -16= 95.05

FY 2016 -17= 175.65

R&D Achievements

Products developed

- Chiller for temperature maintenance of the photomultiplier tubes
- Mechanical vibration and electrical stimulus generator for measuring plant electrical activity
- Educational technology for enhancing the learning skills of students in schools
- Unobstructive capturing of power parasitically from walking.

Processes developed

- Mechanism for the identification of how *Sarvangasana* produces massage effect on the thyroid gland
- Technique that produces a massage action on the deep internal organs of the abdominal cavity without using any external devices and hands
- Theory of tuning of PID controllers for the optimization of performance and robustness for a wide variety of processes and systems

Registered Office

Rajeev Gandhi Memorial College of Engineering and Technology
NH-40, Nerawada Cross Roads,
Nandyal, Kurnool Dist,
Andhra Pradesh 518 501
T: 08514-275201
E: jp.talari@gmail.com
W: www.rgmcet.edu.in

Recognition Status

File No.: 11/617/2013-TU V
Initial Recognition: 2013
Valid Until: 31-03-2019

R&D Manpower

Doctorates: 65
PGs & Graduates: 31

Research Areas

- Process control
- Embedded systems,
- Internet of things
- Image processing, signal, and processing
- Thermal engineering
- Material science
- Nanotechnology
- Big data analytics
- Power electronics
- Thin-film technologies

Research Outcomes

- Papers published: 332
- IPRs held
 - » Patents filed: 9
 - » Patents awarded: 3

- Process for the manufacturing soya milk with maximum extraction and minimum cost, thus preserving the nutrients and constituents

Technical Collaborations

National

Sai Society for Advanced Scientific Research; Indian Institute of Technology, Delhi; Indian Institute of Technology, Roorkee; Steel Hacks India Pvt. Ltd; SPY Agro Industries; Foundation for Assessment and Integration of Traditional Health System (FAITHS), Bengaluru; Phoenix Maritime Services Pvt. Ltd, Nagpur; Hyderabad Management Association, Hyderabad; Monster.com India Pvt. Ltd, Hyderabad; ARK Rao Engineering Solutions

International

University Southern Queensland, Australia; Budhapest University

Societal Relevance

The following R&D outcomes are of national/societal significance:

Products

- ETC with heat pipe-based hot-fluid generator equipped with solar dryer is used in the agricultural domain, which helps in the


storage of the produce even after the harvesting season is over.

- Educational technology for enhancing the learning skills of the students in schools incorporates the concept, acquire, analyse, and present.

Technologies

- Measurement of micronutrients in plants using digital image processing helps farmers take decisions regarding the application of fertilizers and avoiding excess or the under application of fertilizers.
- A mechanism for the identification of 'how *Sarvangasana* produces a massaging effect on the thyroid gland'. This reduces the dependence on medicines for cure, which have side effects; this is an investment-less method for the cure of the ailment.

Awareness programme

- Awareness is created in terms of pre- and post-harvest techniques to be followed for reducing investment, improving productivity, and the quality of agricultural produce to fetch the best price for the produce. 



^ Biotechnology laboratory

RAM NARAIN RUIA COLLEGE, MUMBAI CITY OF SHIKSHANA PRASARAKA MANDALI, PUNE

Brief Description

The Herbal Research Laboratory (HRL) was established with the aim to carry out research on herbal and Ayurvedic, Siddha, or Unani formulations using high-performance, thin-layer chromatography (HPTLC) with a densitometric scanner, high-performance liquid chromatography (HPLC), flash chromatography, Fourier transformed-infra red, and UV-visible spectroscopy. They standardize of herbal medicine and plan to convert some of the herbal preparations into their appropriate pharmaceutical dosage forms and undertake bio-availability studies of phytochemical markers.

R&D Set-up

The research facilities and infrastructure available in the organization are animal house, plant tissue culture laboratory, a green house, and HRL and advanced scientific and technical computing. The Department of Statistics has two statistical software—SPSS and STASTICA, the Department of Mathematics has MATHEMATICA and MATLAB, and the Department of Economics has Stata and Eviews. Also, all these facilities are used by industries, individuals, and the academia.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 61.41

FY 2015 -16 = 48.89

FY2016 -17 = 142.67

R&D Achievements

Products developed

- Anti-fungal ointment
- Micro fluid studies to develop simple tests in clinical biochemistry
- Acute toxicity studies and many more

Processes developed

- Fold-scope application for simple environmental field test.

Major research work or innovation has accomplished the following:

- Molecular characterization and chemoprofiling of five pharmacologically relevant species of dendrobium found in North-east India
- Development of HPLC methods for some known phytochemical markers and their validation as per the ICH guidelines with bio-availability studies
- Phytochemical profiling, molecular characterization, and conservation of *Flemingia vestita*: an endemic medicinally important plant of North-east India.

Registered Office

Ramnarain Ruia College
Sharada Sabhagruha,
SP College Campus, Pune,
Maharashtra 411 030
T: 020 2433 2029
E: pednekarsuhas@gmail.com
W: www.ruiacollege.edu

Recognition Status

File No: 11/349/1997-TU-V
Initial Recognition: 1997
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 33

Research Areas

- Green chemistry
- Electro-analytical methods
- Quality control and standardization of herbal drugs, Indian systems of medicine and their bioactive principles
- Nanotechnology
- Cytogenetics, plant biotechnology, plant physiology, phycology
- Probiotics and endophytes, marine biotechnology
- Toxicology, animal physiology, nutrition and dietetics, nutraceuticals, environmental science
- Molecular biology, biodiversity, biofilms
- Food history and culture and environmental history
- Labour studies and international relations

Research Outcomes

- Books published: 64
- IPRs held
 - » Patents filed: 10
 - » Patents awarded: 2

Technical Collaborations

National

MARICO; Hindustan Unilever; Pitambari Products Pvt. Ltd, Gomite; EMCURE; Ajanta Pharma Ltd; Process Biochem, FTIR Analysis; J B Chemicals & Pharmaceuticals Ltd; Cipla Ltd; Nichem Solutions; SunPharma Industries Pvt. Ltd

International

Iladevi Herbal & Cosmetic Products, London; University of Turku, Finland; AGRAF International Research Group; Valparaiso University, USA; Ontario Universities, Canada. 🔍



^ Single crystal, X-ray diffractometer, AXS D8 QUEST ECO(Mo) (Bruker, Billerica, MA, USA)

RAMAKRISHNA MISSION RESIDENTIAL COLLEGE

Brief Description

Ramakrishna Mission Residential College is identical to that of its parent organization, Ramakrishna Mission Ashrama, Narendrapur. There are several research works undertaken in the various fields of science and arts at the college. They have also undertaken several funded research projects in the field of inorganic chemistry, electron emission from atoms and molecules by impact of ions, non-linear dynamics and chaos, travelling wave solutions, fluid dynamics, Sanskrit, and the works of Rabindranath Tagore.

R&D Set-Up


The research facilities and infrastructure available in the organization are Server, Eyela rotary vacuum evaporator, UV-vis double beam spectrometer, EPR spectrometer mini scope MS 400, etc.

R&D Achievements

- Modelling and synthesizing new functional materials and determination of characteristic features and spectroscopic studies.
- Scattering cross-section for ion–molecule–atom collisions. Interference and diffraction in fast bare ions colliding with atoms/ molecules.
- Study of magnetic oxide semiconductor quantum dot array for spin polarized light emitting diode.

Technical Collaborations

International

Max-Planck-Institut für Chemische Energiekonversion, Muelheim, Germany. 

Research Areas

- Conjugated Di-Amine, Aminophenols, and Phenylenediamines
- Synthesis of Carbohydrate-Derived Conformationally Constrained Carbocyclic and Heterocyclic Ring Containing cis- β -Amino carboxylic Acids and Evaluation of Biological Properties
- Calculate the Scattering Cross-Section for Ion–Molecule–Atom Collisions
- Study of Magnetic Oxide Semiconductor Quantum Dot Array for Spin-Polarized Light-Emitting Diode

Research Outcomes

- IPRs held
 - » Patents filed: 1

Registered Office

Ramakrishna Mission Residential College (Autonomous),
PO Narendrapur, Kolkata 700 103,
West Bengal
T: 033-2477 2205
E: rkmcnpur@vsnl.com
W: www.rkmcnarendrapur.org

Recognition Status

File No.: 11/467/2007-TU-V
Initial Recognition: 2007
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 8
PGs & Graduates: 7



^ Research facility

Registered Office

Raman Centre for Applied and Interdisciplinary Sciences,
16A Jheel Road, Kolkata 700 075,
West Bengal
T: 033-24830029
E: cv@rcais.res.in
W: www.rcais.res.in

Recognition Status

File No.: 11/429/2005-TU-V
Initial Recognition: 2005
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 7

Research Areas

- Fertilizer technology
- Earthquake hazard
- Soil environment
- Computational mineralogy
- Global warming

RAMAN CENTRE FOR APPLIED AND INTERDISCIPLINARY SCIENCES

Brief Description

Raman Centre for Applied and Interdisciplinary Sciences (RCAIS) is a not-for-profit organization registered as a society. The main objectives of the RCAIS are to promote research in interdisciplinary subjects, new areas, and highly innovative schemes.

R&D Set-up

The following are the R&D equipment available in the organization that are used by individuals, industries, and the academia:

- Granulator, pulverizer, vacuum generator
- Nitrogen analyser, reactor, computer accessories
- Parallel computing nodes, nitrogen analyser
- Viscometer, thermal conductor, dryer, furnace
- Spectrophotometer, flame photometer, ph metre, conductometer, and others

Source of income for R&D

- Government agencies
- Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 11.73

FY 2015 -16 = 11.49

FY 2016 -17 = 12.45

R&D Achievements

Processes developed

- Improvement in Global Positioning Satellite (GPS) systems for predicting earthquake hazards

Research studies

- Quantitative information generated for carbon dioxide emission by sunlight
- Methodology derived for the theoretical derivation of stability and metastability regions of clay minerals in an aqueous environment
- Computation of ground state electronic properties of semi-conductors and insulators
- Empirical method developed to overcome the limited availability of experimental data on standard-free energies of the formation of variable composition clay minerals.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Technology for the slow-release fertilizers that can be used in all soils that are deficient in any one of the micronutrients and in soils that show responses to micronutrient application.
- Production of potash fertilizers from mica waste. 🔍

Research Outcomes

- Papers published: 7



^ MWA tiles in Western Australia

RAMAN RESEARCH INSTITUTE

Brief Description

Raman Research Institute (RRI) is registered as a trust and an autonomous research institute funded by grants-in-aid from the Department of Science and Technology, Government of India. The mandate of RRI is primarily research in basic sciences that advances knowledge by creating new knowledge. The research conducted at the institute continually advances the knowledge base via an improved understanding of the fundamental laws and behaviour of nature spanning from sub-atomic to cosmological length scales, thereby laying the basic foundation for the advancement of science and its component benefits to society.

R&D Set-up

The following research facilities and infrastructure are available at the institute:

- Soft condensed matter (SCM) group labs houses state-of-the-art instrumentation
- Computer group provides computing solutions and all other computer-based services, such as email, web, printing, data transfer, digital repository, etc.

Sources of income for R&D

Grant-in-aid

R&D Achievements

Research Studies

- ASTROSAT-LAXPC: Work on the timing and spectral calibration of the ASTROSAT-LAXPC instrument

and the development of the data reduction software is in progress at the X-ray astronomy laboratory.

- General relativity and quantum gravity: the RRI researchers in collaboration with international peers have shown echoes of asymptotic silence in a causal set quantum gravity.
- Quantum diffusion: Researchers at the RRI analysed diffusion at ultra-low temperatures and derived a response function that led to a logarithmic diffusion law in the quantum domain. Further, they proposed experiments that could be realized with the existing technology using cold atoms.

Technical Collaborations

National

Indian Space Research Organization, Karnataka; SWAN project: Collective effort between RRI and 40+ science and technology institutes in India, such as IITs, Indian Institutes of Science Education and Research, National Institute of Science Education and Research, and many universities across India.

International

Square Kilometre Array-India Consortium; Imperial College, London under the Royal Society British Council; Southern Federal University, Russia; University of Western Australia; University of Adelaide, Australia; Institute and Lab de Physique Theoretique et Modeles Statistiques, France; Institute and University of Waterloo, Canada

Registered Office

Raman Research Institute, C V
Raman Avenue, Sadashivanagar,
Bengaluru 560 080, Karnataka
T: 080 2361 0122
E: ao@rri.res.in
W: www.rri.res.in/

Recognition Status

File No.: 11/85/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

Research Areas

- Astronomy and astrophysics
- Light and matter physics
- Soft condensed matter, including biophysics and chemistry
- Theoretical physics

Research Outcomes

- Papers published: 153
- IPRs held
 - » Patents filed: 16
 - » Patents awarded: 4

Societal Relevance

The following R&D outcomes are of national/societal significance:

Members of the Light and Matter Physics Group at the RRI are pursuing research in an area of light–matter interaction which is a combination

of atomic, molecular, and optical physics on one hand, and intense laser-produced plasmas on the other. Light–matter interactions are being investigated by this group in both classical and quantum domains using experiments as well as numerical and theoretical analysis. 🔍



^ Sugarcane tissue culture laboratory

S NIJALINGAPPA SUGAR INSTITUTE

Brief Description

The S Nijalingappa Sugar Institute aims to promote and develop the sugar industry and the cultivation of sugarcane in Karnataka with 22 operating sugar mills. The institute undertakes sugarcane research and development activities in the interest of cane growers and sugar industry. Research activities focus on the agricultural aspects of sugarcane including intercropping, other sugar bearing plants, processing aspects of sugar and utilization of the byproducts.

It is a society registered under Karnataka Societies Registration Act.

R&D Set-up

The following are the research facilities and infrastructure available in the organization and used by industries, individuals, and academicians:

- Sugarcane Tissue Culture Laboratory
- Analytical Laboratories for Bio-refineries
- Sugarcane Research Station: Zadshahapur farm and Yaragatti farm
- Sugar factories
- Sugarcane grower's farm

Sources of income for R&D

State government grant

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 112.50

FY 2015 -16 = 150.00

FY 2016 -17 = 200.00

R&D Achievements

Processes developed

- Effect of different weed management in sugarcane
- Effect of planting geometry and intercrops on sugarcane and their economics
- Screening promising sugarcane varieties
- Screening of drought tolerant sugarcane varieties
- Study the effect of different methods of fertilizer application on growth, yield, and quality of sugarcane
- Maximization of sugarcane productivity and ethanol production through sugarcane-based intercropping system
- B-Heavy molasses route for enhancing fuel ethanol production inference

Technical Collaborations

National

Sugarcane Breeding Institute, Tamil Nadu; National Sugar Institute, Uttar Pradesh; University of Agricultural Sciences, Karnataka; Karnataka University, Dharwad, Karnataka; Vasantdada Sugar Institute, Pune, Maharashtra

Registered Office

S Nijalingappa Sugar Institute,
C.T.S.No. 4125/1B,
Ganeshpur Road, LaxmiTek,
Belagavi 590 009, Karnataka
T: 0831- 2472482
E: snsibgm@yahoo.com
W: www.nijalingappasugars.com

Recognition Status

File No.: 11/664/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 2
PGs & Graduates: 3

Research Areas

- Sugarcane
- Sugar
- Co-generation
- Biofuel
- Tissue culture
- Fertilizer and biopesticide

Research Outcomes

- Papers published: : 6441
- IPRs held
 - » Patents: 878
 - » Copyright: 16

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The institute provides tissue culture raised sugarcane seedlings to the sugarcane growers through sugar factories.
- Conducts training programmes on various new and existing

sugarcane technologies to the sugarcane growers and cane development staff of Karnataka sugar factories.

- Awareness programmes are held on integrated management of sugarcane root grub through mass campaigning, wider row spacing in sugarcane, and trash management in sugarcane. 🔍



^ i-hub facility available for the researchers

SAGI RAMAKRISHNAM RAJU ENGINEERING COLLEGE ASSOCIATION

Brief Description

Sagi Ramakrishnam Raju Engineering College is an autonomous private engineering college and affiliated to JNTU, Kakinada, offering teaching and research programmes. The college has a technology centre to focus on skill development in latest technologies. The college promotes a research culture through consultancy and collaboration.

The college is a non-governmental not-for-profit organization registered as a society under the Societies Act.

R&D Set-up

The college has established 17 centres of excellence for the improvement and enrichment of engineering knowledge. Few of the centres are listed below:

- Water and Environment Technology Research Centre (WET Centre)
- Geo-Spatial Information Centre (GIC)
- Kolleru Lake Information Centre (KLIC)
- Space Technology Research Centre (STRC)
- Centre for Collaborative Product Development (CCPD)
- Centre for Metal Matrix Composites (CMMC) and others

The research facilities are used by industries, individuals, and academicians.

Sources of income for R&D

- Government agencies
- Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 32.66

FY 2015-16 = 31.65

FY 2016-17 = 96.20

R&D Achievements

Products developed

- Smart patient monitoring system using Arduino
- Solar mobile coconut de-husking machine
- Aerial pesticide sprayer using quadrotor
- Probiotics for purifying the drinking water
- Solar energy-based tri-cycle for physically challenged persons; research studies or surveys benefiting the community or improving the services
- Remote sensing and GIS applications for the coastal tracks of Godavari districts and others.

Processes developed

- Autonomous vehicle
- Wearable stress monitoring system
- DIY health monitoring kit for Arduino
- My Power
- Deep meditation analysis

Registered Office

Sagi Ramakrishnam Raju Engineering College, Chinna Amiram, Bhimavaram 534 204, Andhra Pradesh
T: 08816 223332
E: gpsvarma@gmail.com
W: www.srkrec.ac.in

Recognition Status

File No.: 11/685/2016-TU-V
Initial Recognition: 2016
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 99
PGs & Graduates: 82

Research Areas

- Geospatial information technologies
- Water and environmental technology
- Bioinformatics
- Data analytics
- Machine learning with medical images
- Material science

Research Outcomes

- Papers published: :
 - » National: 11
 - » International: 259
- IPRs held
 - » Patents filed: 10

Prototypes developed

- Eye vision keyboard
- Driver alerting system using Android and Opencv
- Farmey
- Designing breaking and navigation system for autonomous vehicle
- IoT-based vehicle parking monitoring system
- Smart case
- Tool for traffic analytics
- Effective measurement plant diseases

Instruments developed

- Gamma tone noise filters
- Fin (Bone Conductive Technology)
- ALDC Algorithm (Effective Measurements of Brain Mapping System)
- Bioinformatics tools, such as MICAS, ChloroMito SSR, FugREP, Web-Weka

Consultancy services rendered

The college provides consultancy to ONGC, Reliance, NRSC, IDEA, AP Transco, Indian Railways, Panchayath Raj, Irrigation, Andhra Pradesh State Government, and Central Government Departments.

Technical Collaborations

National

National Remote Sensing Centre, Indian Space Research Organization

(ISRO), Hyderabad, Telangana; Krishi Vigyan Kendra, New Delhi; Vyakti Vikas Kendra India, Karnataka; National Institute of Technology, Warangal, Telangana; Andhra Pradesh State Skill Development Corporation, Andhra Pradesh; National Skill Development Corporation, New Delhi


International

The University of Colima, Mexico; University of Jaén, Spain; University of Pisa, Italy; Jeju National University, South Korea; UIT The Arctic University of Norway

Societal Relevance

The following R&D outcomes are of national/societal significance:

The college adopted a village Chinna Amiram and conducted financial literacy programme to create awareness on cashless transactions in association with Andhra Pradesh State Skill Development Centre

- Conducted Swachh Bharat programme in nearby villages Chinna Amiram and Bhimavaram and also in the college for every 15 days.
- Solid waste management plant, rainwater harvesting are available in the campus and solar panels are arranged on the roofs of the buildings to generate solar energy and this has direct relevance to clean energy. 



Research facility

SAHRDAYA COLLEGE OF ENGINEERING AND TECHNOLOGY OF IRINJALAKUDA DIOCESAN EDUCATIONAL TRUST

Brief Description

Sahrdaya College of Engineering & Technology is an engineering college with a vision to train the youth to be the leaders with apt skills and deep rooted sense of social responsibility. The Center for Research and Development of the institute supports R&D activities around the campus especially amongst faculty members. It is self-financing engineering college, under Kerala Technical University and recognized by AICTE, New Delhi.

It is a registered as a trust under the name of Irinjalakuda Diocesan Educational Trust.

R&D Set-up

The research infrastructure includes the following R&D equipment:

- Digital Multi metre and Digital Storage Oscilloscope
- M S Cutting, Benque Projector, Motor and other items
- Laboratory Sterilizer, Fermenter, PEC Self Priming Centrifugal pump, Orcad PCB Suite Version-16.3, 2/10Mhs microcontroller-based function pulse and several others

Sources of income for R&D

- Student fee/student projects

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 144.00

FY 2015-16= 130.00

FY 2016-17= 135.00

R&D Achievements

Products/processes developed

- WALK- Walking-aided leg kit
- Automatic civil supply transaction system
- Autonomous vehicle life guard system
- Intelligent helmet for industrial security
- Locked In syndrome freezing equipment
- Fault detection in distribution line system of protection system
- Dynamic power optimization using Voltage Optimization
- Bifico – an effective solution for poultry farm order
- OrgRadiation energy
- Cassava Stem: A paper Antecedent (CaSPA)

Technical Collaborations

National


C-DAC, New Delhi; GE Healthcare, New Delhi; Dr Rani Menon's Eye Care Center, Kerala; KELTRON, Kerala; Elite Agro Specialties, Kerala; Jubilee Mission Hospital

International

Wilmington University, USA

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Mushroom cultivation service has proved as a constant source of income for the unemployed. 

Research Outcomes

- Papers published: 80

Registered Office

Sahrdaya College of Engineering & Technology, Kodakara, P.B.No.17, Thrissur 680 684, Kerala
T: 04802759275
E: info.sahrdaya@gmail.com
W: www.sahrdaya.ac.in/

Recognition Status

File No.: 11/698/2016-TU-V
Initial Recognition: 2016
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 22
PGs & Graduates: 8

Research Areas

- Power electronics
- Environmental pollution
- Healthcare technologies and device development



^ SACON lab

Registered Office

Salim Ali Centre for Ornithology and Natural History (SACON),
Anaikatty, Coimbatore 641 108,
Tamil Nadu
T: 0422 2203101
E: salimalicentre@gmail.com
W: www.sacon.in

Recognition Status

File No.: 11/402/2001-TU-V
Initial Recognition: 2001
Valid Until: March 31, 2019

R&D Manpower

Doctorate: 21
PGs & Graduates: 39

Research Areas

- Avian ecology and endangered bird conservation programme
- Man and biodiversity conservation
- Ecosystem structure and function
- Wetland conservation programme
- Environmental impact assessment
- Nature awareness/extension programme

SALIM ALI CENTRE FOR ORNITHOLOGY AND NATURAL HISTORY

Brief Description

Salim Ali Centre for Ornithology and Natural History (SACON) is a non-government organization registered as a Society. The institute conducts research in ornithology covering all aspects of biodiversity and natural history. They also run post-graduate and doctorate courses in ornithology and natural history. They also aim to create data bank on Indian ornithology and natural history.

R&D Set-up

SACON has its own campus (55 acres) within the Nilgiri Biosphere Reserve situated at Anaikatty. Presently, SACON has buildings for office, library, laboratories such as ecotoxicology, conservation genetics, geo information system (GIS) EIA, and wetland. The R&D expenditure are used by external agencies, individuals, and academicians.

Source of income for R&D

- Donations
- Grant-in-aid

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 557.82

FY 2015-16 = 586.52

FY 2016-17 = 737.52

R&D Achievements

Major research work or innovations accomplished:

- Conservation of the edible-nest Swiftlet *Collocalia fuciphaga* in the Andaman and Nicobar Islands
- Impact of agricultural pesticides on the population status and

breeding success of select species of fish-eating birds in Tamil Nadu

- Monitoring the impact of Jjangi Wind Power Farm (91.8 MW) with special reference to birds and bats
- Monitoring and surveillance of environmental contaminants in birds in India
- Ecological species sorting in relation to habitat structure in the small cat guild of Eaglenest Wildlife Sanctuary, Arunachal Pradesh
- Determining the taxonomic and conservation status of the Forest Owlet (*Heteroglaux blewitti*)

Technical Collaborations

National

Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu; Karunya University, Coimbatore, Tamil Nadu; National Centre for Biological Sciences, Bengaluru, Karnataka; B N Bhandarkar College of Science, Thane, Maharashtra; Manipal University, Manipal, Karnataka; Outreach Foundation of India, Coimbatore, Tamil Nadu; Indira Gandhi National Open University, New Delhi

International

Department of Biology, Davidson College, Davidson, NC, USA

Societal Relevance

As part of MoEFCC Swachh Bharat Abhiyan Programme, SACON is conducting a cleanliness awareness programme in and around Coimbatore city. [Q](#)

Research Outcomes

- Papers published: : 82



^ Campus view

Registered Office

Sanjivani Rural Education Society, PO Shingnapur, District Ahmednagar, Maharashtra 423 603

T: 02423-222862

E: principalcoe@sanjivani.org.in

W: www.sanjivanicoe.org.in

Recognition Status

File No.: 11/683/2015-TU-V

Initial Recognition: 2015

Valid Until: March 31, 2018

R&D Manpower

Doctorates: 36

Research Areas

- Pharmacognosy
- Phytochemistry
- Anti-psychotics drug discovery
- Bioadhesive drug delivery

Research Outcomes

- Paper published : 446
- IPRs held
 - » Patents filed: 29

SANJIVANI RURAL EDUCATION SOCIETY

Brief Description

Sanjivani College of Engineering, Kopargaon, is amongst the premier technical institutes in the state of Maharashtra in the un-aided sector under Sanjivani Rural Educational Society. The vision of the institute is social transformation and upliftment of rural masses through education, training, and research. The mission of this institute is to develop technical human resources towards socio-economic growth of rural India for global competitiveness. Some of the major research interventions are pharmacognostic and phytochemical and pharmacological investigation, synthesis and biological evaluation, etc.

R&D Set-up

The research facilities and infrastructure available in the organization are BOD incubator, coating pan with gun, dehumidifier, tablet dissolution test apparatus, dosing filling for liquid twin head, double cone blender 1 kg, electronic digital balance AY/120, filter press 8"-diameter 6 plates, orbital shaking incubator, sieves shaker electromagnetic, stability oven, rotary tablet punching machine, and many more.

Source of income for R&D

Grant in aid

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 43.46

FY 2015-16= 5.91

FY 2016-17= 6.62

R&D Achievements

Products developed

- » Mouthwash tablet
- » Anti-cancer compound
- » Polyherbal anti-stress formulation

Major research projects undertaken by the organization:

- Pharmacognostic and phytochemical and pharmacological investigation on *Pterospermum acerifolium Wild.* (*Sterculiaceae*)
- Synthesis and biological evaluation of some 1,5-benzodiazepine derivative
- Formulation development, optimization, and evaluation of bioadhesive drug delivery
- Synthesis and evaluation of some pyridodibenzothiazepine derivative as novel anti-psychotic agent
- Synthesis and antipsychotic activity of some novel 1,4 benzoxazepine derivatives

Technical Collaborations

National

Haffkine-Ajintha Pharmaceuticals Ltd (HAPL), Jalgaon; Jubilant Pharmaceutical and Chemical Laboratory (JPCL), Panvel; Micropan Pharmachem Pvt. Ltd, Navi Mumbai; InnCare Specialities, Nashik; Unijules Lifesciences Pvt. Ltd, Nagpur; Brookfield Engineering Ltd, Mumbai; BRK Instruments Pvt. Ltd, Mumbai; Ashwamedh Ayurveda, Kopargaon

International

Kwazulu Natal University, South Africa. 

SARDAR PATEL RENEWABLE ENERGY RESEARCH INSTITUTE

Brief Description

The Sardar Patel Renewable Energy Research Institute (SPRERI) is a leading organization for research and development of renewable energy (RE) technologies, focusses on sustainable biomass conversion and solar energy-based solutions, which are technically efficient, economically viable, environment friendly, and meet the needs of society.

It is a non-profit autonomous organization registered as a society under the Societies Registration Act 21 of 1860.

R&D Set-up

The research facilities and infrastructure available at the Institute are as follows:

- X-ray diffractometer
- X-ray fluorescence spectrometer
- Scanning electron microscope
- Optical microscopy
- Inductive coupled plasma spectrometer (ICP-OES)
- Fourier transform IR spectrometer

Sources of income for R&D

- Grant-in-aid
- Government funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 =134.67

FY 2015-16 =137.75

FY 2016-17 =91.17

R&D Achievements

Products/processes developed

- Activated charcoal from agro residues
- Bioremediation of dairy effluent to clean water for irrigation applications
- Green process for biomass valorization using natural solvents
- Biomass torrefaction for enhancing fuel properties of biomass
- Marine microalgae cultivation
- Dairy wastewater bioremediation
- Humic acid from biogas spent slurry
- Hydrogen sulphide removal from biogas
- Biomethanation of dairy scum
- Biogas from aquatic weeds
- Supplementation of micronutrients for enhanced biomethanation of rice straw
- Pyrolysis of leather waste
- Cellulases production from different biomass and others

Prototypes developed

- Thermal battery-based PV direct driven solar refrigerator
- PIC micro controller-based single axis sun tracker
- Solar bio-gas hybrid refrigeration system
- Forced convection solar drying system for stevia foliage
- Pilot scale biomethanation system for water hyacinth

Registered Office

Sardar Patel Renewable Energy Research Institute, Post Box No.2, Near BVM Engineering College, Vallabh Vidyanagar 388 120, Gujarat

T: 02692 235011

E: director@spreri.org

W: www.spreri.org

Recognition Status

File No.: 11/65/1988-TU-V

Initial Recognition: 1988

Valid Until: March 31, 2019

R&D Manpower

Doctorates: 24

PGs & Graduates: 62

Research Areas

- Solar energy
- Bio-conversion of biomass
- Thermo-chemical conversion of biomass
- Technology transfer
- Regional test centre

Research Outcomes

- Papers published:
 - » National: 13
 - » International: 18
- IPRs held 2

Commercialization potential of products/processes developed

Following are the products, processes commercialized:

- Top feeding natural draft domestic biomass cookstove and top cum side feeding natural draft domestic biomass cookstove
- Natural draft domestic and community size biomass cookstove
- Dairy waste scum biogas plant
- Kitchen waste biogas plant
- Design, development, and evaluation of floating dome type prefabricated biogas plant
- Development of solar ETC with heat pipe heater based wax melting system

Technical Collaborations

National

Indian Council of Agricultural Research; Krishna Allied Industries Pvt. Ltd, Halol; Gujarat State Rural Development Corporation,

Gandhinagar, Gujarat; Acron Industry; Actseven Overseas, Rajkot, etc.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Environmentally-safe green solvents
- Improved in-house cellulases from lignocellulosic waste materials
- Pellets as solid biofuel from agro-residues
- Renewable energy intervention for rural development
- Improved biomass cookstoves (IBCS reduces 30%–40% consumptions of fuels and a substantive percentage of indoor air pollutants, such as PM, CO, and VOC), toilet-linked biogas plants (for better disposal of human and animal waste), etc.
- Solar thermal testing devices which aid in improving the solar energy heating in households and reduction in grid power and others. 🔍



▲ Trapping of isotopic carbon dioxide from ambient air in clay-based nanocomposites

SATYENDRA NATH BOSE NATIONAL CENTRE FOR BASIC SCIENCES

Brief Description

The Centre is an autonomous research institute established under Department of Science & Technology, Government of India. The Centre is also a major hub of advanced manpower training and linkage in this crucial area of science and technology. The Centre offers PhD programmes in areas such as theoretical physics, which has made some of the most fundamental conceptual contributions in the development of quantum mechanics and quantum statistics

Satyendra Nath Bose National Centre for Basic Sciences, registered as a society in 1986.

R&D Setup

The research facilities and infrastructure available in the organizations are ultra-fast spectroscopy set-up; extension of nanofabrication and device fabrication facility, including clean room facility; cluster computing facilities; 75 TeraFlop massively parallel cray supercomputing facility; time and space resolved Kerr effect measurements, etc.

Source of income for R&D

Grant-in-aid

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 3,033.47

FY 2015-16 = 3,167.27

FY 2016-17 = 3,614.15

R&D Achievements

- Observational constraints on back reaction models in the context of analogous scalar field cosmology.
- Phase dependent spectroscopy of a new Mira variable and fundamental parameters of M-giants from optical/IR spectra
- Solar-soft X-ray spectra from VLF radio signal data from a ground-based receiver.
- Patio-temporal correlations among functional protein residues explored.
- Biomedical instruments for non-invasive medical diagnosis developed.
- Stable and enhanced visible-light water electrolysis for clean and sustainable energy by using surface functionalized/surface doped ZnO Nanorods.
- Non-stoichiometric ferromagnetic shape memory alloys of type Ni-Mn-Sn exhibiting transition from high symmetric cubic phase investigated from first principle calculations.
- Schrodinger equation in non-commutative space time, spectral distance in doubled Moyal plane.

Technical Collaborations

Approximately 40 national and international collaborations are a part of the centre.

Registered Office

S N Bose National Centre for Basic Sciences, JD Block, Sector-III, Salt Lake City, Kolkata 700 106, West Bengal
T: 033 2335 1313
E: director@bose.res.in
W: www.bose.res.in

Recognition Status

File No.: 11/152/1989-TU-V
Initial Recognition: 1989
Valid Until: 31 March, 2018

R&D Manpower

Doctorates: 184
PGs & Graduates: 16

Research Areas

- Astrophysics and cosmology
- Chemical, biological, and macro-molecular sciences
- Condensed matter physics and material sciences
- Theoretical sciences

Research Outcomes

- Paper published: 514
- IPRs held
 - » Patents filed: 20
 - » Patents awarded: 6

Societal Relevance

The following R&D outcomes are of national/societal significance:

- A simple diagnostic methodology for non-invasive detection of infection in real time using human breath analysis.
- Pico-calorimeter for biochemical and small volume analyser for DSC/microscope attachment.
- Prototyping thin-film devices using functional oxide patterned films.
- Development of light-operated micro-actuator using photomechanical actuation of ferromagnetic shape memory alloys
- Hybrid nanocomposites and porous metal-organic framework compounds for CO₂ and toxic gases removal.
- Enzyme catalysed biodegradation of xenobiotic compounds: Treatment of industrial effluents.
- NIR optical instrumentation for application. 🔍



Research campus

Registered Office

Principal, Saveetha Engineering College, Saveetha Nagar, Thandalam, Kancheepuram (Dt), Chennai 602 105, Tamil Nadu
T: 9841725345
E: principal@saveetha.ac.in
W: www.saveetha.ac.in

Recognition Status

File No.: 11/593/2013-TU V
Initial Recognition: 2013
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 56
PGs & Graduates: 87

Research Areas

- Renewable energy
- Nano science
- Advanced manufacturing
- Robotics
- Mems
- Material design
- Wireless sensor networks

SAVEETHA ENGINEERING COLLEGE

Brief Description

The Saveetha Engineering College is registered by the Saveetha Medical & Educational Trust. It mainly works in renewable energy, nano science, robotics, etc.

R&D Set-up

The research facilities and infrastructure available are as follows:

- Spectrofluorometer
- Thermo Luminescence Dosimetry Reader
- High Temperature Muffle Furnaces
- Hydraulic Press
- Pulverizing Machine
- High Capacity Dry Grinder
- Muffle Furnace – Temperature 1200 °C and 1500 °C
- Two probe setup for conductivity measurement and LCR metre
- Gamma Ray scintillation counter

Sources of income for R&D

Government funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 =17.00

FY 2015 -16 = 19.00

FY 2016 -17 =13.00

R&D Achievements

Products developed

- Non-silicate glasses for radiation shielding purpose

- Development of Filler Grade PTFE powder and recycling of PTFE scrap materials
- Phosphate glasses with different RE element dopants were prepared by conventional melt quenching method
- Development of a stable RPL/TL phosphor with line array response for radiation dosimetry in high dose region.
- Development of X-ray imaging plate based on filmless radiography
- Development of the largest KBr single crystal for opto electronic device applications

Technical Collaborations

National

K R Industries, Chennai; Ford India Ltd; Infosys Ltd; Oracle Corporation; ICT Academy of Tamil Nadu

International

Intellisense Corporation, USA; University of Massachusetts Lowell, USA; Purdue University University College of Engineering. 🔍

Research Outcomes

- Papers published: 402



▲ Sci Tech advanced learning centre

SCI TECH CENTRE

Brief Description

The SCITECH Centre is engaged in pharmaceutical filling services and research and prototype development on aspects on pharmaceuticals, applications of polymer, and related activities. The centre is a non-governmental organization registered as a company under Section 8 of the Companies Act 2013.

R&D Set-up

The research infrastructure of the institute is used by industry for their research, and by academia and other institutions for their scientific/technical programmes. These comprise of the following facilities:

- Advanced Learning Centre
- Technical Library
- Research Design Office, along with advanced facilities
- Research Prototype Development Centre, with CNC machines and other prototype development equipment.

Sources of income for R&D

- R&D project grants
- Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 2,659.00

FY 2015-16 = 2,691.00

FY 2016-17 = 2,165.00

R&D Achievements

Processes developed

- Design and development of compact thermoforming prototype for lab studies
- Prototype development of spherical shape medicament for dosing in dip moulded containers
- Prototype upgradation and development of 4 camera-based BIS BPO system
- Development of low-cost code vision system which will have smallest size and high speed pharma code reader
- Development of Track & Trace - Secondary packaging compatible checkweigher and others.

Prototypes developed

- Prototype development of novel concept of equipment to prevent aqueous solution
- Design and development of a prototype for measurement of weight of filled dip mould containers.
- Design and development of prototype equipment for uniform heating of moulds for special formulation
- Design and development of prototype equipment to quantify dip mould containers in predetermined requirement
- Development of online vision system for inspecting and marking defects on dip mould containers

Registered Office

SCITECH Centre,
7, Prabhat Nagar, Jogeshwari
West. Mumbai 400 102,
Maharashtra
T: 022 2287 2557
E: scitech.centre@
scitechcentre.com
W: www.scitech.net.in

Recognition Status

File No.: 11/68/1990-TU-V
Initial Recognition: 1990
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 8
PGs & Graduates: 84

Research Areas

- Pharmaceutical engineering
- Dosage forms
- Polymers
- Vision systems and general research

Research Outcomes

- IPRs held
 - » Patents awarded: 6

- Development of sophisticated clamping device for dip mould containers and others.

Commercialization potential of products/processes developed

Following are the projects which have a high commercialization and most of them are commercialized:

- Development of spherical shape medicament for dosing dip mould containers project
- Conceptualization and development for advance high compression machine
- Development of track and trace secondary packaging compatible checkweigher
- Prototype equipment design and development for dip mould container filling of toxic in contained atmosphere
- Development of “verif-i-Solutions” for effective T&T solution for Pharma Industries
- Study of dielectric constant solid doses on different molecules

- Development of prototype equipment to increase productivity of hot pin dip moulds on pilot plant

Technical Collaborations

National


ACG Pam Pharmaceuticals Pvt. Ltd, Maharashtra; Jubilant Life Sciences Ltd, Uttar Pradesh; Dr. Reddys's Laboratories Ltd, Telangana; MSD Wellcome Trust Hilleman Laboratories, New Delhi; Getz Pharma Research Pvt. Ltd, Maharashtra

International

S M Pharmaceutical SDN BD, Malaysia

Societal Relevance

The following R&D outcomes are of national/societal significance:

The institute has been partnering with the Ministry of Health to conduct technical training programmes for drug inspectors. 



^ Solar photovoltaic water pumping systems

SCIENTIFIC AND INDUSTRIAL TESTING AND RESEARCH CENTRE

Brief Description

The Scientific and Industrial Testing and Research Centre works for industry-oriented research projects towards better, competitive, innovative, and energy-efficient products and processes and knowledge management and transfer through the development of human potential. It is registered as a society.

R&D Set-up

The research facilities and infrastructure available are as follows:

- Pumps and accessories testing and material testing computerised AC/DC. Motor submersible electrical materials testing
- Computerized instrumental analysis/identification computerised high precision calibration under controlled environment

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 9.36

FY 2015 -16 = 56.59

FY 2016 -17 = 187.90

R&D Achievements

Products developed

- Testing of solar photovoltaic pumping system
- Development of Single Phase Smart Motor

Research projects undertaken by the organization

- Design and Development of 1.1kW Submersible Monoblock
- Packaged Drinking Water Testing Project
- Solar Photovoltaic Water Pumping Systems
- Smart Submersible (6 inch) pumping solutions for industrial and water supply applications


Technical Collaborations

National

Smile Automation, Coimbatore; Global Rollers, Coimbatore; Plastic Export Zundert (India) Pvt. Ltd, Coimbatore; INF Controls, Coimbatore; L G Balakrishnan & Bros Ltd, Coimbatore, etc.

Societal Relevance

The following R&D outcomes are of national/societal significance:

Smart Submersible (6 inch) pumping solutions for industrial and water supply applications is for import replacement and export of Indian manufacturers' product. 

Research Areas

- Book: 1

Research Outcomes

- Product development from concept through reverse engineering
- Development of appropriate quality management system
- Cluster development

Registered Office

Scientific and Industrial Testing and Research Centre (SiTarc)
83 & 84 Avarampalayam Road,
K R Puram Post, Coimbatore
641 006, Tamil Nadu
T: 0 422 427 3612
E: sitarcinfo@sitarc.com
W: www.sitarc.com

Recognition Status

File No.: 11/135/1989-TU-V
Initial Recognition: 1989
Valid Until: March 31, 2019

R&D Manpower

PGs & Graduates: 13



^ Object-oriented analysis and design laboratory

SETHU EDUCATIONAL TRUST

Brief Description

Sethu Institute of Technology is a non-government organization registered as a trust. Research and development laboratory (image processing) of the institute was established in the academic year 2008-09. Research and development laboratory (networking & data mining) was established in the academic year 2013-14. The department offers qualitative training and scope for research. The department provides state-of-the-art computing facilities to the students. It also promotes active industry-institute collaboration by identifying areas of interest and taking part in sponsored research projects. The department is equipped with seven programming laboratories.

R&D Set-up

All the departments of the institute have their respective laboratories, such as mechanical engineering, computer science and engineering; electronics and communication engineering; electrical and electronics engineering; civil engineering; physics; chemistry, etc.

Source of income for R&D

Grant-in-aid

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 37.85

FY 2015 -16 = 32.80

FY 2016 -17 = 26.70

R&D Achievements

Products developed

- In the phosphating of metal shell project, the oil seals for automobiles are processed by phosphate surface coating process to increase the wear resistance and act as a base for painting.
- In the automation to split reed valves based on flow rate project, the process of inspection of reed valves is automated based on flow rate using sensors to avoid smaller variations in the outward flow of four-cylinder engines in the manufacturing and assembly section.
- In the automated marking on raw materials project, students have developed an automated marking system for identification of raw materials.
- In the elimination of visual inspection project, students have developed machine vision system for the inspection of critical components used in automobiles to ensure zero defect with 100% controlled processes.
- Digital stethoscope project aims to replace the functioning of ECG wherein a magnetic frame covers the digital stethoscope. This setup gives ECG reading in addition to Lub-Tub sound of stethoscope. It reduces the cost of ECG and complicate setup required for ECG.
- In the Vaigai – Dirty to Divine project, the polluted state of river Vaigai was studied and suggestions to change the status from dirty to divine is proposed

Registered Office

Sethu Institute of Technology,
Pullor 626 115, Virudhunagar
District, Tamil Nadu
T: +914566308001
E: sit@sethu.ac.in
W: sethu.ac.in

Recognition Status

File No.: 11/686/2016-TU-V
Initial Recognition: 2016
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 68
PGs & Graduates: 135

Research Areas

- Image processing
- Network and sensors
- Composite materials
- Mathematical bonding
- Nanomaterials

Research Outcomes

- Papers published: : 431
- IPRs held 2

and many other products developed under different projects.

Technical Collaborations

National

Indian Institute of Technology, Madras; Hi tech Arai Ltd, Madurai, Tamil Nadu; CECRI, Karaikudi; TVS Rubbers, Madurai, Tamil Nadu; Kalasalingam University, Krishnankoil; National Institute of Technology, Jamshedpur; VIT University, Vellore; etc.

International

School of Pharmacy and Life Sciences, Robert Gordon University, Aberdeen, UK; Hefei National Lab for Physical Sciences at Microscale, University of Science and Technology of China, Hefei; University of Murcia, Spain; etc.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- In order to make the connectivity with national programme such as Clean Energy, Swasth Bharat, Digital India, and Skill India, the college-neighbourhood network has been promoted by signing an MoU with panchayat presidents of Kambikudi and Kalkurichi Panchayats which consists of 14 villages.
- Several outreach programmes are conducted towards community development and the students are engaged in these community development programmes.
- Activities carried out for sustained community development are tree plantation, blood donation camps, cleanliness drive, etc. 🔍



^ Biochemistry laboratory

Registered Office

Shanmugha Arts, Science,
Technology & Research Academy
(SASTRA), Tirumalaisamudram,
Thanjavur 613 401, Tamil Nadu
T: 04362 - 264111
E: swami@sastra.edu
W: www.sastra.edu

Recognition Status

File No.: 11/428/2003-TU-V
Initial Recognition: 2003
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 287
PGs & Graduates: 517

Research Areas

- Cloud image segmentation
- Identification of a new micro-organism
- Textiles
- Nano science

SHANMUGHA ARTS, SCIENCE, TECHNOLOGY & RESEARCH ACADEMY

Brief Description

The Shanmugha Arts, Science, Technology & Research Academy (SASTRA) is a deemed university registered as a trust. The main focus of the research is to develop a new body of knowledge leading to patents and technology transfer; to develop newer technologies for societal benefit; to publish in highly reputed peer-reviewed international journals; and to forge new collaborations with institutions and industries to leverage on mutual strength.

R&D Set-up

The research facilities and infrastructure available are as follows:

- High Performance Computing Cluster
- Confocal, fluorescence and electron microscopy and live animal imaging facilities
- NABL-accredited chemical and biological testing facility
- Modern Production Centre
- Sensor Fabrication and Testing Facilities
- High Voltage Test Facility
- Central Instrumentation Facility, etc.

Sources of income for R&D

Government funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 559.43

FY 2015-16 = 1,069.81

FY 2016 -17 = 1,660.25


R&D Achievements

Products developed

- Combinational Transmit Diversity (CTD)-enabled Cognitive Radio Network with simple Spectrum Sensing Scheme
- Algorithm for cloud image segmentation
- Identification of a new microorganism to treat textile effluents
- Nanosensors to detect toxic volatile gases, etc.

Technical Collaborations

National

TATA Consultancy Services; Cognizant Technology; TCS; Brakes India Ltd; Altera; Windriver; TATA Communications; Accenture; Texas Instrument; Wipro. 

Research Outcomes

- Papers published: 2,670
- IPRs held
 - » Patents filed: 43



^ R&D Lab

SHIROMANI GURDWARA PARBHANDAK COMMITTEE'S GURU NANAK KHALSA COLLEGE OF ARTS, SCIENCE AND COMMERCE

Brief Description

Shiromani Gurudwara Prabandhak Committee's Guru Nanak Khalsa College of Arts, Science & Commerce is among the earliest institutions of higher learning. It is permanently affiliated to the University of Mumbai. The college has conducted research in fermentation technology, bioinformatics application, stem cell research, etc.

R&D Set-up

The research facilities and infrastructure of the institution are being used by the academia and individuals. These include:

- Colorimeter
- Conductivity metre
- PH metre
- Rotary shaker
- Spectrometer
- Turbidity metre
- Fume chamber-Table Top
- UV Inspection Cabinet
- Laboratory Oven
- Rotary Evaporator with Vacuum Pump
- HPLC
- Gas Chromatograph
- High Performance Dual Bath
- Digital Ultra - Low Temperature Freezer Model WUF-SOO
- Microfuge

Sources of income for R&D

- Fees and funds
- Rent of premises

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 72.48

FY 2015-16 = 62.69

FY 2016-17 = 76.64

R&D Achievements

Organization has worked in various research projects:

- Catalytic Wet Peroxide Oxidation of Organic pollutants from industrial waste water using Partially Substituted La and Pr Perovskite.
- National Facility for Biopharmaceuticals Services for Bioprocess Training and Biopharmaceutical Characterization.
- Contractors Employed by the Great Indian Peninsula Railway for the Construction of Railway Line from 1853 to 1971.
- Development of Smart Paint by Nanoparticles Synthesized via Green Process.

Major research projects completed by the organization include:

- National Facility for Biopharmaceuticals Services for Bioprocess Training and Biopharmaceutical Characterization
- Contractors Employed by the Great Indian Peninsula Railway for

Registered Office

Shiromani Gurdwara Parbhandak Committee's Guru Nanak Khalsa College of Arts, Science and Commerce, Nathalal Parikh Marg, Matunga, Mumbai 400 019 Maharashtra
T: 022-2409 6234
W: www.gnkhalsa.edu.in

Recognition Status

File No.: 11/461/2006-TU-V
Initial Recognition: 2006
Valid Until: March 31, 2018

R&D Manpower

- Doctorates : 16
- PGs & Graduates: 1

Research Areas

- Fermentation
- Biotransformation
- Nutraceuticals
- Bioinformatics
- Mammalian cell culture
- Stem cell analysis

Research Outcomes

- Papers published: 8

the Construction of Railway Line from 1853 to 1971

- Development of Smart Paint by Nanoparticles Synthesized via Green Process

Technical Collaborations

National

Stemade India Pvt. Ltd, Maharashtra; Epigeneres Biotech Pvt. Ltd, Maharashtra; Premium Serums Pvt. Ltd, Maharashtra; Clearsynth Pvt. Ltd, Maharashtra. 🔍



↗ Research laboratory

Registered Office

Synergy Institute of Engineering & Technology, Bhimpur, Pahala, Khorda, Bhubaneswar 752 101, Odisha
T: 06762 225 905
E: sietdkl@synergyinstitute.net
W: www.synergyinstitute.net

Recognition Status

File No.: 11/557/2012-TU V
Initial Recognition: 2012
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 5
PGs & Graduates: 10

Research Areas

- Nano science
- Microbial synthesis
- Green synthesis
- Nano medicine
- Polymer

SHIVANI EDUCATIONAL AND CHARITABLE TRUST (SYNERGY INSTITUTE OF ENGINEERING & TECHNOLOGY)

Brief Description

The Synergy Institute of Engineering & Technology is a non-governmental educational institute funded by Shivani Educational and Charitable Trust. They work on R&D activities, such as fabrication of multiwalled carbon nano tube, synthesis and characterization of polymer nano composites for electronic, photonic and biomedical applications, nano medicine, green synthesis of various nano particles, such as gold, silver, copper, iron, and zinc for cancer therapy, AIDS therapy, and anti-microbial activity, and many more.

R&D Set-up

The research facilities and infrastructure available are as follows:

- Heating mantle
- Chemical
- Fluorometer
- pH metre
- UV Vis Spectrophotometer
- Computer
- Nanoparticle and others

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2015-16 = 4.37

FY 2016-17 = 15.74

R&D Achievements

Products developed

- Chitin and chitosan from prawn shell

- Tamarind seed polysaccharide from tamarind seed
- Curcumin from turmeric powder to be used for cancer therapy
- Polylactic acid (PLA) from mango kernel
- Biodegradable polymers from Guargum
- Degradable polymer film from thermoplastic starch and polyethylene
- PLA from corn starch

Processes developed

- Biodegradable polymer films have been manufactured from PLA which is obtained from corn starch
- Degradable polymers from chitosan
- Degradable polymers from tamarind seed polysaccharide
- New process for the production of curcumin from turmeric

Technical Collaborations

National

Amplus Solar Power Pvt. Ltd

Societal Relevance

The following R&D outcomes are of national/societal significance:

Clean energy intended for supplying to the institution is partially a part of energy conservation. 🔍

Research Outcomes

- Papers published: 5



↖ Moringa leaf powder

SHRI A M M MURUGAPPA CHETTIAR RESEARCH CENTRE

Brief Description

Shri AMM Murugappa Chettiar Research Centre (MCRC) has been working on devices and technologies for rural application of eco-friendly technologies to combat pollution. Resource utilization, recovery, and management are the major areas of focus by scientists in MCRC. Many of the devices and technology packages are eco-friendly and are dovetailed with local needs. Simple technologies have also been designed for the use of local artisans. It is a non-governmental organization registered as a society.

R&D Set-up

MCRC has three campuses:

- Science Centre, Taramani, Chennai
- Technology Centre, Perungudi, Chennai
- Agriculture and Energy Centre, Vadakadambadi, Kanchipuram

The research facilities used by the researchers are:

- Reflectance spectrophotometer, Atomic Absorption Spectrophotometer, High Performance Liquid Chromatography, Mobile Soil Testing Laboratory, Total Carbon Analyser, and Accessories, Glass Fermenter, Soil carbon dioxide (CO₂) flux measurement, Spray Drier, Portable Alternative Analytical technique, Spectrophotometer, Solar-based Water Lifting Device,

Electronic Orbital Shaker, UV-Vis Spectrophotometer.

Source of income for R&D

- Project funding
- Grant-in-aid
- Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 247.64

FY 2015-16 = 284.67

FY 2016-17 = 284.89

R&D Achievements

Products developed

- Meditex: An anti-microbial fabric against multidrug resistance organism.
- Spinosin using as biopesticide, Mangiferin using as biopesticide,

Processes developed

- Improved method of growing organic Ganoderma
- Intensive cultivation of Moringa leaves
- Integrated energy system for water pumping, cold storage, and dryer

Commercialization potential of products/processes developed

- Alternative analytical technology for soil nutrient analysis
- Organic cultivation of indigo and dye extraction

Registered Office

Shri AMM Murugappa Chettiar Research Centre, Taramani, Chennai 600 113, Tamil Nadu
T: 044 2243 0937
E: energy@mcrc.murugappa.org
W: www.mcrc.murugappa.org

Recognition Status

File No.: 11/45/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 10
PGs & Graduates: 18

Research Areas

- Biofertilizers
- Biocontrol agents and Biopesticides
- Bioenergy
- Biomass
- Solar Energy
- Climate Change

Research Outcomes

- Papers published: 27
- IPRs held
 - » Patents filed: 12

Technical Collaborations

National


Indo-German Centre for Sustainability and Departments of Biotechnology, Computer Science, and Chemistry, IITM, Chennai; Centre for Advanced Studies in Botany, University of Madras, Chennai; Alagappa University, Karaikudi; Main Bio-control Research Laboratory, Chengalpattu; Institute of Reservoir Studies, ONGC, Ahmedabad; Gandhigram Rural University, Gandhigram; Centre for Indigenous Knowledge System, Chennai; National Institute of Rural Development, Hyderabad; Central Leather Research Institute, Chennai; Central Electrochemical Research Institute, Chennai; State Training Centre, Education Department, Pondicherry Auroville Farms, Pondicherry, and others.

International

Virtual Fertilizer Research Centre of IFDC, Washington

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The livelihood technologies are well adopted by the beneficiaries and the organic inputs like *Bacillus spp*, Vitamate, biodynamic manures & fortified panchagavya prepared by the beneficiaries using the locally available resources not only helped the farming communities to apply organic inputs to their crops but also helped them to reduce the amount spent on purchase of chemical-based manures and pesticides and earn better quality yield.
- The technologies standardized at MCRC are acting as solutions for the problems faced by the rural communities and thereby improve socio-economic status & quality of life of the downtrodden people. Promotion of intensive cultivation of Moringa and Spirulina in the rural villages to address malnutrition and anemia for the rural women and children.
- MCRC has extended the Spirulina technology to the villages by training the rural people, especially women. 



Research scholars in chemistry laboratory

Registered Office

Shri Vile Parle Kelavani Mandal's Shri C B Patel Research Centre for Chemistry and Biological Sciences, 3rd Floor, Bhaidas Sabhagriha Bldg., N S Road No.1, J V P D Scheme, Vile Parle (West), Mumbai 400 056, Maharashtra
T: 022-4235 5961
E: cbprcentre@gmail.com
W: www.cbprc.ac.in

Recognition Status

File No.: 11/293/1993-TU-V
Initial Recognition: 1993
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 6

Research Areas

- Analytical chemistry
- Phytochemistry
- Physiology
- Toxicology
- Biochemistry
- Microbiology
- Molecular biology

SHRI VILE PARLE KELAVANI MANDAL'S SHRI C.B.PATEL RESEARCH CENTRE FOR CHEMISTRY & BIOLOGICAL SCIENCES

Brief Description

Shri Vile Parle Kelavani Mandal's Shri C B Patel Research Centre for Chemistry and Biological Sciences is a leading research-based organization, funded by Shri C.B.Patel Research Centre for Chemistry & Biological Sciences. This research institute mainly works for analytical chemistry, physiology, phytochemistry, etc. It is a non-governmental organization registered as a trust.

R&D Set-up

The research facilities and infrastructure available in the organizations are High Performance Liquid Chromatograph (HPLC) with fluorescence-Model-FP-920 and UV visible detector-875-UV, HPLC autosampler AS-950, Binary gradient HPLC system with two PU-980 intelligent pumps, HG-980-30 solvent mixing module, UV-975 UV-Vis detector, Low pressure Gradient HPLC system 1500 series consists of PU-1580, UV-1575, AS-1555 with cooling facility & 84 vials, Borwin IS/W, Mixing module, AGILENT 1100 Series HPLC System, etc.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 28.49

FY 2015 -16 = 40.08

FY 2016 -17 = 41.19

R&D Achievements

Products developed

- Isolation and characterization of phyto-constituents for in-vitro

evaluation of hepato-protective activity using cell-lines

- Management of diabetic retinopathy with ayurvedic herbs
- Study on interaction of Cytochrome P450 (CYP450) with an anti-diabetic herb.
- Dissolution rate enhancement study of bio-active constituents from 'Boswellia Serrata'
- 'Antidiabetic potential of some bioactive compounds from *Enicostemma littoraleblume*'

Processes developed

- Study of adsorption characteristics of Carbon Nanomaterials (CNM) synthesized from waste biomass for removal and recovery of heavy metal ions (As and Cr) from aqueous solution
- Development and validation of stability indicating analytical methods for antibiotic drug substances

Technical Collaborations

National

BARC, Konark Fixtures Ltd, Gufic Biosciences Ltd, Themis Medicare Ltd 

Research Outcomes

- Papers published: : 37
- IPRs held
 - » Patents filed: 2



^ R&D activities in the organization

SHRIRAM SCIENTIFIC & INDUSTRIAL RESEARCH FOUNDATION

Brief Description

The Shriram Institute for Industrial Research (SRI), a unit of Shriram Scientific & Industrial Research Foundation is an independent, self sustaining, not-for-profit multidisciplinary contract research institute conducting research and development in the areas of special significance to industry, government agencies, and other organizations. SRI is committed to develop, innovate, analyse, and apply technology for products and processes. SRI also brings its innovations to the marketplace by licensing its technologies and helps in establishing production units for the interested clients.

R&D Set-up

The research facilities and infrastructure of the organization are available many places in India with proper equipments and lab facilities:

- High Performance Liquid Chromatograph (HPLC)
- Gas Chromatograph Perkin Elmer, Clarus 680
- Ion Chromatograph Metrohm 882 compact IC plus
- Thermogravimetric analyzer NETZSCH STA
- DSC/TA Instrument-Model DSC Q 200
- Particle Size Analyser Microtrac S3500 Zetatrac
- Total Organic Carbon Analyzer (TOC) Elementar, Vario TOC cube
- CHNS Analyzer Elementar III, 2005 and many more

Sources of income for R&D

- Government funding
- Pvt. funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 4,750.89

FY 2015-16 = 6,744.81

FY 2016-17 = 7,087.70

R&D Achievements

Products developed

- LED light curable dental cement
- Intraocular Lenses
- Non-toxic X-ray resistant protective aprons
- Dry lubricant using graphite and modified PTF
- Pepper spray gel

Processes developed

- Synthesis of fluorinated fluids
- Synthesis of polyvinyl tetrazole binders highly efficient activated bamboo charcoal UV curable wood coatings

Prototypes developed

- UV curable wood coatings machine
- Chromium Test Kit

Technical Collaborations

National

Bhabha Atomic Research Centre (BARC), Mumbai; Defence Research and Development Organisation; The Tribal Cooperative Marketing Development Federation of India Ltd

Registered Office

Shriram Institute for Industrial Research (SRI)
(A unit of Shriram Scientific & Industrial Research Foundation),
8E, Diamond Press Building,
2nd Floor, Rani Jhansi Road,
Jhandewalan Extension,
New Delhi 110 055
T: 011 2766 7267
E: doff@shriraminstitute.org
W: www.shriraminstitute.org

Recognition Status

File No.: 11/87/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates : 47
PGs & Graduates: 117

Research Areas

- Rubber and plastics
- Waste utilization
- Bio-fuels
- Coating
- Natural polymer
- Drug and pharma
- Radiation processing

Research Outcomes

- Papers published: 30

(TRIFED); Bureau of Energy Efficiency (BEE), Delhi; National Dairy Research Institute (NDRI), Karnal; etc.

International

Royal Government of Bhutan; Korn Technologies Ply Ltd, Australia; Thailand Institute of Scientific and Technological Research (TISTR), Thailand; Danish Technological Institute, Denmark, etc.

Societal Relevance

The following R&D outcomes are of national/societal significance:

The service developed with technical co-operation of the Government of India for capacity building in the areas of sewage treatment & solid waste handling aims to provide a clean environment to the society. 🔍



^ Radar altimeter

SOCIETY FOR APPLIED MICROWAVE ELECTRONICS ENGINEERING AND RESEARCH

Brief Description

The Society for Applied Microwave Electronics Engineering and Research (SAMEER) is an autonomous organization. Its key research areas are Industrial Application of High Power RF and Microwave Electronics, EMI / EMC Tests, Measurements & Certification, Antenna & Electromagnetics, Communication Systems, etc. It is registered as a society under the Government of India.

R&D Set-up

The research facilities and infrastructure available in the organizations are EMI/EMC test facility as per civilian & military standards, EMI/EMC instruments and RF equipment/component calibration facility, Electrical / Electronic & Environmental Safety test facility, Antenna Positioner and controller, Meter, shielded Anechoic Chamber, MIL Standard Chamber, Conducted Immunity Test, Harmonics & Flicker CTS, Surge /DO/Ring Wave Test System, Automotive Test Generator, RF Power Amplifier, etc.

Source of income for R&D

- Grant-in-aid
- Sponsored projects

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 7,751.00

FY 2015-16= 1,0729.00

FY 2016-17= 8,990.00

R&D Achievements

Major research work or innovation accomplished are the the following:

- Two RF Channel CDMA Receiver Target Update Receiver Femtosecond Laser
- Spread Spectrum Transmitter Target Update Transmitter
- Development of FCS System for Cochin Ship Yard
- Design development & supply of Omni directional Antennas for Radio On the Move ROTM
- Development of DDACS System for the new RIB Facility of VECC
- Development of GaAs based Quantum infrared Detectors in the transmission window of 8 to 12 Microns
- 6 MV Medical LINAC based integrated Oncology system under Jay Vigyan Mission Phase I
- Development of Hand Held Data Logger HHDL for acquiring and processing Surface Observations at Synoptic Intervals

Commercialization potential of products/processes developed

- EMC instruments and RF components calibration facility / services
- CDMA based Tele-command system
- Two RF Channel CDMA Receiver
- Consultancy service towards Evaluation of shielding effectiveness of shield chambers

Registered Office

Society for Applied Microwave Electronics Engineering and Research (SAMEER),
IIT Campus Hill Side Powai,
Mumbai 400 076
Maharashtra
T: 022-2572 7100
E: director@sameer.gov.in

Recognition Status

File No.: 11/354/1997-TU-V
Initial Recognition: 1997
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 14
PGs & Graduates: 129

Research Areas

- Radar-based instrumentation for strategic and civilian applications
- Industrial application of high power RF and microwave electronics
- EMI / EMC tests, measurements and certification
- Antenna and electromagnetics
- Communication systems
- Medical electronics
- Photonics-based instrumentation
- Millimeter wave radars and systems for strategic and civilian applications
- Electromagnetic environmental effects (E3) research and development
- High power microwave tube and component

Research Outcomes

- Papers published: 77
- IPRs held
 - » Patents awarded: 5

- Medical cancer therapy machine
- Revenue earned by commercialization of products and services is ₹1,478 lakhs.

Technical Collaborations

National

IITM, IITH Development, Magneto

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Electrical / Electronic Safety & Environmental Test Services: This service is essential as there are international safety standards for electronic/electrical products. In the absence of testing facilities, the products cannot be put in the market and also exported to other

countries, thus, directly affecting industrial growth.

- CDMA-based Tele-command System: The developments are meant for application in DRDO labs. CDMA technology is robust against jamming of communication links. Hence, the product can improve the reliability of the systems wherein the technology is implemented.
- Two RF Channel CDMA Receiver: The developments are meant for application in DRDO labs. CDMA technology is robust against jamming of communication links. Hence, the product can improve the reliability of the systems wherein the technology is implemented. 🔍



▲ Building materials from C&D waste

SOCIETY FOR DEVELOPMENT ALTERNATIVES

Brief Description

The Society for Development Alternatives (DA), is a social enterprise dedicated to sustainable development. The institution is a research and action organization with a mission to help eliminate poverty and regenerate the environmental resource base through methods that are highly scalable. The activities broadly cover three primary areas that underlie any sustainable development process: the design and large-scale dissemination of appropriate technologies, rational environmental management systems, and equitable people-oriented institutions and policies. The institution is registered as a society under the Societies Registration Act.

R&D Set-up

The research facilities and infrastructure available in the organization used by industries, individuals, and academia are as follows:

- **Product and Technology Development Workshop:** The workshop designs and develops hardware for technology packages successfully run by skilled professionals qualified in various aspects of machine design and development.
- **Building Material Laboratory:** The Building Material Testing Laboratory is one- of-its-kind R&D centres in India addressing the needs of Indian brick industry. The lab offers facilities, such as testing for soil, green, and fired

bricks, demonstration of improved methods for soil storage and handling, mix preparation, firing and performance monitoring and balanced mechanization to ensure easy handling of greenbricks in each and every step of production.

- **Research and Development Facility:** This lab facility has a team of highly skilled scientists and analysts in the field of air quality, drinking water, and wastewater and soil quality monitoring.
- **Materials Testing Laboratory:** Material research and characterization laboratory has been set up to facilitate laboratory testing and thermal characterization of different building materials.

Sources of income for R&D

- Government grants
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D

FY 2014-15 = 621.06

FY 2015-16 = 698.83

FY 2016-17 = 3,843.02

R&D Achievements

Products developed

- 100% pond ash-based bricks
- C&D waste-based kerbstones
- High strength fly ash bricks using additive
- Low carbon cement with Gujarat raw materials

Registered Office

Society for Development Alternatives (DA), B-32, TARA Crescent, Qutub Institutional Area, New Delhi 110 016
T: 011 2654 4100
E: mail@devalt.org
W: www.devalt.org/

Location of R&D Units

- New Delhi, Delhi
- District Tikamgarh, Madhya Pradesh
- Datia, Madhya Pradesh
- Jhansi, Uttar Pradesh

Recognition Status

File No.: 11/52/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 6
PGs & Graduates: 97

Research Areas

- Industrial waste utilization technologies
- Low carbon and resource efficient building technologies
- Water testing and purification systems
- Clean energy technologies
- Livelihood technologies
- Community empowerment

Research Outcomes

- Papers published: : 2
- IPRs held
 - » Patents filed: 1
- Technologies transferred/commercialized: 8

- Household AuroAquasafe fluoride solution
- Jal-TARA RO HARIT Household filter
- Low and medium duty foundry slag-based paver block
- Low and heavy duty C&D waste based paving block
- Household SODIS products
- Multi pure Arsenic Filter (Community)

Processes developed

- TARA gram store-aggregation model
- Paper and product development
- Social enterprise model for delivery of aqua+
- San-nap technology(Aakar Innovation)
- TARAloom Technology (Utilizing PET Yarn)
- Foundry slag-based paver block technology
- Women group as owner and distributor model for San-Nap
- Social enterprise as owner and distributor model for San-Nap
- Business model for enterprise development model on fibres

Prototypes developed

- Poned ash marble sludge bricks
- Kota stone dust as supplementary cementitious material
- Rapid bacterial testing kit (ColiPAT)

- Jal-TARA Community Arsenic filter
- Community SODIS product

Technical Collaborations

National

Indian Institute of Technology Delhi, Madras, Bombay; Indian Institute of Science, Bengaluru; Malviya National Institute of Technology, Jaipur; National Environmental Engineering Research Institute, Nagpur; Foundation for MSME Clusters, New Delhi.

International

EcolePolytechniqueFederale De Lausanne, Switzerland; Wuppertal Institute, Germany; Chatham House, England; York University, Canada; Antenna Technologies, Switzerland; TAFGuard Technologies, Japan; Global Infrastructure Basel Foundation, Switzerland.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Various building materials produced from mining, construction, demolition, and other wastes has a direct relevance to Swachh Bharat mission.
- They use low energy technologies for clean energy and create skilled jobs which has direct relevance to Skill India Mission of the Government of India. 🔍



↗ Side channel evaluation set-up

SOCIETY FOR ELECTRONIC TRANSACTIONS AND SECURITY

Brief Description

The Society for Electronic Transactions and Security (SETS) is an autonomous organization registered as a society under the Government of India. The main charter of SETS is to pursue basic and applied research in the area of Cyber Security, Network Security, Security of Embedded Systems, and Cryptology. It also works towards dissemination of knowledge for development of human resource in these critical areas of national importance.

R&D Set-up

The research facilities and infrastructure available in the organization are Fortigate 80c Firewall, Primergy CX400S1, Side Channel Analysis on FPGA board (SUKURA-X-FPGC Board), Side Channel Analysis on Smart - card Board (SAKURA-W Board) Including Smart Card At Mega 163+24c256, Burp Suite Professional – License, etc.

Source of income for R&D

Government funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 312.27

FY 2015 -16 = 316.49

FY 2017 -18 = 349.14

R&D Achievements

Products developed

- Integrated Threat Management Appliances (ITMA), Version-1

- Deep Packet Management Analysis Tuning Engine (DATE), Version-1
- Development of PKI-based on ECC for CA Services: A Pilot Project
- Analysis, Design and Development of Microkernel-based Secure Operating System
- Design and Development of Algorithmic Counter measures against SCA in implementation of crypto algorithm
- Development of Key Distillation Engine for IITM-QKD Project and many more

Processes developed

- Formulation of IT Security Policy for Tamil Nadu Electricity Board (TNEB)
- Vulnerability Assessment and Penetration Testing (VAPT) of ANURAG Operating System

Technical Collaborations

National

KJLJL, JMISC, JfcXIJL, HIM, IIT-Bombay, IIT-DelM, IGCAR, DRDO, DAE, and other central and state government organizations

International

NTU, Singapore, QUT, Australia

Societal Relevance

The following R&D outcomes are of national/societal significance:

- ECC-based PKI facilitates Digital Signing to the users
- Digital Signing, e-Document Signing, and Digital Signature

Registered Office

Society for Electronic Transactions and Security (SETS), MGR Knowledge City, C.I.T. Campus, Taramani, Chennai 600 113, Tamil Nadu
T: 011-26510491
E: ed@setsindia.net
W: www.setsindia.org/index.html

Recognition Status

File No.: 11/443/2005-TU-V
Initial Recognition: 2005
Valid Until: March 31, 2020

R&D Manpower

Doctorate: 3
PGs & Graduates: 17

Research Areas

- Cryptography
- Cryptanalysis
- Hardware security
- Cyber/network security
- Training and services

Research Outcomes

- Papers published: 332
 - » National: 4
 - » International: 7

Creation for the user; ECC also facilitates digital signing to the users

- Trainings and workshops are organized for miscellaneous

services, such as Digital Signing, e-Document Signing, and Digital Signature Creation for the respective users. 🔍



Fresh Amla

Amla Drying in Amla



Beetroot Colour coated Amla chutneys

Dried Amla Chutneys

^ Beetroot colour coated to solar hydrated amlasupari

SOCIETY FOR ENERGY, ENVIRONMENT & DEVELOPMENT

Brief Description

The thrust areas of the Society for Energy, Environment & Development (SEED) include research and development as well as training in the field of solar cabinet dryer technology and solar food processing technology. The institute aims to improve the quality of life of rural India through empowerment of women and youth by adopting modern technologies and generating new ones. The institute seeks to promote and popularize solar drying and solar food processing technologies in the country. SEED is registered as non-governmental society.

R&D Set-up

The following are the research facilities available to carry out the R&D activities:

- Hot air oven, spectrophotometer, pH metre, water bath, hot plate
- Water distillation unit, soxhlet apparatus, muffle furnace
- IR moisture analyser, fume exhaust hood, vacuum oven, centrifuge
- Digital moisture analyser, laminar air flow, autoclave, flame photometer, incubator, rotary evaporator, microscope, solar power system, and environmental chambers

Sources of income for R&D

Government agencies

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 23.70

FY 2015-16 = 11.60

FY 2016-17 = 33.84

R&D Achievements

Products developed

SEED has developed around 40 products since 2014; few of them are given below:

- Solar dehydrated fruit bars of fig, apple, apricot, plum, cherries, jack fruit, and pineapple
- Solar dehydrated forest products
- Osmo-solar dehydrated fruit slices
- Nutritive supplementary drink
- Chocolate enrobed osmo is a solar dehydrated fruit
- Organic fruit bars of mango, guava, banana, sapodilla (*chikku*), pineapple, and dates
- Solar dehydrated-vegetables of capsicum, cabbage, cauliflower, red chillies, carrot, beans, and onions

Processes developed

- Solar dehydration process for the underutilized fruits and vegetables in different sub-tropical and tropical regions of the country, such as fig, sapota, guava, apple, apricot, plum, etc.
- Osmo-solar food processing of fruits, such as mango, guava, pineapple, jack fruit, and *chikku*.
- Process for formulation of enriched nutritional supplementary diet containing sprouted ragi, soya flour, dehydrated vegetables and sugars to combat malnutrition,

Registered Office

Society for Energy, Environment & Development, Plot No. 81, 'Golden Residency', Road No.7, Jubilee Hills, 500 033, Telangana
T: 040-23608892
E: seed@seedngo.com
W: seedngo.com/

Recognition Status

File No.: 11/549/2011-TU-V
Initial Recognition: 2011
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 10
PGs & Graduates: 13

Research Areas

- Green energy applications
- Solar food processing technology
- Rural employment

Research Outcomes

- Papers published: 4

such as protein, calcium, iron, Vitamin-A & C for 6-16 years students

- Organic fruit bars and slices with no preservatives chocolate enrobed dried fruits of mango, guava, etc.

Prototypes developed

- Solar Cabinet Dryer-200, SDM-400 & SDM-500 models
- Solar powered Micro Food Processing System interfacing with food processing equipment. In this entire production line, only solar power is used, thereby, there is no energy cost.

Commercialization potential of products/processes developed

- Mango, *chikku*, guava, mixed fruits, fig, bars/rolls wheat grass, ragi malt, curry leaves powders, gooseberry (*amla*) *supari*, nutritive drink and chocolate enrobed fruits. Promotion of innovative products through conducting workshops/seminars/training programmes/skill development programmes for women empowerment for sustainable livelihood. Technology partner for commercialization of 'SEED' solar dried food products &

'SEED' Solar cabinet dryers through M/s Solar Dryers & Foods LLP, Hyderabad.

Technical Collaborations

National

National Institute of Nutrition, Hyderabad, Telangana; Regional Centre, Central Food Training & Research Institute, Hyderabad, Telangana; Prof. Jayasankar Agricultural University, Hyderabad, Telangana; Andhra Pradesh Horticultural University, Tadepalligudem, Andhra Pradesh; Kovel Foundation, Visakhapatnam.

Societal Relevance

The following R&D outcomes are of national/societal significance:

Dried food products, dryers, and food processing techniques are based on solar energy which are environment-friendly. Eco-friendly technologies have been developed to protect climatic conditions. Promotion of innovative products through conducting workshops/seminars/training programmes/skill development programmes for women empowerment for sustainable livelihood. 



^ Training laboratory

SOCIETY FOR INNOVATION AND DEVELOPMENT INNOVATION CENTRE, INDIAN INSTITUTE OF SCIENCE

Brief Description

The society for Innovation and Development (SID) was set up in 1991 in close collaboration with Indian Institute of Science (IISc) Bengaluru. It was founded to use this repository of knowledge to help business enterprises and thereby the economy and nation at large. The major research areas are neuro-degenerative related to age, population health and population genetics.

R&D Set-up

The research facilities and infrastructure of the organization are available at many places in India with proper equipments and lab facilities:

- The Centre has a facility for high throughput genetic studies. This includes facilities for blood sample storage, DNA isolation, genetic studies, and long-term storage of DNA samples.
- Computational Infrastructure: The Centre has its own servers and workstations for large-scale computing and data storage. It also has its own website server.
- The Centre has a behavioural core facility which aims to identify early behavioural deficits in Alzheimer's disease animal models. The Centre is also equipped with a histology and ultra-structural imaging platform. It provides routine histology processing, specialized histo-chemical and immune histological techniques,

and access to several microscopic platforms.

Sources of income for R&D

- Donation

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2015-16 = 0.30

FY 2016-17 = 56.44

R&D Achievements

They have been involved in various projects such as Srinivaspura Aging, Neuro Senescence and COGnition (SANSCOG) study; IndianGenome project and Dementia and stroke: genetic determinant and their interaction in the setting of a hospital based study population from South India and many others.

Technical Collaborations

National

National Institute of Mental Health and Neurosciences

Societal Relevance

The following R&D outcomes are of national/societal significance:

In recent years, the burden of infectious disease has come down while the burden of non-communicable disease like those of the heart, diabetes, blood pressure, and mental and neurological disorders have increased. Neurological disorders, such as dementia, have a

Registered Office

Centre for Brain Research,
CV Raman Avenue,
SID Complex,
Indian Institute of Science,
Bengaluru 560 012, Karnataka
T: 080-22933589
E: rmd@iisc.ac.in
W: www.cbr.iisc.ac.in

Recognition Status

File No.: 11/368/1999-TU-V
Initial Recognition: 1999
Valid Until: March 31, 2020

R&D Manpower

Doctorates : 5
PGs & Graduates: 12

Research Areas

- Neuro-degenerative disorders related to age
- Population health
- Population genetics

Research Outcomes

- Papers published: 4

huge social and economic burden and India will have the maximum number of these disorders in years to come.

The Centre for Brain Research's focus is on such neurological disorders that will affect millions of Indians. Through its population-based studies, the Centre is trying to identify the risk and protective factors that lead to these disorders. Identifying these factors will lead to a better understanding of the disease which will then lead to therapeutics in terms of intervention and medications.

- Centre for Brain Research is also leading studies to identify the

genetic basis of many diseases.

This work is in collaboration with many research institutes across the country. The final product will be a genetic chip that can diagnose a genetic disease at a very low cost in the Indian population.

- Most of the knowledge generated at Centre for Brain Research will be made available free to everyone so that further advances in technology and diagnostic methods for diseases can be carried out in an easier manner and at a lesser cost. 🔍



^ Innovative technology developed in Punjab Shodh Yatra

Registered Office

Society for Research and Initiatives for Sustainable Technologies & Institutions, AES Boys Hostel Campus, Near Guj. Uni. Library & SBI Bank, Navrangpura, Ahmedabad 380 009, Gujarat
T: 079 27913293
E: sristi100@gmail.com
W: www.sristi.org

Recognition Status

File No.: 11/398/2001-TU-V
Initial Recognition: 2001
Valid Until: March 31, 2018

R&D Manpower

- Doctorates : 4
- PGs & Graduates: 16

Research Areas

- Grassroots innovations
- Honey Bee Network
- Honey Bee Database
- Medicinal Plant Database

SOCIETY FOR RESEARCH AND INITIATIVES FOR SUSTAINABLE TECHNOLOGIES & INSTITUTIONS

Brief Description

The Society for Research and Initiatives for Sustainable Technologies & Institutions (SRISTI) is a non-government organization registered as a society. It mainly works on grassroot innovations, medical plant database, etc.

R&D Set-up

The research facilities and infrastructure of the organization is available at many places in India with proper equipments and lab facilities:

- Multiple laboratory equipments, such as HPTLC, HPLC, GC, AAS, Lyophilizer, Cold Room
- Facility of 2,880 sq. ft will be shared from Grambharti Amrapur Grambharti for Bio incubator, etc.

Sources of income for R&D

Government funding

R&D Achievements

Products developed

- Agriculture machinery
- Three agriculture inputs
- Seven human external application

Processes developed

- Improvement as per users' feedback and further characterization

Technical Collaborations

National

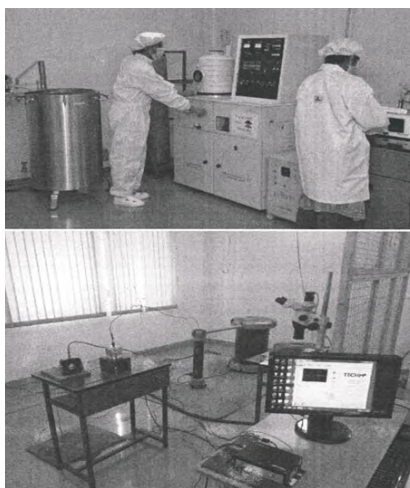
National Innovation Foundation (NIF), Ahmedabad, etc.

International

IDRC, The World Bank, International Labour Organization (ILO), USAID, JKUAT-Kenya, JSW, 3M, IMTech, BIRAC-DBT, TUFFE-China, NIF, and many more. 🔍

Research Outcomes

- Papers published: 7
- IPRs held
 - » Patents filed: 12



▲ Lab facilities

SONA COLLEGE OF TECHNOLOGY

Brief Description

Sona College of Technology was established in 1997. The college is engaged in the fields of science, applied sciences, engineering, technology and management studies. It offers bachelor of engineering, master of engineering, and doctoral degree in all major disciplines.

R&D Set-up

The following research facilities are provided by the organization:

- Centre for Nano Materials / Micro Machining (SONA CNM / CMM)
- Centre for Material Fabrication and optimization Research in Manufacturing (SONA METFORM)
- Sona Special Power Electronics and Electric Drives (SONA SPEED)
- Sona Electric Power Engineering Research and Testing
- Sona Power Electronics Drives and Controllers
- Centre of Excellence in Industrial Automation
- Sona Signal and Image PROcessing Research Centre

Sources of income for R&D

- Government sources
- Institutional contribution

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 88.13

FY 2015-16 = 95.00

FY 2016-17 = 251.92

R&D Achievements

Products developed

- Digital optic warp, weft stop motion, and counter
- Carbon quantum dots covered metal oxides nanomaterials
- Paver block bricks, Block Jelly works, precast elements, ferro cement chairs, road divider, geo polymer concrete
- Web Portal
- Android app

Processes developed or/under development

- Development of low cost, high efficiency third generation solar cells
- Improvement in size uniformity of self-assembled as quantum dots on GaAs substrate
- Implementation Fuzzy-PID controller in dSPACE hardware unit
- A simple process is developed to treat textile industry wastewater with nanohybrid materials
- Quantum well Infra Red photo detector
- Solar DC power and normal grid AC power controller
- A hand operated sewing machine developed for differently-abled persons.
- A novel L-shaped pressure plate was designed to control sewing machine speed. This development helped differently-abled people earn employment in the garment industry to control the sewing machine.

Registered Office

Sona College of Technology,
Junction Main Road,
Salem 636 005
Tamil Nadu
T: 0427-4099999, 4099919
E: principal@soantech.ac.in
W: www.sonatech.ac.in

Recognition Status

File No.:11/708/2016-TU-V
Initial Recognition: 2016
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 124
PGs & Graduates: 76

Research Areas

- Micro machining and coating
- Robotics and nonlinear dynamics
- Advanced electrical motors and drives
- High power converters and power supplies
- High voltage insulation design
- Nano dielectrics for high voltage applications
- Design of controllers, converters and inverter and simulation and modelling of motor
- Automation digital image processing
- Data mining and database technology

Research Outcomes

- IPRs held : 2
- Technologies transferred/ commercialized: 5

Technical Collaborations

National

EMBDES Technologies Pvt. Ltd, Bengaluru; Vikram Sarabhai Space Centre(VSSC), Thiruvananthapuram; Indira Gandhi Atomic Research Centre, Chennai; ISRO Inertial System Unit(IISU), Thiruvananthapuram; Atmospheric Science Department, Cochin University of Science and Technology, Cochi,n among others.

International

UNIVERSITAS AHMAD DAHLAN, Indonesia; University of Bologna, Italy; Centre for Research on the Epidemiology of Disasters (CRED); UNIVERSITY CATHOLIQUE DE LOUVAIN (UCL), Belgium; Advanced Science Research Center Japan Atomic Energy Agency, Tokai, Japan among others.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Android app is related to entrepreneurship of the rural farmers.
- Sewing machine for differently-abled persons: This development has good potential in society, especially to enhance the livelihood of differently-abled people.
- Training imparted to rural women on developed technologies: The differently-abled people in society are benefitted by this new instrument and can operate the sewing machine by use of hands. This will help them to sew garments and earn revenue for their livelihood.
- SONASTARCH is offering quality testing services to the tapioca starch-based food products in order to find the adulterants added during production processing. 🔍

SREE SASTHA INSTITUTE OF ENGINEERING AND TECHNOLOGY

Registered Office

Sree Sastha Institute of Engineering and Technology,
Bengaluru Highway,
Chembarambakkam, Chennai,
Tamil Nadu
T: 044 -26450120
E: principal@sasthaenggcollege.com
W: sasthaengg.com

Recognition Status

File No.: 11/680/2015-TU-V

Initial Recognition: 2015

Valid Until: March 31, 2018

Research Areas

- Biotechnology
- Study design of low power wireless sensor nodes
- Performance analysis of analog and digital circuits in VLSI
- Security in wireless networks-establishment and testing
- Performance study in liquid fluid bed using PCM
- Energy recovery study from cooling tower for photovoltaic cooling
- Performance study of heat pipes with nanoparticles

Brief Description

Sree Sastha Institute of Engineering and Technology is a self-financed engineering college situated in Tamil Nadu. It works mainly under the areas of Biotechnology and since it is an interdisciplinary course, the institute extends its arm in the following research areas: medical biotechnology, nanotechnology, pharmaceutical-based studies, food processing, environmental studies, etc.

R&D Set-up

The institute provides facilities for testing of steel, concrete and structural lab, properties of materials and building components, automotive fuel property test lab, SI engine Test Rig with Digital Data Acquisition System, emission analyser, H₂ fuel cell rig, cold storage [10 tonne] research facility, phase change materials application/utilization study in solar field, steam power generation unit, and others. There are other equipments available in the institute, such as PEM Single fuel Cell Research Panel, universal testing machine, bioreactor, 50 tonne loading frame, ultrasonic pulse velocity, electronic universal testing machine, two-wheeler chassis dynamometer, steam boiler with turbine test, wheel alignment apparatus, two-wheeler test rig p-v p-q set-up, diesel fired steam boiler test, and others.

R&D Achievements

Products developed

- Hindrance to prison break using neuro simulator

- Mobile App for Hydraulic Analysis and Design of Water Pipes and Waste Water Sewers
- Manually-operated pesticide spray
- Strapless safety helmet
- Supercharging a naturally-aspirated two-wheeler SI engine
- Test algorithm for mycobacterium growth in liquid medium and others

Technical Collaborations

National

- NIIT; Time Institute; Zi Technology; Oracle; Vee Eee Technologies Solutions Pvt. Ltd; Eye Open Technology; Kriatec Services Pvt. Ltd; Institute of Biomedical Research (IBMR); Central Leather Research Institute (CLRI); Steinbeis Solar Research Centre; BSNL, Chennai; Vishnu Cars Pvt. Ltd; Trans SUN Energy; Indian Institute of Entrepreneurial Development; Kriatech Services Pvt. Chennai; Yokogawa India Ltd, Bengaluru; EPR Lab, Chennai

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The research projects and products aimed are very useful for the society for utilization, improving the quality of life, protecting the environment, and at the same time improving the economic conditions too. 🔍

Research Outcomes

- IPRs held:
 - » Patents filed: 21



^ Campus view of the research and development set-up

SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY

Brief Description

Sreenidhi Institute of Science and Technology is sponsored by Sree Education Society of the Sree Group of Industries, Sreenidhi Institute of Science & Technology, Hyderabad. It is a non-governmental organization registered as a trust.

R&D Set-up

The research facilities and infrastructure of the organization is available at many places in India with proper equipments and lab facilities:

- LoT research lab sponsored by ibm
- Embedded systems lab sponsored by ARM university programme
- VLSI lab sponsored by xilinx university programme
- Analog lab sponsored by TI university programme
- Big data and analytics research lab and many more

Sources of income for R&D

Government funding

R&D expenditure (₹ in lakhs)

The SIRO is not maintaining separate accounts for R&D.

FY 2014-15 = 17.85

FY 2015-16 = 90.00

FY 2016-17 = 64.56

R&D Achievements

Products developed

- Intelligent robotic arm for electrical integration of missile systems
- Hexacopter for surveillance

- Speech recognition robot for differently-abled persons
- Internet of things (IOT) augmentation for radiation detectors
- Chip design with radiation hardened feature
- Thin films for solar energy
- Micro algal biomass production for biodiesel
- Speech recognition system for people with speaking disabilities
- Aluminium-silicon nano allied material
- Metabolic engineering of safflower for increased seed oil
- Artificial heart – ventricle assist device

Processes/Prototypes developed

- Mechanical stress analysis process for HAL
- Agro robot for higher crop yield
- Smart irrigation with automation for farmers
- IOT for home automation
- Solar-powered vehicles
- Solar panel cleaning system
- Solar incinerator

Technical Collaborations

National

Thrive Solar Energy Pvt. Ltd, Cherlapally, JDA, Hyderabad; Aerospace Technologies Ltd; Habsiguda, Hyderabad; Indian Institute of Foundrymen, R&D Centre, Hyderabad; Rocsys Technologies Pvt. Ltd, Hyderabad;

Registered Office

Sreenidhi Institute of Science and Technology Yamnampet, Ghatkesar, Hyderabad 501301, Telangana
E: principal@sreenidhi.edu.in
W: www.sreenidhi.edu.in

Recognition Status

File No.: 11/507/2009-TU-V
Initial Recognition: 2009
Valid Until: March 31, 2018

R&D Manpower

Doctorates : 93
PGs & Graduates: 116

Research Areas

- Robotics
- Low power VLSI plant
- Biotechnology
- Internet of Things
- Fault tolerant (VLSI) artificial Heart (VAD)
- Data Analytics and Cloud


Research Outcomes

- Papers published: : 714
- IPRs held
 - » Patents filed: 22
 - » Patents awarded: 5

Cherlapally Industries, Hyderabad;
Borewell Equipment Pvt. Ltd,
Hyderabad; Kadevi Engineering
Company (P) Ltd, Hyderabad

Societal Relevance

The following R&D outcomes are of
national/societal significance:

- Thin films for solar energy
- Solar-powered vehicles
- Solar panel cleaning system
- Solar incinerators. 



^ LabVIEW software and EmonaDATEX telecommunication board for ELVIS

SRI RAJESHWARA EDUCATIONAL SOCIETY

Brief Description

Sri Rajeshwara Educational Society runs three engineering colleges, and scores of junior colleges and schools spreading over Telangana and Andhra Pradesh. The institution fosters research and innovative approaches for continuous improvement by strategic planning, benchmarking, and performance monitoring. The society is a non-governmental body registered under the Andhra Pradesh (Telangana areas) Public Societies Registration Act.

R&D Set-up

The institute has an exclusive R&D Cell with required computational facilities. Apart from the facilities, the institute has various equipments available, few of them are listed below:

- DELL - RADIUS server
- NI Labview (for 35 users): NI ELVIS II, NI two axis step/servo high-performance motion controller, two-axis integrated stepper drive power unit, stepper motor for DC drive, stepper drive
- HP server (NComputing Thin klient Server)
- Morse Test & Performance Study of multi cylinder S.I. engine with hydraulic dynamometer
- Universal-testing machine model: UTM 40
- Micro vickers hardness tester and many more.

Sources of income for R&D

Government agencies

R&D expenditure (₹ in lakhs)

The SIRO maintaining separate accounts for R&D.

FY 2014-15 = 80.41

FY 2015-16 = 80.36

FY 2016-17 = 120.17

R&D Achievements

Products developed

- There are 23 products developed by the organization that include the following:
- Mobile application for mapping wildlife sanctuaries/National Parks / Bird Sanctuaries with requisite travel information useful for tourists
- Tablet-based 'app' for the collection of community health data
- Artificial arm: bracelet, fuel indicator in gas cylinders, pill alarm, stress-controlling machine, vehicle movement-based street lights, gas-leakage detector, anti hiking walking stick, smart bin, and many more.
- It is observed that banana fibre is a natural fibre with high strength, which can be blended easily with cotton fibre to produce blended fabric and textiles. At present, the process of blending is in progress in Women Technology Park.

Technical Collaborations

National

Infosys Ltd, Electronic City, Karnataka; IBM, Karnataka; CISCO, Tamil Nadu;

Registered Office

Sri Rajeshwara Engineering College Ananthasagar, Hasanparthy, Warangal Urban, Telangana 506 371
T: 0870 2818333
E: principal@srecwarangal.ac.in
W: www.srecwarangal.ac.in

Recognition Status

File No.: 11/674/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 15
PGs & Graduates: 25

Research Areas

- Engineering and technology
- Basic sciences
- Cognitive science

Research Outcomes

- Papers published: 128
- IPRs held
 - » Patents filed: 1

Microsoft Corporation (India) Pvt. Ltd, NCR; Hallmark Engineers, Telangana; MTS Technologies, Telangana; Delegate Technologies Pvt. Ltd, Telangana; 3Edge Solutions, Tamil Nadu

International

University of PURDUE, USA; Saint Louis University, USA; Indo-US Collaboration for Engineering Education

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The product clean bots developed by the society has direct relevance to Swachh Bharat Mission.
- Services, such as mobile application for mapping wildlife sanctuaries/national parks/bird sanctuaries with requisite travel information useful for tourists, and tablet based 'app' for collection of community health has direct relevance to Skill India and Smart India. 🔍



^ Website gallery

SRI RANGANATHA PADUKA VIDYALAYA TRUST

Brief Description

Sri Ranganatha Paduka Vidyalaya Trust is a non-governmental organization registered as a trust.

R&D Set-up

The research facilities and infrastructure of the organization are available at many places in India with proper equipments and lab facilities:

- Biological safety cabinet; autoclave; waterbath serological – digital; Millipore unit; Western blot; inverted microscope; UV-visible spectrometer
- Electronic balance; Elisa reader; PCR; centrifuge; CO₂ incubator; CO₂ cylinder (small) and many more

Sources of income for R&D

Government funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 18.49

FY 2015-16 = 38.56

FY 2016-17 = 37.43

R&D Achievements

Products developed

- The product comprises of cereals and sprouted grains fortified medicinal plant extract.
- It is a polyherbal formulation of extracts from medicinal plants and it was tested for its efficacy using various experimental wound models

- A health drink made up lyophilized extracts of natural revitalisers, immuno modulators, and antioxidants
- Mixture of plants extracts with rich antioxidant potentials
- It is a solution of effective microorganisms used to improve the yield of agro produce and also used to treat wastewater.
- A cream with natural moisture and essential oils from rose and Jasmine
- An eco-friendly, non-toxic plant growth stimulator

Technical Collaborations

National

Sree Padam, Mysore; Kalpatharu; Sami Labs Ltd, Bengaluru; Aravind Laboratories, Chennai

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Nutritive supplement fortified with rich herbal extract was formulated and their nutritive values were analysed and intense training was given to the entrepreneurs for marketing the same
- The target population (women/ SHG/farmers) are trained in preparing the organic manure using garden waste
- The target population (women/ SHG/farmers) are trained in preparing organic manure using domestic waste
- The SC/ST female population are

Registered Office

Sri Ranganatha Paduka Vidyalaya Trust (Srimad Andavan Arts & Science College) No.7, Nelson Road, Thiruvanaikovil, Tiruchirappalli 620 005, Tamil Nadu
T: 04314250152
E: srimad.principal@gmail.com
W: www.andavancollege.ac.in

Recognition Status

File No.: 11/427/2004-TU-V
Initial Recognition: 2004
Valid Until: March 31, 2018

R&D Manpower

Doctorates : 26
PGs & Graduates: 9

Research Areas

- Phytochemistry
- Medicinal plant research
- Protein biochemistry
- Standardization and scientific validation of herbal drugs
- Nutritional analysis
- Clinical microbiology
- Agricultural microbiology
- In-silico studies

Research Outcomes

- Papers published: 116

trained in preparing the nutritive supplement fortified with rich herbal extracts

- The SC/ST female population is trained in preparing the herbal-based cosmetics using

lyophilized powders herbal extracts

- The target population is trained in cultivating mushrooms and its nutritional analysis. 🔍



^ Research lab facility

SRI SATHYA SAI INSTITUTE OF HIGHER LEARNING

Brief Description

Sri Sathya Sai Institute of Higher Learning (SSSIHL) is a non-governmental organization registered as a university. The Faculty of Science has made tremendous progress in research over the last three decades. Scores of doctoral research students have graduated across the science streams and the facilities; also the know-how, and shared learning between the departments has facilitated high quality research.

R&D Set-up

The research facilities and infrastructure of the organization are available at many places in India with proper equipments and lab facilities:

- Scanning and transmission electron microscopes
- Liquid chromatography –mass spectrometry-(HR-MS [Q-TOF] and triple quad]
- Identification and quantification of multi-analytes
- Femto-second laser system
- Nuclear magnetic resonance spectrometer
- Structural studies at molecular level
- X-ray powder diffractometer
- Vibration sample magnetometer
- TIM- in vitro dynamic gastro-intestinal system
- BET surface area analyzer (physisorption/chemisorption)
- HP-TLC and many more

Sources of income for R&D

Government funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 463.91

FY 2015-16 = 502.52

FY 2016-17 = 587.12

R&D Achievements

Products developed

- Development of composite flour using wheat flour, pearl millet, foxtail millet, barnyard millet, and finger millet. Enrichment of composite flour was done by flax seed/garden cress seed for the development of cookies
- Composite flour was formulated by using only millets: pearl millet, foxtail millet, barnyard millet, finger millet, and enriched with flax seed for the development of cookies
- Passion fruit, a seasonal fruit, is a nutrient-rich fruit which is majorly used for juice manufacturing. Jelly was formulated by using pectin carotene rich pulp of passion fruit along with additives such as agar agar. The formulated jelly showed good acceptability and storage stability of 12 weeks at refrigerated conditions and many more

Technical Collaborations

National

Sri Sathya Sai Institute of Higher Learning; Foundation for Innovation

Registered Office

Sri Sathya Sai Institute of Higher Learning, Vidyagiri,
Prasanthinilayam 515 134,
Anantapur District,
Andhra Pradesh
T: 08555 287239
E: registrar@sssihl.edu.in
W: www.sssihl.edu.in

Recognition Status

File No.: 11/156/1989-TU-V
Initial Recognition: 2004
Valid Until: March 31, 2018

R&D Manpower

Doctorates : 52
PGs & Graduates: 52

Research Areas

- Molecular medicine and integrative biology
- Designing functional and therapeutic foods
- Catalysts and sensors
- Engineering multifunctional materials at different length scales

Research Outcomes

- IPRs held
 - » Patents filed: 2

and Social Entrepreneurship; Institute of Bioinformatics and Applied Biotechnology; Madras Diabetes Research Foundation; Sri Maharshi Research Institute of Vedic Technology; OmiX Research and Diagnostics Laboratories Pvt. Ltd

International

Japan Advanced Institute of Science and Technology; Maestro Technologies; Centre for Biologics Evaluation and Research; Food and Drug Administration (FDA), Bethesda, Maryland; Intel Corporation, USA. 



^ Vertical wind turbine

SRI VENKATESHWARA EDUCATION SOCIETY

Brief Description

Sri Venkateshwara College of Engineering as the flagship institution under Sri Venkateshwara Education Society imparts education in engineering, management, and beyond.

R&D Set-up

The research facilities and infrastructure of the organization are available at many places in India with proper equipments and lab facilities:

- Loading frame
- Biofuel lab
- Solar panels
- Internet connection and many more

Sources of income for R&D

Government funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 5.00

FY 2015-16 = 5.00

FY 2016-17 = 5.00

R&D Achievements

Products developed

- Automated gas leakage control system
- Pervious optical divider blocks
- Retractable traffic controller
- Starch/collagen-based vegetable casings for co-extruded food products

- Development of sheep wool fibre reinforced concrete
- Development of cock feather fibre reinforced concrete
- Development of civil engineering-related website
- Low-cost sustainable interlocking bricks
- Precast storm water drainage system
- Luminous concrete divider

Prototypes developed

- Pin on disc wear testing machine
- Vertical wind turbine

Commercialization potential of the processes/products developed

- Wear testing machine
- Vertical wind turbine

Technical Collaborations

National

MGIRE, Bengaluru; KGTTI, Government of Karnataka, Bengaluru; EMC2 Academic Alliance; Amazon Web Services; Virtual Academy of Ancient Knowledge Systems; Oracle India Pvt. Ltd; National Design & Research Forum, Bengaluru; ICT Academy; Karnataka Hybrid Micro Devices Ltd, Bengaluru; Unique Heat Carbo Pvt. Ltd, Bengaluru

Registered Office

Sri Venkateshwara College of Engineering Vidyanagar, Kempegowda International Airport Road, Bettahalasur Post, Bengaluru 562157, Karnataka
T: 080-32717536
E: secretary@svcengg.com
W: www.svcengg.com

Recognition Status

File No.: 11/564/2012-TU V
Initial Recognition: 2012
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 5
PGs & Graduates: 17

Research Areas

- Renewable energy
- Advanced concrete technology
- Robotics
- Network and information security
- Assistive technology
- Nanomaterials

Research Outcomes

- Papers published: 402

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Wear testing machine: Make in India
- Vertical wind turbine: Clean Energy
- Solar Mobile Charger: Clean Energy
- AgBot: Make in India
- M programming App: Digital India. 



^ R&D work in the organization

SRI VISHNU EDUCATIONAL SOCIETY

Brief Description

Sri Vishnu Educational Society is a non-governmental organization registered as a society. Its R&D activities mainly focus on high-voltage engineering, nanomaterials/nano drug delivery system., Cancer drugs/ molecular imaging of cancer, water resources engineering and GIS, and many more.

R&D Set-up

The research facilities and infrastructure available in the organization are micro-plate reader, auto analyzer, blood analyser, tablet-punching machine, flame photometer, FTIR & ATR, stereotaxic instrument, gel electrophoresis, Western blot, UV-visible spectrophotometer, etc.

Source of income for R&D

Grant-in-aid

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 175.73

FY 2015-16 = 221.23

FY 2016-17 = 275.34

R&D Achievements

Products developed

- Fully automatic wireless watertank control and monitoring system using IoT.
- Smart feeding device for feeding food to help disabled people (with upper limb paralyzed) and the elderly people.

- Home automation system with speed and intensity control using iot.
- A pharmaceutical combination for the treatment of sinusitis and other related disorders.
- Solar-based shrimp/fish feeding system.
- Wheelchair for physically challenged people
- Solar aerator
- Wireless communication device for those with hearing problems.
- Automatic page turner
- Autonomous navigation system for visually challenged people
- Hand gesture voice conversion
- Talking box with wireless, etc.

Processes developed

- A patient medical record repository system and associated method there in 5075/CHE/2015.
- Precise position control for elevator using high performance BLDC motor.

Prototypes developed

- Design and development of e-Moto bike this seen in the national-level Vishnu E-Moto championship 2016)
- IV & PV characteristics
- Configurable DC-DC converter
- Horizon-A-unmanned vehicle

Technical Collaborations

National

Aizant; Incogen Therapeutics Pvt..Ltd; Dr. Reddy's Laboratories; Granules India Ltd; VI Microsystems; Saurashtra

Registered Office

Sri Vishnu Educational Society,
Plot No. 7 & 8, Nagarjuna Hills,
Punjagutta Main Road,
Hyderabad 500 082
Telangana
T: 040-40334848
W: www.srivishnu.edu.in

Recognition Status

File No:11/626/2014-TU-V
Initial Recognition: 2014
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 90
PGs & Graduates: 235

Research Areas

- Radar signal processing
- Speech processing
- VLSI & robotics
- Antenna design and communications
- Data mining and big data analytics
- Artificial intelligence and image processing
- High voltage engineering
- Nano materials/ nano drug delivery system.
- Cancer drugs/ molecular imaging of cancer, etc.

Research Outcomes

- Paper published: 383
 - » IPRs held 6

University; Central Council for Research in Ayurvedic Science; Boga R Laboratories; Cyient Pvt. Ltd; TVS-Haritha; Titan Energy Systems

International


Vrije Universities, Amsterdam, The Netherlands; Konkuk University; University of Massachusetts Lowell, USA; Georgia Tech University, GA, USA; Elkem Solar, Norway

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Adoption of the cluster method for improving the vegetable farming practice for enhanced vegetable production for

sustainable livelihoods amongst the rural people. Various vegetable products with improved yields are developed under the DST-sponsored project and serving the rural farmer community.

- Rural Women Technology Park at Vishnupur College, Narsapur Mandal, Medak District, Telangana state. Under this DST-sponsored project, awareness is created amongst the rural women in order to enable them to set up enterprises based on the locally available resources. 

SRIMAHARSHI RESEARCH INSTITUTE OF VEDIC TECHNOLOGY

Brief Description

Srimaharshi Research Institute of Vedic Technology is a non-governmental organization registered as a trust. This institute works on ancient metallurgy, chemistry, and nano science.

R&D Set-up

The research facilities and infrastructure available in the organization are as follows:

- XRF machine
- Nano particle-size analyser
- BET surface area analyser
- UV-visible spectrometer
- – 20° C freezer
- Autoclave
- Orbital shaker
- Laminar air flow
- Incubator
- Hot air oven and many others

Sources of income for R&D

Government agencies

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 42.44

FY 2015-16 = 20.77

R&D Achievements

Products developed

- Fabrication of OFET-based gas sensors using green nano ZnO
- Energy harvesting using nano ZnO

- Synthesis of non-toxic and earth abundant kesterite nano powders
- Anti-bacterial and anti-fungal nano fabrics using nano copper

Processes developed

- Exploratory Study on Laboratory Scale Production of Armour Alloys as per procedures described in ancient Sanskrit literature
- Anti-corrosive paints for ship bottom applications using nano Zinc Oxide and Nano Copper.
- Development of nano alumina particles for increasing the elastic module and compression strength of the Cement

Commercialization potential of products/processes developed

- Aarshadhaatu Green Nanotechnologies and Navayuga Engineering Company

Technical Collaborations

National

IIT-D; IIT-M; NIPER, Guwahati; Central University, Hyderabad; Indian Institute of Chemical Technology (IICT - Hyderabad); S V University, Tirupati; Acharya Nagarjuna University, Guntur Vignan Foundation (Deemed to be University); S. VYASA University, Bengaluru

International

Prime Bio Inc – Boston, USA;
INADS – Boston, USA

Registered Office

Srimaharshi Research Institute of Vedic Technology (SRIVT),
2-14-159/2, Sri Manidweepam,
11th Lane, Syamala Nagar Extn.,
Guntur 522 006, Andhra Pradesh
T: 0863 2351777
E: sastryji@gmail.com
W: www.srivt.org

Recognition Status

File No.:11/492/2008-TU-V
Initial Recognition: 2008
Valid Untill: March 31, 2020

R&D Manpower

Doctorates: 3
PGs & Graduates: 2

Research Areas

- Ancient metallurgy
- Ancient chemistry
- Nanotechnology
- Biotechnology
- Food technologies
- Pharmacy-related research

Research Outcomes

- Papers published: : 4
- IPRs held
 - » Patents filed: 2

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Anti-germ pellets for public toilets and gas & chemical sensors material are significant to the Swachh Bharat Mission of the Government of India.
- Services Natural Food supplements is helpful for pursuance of the objectives of Swastha Bharat
- Green synthesis of nanomaterials is relevant for the Clean Energy Mission and Make in India campaign. 🔍



▲ Sectional model of a 4-stroke, single-cylinder diesel engine

Registered Office

Srinivasa Educational Academy
RVS Nagar, Tirupati Road,
Chittoor 517 127, Andhra Pradesh
T: 08572246339
E: info@svcetedu.org
W: www.svgei.org

Recognition Status

File No.: 11/628/2014-TU-V
Initial Recognition: 2014
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 36
PGs & Graduates: 48

Research Areas

- Automobile, industrial engineering, power electronics, and electrical drives
- Renewable energy sources
- Water resources
- Medical and pharmaceutical sciences, pharmacy, nursing, and life sciences

SRINIVASA EDUCATIONAL ACADEMY

Brief Description

Sri Venkateswara Group of Institutions comprises 23 colleges promoted by Srinivasa Educational Academy spread all over Andhra Pradesh. The integration of teaching and research on topics of the educational institutes enriches the relevance of education imparted to students at these educational institutes.

It is registered as a non-governmental organization registered under the Societies Act.

R&D Set-up

The following are the research facilities and infrastructure available in the organization and used by industries, individuals, and academicians:

- MTAB CNC bench milling and mini Robot, Computerized VCR diesel engine test rig, computerized VCR diesel engine set-up rig
- STAR TURN CNC Lathe, STAAD.PRO & STAAD Foundation Software, HORIBA Particle Size Analyser
- FT – IR spectrophotometer (Bruker), high pressure liquid chromatography (HPLC), stability chambers (02), vertical machining centre 610 and micro-hardness tester.

Sources of income for R&D

Government sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 87.93

FY 2015-16= 178.00

FY 2016-17= 126.79

R&D Achievements

Products/processes developed

- Electrical energy recycling fan
- Transform techniques for radar image analysis

Technical Collaborations

National

Infosys, Karnataka; Microsoft, Hyderabad, Telangana; SunGlow Pharmaceuticals Pvt. Ltd, Puducherry; Indian Healthcare BPO, Tamil Nadu

International

Kansas University, Manhattan, Kansas, USA; Milwankee School of Engineering, Wisconsin, USA

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Vision Robotics Workshop which has relevance to Skill India movement of the Government of India.
- Technologies, such as electrical energy recycling fan and techniques for radar image analysis. 🔍

Research Outcomes

- Papers published: 402
- IPRs held
 - » Patents filed: 7

ST. JOSEPH'S INSTITUTE OF SCIENCE & TECHNOLOGY TRUST

Brief Description

The chief vision of St. Joseph's Institute of Science & Technology Trust is to create a better learning environment to produce competent and innovative professionals with sound technical knowledge and management skills, to instill ethical and social values amongst the students to contribute to the global technological and socio-economic development, to inculcate qualities of leadership and entrepreneurship in students to improve their employability and achieve sustained placement through campus interviews, and to provide opportunities and resources through consistent industry-institute interaction for research and development in the emerging fields.

R&D Set-up

To carry out research and development works, department-wise facilities are available in the institute. These facilities are used by individuals and academicians.

Sources of income for R&D

Grants from government

R&D Achievements

They have developed a variety of innovative products based on the research work conducted in their college, some of which are listed below:

- Design of gyroscopically-controlled biomorphic robot and gait generation for assisted walking of humans

- Design and development of 3D printer
- Effect of dynamically-controlled reflectors on the performance of solar panels
- Dy Agram (Beta)—A Unique DNA-based ink and hologram for authentication security. 🔍

Research Areas

- Nanobiotechnology
- Image processing
- Targetted drug delivery
- Bigdata analysis
- Controller design
- Optical biosensors

Research Outcomes

- Papers published:
 - » International: 643
- IPRs held
 - » Patents filed: 11
 - » Patents awarded: 11

Registered Office

St. Joseph's Institute of Science & Technology Trust, 56-C, Old Mamallapuram Road (OMR), Sholinganallur, Chennai, Tamil Nadu
T: 044 2450 3132
E: principal@stjosephs.ac.in
W: www.stjosephstechnology.ac.in

Recognition Status

File No.: 11/569/2012-TU-V
Initial Recognition: 2012
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 122
PGs & Graduates: 1



^ R&D activity in by the society

ST. MARTIN'S CHILDREN'S EDUCATIONAL SOCIETY

Brief Description

St. Martin's Children's Educational Society is a non-governmental organization registered as a society. Their research is mostly in the domains of cloud computing, big data, data analytics, embedded systems, digital image processing, VLSI, communication, etc.

R&D Set-up

The research facilities and infrastructure available is as follows:

- High speed Internet facilities with latest configuration and latest version operating system, such as MATLAB, PSPICE, XYLINC, Mentor Graphics, Texas Instruments
- Full-fledged softwares and equipments, such as Abrasivejet machining, high temperature formability testing facilities, severe plastic deformation facilities, composite materials die facilities, etc.
- The research and development cell provides facilities of CATIA, MATLAB Software, and metal forming simulation facilities, software hyper works with all modules, such as hyper mesh and hyper form.

Sources of income for R&D

- Donations
- State schools
- Society

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 8.76

FY 2015-16 = 11.18

FY 2016-17 = 9.60

R&D Achievements

Products developed

Circuitous branches:

- LED display boards
- VLSI kits
- Low power VLSI devices
- Trainer kits for labs
- Solar street lights with automatic controller lights using sensors
- Water level indicators for apartments
- Electronic lock system
- Design & development trainers kits
- LED panels

Non-circuitous branches:

- Abrasive jet machine
- Metallic 3D printer
- Composite materials using human hair and other fibres
- Multi-spindle drilling machine
- Square hole broaching machine

Processes developed

Non-circuitous branches:

- Analysis of high-temperature formability of titanium alloys
- Severe plastic deformation of aluminium alloy using ECAP process
- Preparation of biodiesel from mango seed

Registered Office

St. Martin's Children's Educational Society, Secunderabad 500 014, Telangana
T: 040-2377 8018

Recognition Status

File No.:11/697/2016-TU-V

Initial Recognition: 2016

Valid Untill: March 31, 2019

R&D Manpower

Doctorates: 24

PGs & Graduates: 28

Research Areas

- Cloud computing
- Big data
- Data analytics
- Embedded systems
- Digital image processing
- VLSI
- Communication
- Formability
- Abrasive jet machining
- Welding
- IC engine

Research Outcomes

- Papers published:
 - » National: 7
 - » International: 305
- IPRs held
 - » Patents filed: 3

Commercialization potential of products/processes developed

Bamboo bicycle by non-circuitous branches has been commercialized by the organization.

Technical Collaborations

National

Coign Consultants Pvt. Ltd; Athena Knowledge Services Pvt. Ltd; Life Make Overs Training; Telangana Academy for Skill and Knowledge (Task); Focus Academy for Career Enhancement; Monster.Com India Pvt. Ltd, and others.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Solar street lights with automatic controller lights using sensors: renewable energy reduces the pollution

- Water level indicators for apartments: by water level indicator one can decrease the wastage of water
- Analysis of high temperature formability of titanium alloys under optimized tribological conditions at elevated temperature for aeronautical products application has direct significance to Make in India scheme of the Government of India as the aeronautical products can be produced for civil and defence aircrafts to make nation self-sufficient in aircraft production. 🔍



^ Products developed in the organization

ST. VINCENT EDUCATIONAL SOCIETY

Brief Description

The Samskruti College of Pharmacy was founded by St Vincent Educational Society in 2005. The college follows the University norms and has the required number of faculty—both ratio- and cadre-wise. The Samskruti College of Pharmacy has emerged into a centre-of-excellence in engineering. The key areas where they work are pharmaceutical analysis, pharmaceuticals, pharmacology, and others.

R&D Set-up

Research facilities and infrastructure of the organization are used by academicians for their research work and for research activities in MPharmacy and PhD courses.

Sources of income for R&D

Self-funding

R&D Achievements

Products developed

- The new product developed by the organization is accident spray. 🔍

Research Areas

- Pharmaceutical analysis
- Pharmaceuticals
- Pharmacology

Research Outcomes

- Papers published:
 - » National: 20

Registered Office

St. Vincent Educational Society
Samskruti College of Pharmacy,
Kondapur (V), Ghatkesar (M),
Medchal Dist (Old R R Dist),
Hyderabad 501 301, Telangana
T: +91-7989541235
E: info@samskruti.ac.in
W: www.svi.edu.au

Recognition Status

File No.: 11/676/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2017

R&D Manpower

Doctorates: 4
PGs & Graduates: 43

ST. XAVIER'S COLLEGE

Brief Description

St. Xavier's College is a non-governmental organization registered under a trust. Their research mainly revolves around cancer research, microbiology, etc.

R&D Set-up

The research facilities and infrastructure available in the organization are as follows:

- Carbon dioxide (CO₂) incubator
- Biological safety cabinet
- Inverted microscope
- Atomic absorption spectrophotometer (AA-400)
- Plant growth chamber
- Gel electrophoresis apparatus
- Shaker incubator
- U-2900 UV/VIS spectrophotometer
- F-7000 fluorimeter and many others

Sources of income for R&D

Government agencies

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 3.83

FY 2015-16 = 5.78

FY 2016-17 = 4.59

R&D Achievements

Products/ processes developed

- Bio-fertilizer formation is being developed along with liquid PGPR

- Use of desiccant silica and aluminium packaging to increase shelf life of green tea
- Standardization of protein crystallization and the techniques of structure determination using X-ray crystallography.

Prototypes developed

- Plant products were assessed using standard anti-microbial protocols
- Bio-filter is being developed

Technical Collaborations

National

Organic Agro India Pvt. Ltd Analytics India

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Development of liquid bio-fertilizer and organic pesticides
- The arsenic, cadmium, and lead content are tested on request and a survey is being conducted in semi-rural areas, such as Rajarhat, in the form of a coliform test in drinking water samples.
- A complete set of products are being developed with respect to bio-pesticides, bio-fertilizers, and plant growth-promoting substances.
- Treatment of biological waste, chemical waste, and disposal of biochemical waste.

Registered Office

St. Xavier's College, Kolkata,
30, Mother Teresa Sarani,
Kolkata 700 016, West Bengal
T: 03322551231
E: sxcket@sxccal.edu
W: www.sxccal.edu

Recognition Status

File No.:11/482/2007-TU-V
Initial Recognition: 2007
Valid Untill: March 31, 2020

R&D Manpower

Doctorates: 24
PGs & Graduates: 23

Research Areas

- Molecular biology - epigenetic regulation mechanism
- Protein interaction, unfolding dynamics
- Structural aspects probed with phosphorescence studies, docking studies
- Cancer biology
- Plant biochemistry / photo chemistry, development of bio-fertilizers, bioremediation
- Statistical mechanics and condensed matter physics

Research Outcomes

- Papers published:
 - » National: 14
 - » International: 58

- Recycling of flakes for the manufacturing of handmade purse, spectacle bag, and pencil bag. 🔍

SUMANDEEP VIDYAPEETH TRUST

Brief Description

Sumandeep Vidyapeeth Trust is a non-governmental organization registered as a trust. The R&D activities in the organization focus on neurological disorder, Metabolic disorders, designing of novel drug delivery, and many more.

R&D Set-up

Research facilities and infrastructure of the organization is available at many places in India with proper equipments and lab facilities:

- Semi-automated biochemistry analyses
- Hematofluorometer
- Bio-Rad-D-10 HPLC
- Vortex Mixture (KHCM-2223], Remi
- Blood mixer, Top tech
- Digital pH/ potentiometer, sytronics
- Magnetic stirrer, Remi
- Micro centrifuge , Remi ZBBN-3285
- Binocular microscope, Olympus/ 2 Nos
- Needle cutter and many more

Sources of income of R&D

Government funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 8.70

FY 2015-16 = 4.81

FY 2016-17 = 5.50

R & D Achievements

Major research projects undertaken:

- Dispensing nozzle for toothpaste
- Mouth probe with tongue retractor
- Development of new scale for assessment of dental anxiety in children between 4–7 years of age: a pilot study
- Denture flask

Technical Collaborations

National

Chest Research Foundation; StemGenn Therapeutics; Actorius Innovations & Research Pvt. Ltd; Rav Research Pvt. Ltd; Global Drug Development Experts; Royal Research Centre

International

Egyptian Association for International Medical Studies, Egypt; The Orenburg State Medical University, Russia; University of Rochester, USA; Mount Sinai Services of the Icahn School of Medicine, USA

Societal Relevance

More than 3,000 women have been benefited with free consultancy, food kits, and medicines. Identification of sickle cell trait among local population. Sickle cell trait identification is beneficial for management of anaemia during pregnancy. 🔍

Research Outcomes

- Papers published:
 - » National: 97
 - » International: 108
- IPRs held
 - » Patents filed: 11

Registered Office

Sumandeep Vidyapeeth,
At & Post: Piparia, Ta: Waghodia,
Dt. Vadodara- 391760, Gujarat
E: rd.sumandeep@gmail.com
W: www.sumandeepuniversity.co.in

Recognition Status

File No.: 11/678/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

Research Areas

- Neurological disorder
- Metabolic disorders
- Designing of novel drug delivery system for cancer and osteoporosis
- New drug discovery
- Epidemiological studies
- Phyto-pharmacological screening and formulation development



^ Michelson Morley (LASER) Spectrograph with 3D Printer

TAMIL NADU SCIENCE AND TECHNOLOGY CENTRE

Brief Description

The Tamil Nadu Science and Technology Centre was established by the Government of Tamil Nadu with the objective of the centre to popularize science and technology amongst the people in general and students in particular. The centre aims to establish science and technology centres in the state and to design, develop, and fabricate science and technology exhibits, prototype demonstration equipment, and scientific teaching aids for furtherance of science education. The Tamil Nadu Science and Technology Centre is registered as an autonomous society.

R&D Set-up

The centre has well-equipped mechanical workshop, astronomical telescopes with focal plane detectors, well-furnished library. Scientific journals on physical sciences, astronomical sciences, and biological sciences are being obtained regularly for the library.

Sources of income for R&D

- Grants
- Donations
- Project funding
- Foreign contribution
- Testing

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 478.52

FY 2015-16 = 441.23

FY 2016-17 = 633.91

R&D Achievements

Products developed

- To dispel the misconceptions and unfounded fear about the nuclear power plants, a Hall of Nuclear Power was established in Periyar Science and Technology Centre, Chennai.
- For exposition of defence technology in, a Defence Research Gallery.
- Centre has also established an Evolution Park Anna Science Centre at Tiruchirappalli.

Processes developed

Establishment of Hybrid Planetarium

- Science on a Sphere is a global display system that uses computers and four video projectors to display planetary data onto a six foot diameter sphere, analogous to a giant animated globe.

Revenue earned by way of licencing products/processes

- Establishment of Science Parks at Ramanathapuram and Perambalur leads to a collection of around ₹3,75,000/- of revenue.

Technical Collaborations

National

Women's Christian College, Chennai, Tamil Nadu; Defence Research and Development Organization

Registered Office

Tamil Nadu Science and Technology Centre,
Gandhimandapam Road, Chennai
600 025, Tamil Nadu
T: 044-24410025
E: tnstc@md5.vsnl.net.in
W: www.tnstc.gov.in/

Recognition Status

File No.: 11/75/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 3
PGs & Graduates: 5

Research Areas

- Astrophysical research
- Science popularization
- Innovation hub
- Planetarium

Research Outcomes

Published books: 3

Upcoming outcomes include:

- Non-conventional energy park
- Geosynchronous Satellite Launch Vehicle (GSLV) Model


Societal Relevance

The following R&D outcomes are of national/societal significance:

The following outcomes have national/societal significance:

- The centre collects, restores, and preserves important historical

objects which represent landmarks in the development of science and technology.

- The centre trains teachers in the art and craft of improving teaching aids for science instruction with a view to improving the quality of science education in the state. 



^ Products developed in the organization

TAMIL NADU VETERINARY AND ANIMAL SCIENCES UNIVERSITY

Brief Description

The Tamil Nadu Veterinary and Animal Sciences University (TANUVAS) is an autonomous institution governed by its Board of Management, which regulates the policies of the University in accordance with the provision of act and statutes. The mandates of the university are to impart education, ensure the advancement of learning and research, and include people living in the rural areas to cooperate with the government departments in the different branches of veterinary and animal sciences.

R&D Set-up

The research facilities and infrastructure available is as follows:

- Laboratories, such as centralized clinical laboratory, centralized instrumentation laboratory, central university laboratory, zoonoses research laboratory, avian disease laboratory, pharmacovigilance laboratory for animal feed and food safety, poultry disease diagnosis and surveillance laboratory, and others
- Vaccine Research Centre for viral vaccines
- Translational research platform for veterinary biologicals and others

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 2,885.06

FY 2015-16 = 3,202.05

FY 2016-17 = 2,633.61

R&D Achievements

Products developed

- Products developed by TANUVAS are pet feast and pet feast plus, ready-to-cook and ready-to-eat Japanese quail tandoori, dual-type shed for goats and desi fowls, and Omega 3-enriched chicken meat balls.
- Processes developed by TANUVAS are ELISA kit for serodiagnosis of leptospirosis using novel recombinant multiepitopic antigen, ICAR-TANUVAS mobile poultry processing unit, practice of permanent body tattooing for identification of pigs, rapid plate agglutination test for detection of antibody against *Mycoplasma gallisepticum*.

Commercialization potential of products/processes developed /prototypes

The services such as ELISA kit for serodiagnosis of leptospirosis using novel recombinant multiepitopic antigen are ready to be commercialized.

Technical Collaborations

National

Genomix Molecular Diagnostics Pvt. Ltd, Hyderabad, Telangana; Hester Biosciences, Ahmedabad, Uttar Pradesh; Venkateshwara Hatcheries Pvt. Ltd, Pune, Maharashtra

Registered Office

Tamil Nadu Veterinary and Animal Sciences University, Madhavaram Milk Colony, Chennai 600 051, Tamil Nadu
T: 044 2555 1584
E: registrar@tanuvas.org.in
W: www.tanuvas.ac.in

Recognition Status

File No.: 11/272/1992-TU-V
Initial Recognition: 1992
Valid Until: March 31, 2018

Research Areas

- Animal production
- Animal health
- Clinical studies
- Animal biotechnology
- Extension and media studies and value-added livestock products

Research Outcomes

- IPRs held
 - » Patents filed: 3

Societal Relevance

The following R&D outcomes are of national/societal significance:

Certificate courses and skill development courses are offered on various areas, such as dairy farming,

which has direct relevance to the National Skill Development Mission of Government of India.

- Transfer of technologies at village levels helped in improving the animal husbandry practices. 🔍



▲ LAXPC instrument for ASTROSAT Satellite

Registered Office

Tata Institute of Fundamental Research (TIFR)
Homi Bhabha Road,
Colaba, Mumbai 400 005
Maharashtra
T: 022-22782306
E: director@tifr.res.in
W: www.tifr.res.in

Recognition Status

File No.: 11/596/2013-TU-V
Initial Recognition: 2013
Valid Until: March 31, 2019

R&D Manpower

PGs & Graduates: 534

Research Areas

- Differential geometry
- Automorphic forms
- Astronomy and astrophysics
- Chemical sciences
- Atomic physics

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

Brief Description

The Tata Institute of Fundamental Research (TIFR) is a national centre of the Government of India, under the umbrella of the Department of Atomic Energy, as well as a deemed University awarding degrees for the masters and doctoral programmes. The TIFR is a trust registered under the Bombay Public Trusts Act, 1950.

R&D Set-up

The organization has research facilities available, some of these are:

- Alcatel Omni Pcx Enterprise Crystal Architecture
- Manufacturing, inspection, testing, and supply of intelligent addressable FACP suitable for network
- Active components (supply) CCTV cameras
- Design and manufacture of 1.5 M dia thermo vacuum Chamber
- Varian turbo v-1000 navigator pump
- CZT array complete detector system
- Helium fill and purge station with actuators
- H2rg roic in ground package - RT H2RG ROIC- Comme and many more

Sources of income for R&D

- Government funding
- Project-based funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 588.04

FY 2015-16 = 703.50

FY 2016-17 = 668.85

Technical Collaborations

National

India-based Neutrino Observatory (INO)

International

CMS Collaboration at CERN; Belle Collaboration at KEK, Japan; LIGO Collaboration. 🔍

Research Outcomes

- Papers published: 2,223
- IPRs held
 - » Patents filed: 12



↖ Entomology field and laboratory

TEA RESEARCH ASSOCIATION

Brief Description

The formation of the Tea Research Association (TRA) in 1964 with Tocklai at the centre of all activities further expanded the horizon of tea research to cover the entire Northeast India. Research on all aspects of tea cultivation and processing is carried out at the Tocklai Experimental station. Collection, conservation, and utilization of tea genotypes or germplasms have been continuing as an essential activity of Tocklai since its inception.

R&D Set-up

The following research facilities and infrastructure are available at the institute:

- LC-MS/MS, GC-MS/MS, GC-ECD, GC-FID, GC-NPD, GC-PFPD for precise determination of pesticide residues, nicotine, anthraquinone analysis from green tea leaf, black and green tea, water, soil, etc.
- AAS equipped with Flame, Furnace & FIAS for determination of different heavy metals including arsenic and mercury from green tea leaf, black and green tea, water, soil, etc.
- Ion selective electrode, spectrophotometer, colorimeter, pH metre, muffle furnace, etc., for determination of fluoride, biochemical quality of tea, nutrient level of organic and chemical fertilizers, soils, etc.
- Microscope, culture and incubation chambers, laminar air flow chambers, autoclaves of different sizes, incubator, etc.

Sources of income for R&D

- Government sources,
- Non-governmental organizations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 53.57

FY 2015-16 = 134.40

FY 2016-17 = 150.44

R&D Achievements

Products developed

Since 2014, the association has developed four types of products which are as follows:

- Tea bioactive enriched mineral water, soft drinks, tea wine
- Two clones (TTRI 1 and TTRI 2) and 2 seed varieties (TSS 1 and TS 560)
- Multipurpose light trap: A low-cost trap developed from the empty, yellow, coloured container which can be used to trap lepidopteran moths, thrips, jassids, white flies, and can also act as pheromone trap for *Helopeltis*.
- Value-added quality organic manure for use in tea field
- Viable/alternative and cost-efficient planting pit mixture for use in planting pit during tea planting

Processes developed

The Association has also developed the following processes since 2014, which are listed as follows:

- Identification of drought-tolerant plants through molecular marker technology

Registered Office

Tea Research Association,
113 Park Street (9th Floor),
Kolkata 700 016, West Bengal
T: 033-22297943, 22291815
E: secretary@tocklai.net
W: www.tocklai.net

Location of R&D Units

Jorhat, Assam

Recognition Status

File No.: 11/51/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 45
PGs & Graduates: 50
Research Fellows: 47

Research Areas

- Climate change and adaptation strategies for tea plantation
- Tea cultivars for high-yield, quality and drought tolerance
- Molecular biology, abiotic, and biotic stress analysis and gene expression
- Soil health for sustained tea productivity
- Water management
- Non-conventional and Integrated pest and disease management
- Chemistry of tea
- Speciality teas
- Tea bioactive and product diversification
- Regulatory research and quality improvement

Research Outcomes

- Papers published: 62
- IPRs held
 - » Patents filed: 2
- New crop varieties developed: 2

- Yellow sticky trap: Yellow polythene sheets wrapped around the shade trees just above the plucking table with a coat of HMPSA. This is an effective tool to trap moths, thrips, jassids, and white flies.
- Process for preparation of compost/vermicompost, vermiwash, and organic cultivation of tea.

Prototypes developed

- Colorimetric Bio-sensing System and Electrochemical Biosensing System for detection of pesticide in tea.

Revenue earned by way of licencing products/processes/ prototypes (₹ in lakhs)

Revenue earned since 2014–17 through commercialized products is ₹24.47 lakh and services is ₹6.58 lakh.

Technical Collaborations

National


Centre for Development of Advanced Computing (CDAC), Kolkata; Birla Institute of Technology and Science (BITS), Pilani, Goa; Jadavpur University, Kolkata; Assam Agricultural University.

International

UK Tea & Infusions Association and University of Braunschweig, Germany

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Soil Health Card Scheme launched by the Government of India provides soil health cards to the commercial gardens and small tea growers (STGs) of North-east India. 



^ TIFAC-MSME programme

TECHNOLOGY INFORMATION FORECASTING & ASSESSMENT COUNCIL (TIFAC)

Brief Description

The Technology Information Forecasting & Assessment Council (TIFAC) is an autonomous organization set up under the Department of Science & Technology, Government of India, to look ahead in the technology domain, assess the technology trajectories, and support innovation by networked actions in a few select areas of national importance. TIFAC continues to strive for technologies development in the country by leveraging technology innovation through sustained and concerted programmes in close association with industry and academia. The major research work include technology forecasting, market survey, technology promotion, etc.

R&D Set-up

The research facility includes access to e-resources.

Sources of income for R&D

Government agencies

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 1,823.93

FY 2015-16 = 2,193.41

FY 2016-17 = 2,647.10

R&D Achievements

Products developed

A total of 12 products have been developed by TIFAC and a few of these are mentioned below:

- Inertial navigation sensors for defence and industrial applications
- Powdered oil-based mud for oil drilling in sub-zero climatic conditions and remote locations, reducing energy and logistics cost
- Single release liner carrying label stock on both sides reducing waste generation in bottling and packaging industries
- Corrosion-free idler roller for conveyer belt system in steel industry reducing maintenance and enhancing productivity and many more.

Processes developed

- For recovery of precious metals, such as gold, silver, and copper from e-waste, such as discarded printed circuit boards
- Process of making low lactose cattle milk for consumption by lactose-intolerant people
- Production of value-added chemicals such as carrageenan (hydrocolloids) and liquid plant nutrients in concentrated form from freshly harvested seaweeds (*Kappaphycus alvarezii*) for application as nutrients for humans, animals, and plants.

Registered Office

Technology Information
Forecasting & Assessment
Council (TIFAC),
Vishwakarma Bhavan, A Wing,
Shaheed Jeet Singh Marg,
New Delhi 110 016
T: 011-42525602
E: registrar@tifac.org.in
W: www.tifac.org.in

Recognition Status

File No.: 11/287/1993-TU-V
Initial Recognition: 1993
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 8
PGs & Graduates: 22

Research Areas

- Technology forecasting, assessment, market survey
- Promotion and technology demonstration

Research Outcomes

- Papers published: 9

Technical Collaborations

National

Department of Heavy Industry, Ministry of Heavy Industries & Public Enterprises, Government of India

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The new products and processes developed and commercialized

are relevant to the national programmes of the Government of India, such as Swachh Bharat Mission, Make in India, Start-up India, etc.

- Development of vehicles and component technologies under the National Mission on Electric Mobility (NMEM) is a part of the Make in India programme. 🔍



Computer lab

TEJA EDUCATIONAL SOCIETY (GEETHANJALI COLLEGE OF ENGINEERING & TECHNOLOGY)

Brief Description

The Geethanjali College of Engineering and Technology (GCET) under Teja Educational Society is engaged in teaching, research, and service to meet the needs of all stakeholders, and students. The research areas of GCET include atmosphere, environmental degradation, emissions, disaster management, robotics, electronics, etc.

It is a non-government organization registered as a trust.

R&D Set-up

The laboratories are devoted to support R&D activities; the infrastructure and equipments are used by individual research project staff, PhD scholars, M.Tech students and undergraduate students for carrying out their project work are listed as follows:

- R&D Lab
- Lidar & GNSS Lab
- IBM Centre of Excellence

Sources of income for R&D

- Consultancy
- Grants from government
- Incubation and external sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 3.36

FY 2015-16 = 12.55

FY 2016-17 = 10.84

R&D Achievements

Products developed

- Lidar system has been designed, developed, and operationalized for regular scientific studies on aerosols and clouds in the atmosphere.

Processes developed

- High emission density electron emitter for multi-beam klystron for defence applications.

Prototypes developed

- PlaPER - Plastic Pelletizer, Extruder, and Recycler
- Spray Copter
- STARS - Self triggering Accident Response System
- Object Detection walking stick for visually impaired
- GCET - Google App
- DOIT - Part Time jobs app
- Sensor-based guide for the blind
- Electricity generation using piezo electricity
- Automated switch for high beam light in vehicles
- Automated parking slot detection system
- Bicycle mobile charger
- SOUND - Generation of power from various sounds
- Smart Switch

Principle/ theory developed

A new model has been developed to mitigate the effect of ionosphere on

Registered Office

Geethanjali College of Engineering and Technology,
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Medchal District,
Hyderabad 501 301, Telangana
T: 040-3100 1617
E: drsatyanarayana.malladi@gmail.com
W: www.geethanjaliinstitutions.com

Recognition Status

File No.: 11/532/2011-TU-V
Initial Recognition: 2011
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 4
PGs & Graduates: 41

Research Areas

- Image Processing, LIDAR: Aerosols, Navigation: GNSS, Multi-constellation positioning, Multipath analysis/modelling, and Ionospheric modeling, VLSI design
- Information retrieval, Cryptography and information security, Machine learning
- Machine condition monitoring, Multi-level inverters for power system application, Synthetic Aperture Radar (SAR) image processing for disaster detection
- Robotics, Advanced/ Composite materials, Advanced manufacturing techniques

Research Outcomes

- Papers published: 270

Global Navigation Satellite Systems (GNSS) signals to meet the required navigation performance in civil aviation.

Technical Collaborations

National

Tech Mahindra; Oracle Academy; Dark Horse IT Consulting Ltd;

Zenopsys Technologies Ltd; Data 64 Cyber Solutions Ltd; Sitra Infotech Pvt. Ltd; Navanidhi Electronics Pvt. Ltd; Powertronics Ltd

International

IBM; Redpine Signals Inc. 



^ Engine development from concept

THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA

Brief Description

The Automotive Research Association of India (ARAI) is research association of the automotive industry with Ministry of Heavy Industries and Public Enterprises, Government of India. ARAI has been providing various services to the Indian automotive industry in the areas of design and development and know-how for manufacture and testing of components / system to national / international standards.

R&D Set-up

The research facilities and infrastructure available in the organization is used for its R&D activities and are listed below:

- Complete tool chain for development and evaluation of automotive embedded solutions & automotive electronic components
- Complete simulation and testing setup for automotive embedded solutions, xEV, and related sub-systems
- State-of-the-art facility for certification testing / evaluation of electric vehicles/hybrid electric vehicles (EVS/HEVS), and related sub-systems
- Facility for calibration & optimization of automotive embedded systems, EV/HEV, retrofitted electric and hybrid electric vehicles.

Sources of income for R&D

- Government sources
- Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 188.11

FY 2015-16 = 218.49

FY 2016-17 = 395.26

R&D Achievements

Products developed

Thirteen products have been developed and are under development such as :

- Offline and Real-time Simulator for EV/HEV application
- Portable SAARTHI - OTG (On the Go)
- Transmission System for Parallel Hybrid Small Commercial Vehicle
- Front Axle for Tractor Application

Processes developed

Apart from the products, around 22 processes have been developed and are under development such as:

- Advanced Front Lighting System (AFLS) solution
- Development and evaluation of lithium battery cells
- Virtual simulation concept using DOE software for process optimization
- Development of Advanced Low temperature Diesel Combustion (LTC) System
- Dual Fuel Engines (Diesel-CNG) Technology

Registered Office

The Automotive Research Association of India, Registered Office: S. No. 102, Vetal Hill, Off Paud Road, Kothrud, Pune 411 038, Maharashtra
T: 020-3023 1111
E: director@araiindia.com
W: www.araiindia.com

Recognition Status

File No.: 11/91/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 5
PGs & Graduates: 84

Research Areas

- Powertrain engineering
- Structural dynamics & fatigue
- Automotive electronics
- Automotive materials
- Noise, vibration & harshness
- Active & passive safety
- Emissions

Research Outcomes

- Papers published: 10
- IPRs held
 - » Patents filed: 8
 - » Patents awarded: 4
 - » Copyright filed: 1

Prototypes developed

- Prototype of configured & built out of a conventional intra-city public transport small commercial vehicle
- 5-speed Manual Synchromesh Transmission
- Electronic Power Assist Steering (EPAS) system
- Air Suspension for MUV type vehicle
- Development tool kit for fuel consumption analysis, prediction
- Design of CRS head drop test rig and dynamic test setup

Commercialization potential of products/processes developed

Various competencies have been developed through different research projects, which, in turn, have generated new services.

Technical Collaborations

National

Vikram Sarabhai Space Centre (VSSC - ISRO); Defence Research and Development Organisation (DRDO); Research Designs and Standards Organization (RDSO), Ministry of Railways; Bhabha Atomic Research Centre (BARC); Centre for Development of Advanced Computing (CDAC), Thiruvananthapuram; National Chemical Laboratory (NCL), Pune; and many more.

International

Fraunhofer Institute, Germany; Lund University, Sweden; University of Alabama, Birmingham, USA; and Japan Automobile Standards Internationalization Center (JASIC)

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Clutch Test Rigs, Chassis dynamometer, and Lightweight Forged Ploughshare have direct relevance to the Make in India campaign of Government of India.
- Lightweight aluminium bus superstructure, lightweight forging processes for automotive components, guideline standards for xEV charging stations, and regulatory framework for conversion to EVs / HEVs electric vehicles have direct relevance to clean energy.
- Adaptive front lighting system, design, simulation and validation of security bollard, design of crash barrier, and adaption of space technology (Li-ion battery cells) for automotive application have direct relevance to Make in India campaign.
- Proficiency Improvement Programmes for imparting training to working professionals and engineers and organizing events for knowledge dissemination comprise relevance for the Skill India campaign. 🔍



^ Atmospheric Pressure Plasma Machine

THE BOMBAY TEXTILE RESEARCH ASSOCIATION

Brief Description

The Bombay Textile Research Association (BTRA) has grown leaps and bounds over the years since its inception in 1954 to meet the technological needs of the Indian textile industry as well as to achieve S&T (science and technology) objectives set at the national level. BTRA members include not only textile units but also manufacturers from man-made fibre, machinery, dyes, and chemical auxiliaries industries. BTRA was registered as a 'Society' under Societies Registration Act, XXI 1860 in the year 1954 (21 April, 1954) as a Cooperative Research Association.

R&D Set-up

BTRA has excellent infrastructure comprising pilot plants for conducting trials and evaluation, sophisticated testing and measuring instruments, and a library. The pilot plants are as follows:

- Non woven pilot plant (Ilydroentanglement by Fleissner)
- Non-woven pilot plant (needle-punch type by Dilo)
- Weaving machine for development of technical textiles
- Chemical processing plant is useful for undertaking various fabric trials and evaluation of dyes/chemicals/ auxiliaries
- Plasma treatment machine for textiles and polymers
- Electro-spinning plant
- Composites development -compression & injection moulding

- Single Screw Extruder - suitable for wide range of polymers, such as PET, PP, PE, Nylon, etc.
- Twin Screw Extruder - suitable for melt blending of polymer with fillers or different polymers.

Sources of income for R&D

Government agencies

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 126.23

FY 2015-16 = 317.25

FY 2016-17 = 464.57

R&D Achievements

Products developed

BTRA, since 2014, has developed the following products for the industry in its pilot plants:

- Electro-conductive cotton fabric way prepared by electron beam induced graft polymerization and electroless deposition technology
- Development of cotton and kapok blended needle punched nonwoven for sorbent product for an educational institute
- Development of banana/viscose blended needle punched nonwoven for use in helmet as an inner liner for an educational institute
- Development of coir-based needle punched nonwoven to be used in the interior of car for an educational institute
- Development of viscose fibre-based spunlace nonwoven to be

Registered Office

The Bombay Textile Research Association (BTRA),
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Maharashtra
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E: btra@vsnl.com
W: www.btraindia.com

Recognition Status

File No.: 11/112/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 3
PGs & Graduates: 10

Research Areas

- Application of plasma technology to textiles
- Application of Electron Beam Radiation in textiles
- Conducting polymers and textiles
- Electro-spinning
- Fibre science
- Eco-friendly technologies

Research Outcomes

- Papers published: 14
- IPRs held
 - » Patents filed: 6

used in hygiene applications for a research institute

- Development of viscose fibre-based spunlace nonwoven to be used in laundering applications for a research institute
- Samples of viscose spunlace nonwovens and polyester needle punched nonwovens are developed for the industry.

Samples of PP filament sandwiched needle punched nonwoven geotextiles, viscose spunlace nonwovens, and plasma treated polyester spunlace nonwovens are developed for the industry.

Under smart textiles, BTRA developed the following:

- Fabric-based ECG electrodes to check the problem with electrical activity of patient's heart. Signal traced by them are found to be very effective without using any metal or corrosive element. Ideal for cardiac monitoring and diagnostic application.
- Fabric based heating elements which are incorporated into blankets to provide warmth and comfort in cold weather conditions.
- Fabric-based ammonia and ethanol sensors
- EMI shielding materials

Commercialization potential of products/processes developed

- One of the industrial units were interested to commercialize Fabric based ECG Electrodes developed at BTRA

Technical Collaborations

National

National Textile Corporation Ltd; CSIR-Tech Pvt. Ltd (CTPL), Pune; CSIR-Central Road Research Institute (CRRI), New Delhi

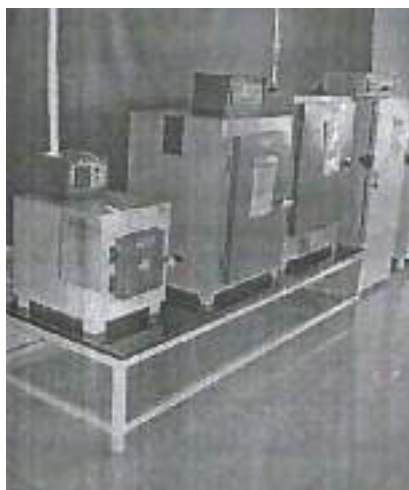
International

The Geosynthesis Institute (GSI), Folsom, USA; FITI Testing & Research Institute, Seoul, South Korea

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Under 'Clean India Mission', BTRA focusses its research on Textile Effluent Treatment and Water Conservation to meet the needs of the textile wet processing industry.
- Under 'Skills India' programme, the following activities are carried out by BTRA in collaboration with Textile Sector Skill Council, New Delhi:
 - » The BTRA staff conducted a three-day training programme on Training of Trainers' for Textile Sector Skill Council (ISC), New Delhi, between 25 and 27 June, 2015 and 16 and 18 July, 2015 at BTRA.
 - » The following technical services were undertaken by BTRA related to Skills India Programme:
 - » Document setting and certification under PMKVY Scheme for two mills
 - » Document vetting for Qualification Packs (QPs) in processing for five units
 - » Reports on Training of Trainers to Textile Sector Skill Council
 - » Training of Trainers at Coimbatore and Mumbai
 - » Standard Operating Procedures for two processing and weaving plants. 🔍



^ R & D laboratory

THE DECCAN SUGAR TECHNOLOGISTS' ASSOCIATION

Brief Description

The Deccan Sugar Technologists' Association (DSTA) was established in the year 1936 to understand and operate the sugar plant and machinery. DSTA conducts regular research in the areas of biocomposting, biotechnology, distillery, ethanol, tech etc.

R&D Set-up

DSTA has an air-conditioned R&D laboratory where they have sophisticated instruments, few of these are mentioned below:

- Shimadzu UV-visible spectrophotometer, overhead stirrer, microscope, sieve shaker, orbital shaker, magnetic stirrer, glass desiccator and vacuum desiccator, and many more.

Sources of income for R&D

- Government sources
- Donations
- International funding, etc.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 22.30

FY 2015-16 = 7.28

FY 2016-17 = 4.33

R&D Achievements

Products developed

- Developing an alternative source of phosphate solubilizing (microbes) bio-fertilizer which will help to increase sugarcane yield.

- Developing activated charcoal from bagasse for its use in raw sugar refining.
- Developing a process for the recovery of nitrogenous/potassium containing fertilizer from bio-methanated spent wash which will help farmers to get good fertilizer as well as it will help in the effluent treatment process.

Processes developed

- Carbonation process for the plantation and manufacturing of white sugar using by-product carbon dioxide (CO₂) gas readily available from distillery fermentation. An environment-friendly green process, this not only makes sugar sulphur free but is also as an alternative process to the current expensive use of the sulphitation process.
- The agricultural experts have carried out a lot of R&D in sugarcane cultivation and its subsequent management, which has helped farmers in the Maharashtra region to improve the sugarcane yield significantly to a productivity level of more than 90 tonnes from the current levels of 35–40 tonnes.

New principle/theory developed

- DSTA's agricultural experts have evolved a new procedure for the plantation of sugarcane to increase sugarcane yield

Registered Office

The Deccan Sugar Technologists' Association, 'DSTA House',
17/1&2, Shivajinagar,
Opposite Bus Stand,
Pune 411 005, Maharashtra
T: 020-25536044
E: dstapune@gmail.com
W: www.dsta.in

Recognition Status

File No.: 11/560/2012-TU V
Initial Recognition: 2012
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 5
PGs & Graduates: 4

Research Areas

- Sugar industry processes
- Sugarcane crop improvement
- Distillery
- Sugar and by-products
- Ethanol
- Bio-compost
- Biotechnological work

Research Outcomes

- IPRs held
 - » Patents filed: 1
- New crop varieties developed: 2

Commercialization potential of products/processes developed

The following processes are ready to be commercialized:


- Sugarcane plantation and its cultivation to improve the sugarcane yield has been demonstrated to farmers and its further propagation is an ongoing process at DSTA.
- Carbonation process demonstrated at a commercial scale is being propagated for its wider acceptance.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Agricultural waste is recycled to produce bio-compost instead

of dumping in the environment along with provision of a zero discharge system to distilleries and both of these are directly relevant to the Swachh Bharat Mission.

- Agricultural waste as well as distillery spent wash is used to produce biogas which is relevant to the Clean Energy Mission of the Government of India.
- Training programmes are being regularly conducted to help sugar factories and cane growers and the carbonation process is used instead of the sulphitation process in raw sugar refining both of which have relevance to the Skill India Mission. 



^ Ecological baseline assessment and biodiversity mapping of coastal ecosystem

Registered Office

The Energy and Resources Institute (TERI), 6C, Darbari Seth Block, India Habitat Centre, Lodhi Road, New Delhi 110 003
T: 011 4150 4900
E: mailbox@teri.res.in
W: www.teriin.org

Location of R&D units

- Bengaluru, Karnataka
- Goa
- Guwahati, Assam
- Mumbai, Maharashtra
- Nainital, Uttarakhand
- Gurugram, Delhi-NCR

Recognition Status

File No.: 11/25/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 47
PGs & Graduates: 117

THE ENERGY AND RESOURCES INSTITUTE (TERI)

Brief Description

The Energy and Resources Institute (TERI) is an independent, multi-dimensional organization, with capabilities in research, policy, consultancy, and implementation. TERI believes that resource efficiency and waste management are the keys to smart, sustainable, and inclusive development. Their main objectives behind the R&D activities is to promote efficient use of resources across sectors, increasing access and uptake of sustainable inputs and practices, and reducing the impact on environment and climate.

R&D Set-up

The research facilities and infrastructure of the organization are available at many places in India with proper equipments and lab facilities:

- Centre for Mycorrhizal Culture Collection (CMCC) Germplasm bank has three temperature controlled green-houses at Gual Pahari in Gurugram, Haryana, which house 2,800 isolates of arbuscular mycorrhizal fungi (AMF) and 285 cultures of ectomycorrhizal fungi (EMF) collected from different soil types from India and around the globe.
- In Vitro mass production technology produces viable, healthy, genetically pure, and high quality mycorrhizal propagules without any pathogenic contamination in a sterile environment.
- The solar lighting laboratories are involved in design customization,

lab and field-based performance assessment, and training on distributed generation-based systems for various applications. These include solar lighting systems, solar multi-utility charging stations for charging lanterns, mobile phones, and e-bikes.

- Herbal garden at Supi is home to more than 60 different varieties of fresh and dry exotic vegetables, fruits, and herbs, such as broccoli, pochchoy, kiwi, plum, parsley, rosemary, etc.
- TERI-Deakin Nanobiotechnology research centre bridges the gap between industry and academia through research and collaboration of leading international experts to generate effective solutions for a sustainable future and there are many other research facilities and infrastructure available.

Sources of income for R&D

- Government funding
- International funding
- Income from projects
- Sales of publications

R&D Achievements

Products developed

- The TERI-Deakin Nanobiotechnology Centre has been making significant strides in developing nanonutrients and nanofertilizers, nanopesticide nanoformulations, and nanosensors. The centre has developed a series of

Research Areas

- Sustainable development
- Climate change
- Renewable energy
- Energy
- Nanobiotechnology

Research Outcomes

- Papers published: 74

nanonutrients-based products, which are biologically synthesized and can reduce the burden of excessive use of fertilizers.

- Using tissue culture technology the sustainable agriculture division has distributed more than 3.5 million disease-free plants of banana, strawberry, citrus, potato, bamboo, and ornamentals to farmers and agro-based companies.
- The organization has worked towards customizing forced draft cooking technology to improve quality and to suit consumer preference and contextual cooking conditions, varying in complexity and cost, have been developed over the last five years.

Technical Collaborations

National


- Arunachal Forest Department; Assam Forest Department; Assam State Council for Science and Technology; Biotechnology Industry Research Assistance Council; Bureau of Energy Efficiency; Central Glass and Ceramic Research Institute, Khurja; Department of Science and Technology, Ministry of New and Renewable Energy; Ministry of Environment, Forests and Climate Change; and many more.

International

- Ministry of Water, Irrigation & Energy, Federal Democratic Republic of Ethiopia; National Health Medical Research Council, Government of Australia; National Renewable Energy Laboratory (NREL) and RTI International, USA; Center for Tropical Crops and Bio-Commodities, Queensland University of Technology, Brisbane, Australia; and many more.

Societal Relevance

The following R&D outcomes are of national/ societal significance:

- Under the Koshi Basin Programme (KBP), ICIMOD and HELVETAS Swiss Intercooperation Nepal have initiated a collaborative action research to develop Water Use Master Plans (WUMPs) at the village development committee (VDC) level in three districts — Sindhupalchowk, Sindhuli, and Saptari of Nepal representing three ecological zones of the Koshi basin. Families receiving solar lamps included earthquake survivors, marginalized families and women-headed households—all of whom have no electricity. With the lamps, women are able to resume their adult literacy classes normally held in the evening. Children use their lamps for homework.
- A TERI initiative, funded by the Louis Dreyfus Foundation, in chosen villages of Uttarakhand has been working to revitalize the region's traditional crops and practices to improve local food security in a sustainable manner. While these crops are rich in many important nutrients and resilient to disease, drought, etc., their use and acceptability had declined over the years. TERI worked with the local population, including farmers, in awareness creation, agricultural practices, and capacity development. TERI's efforts led to improvement in nutrition of 2,000 families (around 8,000 indirect beneficiaries), enhancement of resource-use efficiency, conserving traditional knowledge and practices, and conservation of the environment and many more. 



Research scholars working in Department of Chemical Sciences

THE IIS UNIVERSITY

Brief Description

The IIS University is a non-government organization registered as a deemed to be private university. The institute is engaged in research to facilitate skill development and creation and dissemination of knowledge with a view to serving the society. In order to develop research acumen in the staff and the students, the university conducts in house research funding & from external agencies for undertaking research projects. The nature of consultancy services provided by the university ranges from fashion and textile industry, consumer services and marketing, water conservation and environment protection, nutrition and health/ women and child welfare, translation.

R&D Set-up

There are several R&D equipments available in the university, in separate departments, and a few of these are listed below and it has been used by academia:

- **Department of Chemical Sciences:** Cryostat (Ordered through DSIR certificate) UV-Visible, Spectrophotometer, Digital Turbidity Meter, Digital DO Meter, Polarimeter, Polarograph, Potentiometric Bridge, and many more.
- **Department of Physical and Computing Sciences:** Microwave benches for Ku-, C-, J- and X-Band, Spot Reflection Galvanometer-600 Ohms, Abbe's Refractometer, and Temperature controlled

Water bath, Digital Thermo-Hygrometer, and many more.

- **Department of Environmental and Life Sciences:** Micro plate reader (DSIR certificate)
- Digital gel imaging system, SDS Page assembly, Western blot assembly, Homogenizer, Binocular Advanced Research Microscope Binocular Research Microscope and many more.

Sources of income for R&D

- Government agencies
- Grant-in-aid

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 120.65

FY 2015-16 = 13.38

FY 2016-17 = 134.66

R&D Achievements

The research work is mainly focussed on designing and developing microbial technologies to treat industry-generated wastes. They are in the process of developing microbial strategy to reduce highly toxic chromium (VI) generated in tannery waste waters.

- They have applied for a bioreactor that can, to a certain extent, tackle arsenite toxicity and help in reducing arsenite contamination.
- They are also working on the assessment of antibiotics and antibiotic-resistant genes in

Registered Office

IIS University, Gurukul Marg, SFS, Mansarovar, Jaipur 302 020, Rajasthan

Recognition Status

File No.: 11/540/2011-TU-V

Initial Recognition: 2011

Valid Until: March 31, 2020

R&D Manpower

Doctorates: 3

PGs & Graduates: 251

Research Areas

- Environment and life sciences
- Chemical sciences
- Physical and computing sciences

Research Outcomes

- Papers published: 147
- IPRs held
 - » Patents filed: 3

bacterial community isolated from hospital wastewaters of Jaipur city and their impact on the receiving environment.

The organization has undertaken major research projects, such as:

- Genetic analysis of proprotein convertase subtilisin/kexin-9 (PCSK9) to decipher correlation with cardiovascular diseases in India, ₹30,20,000/
- Isolation of arsenite oxidizing bacteria from soil and purification of the oxidizing enzymes

Technical Collaborations

National

Malaviya National Institute of Technology (MNIT), Jaipur, Rajasthan; Central University of Rajasthan, Ajmer, Rajasthan; Birla Institute of Scientific Research, Jaipur, Rajasthan; University of Rajasthan, Jaipur, Rajasthan;

Banasthali University, Vanasthali, Rajasthan; Desert Medicine Research Centre, Jodhpur, Rajasthan; University of Hyderabad, Hyderabad, Telangana; National Chemical Laboratory, Pune, Maharashtra; Central Sheep and Wool Research Institute (CSWRI), Avikanagar, Rajasthan; Kumarappa National Handmade Paper Institute, Jaipur, Rajasthan

International

Philipps University, Marburg, Germany; University of Braunschweig, Germany

Societal Relevance

The following R&D outcomes are of national/societal significance:

The institute has inclination towards national missions such as Swachh Bharat, Digital India, and Swastha Bharat. 🔍



^ Transit of Venus from Shimla

Registered Office

The Indian Planetary Society,
B-204, Vishnu Apartments,
L.T. Road, Borivili (W),
Mumbai 400 091
Maharashtra
T: 022-28988987
E: ips.science@gmail.com
W: www.ipsindia.org

Location of R&D Units

Bhuj, Gujarat

Recognition Status

File No. : 11/401/2001-TU-V
Initial Recognition: 2001
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 10
PGs & Graduates: 5

Research Areas

- Astrophysics
- Earthquake science
- Mathematical science

THE INDIAN PLANETARY SOCIETY

Brief Description

The Indian Planetary Society (IPS) is a well-equipped scientific organization. The main objectives are to popularize and conduct research in the areas of planetary science, solar physics, astrophysical, and the allied subjects. This organization helps in setting up planetariums, science centres, science parks and observatories, research centres to study planetary science, astronomy, and earth science. The institute also runs postgraduate and doctorate programmes in astronomy & astrophysics.

R&D Set-up

The research facilities and infrastructure of the institution are being used by the academia and individuals. These include a mini planetarium, multimedia computers, telescopes, etc.

Sources of income for R&D

Donation

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 19.94

FY 2015-16 = 44.64

FY 2016-17 = 21.13

R&D Achievements

Some of the research projects conducted by the organization are as follows:


- *Investigation of Khajjiair take in Chamba, Himachal Pradesh, as A new meteor impact crater:*
There are very few craters on the

earth's surface because the planet is a 'living planet'. Scientists are in search of many such craters, such as the Lonar Lake. This research will throw light on the catastrophic events taking place on the Earth and in the entire solar system, its evolution, structure, and composition. This is also relevant with life on the earth, its modification, and extinction.

- *Approximate Kerr-like interior and exterior solutions for a slowly rotating star of perfect fluid:* the actual Kerr solution for rotating star is extremely difficult to grasp for beginners. Herein, they are trying to find an approximate Kerr solution using the usual simple method by investigating its relevant parameters.

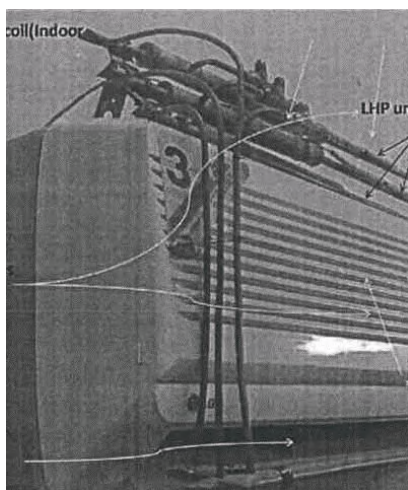
Societal Relevance

The following R&D outcomes are of national/societal significance:

The Indian planetary society publishes books, magazines; conducts lectures, workshops and seminars to gain first-hand experience on astronomy and screens documentary films. They also conduct sky-shows for the general awareness of regarding astroscience. 

Research Outcomes

- » Research theories developed: 10



^ Split-AC cooling coil with loop heat pipes

Registered Office

The Institute of Road Transport,
100 Feet Road, Taramani,
Chennai 600 113, Tamil Nadu
T: 044-2254 1723
E: irttaramani@gmail.com, irt_
taramani@yahoo.com
W: www.irtchennai.in

Recognition Status

File No.: 11/29/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 8
PGs & Graduates: 12

Research Areas

- Road transport
- Traffic and transportation
- Road safety
- Bus system management

THE INSTITUTE OF ROAD TRANSPORT

Brief Description

The Institute of Road Transport (IRT) was established in 1976 under the control of the Government of Tamil Nadu and has been registered as a society under the Indian Societies Registration Act, 1860. The prime objective of the IRT is to conduct research studies on various issues relating to the road transport sector with a view to improve the performance of bus transportation by updating and adopting the latest developments that are taking place around the world. Research is being carried out to improve the automobile components to ensure road safety.

R&D Set-up

The research facilities and infrastructure available for research and development (R&D) is mentioned below and this is being used by industries, individuals, and academia:

- AVL make Gas Analyser
- AVL make Smoke Meter
- Engine test bed with Eddy current dynamometer with all accessories
- AVL Pressure Transducer, Encoder, and Indismart
- Two wheeler chassis dynamometer
- Eddy current dynamometers (Capacity: 20 kW to 200 kW)
- Engine analyser

Sources of income for R&D

Government funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 108.20

FY 2015-16 = 81.90

FY 2016-17 = 91.00

R&D Achievements

Major research projects undertaken

- Making biomass briquette from water hyacinth and energy evaluation
- Road accident analysis and modelling for a NH stretch incorporating traffic and highway factors
- Energy-conservation studies on a split air-conditioner using loop heat pipes
- Endurance testing of three cylinder turbo-charged diesel engine

Technical Collaborations

National

Infosys, Bengaluru 

Research Outcomes

- Papers published:
 - » National: 22
 - » International: 112
- IPRs held
 - » Patents filed: 1



^ IETE students forum activities

THE INSTITUTION OF ELECTRONICS AND TELECOMMUNICATION ENGINEERS

Brief Description

The Institution of Electronics and Telecommunication Engineers (IETE) is a non-governmental organization. IETE focusses on advancement of science and technology of electronics, telecommunication, computers, information technology, and related areas. IETE empowers the youth through technical education and skill development.

R&D Set-up

The research facilities and infrastructure available in the organization are used by the industries, individuals, and academicians as they have 63 centres all over India in which 30 centres are well-equipped with lab facilities.

Sources of income for R&D

- International funding
- Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 6.58

FY 2015-16 = 2.90

FY 2016-17 = 2.56

R&D Achievements

The IETE has been disseminating information on research and latest developments in the relevant fields through its journals—*IETE Journal of Research*, *IETE Technical Review*, and *IETE Journal of Education*.

Under its Research Fellowships Scheme, IETE has sponsored ten research projects which have been

successfully completed at IITs (Delhi, Madras, and Guwahati), and other universities.


Technical Collaborations

National

Electronics Sector Skills Council of India (ESSCI), New Delhi; National Institute of Electronics & Information Technology, New Delhi; Telecom Sector Skill Council, Haryana; Tata Tele Services Ltd, Mumbai.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Under Skill India Pradhan Mantri Kaushal Vikas Yojana (PMKVY) 1.0, the institution has trained 150 students in the Optical Fibre Technician course.
- Edusat facility through transmitting hub at IGNOU (e-class room project—establishment of a facility for broadcasting the high quality interactive lectures. 

Research Areas

- Telecommunication
- Internet of things
- Emerging wireless technologies
- Microwave and radar engineering
- Very-large-scale integration (VLSI) and nanotechnology
- Artificial intelligence

Research Outcomes

- Papers published: 3

Registered Office

Institution of Electronics and Telecommunication Engineers,
2 Institutional Area, Lodi Road,
New Delhi 110 003
T: 011- 43538821
E: sec.gen@iete.org
W: www.iete.org

Recognition Status

File No.: 11/274/1992-TU-V
Initial Recognition: 1992
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 5
PGs & Graduates: 7



^ R&D activities in the organization

Registered Office

The Kelkar Education Trust's Scientific Research Centre, V G Vaze College Campus, Mithagar Road, Mulund (East), Mumbai 400 081, Maharashtra
T: 022-21630391
E: kelkarsrc@gmail.com
W: www.kelkarresearchcentre.org

Recognition Status

File No.: 11/329/1996-TU-V
Initial Recognition: 1996
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 2
PGs & Graduates: 15

Research Areas

- Medicinal and aromatic crops
- Anti-bacterial claims and testing
- Alternate methods of animal testing
- Cosmetic testing

THE KELKAR EDUCATION TRUST

Brief Description

The Kelkar Education Trust's (KET) Scientific Research Centre was established by Kelkar Education Trust. They work on plant biotechnology, animal cell culture, molecular techniques, microbial and bioreactor technology, analytical techniques, greenhouse, cultivation technology, cosmetology, etc.

R&D Set-up

The research facilities and infrastructure available are as follows:

- The trust owns land measuring 10,913 sq. m on which it has constructed buildings measuring 2,00,000 sq ft out of which 21,500 sq. ft area is marked for the Scientific Research Centre. The Cosmetology Division has been set up on the fourth floor of the College Building with 8,433.38 sq. ft area. The greenhouse facilities are provided by promoters of the Education Institute for the Scientific Research Centre. The area of the constructed greenhouse is approximately 3,200 sq ft There is a shade house near the site of the greenhouse, each measuring 3,200 sq. ft.

Sources of income for R&D

Grant-in-aid

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 243.30

FY 2015-16 = 251.08

FY 2016-17 = 256.18

R&D Achievements

Products developed

- Discovery of the number of SNPs from ESTs deposited on the NCBI databases as well as from the libraries targeting biotic stress tolerance and sensitive and from abiotic (salinity) stress-responsive ESTs from already available clones and sequence for further use in the saturation of map generated using EST SSRs.
- Standardization of agro-technologies for optimal yield production of lemongrass, citronella, palmarosa, patchouli, and geranium under agro-climatic conditions of target marketing tie-ups for buyback of aromatic oils through KET's SRC.

Processes developed-

- Around 150 SSR primers from the previously reported *Jatropha* EST SSRs were synthesized and used for screening parental genotypes to check the polymorphic primers.
- Set up farm-scale distillation units for value addition and extraction of essential oils. 🔍

Research Outcomes

- IPRs held
 - » Patents filed: 4



^ Carbon nanotubes

THE MOUNT CARMEL EDUCATIONAL SOCIETY

Brief Description

Mount Carmel College is a premier institution for women's education in India. Established in 1948, it is run by the sisters of the CSST (Carmelite Sisters of St. Teresa) order. The institution has stood the test of time as is reflected in its dynamism and energy. Mount Carmel has always been the forerunner of constructive changes in academics to help generations enrich their knowledge and enhance skills to meet the challenges of a rapidly evolving world.

Mount Carmel is registered under the Societies Registration Act.

R&D Set-up

The following are some of the research facilities available with the organization:

- Microtome
- Colony counter
- Flame photometer
- UV-Spectrophotometer
- Eliza reader
- Laminar air flow units
- Soxhlet mantle
- Cooling centrifuge
- Shaker incubator
- Inoculation hood without air flow
- Millipore unit
- Electrical conductivity (EC/TDS/NaCl)
- Bio-safety level 2
- HPLC
- Gel doc
- Invert microscope

- PCR
- Sonicator
- UV-NIR spectroscopy
- Shaker incubator
- Lyophilizer
- Atomic-absorption spectroscopy
- Thermal evaporation
- Flash evaporation
- Humidity-sensor unit
- Micro-hardness tester
- Source-measuring unit
- Four-probe unit
- Impedance analyzer

Sources of income for R&D

- Project grants

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 50.85

FY 2015-16 = 62.85

FY 2016-17 = 30.97

R&D Achievements

Products developed

- Antimony oxide nanobelts preparation
- Bajra-based complementary feeding mixes
- Barnyard millet and barnyard foxtail millet mix products
- Buckwheat (Fagopyrum esculentum) Bar
- Calcium-rich sesame millet mix
- CNT antenna for Wi-Fi applications
- Fibre-enriched health drink mix with chia seeds

Registered Office

Mount Carmel College,
58 Palace Road, Vasanth Nagar,
Bengaluru 560 052, Karnataka
T: 080 22261759
E: mounts@bgl.vsnl.net.in
W: www.mountcarmelcollegeblr.co.in

Recognition Status

File No. : 11/529/2011-TU-V
Initial Recognition: 2011
Valid Until: March 31, 2019

R&D Manpower

Doctorates : 10
PGs & Graduates : 7

Research Areas

- Plant pathogen management
- Bio-control techniques
- Thin films
- Nanomaterial fabrication
- Lake water restoration
- Development of nutritional products to tackle malnutrition and osteoporosis
- Environmental biosensors development
- Development of flexible patch antenna
- Probiotics and prebiotics
- Phytoremediation
- Development of herbal products
- Animal cell culture

Research Outcomes

- Papers published:
 - » National: 61
 - » International: 143
- Technologies transferred/commercialized: 4

- Flexible copper antenna device on OHP
- Food-borne bacteria sensor
- Foxtail millet and Foxtail Kodo millet mix products
- Health mix
- Iron-fortified products
- Jamun (*Syzygiumcumini*) seed biscuits
- Kodo millet and kodo barnyard millet mix products
- Nanocellulose material
- Nutri bar enriched
- Nutridense product
- Overhead projector sheet (OHP) flexible gas sensor device
- Ready to bake cup cake mix
- Simulated body fluid cubes(SBF)
- Soya and ragi-based custard powder

Commercialization potential of products/processes developed

- Products commercialized: 4

Developed the products and the revenue is recycled for buying raw drugs and other ingredients

Technical Collaborations

National

VproV Pvt. Ltd, Bengaluru; BiozeenPvt. Ltd, Bengaluru; VistaMind Education Pvt. Ltd, Bengaluru; Bright Sparks Montessori, Bengaluru; Manipal Institute of Computer Education, Udupi, Karnataka; GCPP Learning Network, Bengaluru; ISTAR Skill Development Pvt. Ltd, Bengaluru; Leads Clinical Research and Bio Services Pvt. Ltd, Bengaluru; Department of Biotechnology, St.Joseph's College

Autonomous,Tiruchirappalli; Jain University, Bengaluru; BMS Institute of Technology (BMSIT), Bengaluru

International

Binary University, Malaysia

Societal Relevance

The following R&D outcomes are of national/societal significance:

The following services provided by Mount Carmel College are directly relevant to the national missions—Clean Energy and Swachh Bharat:

- Green Audit is carried on campus.
- Monitoring of the air quality and noise level.
- Segregation of solid waste generated on the campus
- Safe disposal of chemicals from the laboratory.
- The sanitary pads are segregated and disposed separately.
- E-waste is collected and sent to recycling plants.
- Students carry out awareness campaigns in the neighbourhood.
- Adoption of large-scale vermicomposting.
- Usage of CFL and LED bulbs to conserve electricity.
- Greater usage of RO water in the Institution.
- Establishment of a 100-kwp solar photovoltaic rooftop plant.
- Rooftop rainwater is collected and recharged.
- Scientific and environmental measures are adopted in an endeavour to reduce the carbon footprint. 🔍



▲ Brahmaputra Gallery at Guwahati

THE NATIONAL ACADEMY OF SCIENCES, INDIA (NASI)

Brief Description

The objective of the National Academy of Sciences, India (NASI) is to provide a national forum for the publication of research work carried out by Indian scientists and to provide opportunities for the exchange of views amongst them. The academy envisions promoting scientific and technological research related to the problems of societal welfare. It is an Autonomous Society under Department of Science and Technology, Government of India.

R&D Set-up

The following research facilities and infrastructure available at the institution are being utilized by the students and researchers:

- Portable scientific kits, interactive modules, 3-Dequipments, etc.
- The NASI has established three river galleries at Allahabad, Guwahati, and Mysuru that are electronically well equipped

Sources of income for R&D

Grant-in-aid from the Department of Science and Technology

- Grant-in-aid from other sources
- Interest
- Royalty
- Membership fee

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15= 961.90

FY 2015-16= 1,056.15

FY 2016-17= 1,413.98

R&D Achievements

Products developed

- Tomato transgenic plants with 7-sterol-C-5-desaturase from *F. velutipes* with improved drought tolerance and fungal resistance along with the increased iron and polyunsaturated fatty acid content
- Transgenic RNAi tomato plants suppressing both D-mannosidase and D-Nacetylhexosaminidase genes together
- Microbial consortia developed for inoculating chilly can go as an eco-friendly product, whereby farmers can save 50% of chemical fertilizer use.

Processes developed

Fourteen processes have been developed since 2014, out of them a few are listed below:

- Polynucleotide sequence of fruit softening associated A-Mannosidase and its uses for enhancing fruit shelf life
- Polynucleotide sequence of fruit softening associated B-D-N-acetylhexosaminidase and its uses for enhancing fruit shelf life
- New quadrature formulae have been derived to accommodate functions with integrable singularities in the range of integration and many more.

Revenue earned by way of licencing products/processes/ prototypes (₹in lakhs)

FY 2014-15 = 7.43

FY2015-16 = 27.86

FY2016-17 = 25.07

Registered Office

National Academy of Sciences,
India, 5, Lajpatrai Road, Allahabad
211 002, Uttar Pradesh
T: 0532 2640224
E: nasi.allahabad1@gmail.com
W: www.nasi.org.in/

Recognition Status

File No.: 11/36/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 36

Research Areas

- Agriculture
- Animal and plant sciences
- Biochemistry and biophysics
- Biotechnology
- Chemical and physical sciences
- Earth sciences
- Engineering and mathematics
- Medical and forensic sciences

Research Outcomes

- Papers published: in peer-reviewed journals: 3
- IPRs held
 - » Patents filed: 7
 - » Patents awarded: 4

Commercialization potential of products/processes developed

- About 20 products/processes have been developed which are potentially viable for commercialization.

Technical Collaborations

National


Indian National Science Academy, New Delhi; Indian Academy of Sciences, Bengaluru, Karnataka; Reliance Industries, Maharashtra; SCOPUS; Springer

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The NASI organized several programmes on national

mission programmes of skill development and start-up India at Mohali, Lucknow, Chennai, Madurai, and Mumbai. Young, potential candidates interested in entrepreneurship benefitted from these programmes.

- Awareness and training programmes on nutrition, safe drinking water, health and hygiene, etc., are held. A mixed participation of rural and urban population was ensured. This was included as a part of the 'Swasth Bharat Mission'.
- Safe drinking water and pollution abatement—especially for the rural areas and municipal workers—this is part of the 'Swachh Bharat Mission'. 



^ Central Instrumentation Facility at IIAR

Registered Office

The Puri Foundation for Education in India (Indian Institute of Advanced Research, Gandhinagar as the beneficiary) Institutional Area, Koba, Gandhinagar 382 426 Gujarat
 T: 079-3051 4106
 E: findashwani@yahoo.com
 W: www.iar.res.in

Recognition Status

File No.: 11/442/2005-TU-V
 Initial Recognition: 2005
 Valid Until: March 31, 2019

R&D Manpower

Doctorates: 6
 PGs & Graduates: 22

Research Areas

- Biological Sciences
- Biotechnology
- Cell Biology
- Immunology
- Genetics
- Bioinformatics
- Biophysics

THE PURI FOUNDATION FOR EDUCATION IN INDIA

Brief Description

The Indian Institute of Advanced Research (IIAR) is envisioned to be a state-of-the-art research center for achieving excellence in identified crucial areas of science and technology. The institute is fully supported by the Puri Foundation for Education in India.

It is registered as a non-government trust.

R&D Set-up

The Institute has the following facilities and all these are used by individuals, industries, and academia:

- Plant cell and Molecular biology lab with green house, plant tissue culture facilities, growth chamber, and laminar air flow.
 - Immunology lab is equipped with the biosafety class II facility for primary mammalian cell culture as well as microbial cultivation. Equipments, such as, carbon dioxide (CO₂), incubator, real time PCR, ELISA reader, PCR gel doc, etc.
 - Cell biology lab with class II cell culture facility, florescence microscope, Multimode plate reader, etc.
 - Biophysics and Bioinformatics lab with complement of servers, computers, cluster computer system, and experimental lab.
 - Genetics and Developmental Biology has well developed Drosophila model system for neurodegenerative disorders and has an excellent confocal microscopy facility.
- An environment and ecology laboratory with Eddy Covariance Instrument to measure climate change parameters.
 - The Department of Chemistry is equipped with HPLC, Gas Chromatography, Rota-vac, Fume hoods, etc.

Sources of income for R&D

- Government agencies

R&D Expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 144.04

FY 2015-16 = 78.69

FY 2016-17 = 66.07

Technical Collaborations

National

Nirma University, Ahmedabad, Gujarat; The M S University of Baroda, Vadodara, Gujarat; B.V. Patel PERD Centre, Ahmedabad; National Centre for Cell Science, Pune; Tezpur University, Assam; Central Food Technological Research Institute (CFTRI), Mysore; Nirma University, Ahmedabad, Gujarat; Arpan New born Care Centre, Ahmedabad; ICMR: National Institute for Research in Tuberculosis

International

London South Bank University. 

Research Outcomes

- Papers published:
 - » International: 20



^ Research facilities

THE SCIENCE FOUNDATION FOR TRIBAL AND RURAL RESOURCE DEVELOPMENT

Brief Description

The major thrust areas of Science Foundation for Tribal and Rural Resource Development (SFTRRD) are research and development activities on conservation, documentation, and characterization of plant genetic resources and sustainable use of natural resources to enhance livelihoods and food security in tribal and rural areas. It is registered as not-for-profit trust.

R&D Set-up

The following laboratories are equipped with R&D facilities:

- Molecular Biology Laboratory
- Microbiology Laboratory
- Phyto Chemistry Laboratory
- Clean Energy Laboratory
- Natural Products Laboratory
- Soil & Water Laboratory

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 13.69

FY 2015-16 = 7.91

FY 2016-17 = 8.05

R&D Achievements

Products developed

- Herbal drug for elimination of filariasis
- Biofuel /biodiesel from *Argemone mexicana*
- *Olax scandens* was used for alternative/ renewable source distributed perennial and scandent

shrub of the family Olacaceae. Seed oil for biodiesel production for the regular bearing habit and high productive potential even on marginal lands; the fermented pulp yielded ethanol for blending with petrol.

- Bio-ethanol from *Olax scandens*, ethanol was recovered from pulp of *Olax* before extraction kernel from ripe fruit (drupe); *Olax* is a source of bio-ethanol (23.4 % of pulp) and 59 % oil of seed (kernel) for biodiesel additives.

Processes developed

- Protocols developed on tissue culture *Typhonium flagelliforme*
- Micropropagation of bamboo

Prototypes developed

- Degumming apparatus for biodiesel

Commercialization potential of products/processes developed

- Protocols developed on tissue culture of banana, protected cultivation of cacti, micropropagation of bamboo, Chrysanthemum has been shared with Centurion University, Odisha for commercial application.
- The products, technologies developed by SFTRRD are being commercialized by SAAN Innovations (Pvt.) Ltd, Bhubaneswar.

Technical Collaborations

National

- Central Salt & Marine Chemicals Research Institute, Gujarat;

Registered Office

The Science Foundation for Tribal and Rural Resource Development, C-122, HIG, State Housing Board Colony, Baramunda, Bhubaneswar 7510 03, Odisha
T: 674 235 5505
E: profpdas@sftrrd.org
W: www.sftrrd.org/

Recognition Status

File No.: 11/533/2011-TU-V
Initial Recognition: 2011
Valid Until: March 31, 2017

R&D Manpower

Doctorates: 2
PGs & Graduates: 1

Research Areas

- Molecular Taxonomy, Cytotaxonomy, Chemotaxonomy
- Bioassays
- Evaluation of oils and fats
- Threatened plant species
- Characterization of plant resources

Research Outcomes

- Papers published:
 - » International: 6
- IPRs held
 - » Patents filed: 8


Sambalpur University, Odisha; North-East Institute of Science & Technology, Assam; Centurion University of Technology and Management, Odisha; Council of Analytical Tribal Studies, Odisha; SAAN Innovations Pvt. Ltd, Bhubaneswar, Odisha

International

- United Nations Convention to Combat Desertification

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Focussing on the use of renewable and other on-farm resources through integration of natural and biological processes and eco-technologies to enhance livelihood
- Inspiring rural youth and tribals for nature conservation and better livelihoods. 



^ R&D activities in the organization

THE SOUTH INDIA TEXTILE RESEARCH ASSOCIATION

Brief Description

The South India Textile Research Association (SITRA) is an autonomous organization registered as a society. The R&D activities in SITRA include high-speed reel, high-speed cams for knitting machines, storage-positive feed for knitting machines, two-for-one twisting machine, Kapas impurities purifier, miniature ring-spinning frame, etc.

R&D Set-up

The research facilities and infrastructure available are as follows:

- Spunlace non-woven set-up
- Tricot warp knitting machine
- Gas chromatography and mass detector
- Atomic-absorption spectrophotometer
- High-performance liquid chromatography and thin-layer chromatography
- Electro spinning set-up
- Sweating-guarded-hot-plate tester
- Thermo gravimetric analyser
- 3-dimensional braiding set-up
- Compression stockings knitting set-up
- Fourier transform infrared spectroscopy
- Hotmelt multipurpose laminating and coating pilot plant and many more

Sources of income for R&D

- Government funding
- Project funding

R&D Achievements

Products developed

- Collagen-coated hernia mesh
- Nonwoven-based mopping pad
- Textile matrices for the effective wound management
- Leukodepletion blood filter
- Biofilm destruction and cytotoxicity studies of wound dressing materials
- Chitosan nano particles
- Hygroscopic nylon
- Spunlace and film composite gown
- Fruit-based biofilm
- Chitosan-based film for wound dressing
- Spunbond breathable film spunbond composite, etc.

Prototypes developed

- Toumiquit applicator
- Spunlace and film composite gown
- Hygroscopic nylon for exudates absorption
- Fruit-based biofilm for wound dressing
- Chitosan-based film for wound dressing, etc.

Technical Collaborations

National

Indian Space Research Organization, Bengaluru; Bionodical Innovation Pvt. Ltd, Bengaluru

International

Deakin University, Australia; APRUS Biomedical Innovation Pvt. Ltd, Bengaluru

Registered Office

The South India Textile Research Association 13/37, Avinashi Road, Civil Aerodrome Post, Coimbatore 641014, Tamil Nadu
W: www.sitra.org.in

Recognition Status

File No.: 11/13/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2020

R&D Manpower

Doctorates:4
PGs & Graduates:19

Research Areas

- Fibre science- cotton, man-made fibre, jute, pineapple, banana, flax, coir, sisal
- Textile technology, including spinning, weaving, knitting, non-wovens, textile chemistry, applied research for process and product development, medical textiles
- Operational research, machinery development and instrumentation, management problems, services to decentralized sector, human resources development, modern methods of maintenance and operation of machinery

Research Outcomes


- Papers published:
 - » National: 25
 - » International: 13
- IPRs held
 - » Patents filed: 2

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The import-substitute products developed by the association helps to boost the Make in India

concept and reduce the cost of the product to the end- user.

- Implementation of the Integrated Skill Development Scheme leads to an increase in self-employed people to improve their poor economy. 



^ Shipper's airbag

THE SOUTH INDIAN EDUCATION SOCIETY

Brief Description

The South Indian Education Society (SIES) is one of the oldest educational societies in Mumbai and was pioneered in 1932. The SIES conducts research on ecology, biodiversity, biofertilizers, nano-biotechnology, water pollution, etc.

R&D Set-up

As part of the research facilities and infrastructure in SIES, several equipments are available for R&D. A few of these are listed below and these are used by industries, individuals, and academia:

- Gel documentation unit
- Cooling centrifuge
- UV-Vis spectrometer
- Autoclave
- Surface tensiometer
- Hygrometer
- Flocculator and many more

Sources of income for R&D

- Government sources
- Testing
- Industrial projects
- Testing

R&D expenditure (₹ in lakhs)

FY 2014-15 = 186.18

FY 2015-16 = 150.10

FY 2016-17 = 147.89

R&D Achievements

Processes developed

- Dosage of pond ash with organic and biofertilizers optimized for onion and grapes crop for

improving crop yield and soil fertility.

- Electrochemical oxidation process development for the treatment of organic ion exchange resins and organic solvents.
- Electrolytic process development for leachate treatment.

Prototypes developed

Since 2014, there are around 40 prototypes developed by the SIES. A few of these are listed below:

- Optimization and up scaling of fly ash utilization for sustainable production of grapes and onions
- Evaluation of comparative performance of available technologies for removal of pathogenic organisms and turbidity from drinking water and many more.

Technical Collaborations

National

National Horticultural Research & Development Foundation, Nashik; National Research Centre for Grapes, Pune

International

Rutgers School of Engineering, Rutgers University, New Jersey, USA, CAL Poly State University, USA

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Optimized dosage of pond ash of thermal power plant in onion and grapes cultivation with beneficial microorganisms, this technology

Registered Office

The South Indian Education Society, K A Subramaniam Road, Matunga, Mumbai 400 019 Maharashtra
T: 022-2401 0051; 24044242
E: siesvs@gmail.com
W: www.siesedu.net

Recognition Status

File No.: 11/411/2002-TU-V
Initial Recognition: 2002
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 4
PGs & Graduates: 10


Research Areas

- Ecology and biodiversity
- Groundwater and pollution quality monitoring and management
- Biofertilizers, biopesticides, biomethanation, bioremediation, nanobiotechnology
- Climate change, vulnerability assessment, mitigation, and adaptation
- Packaging of liquid pesticide, standardization of desiccant, discolouration of capsules, etc.

Research Outcomes

- Papers published:
 - » National: 22
 - » International: 8

is relevant for society and the environment because utilization of chemical fertilizers is very high in the cultivation of onion and grapes

and developed technology curtails the utilization of organic fertilizers to 50%. 



^ Seminar at Kolhapur

THE SUGAR TECHNOLOGISTS' ASSOCIATION OF INDIA

Brief Description

The Sugar Technologists' Association of India (STAI) is an apex body of the sugar industry professionals and institutions pursuing the cause of the development of sugar and the allied industries in India through the participatory process. The institution carries out or sponsors schemes of research relating to the sugar industry and its allied fields. The institution strives to bring out cost-effective and innovative technologies in sugar, power, alcohol, and sugarcane farming to enhance productivity, quality, and competitiveness. It is a non-governmental organization registered under the society act.

R&D Set-up

The following research facilities and infrastructure are available with the association:

The association has its own R&D centre which is equipped with electronic gadgets. It also has a well-established library that has nearly 4,000 books covering sugar and the allied industries. It has digitized its 81 years technical and scientific papers, spanning from 1936 to 2017, on its web portal which is widely used by its members both in India and abroad. The infrastructure and research facilities are used by industries, individuals, and academicians.

Sources of income for R&D

Government agencies

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 230.32

FY 2015-16 = 270.76

FY 2016-17 = 207.03

R&D Achievements

Processes developed

- The association along with the sugar research institutes and the industry worked on varietal improvement and mechanization of sugarcane harvesting. It involved developing new varieties in a phased manner which led to the development of new sugarcane which are early maturing and have high yield and high recovery.
- Energy conservation and bagasse-based co-generation
- Process change from double sulphitation to manufacture of raw and refined sugar
- Use of B heavy molasses and alternate feedstocks for maximizing ethanol production
- Water and wastewater management

Technical Collaborations

National

National Sugar Institute, Kanpur, Uttar Pradesh; Vasantdada Sugar Institute, Pune, Maharashtra; Indian Institute on Sugarcane Research, Lucknow, Uttar Pradesh; Sugarcane Breeding Institute, Coimbatore, Tamil Nadu

Registered Office

The Sugar Technologists' Association of India, Plot No.15, 301 Aggarwal Plaza, Okhla Phase 1, New Delhi 110 020,
T: 011-45960930
E: office@staionline.org
W: www.staionline.org

Recognition Status

File No.: 11/26/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 3
PGs & Graduates: 20

Research Areas

- Sugarcane agriculture
- Sugarcane engineering
- Factory processing and co-products

Research Outcomes

- Proceedings of annual conventions: 3
- Technical reports: 3
- Books: 1

International

International Society of Sugarcane Technologists, Mauritius; International Commission for Uniform Methods of Sugar Analysis, UK

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Make in India campaign: To promote the cause of their equipment manufacturers, consultants, and technocrats, the association organized three dedicated sugar exhibitions in 2010 (Nairobi, Kenya), 2013 (Nairobi, Kenya), and 2014 (Surabaya, Indonesia). These were a huge success and gave entry to a number of companies in the African and South-East Asian markets.
- Skill India: STAI represents India at ICUMSA (International Commission for Uniform Methods of Sugar Analysis) an international body which forms methods on sugar colour for international trade. Referees and associate referees from India deliberate and participate actively in the collaborative studies conducted by ICUMSA with members from 30 sugar-producing countries of the world.
- Swachh Bharat Abhiyan: The association has been propagating zero liquid discharge by factories and distilleries attached with factories. This is to conserve the groundwater mandate which has traditionally been an under-priced resource. 



^ Supercritical carbon dioxide set-up for a waterless processing of textiles

THE SYNTHETIC & ART SILK MILLS' RESEARCH ASSOCIATION

Brief Description

The Synthetic & Art Silk Mills' Research Association (SASMIRA) is a co-operative venture set up by the man-made textile industry of India as a multi-functional institute to serve its scientific and technological needs, thereby assisting growth and development of the sector. One of the objectives of the association is to render scientific and technical assistance to textile and related industries by research and development. SASMIRA is a registered society under the Societies Act 1860.

R&D Set-up

- Lea tester, wrap reel, twist tester, crimp tester, crimp rigidity tester, pilling tester, crease recovery tester, thickness tester, stiffness tester, vibroskop 400, beaker dyeing machine, vertical flammability tester, limited oxygen index tester, hydro-static head tester, spray tester, launderometer, etc.
- The pilot plant machineries available are pirn winding, over pick loom, dobby, Riyalakshmi Auto Pirn winder 4 Spindle, Krislon Heavy Duty Two for One Twister (Model KEI 96D), non-woven needle punching machine, warp knitting machine, Dornier Rapier weaving machine, spinning line from bale opener to ring frame plus precession winder, etc.

Sources of income for R&D

- Government Sources

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 1,352.42

FY 2015-16 = 1,228.41

FY 2016-17 = 2,791.50

R&D Achievements

Products developed

- Moisture-managing fruit- and vegetable bag
- Visible, near, infrared camouflage textile
- Contour-woven socks
- High-strength light-weight nanocomposite fabric
- Smart shade net through thermal auto-regulation
- light radiation
- Multipurpose shade net for water harvesting

Products developed

- Green surfactant in textile processing
- Environment-friendly textile effluent treatment process by reducing phenol content
- Biodegradable agro-textile products for horticulture application using keratin-based waste products
- Biodegradable textile polymer
- Eco-friendly flame retardants for imparting functionality to textiles

Prototypes developed

- Set-up of supercritical carbon dioxide (SC-CO₂) dyeing technology for textiles

Registered Office

The Synthetic & Art Silk Mills' Research Association
Sasmira Marg, Worli,
Mumbai 400 030, Maharashtra
T: 022-24935351
E: sasmira@vsnl.com
W: www.sasmira.org/

Recognition Status

File No.: 11/108/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 5
PGs & Graduates: 23

Research Areas

- Technical textiles
- Instrumentation
- Recycling of wastes
- Energy conservation
- Eco-friendly alternatives
- Support to decentralized sector
- Chemical processing
- Mechanical processing
- Polymer processing
- Agro-textiles

Research Outcomes

- Papers published: 69
- IPRs held
 - » Patents filed: 6
 - » Patents awarded: 2

- Solar shade net house for simultaneously increasing agricultural yield and generating green power

Commercialization potential of developed products/ processes

- Green surfactant by biotechnology route for textile application
- Design and development of supercritical carbon dioxide dyeing vessel for textile wet processing
- Design and development of shade-o-metre for shade net evaluation for horticultural applications
- Design of a bio-mat to combat oil spill pollution

Technical Collaborations

National

Indian Rubber Manufacturers Research Association, Thane, Maharashtra; Institute of Chemical Technology, Mumbai, Maharashtra; The South India Textile Research

Association (SITRA), Coimbatore, Tamil Nadu; The Gandhigram Rural Institute, Gandhigram, Tamil Nadu; Dr. B M N College of Home Science, Mumbai, Maharashtra; Army Institute of Fashion and Design, Bengaluru, Karnataka; Sker-E-Kashmir University of Agricultural Sciences and Technology, Jammu & Kashmir

International

Nonwovens and Advanced Materials Laboratory, USA

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Supercritical carbon dioxide technology for waterless processing of textiles has direct relevance to clean energy and Make in India campaign of the Government of India.
- Bio-mats to combat oil spill pollution has direct relevance to Swacch Bharat and Swastha Bharat Mission. 🔍



^ Research facilities available in TREC-STEP

TIRUCHIRAPPALLI REGIONAL ENGINEERING COLLEGE – SCIENCE AND TECHNOLOGY ENTREPRENEURS' PARK (TREC-STEP)

Brief Description

The Tiruchirappalli Regional Engineering College – Science and Technology Entrepreneurs Park (TREC-STEP) is one of the first science and technology entrepreneurs parks in the country. It implements several focussed developmental initiatives with the support of national and international developmental agencies.

R&D Set-up

TREC-STEP has various equipments available for its R&D work; a few of these given below have been used by industries, institutions, and academicians:

- NH-26 HMT Lathe, HMT – LTM 20 centre lathe, BVR 5 radial-drilling machine
- Milling machine, drilling machine (column type), wood turning lathe
- Universal wood working machine, power hacksaw, double body fly press, bend straightening press, iol indarc welding rectifier, IOL indarc gas cutting machine, and regulators
- Drilling cum tapping machine, pedestal grinder, angle grinder, bench grinder, rmp air compressor, portable drilling machine, portable tapping machine, flexible shaft grinder, material handling system with 3 axes control elements, measuring instruments, tools, and other accessories

Sources of income for R&D

- Government sources
- International funding
- Training
- Workshop
- Rent

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 587.36

FY 2015-16 = 538.67

FY 2016-17 = 483.92

R&D Achievements

Products developed

TREC-STEP has developed 16 products, few of these are listed below:

- Veneer-laminated lumbar
- Closed-circuit cooling tower
- Pedal-wind-operated RO water purifier
- Fungi spores for bio-control
- Mechanical porter
- Digital assistant-rural banking
- Nano-coated hollow fibre membrane-based water and gas purification systems
- Bio-fuel based fuel additive
- Solar energy solutions for unconventional applications

Processes developed

Apart from the products they have developed two processes which are as follows:

Registered Office

Tiruchirappalli Regional Engineering College – Science and Technology Entrepreneurs Park, NITT Campus, Tiruchirappalli 620 015 Tamil Nadu
T: 0431-2500085 /2500697
E: jawa_ts@yahoo.com
W: www.trecstep.com

Recognition Status

File No.: 11/436/2004-TU-V
Initial Recognition: 2004
Valid Until: March 31, 2019

R&D Manpower

- PGs & Graduates: 10

Research Areas

- Entrepreneurship
- Innovative technology-based products
- Innovation and skill enhancement
- Micro-enterprise development

Research Outcomes

- IPRs held
 - » Patents filed: 19
 - » Patents awarded: 9

- Kappa carrageenan gel for confectionary and cosmetics
- Automated ETPs for dyeing units

Commercialization potential of products/processes developed

TREC-STEP has supported the development and commercialization of 214 innovative product and processes till date and has equity investment in 11 innovative ventures so far, however they have not yet enabled technology transfer.

Technical Collaborations

National

Bharat Heavy Electricals Ltd, New Delhi; Tamil Nadu Soap Manufacturers Association; Tamil Nadu Plastics Manufacturers Association; Tamil Nadu Plastic Woven Sacks Manufacturers Association; Tamil Nadu Pharma Cluster; Tamil Nadu Leather Cluster; Neyveli Lignite Corporation, Chennai; Karnataka Power Corporation Ltd, Bengaluru; Central Power Research Institute, Noida.

International

European Business Incubator Network, Brussels; National Business Incubation Association (NBIA), USA; German Association of Innovation, Technology and Business Incubation Centres; Centre on Sustainable Consumption and Production (CSCP),

Germany; International Energy Agency Clean Coal Centre, London; UNEVOC - International Centre for Technical and Vocational Education and Training.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Radiography solutions for fruit exports, food processing and other ndt applications; special tooling for cnc machines; split type wood forming cutters, inserts and cutter heads; recovery of tungsten carbide; cost effective synthesis of designed peptides and carbon nano tubes; and special precision engineering works have relevance to the Make in India campaign of the Government of India.
- Improvised agro machinery for bio-energy applications; unique fuel additive; customized indigenous solar energy solutions; and hollow fibre membrane-based water and gas purification systems have relevance to the Clean Energy Mission.
- Web platform for integrating unorganized service providers; and unique ICT services, ERP solutions for chemical industries has relevance to the Digital India campaign of the Government of India. 🔍



Research laboratory: OPTO electronics and laser instrumentation lab

Toc H INSTITUTE OF SCIENCE & TECHNOLOGY

Brief Description

Toc H Institute of Science & Technology (TIST) Institute established the 'Department of Research and Development' in 2006. One of the missions of the Institute is to undertake collaborative research that fosters new ideas for sustainable development, such as nanotechnology, biodiesel production, laser-based application, etc.

It is a self-financing Engineering College recognized by Cochin University of Science and Technology and affiliated to A P J Abdul Kalam Technological University.

R&D Set-up

The institute has plenty of research facilities and infrastructure available for the research and development (R&D) work. A few of these are given below and they are used by industries, individuals, and academicians:

- Optoelectronics & Laser Instrumentation Lab: Designing high power diode pumped ND: Yag laser with frequency doubled output.
- PARAM supercomputing facility: The tools, such as mpiBLAST and WRF are utilized using this supercomputing facility and many others.

Sources of income for R&D

Government agencies and self-funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 18.20

FY 2015-16 = 1.40

FY 2016-17 = 0.70

R&D Achievements

Products developed

- LASER audio transmitter
- Interactive holographic projector
- Diode pumped ND:YAG laser with frequency doubled output

Major Research projects

- Design, development and technology transfer of high-power diode pumped nd:yag laser with frequency doubled-output.
- Sputter deposition studies on nickel super alloy-based specimens for thin film sensor deposition.
- Development of thin film strain sensor technology for hot section gas turbine engine components.
- Commercial use of biomass from *Musa* sp. (banana) to reduce its negative impact on environmental quality of Kuttanad ecosystem.
- Metal nanoparticle1 incorporated mesoporous nanotitania with photo-catalytic applications.

Technical Collaborations

National

KELTRON, Government of Kerala; Digital Shark Technology Pvt. Ltd, Bengaluru; Intel FICE, Bengaluru; Information and Communication Technology Academy of Kerala; Centre for Development of

Registered Office

Toc H Institute of Science & Technology, Arakkunnain, Ernakulam 682 313, Kerala
T: 0484-23200129

E: principal@tistcochin.edu.in

W: www.tistcochin.edu.in

Recognition Status

File No.: 11/556/2012-TUV

Initial Recognition: 2012

Valid Until: March 31, 2018

R&D Manpower

Doctorates: 8

PGs & Graduates: 8

Research Areas

- Optoelectronics-laser instrumentation
- Material science
- Nanotechnology
- Biodiesel production

Research Outcomes

- Papers published:
 - » National: 4
 - » International: 22

Advanced Computing (CDAC), Pune;
Technolodge Piravom, Kerala

International

Keysight Technologies, Canada; VSB
Technical University, Ostrava, Czech
Republic

Societal Relevance

The following R&D outcomes are of
national/societal significance:

The core research areas include
indigenous development of a high

power diode pumped Nd:YAG laser
with frequency doubled output,
training of manpower for industrial
production, and technology transfer
to industry. The work envisaged
here includes simulation of thermal
management of Nd:YAG rod laser,
resonator design, fabrication,
assembly and testing, design
optimization, technology transfer,
and training of manpower and this is
relevant to the Make in India and Skill
India Mission. 🔍



^ LTHM neutron diffraction

UGC-DAE CONSORTIUM FOR SCIENTIFIC RESEARCH

Brief Description

UGC-DAE Consortium for Scientific Research (CSR) is an autonomous institute of the University Grants Commission (UGC) which provides specialized training and advanced characterization of facilities for university researchers. The DAE conducts research in the areas of thin films, radiation sources, etc.

R&D Set-up

There are four different centres of the UGC-DAE in India and they have their respective research facilities and infrastructure and provide access and support to universities and academic institutions. A few of these are listed below:

The CSR centres are located at Indore, Kolkata, Mumbai, and Kalpakkam Node. Each centre has dedicated labs for research.

- Magnetometer and AC susceptibility
- Dielectric measurements facility
- Facilities for Co-60 irradiation of liquid and solid materials
- Inverse Photo-emission spectroscopy (IPS)
- Electron spectroscopy for chemical analysis (ESCA)
- Vibrating sample magnetometer and others and all these are used by individuals and academicians
- The Kolkata Center is primarily devoted to research in different aspects of experimental and

theoretical nuclear physics and applications of nuclear techniques in condensed matter physics, chemistry, and biosciences.

- The Mumbai Centre provides access to the National Facility for Neutron Beam Research (NFNBR) at Dhruva reactor.
- The Indore Centre is developed towards utilization of the synchrotron radiation sources INDUS-1 and -2. INDUS-1 is a 450 MeV electron storage ring giving useful light in the energy range 10 to 800 eV - vacuum ultra-violet to soft X-rays.

Sources of income for R&D

Government agencies

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 5,121.86

FY 2015-16 = 4,667.03

FY 2016-17 = 4,485.34

R&D Achievements

Instruments developed

New instruments wherein CSR continuously expands its activities that require certain basic infrastructure to expand the commercially non-available options were developed. Such systems include developmental work on the following:

- XAS beamline in Indus 2 at RRCAT, Indore

Registered Office

UGC-DAE Consortium for Scientific Research, University Campus, Khandwa Road, Indore 452 001, Madhya Pradesh
T: 0731-2463913
E: ajitmars@gmail.com
W: www.csr.res.in

Location of R&D Units

- Indore, Madhya Pradesh
- Mumbai, Maharashtra
- Kolkata, West Bengal
- Kalpakkam, Tamil Nadu

Recognition Status

File No.: 11/375/1999-TU-V
Initial Recognition: 1999
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 40
PGs & Graduates: 18

Research Areas

- Synchrotron radiation sources
- Surface sciences and thin films, spatial
- Inter-disciplinary sciences, etc.

Research Outcomes

- Papers published:
 - » National: 11
 - » International: 1,139

- Establishing LTHM XRD
- LTHM Mossbauer and MOKE spectroscopies
- UHV deposition and in-situ measurements
- CHUF protocols on first-order magnetic phase transitions
- Novel protocols in polarization and dielectric measurements
- New electronic items developed for laboratory use
- Unconventional and new measurement protocol for various experiments
- Cryogenic facility, etc.

Technical Collaborations

National

Bhabha Atomic Research Centre (BARC), Mumbai; Variable Energy Cyclotron Centre (VECC), Kolkata; Raja Ramanna Centre for Advanced Technology (RRCAT), Indore; Indian

Institute of Technology; Indira Gandhi Centre for Atomic Research (IGCAR), Tamil Nadu, and many others.

Societal Relevance

The following R&D outcomes are of national/societal significance:

CSR had initiated efforts on gathering talent across researchers in universities and other national institutes in the above said direction of clean energy, such as materials for magnetic and thermoelectric refrigeration, water purification, etc. Regarding the Make in India and Skill India initiatives, CSR has an enormous contribution of serving with high quality experimental access for some of the major facilities of the department of Atomic Energy as well as in-house developed facilities, including novel low temperatures and high magnetic field (LTHM) facilities for various measurements to numerous researchers. 🔍



Research activities in the organization

VALLIAMMAI SOCIETY

Brief Description

The Valliammai Engineering College is a part of the SRM Group of Educational Institutions, sponsored by the Valliammai Society. The Valliammai Society was founded by Dr T R Paarivendhar. It is a non-governmental organization registered as a society.

R&D Set-up

The research facilities and infrastructure available with the organization are as follows:

- High pressure reactor
- Cryogenic reactor
- Rotary evaporator with recirculating chiller
- Glove Box 3.30 5 vacuum oven with vacuum pump
- Oil bath with magnetic stirrer
- Overhead stirrer
- Platinum crucible
- Muffle furnace
- BOD incubator
- pH metre and others

Sources of income for R&D

- Grants from government agencies

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2015-16 = 5.67

FY 2016-17 = 25.16

R&D Achievements

Products developed

- Portable car washer
- Vegetable oil stove
- Mobile navigator
- SPV cleaner


- Fly ash concrete maker
- Portable air conditioner and others

Prototypes developed

- Drying performance test rig
- Paper-based mercury sensor
- Electrical calorimeter

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Beach cleaning equipment is used for cleaning the plastic bags in the beach
- PCM integration in buildings reduces the usage of air conditioners
- Parabolic concentrator use of solar technology for power production
- Agricultural seeding and ploughing equipment to reduce the burden on farmers. 

Research Areas

- Synthesis and characterization
- Nanomaterials
- Computational fluid dynamics
- Image processing
- Wireless sensor network
- Nano concrete
- Structural engineering
- Building energy simulation

Research Outcomes

- Papers published:
 - » National: 15
 - » International: 234
- IPRs held
 - » Patents filed: 7

Registered Office

Valliammai Society, Bharathi Salai,
Ramapuram, Chennai 600 089,
Tamil Nadu
T: 044-27454784

E: srmvec@valliammai.co.in

W: www.srmvalliammai.ac.in

Recognition Status

File No.: 11/687/2016-TU-V

Initial Recognition: 2016

Valid Until: March 31, 2019

R&D Manpower

Doctorates: 6



^ Research facility available for the R&D work

VARDHAMAN COLLEGE OF ENGINEERING OF VARDHAMAN EDUCATIONAL SOCIETY

Brief Description

The prime objective of Vardhaman College of Engineering (VCE) is to provide professional education. It is affiliated to Jawaharlal Nehru Technological University (JNTU), Hyderabad, and has been approved by the AICTE, with major disciplines of engineering. The research objectives of the institute are (1) to promote a research hub facilitating multiple research centres and covering heterogeneous research areas, such as image processing, water marking, video quality, etc.; (2) to enhance the quality of quantitative research; (3) to amplify collaborative research with premier institutions and industries, etc.

It is registered as Vardhaman the College of Engineering of vardhaman Educational Society (Autonomous), a Pvt. unaided institute.

R&D Set-up

The VCE has plenty of research facilities and infrastructure available for the research and development; few of these are given below:

MATLAB Software

- Hydraulic Jump Apparatus Model
- Universal Testing Machine
- Vickers Hardness Tester
- Trinocular Metallurgical Microscope with capturing camera and many more

Sources of income for R&D

Project grants

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 4.16

FY 2015-16 = 189.58

FY 2016-17 = 96.08

R&D Achievements

Products developed

- A Graphics Compatible Adder (GCA) for digital signal processing
- Piezoelectric compound for elevated temperature
- Investigation of 2debg ground plane effect in array antenna design

Processes developed

- A novel process for synthesizing high-temperature lead-free piezoceramics
- A system and method for monitoring environmental pollutants
- A novel method and composition for preparing pizza using pure ghee

Prototypes developed

Nearly 28 prototypes have been developed by the organization and a few of these are listed below:

- Counter measurements of attack immunizing architecture for adiabatic and reconfigurable digital systems
- Arduino-based capacitance metre
- Defense robot

Registered Office

Vardhaman College of Engineering
Kacharam,
Shamshabad 501 218
Hyderabad, Telangana
T: 08413-253335
E: principal@vardhaman.org
W: www.vardhaman.org

Recognition Status

File No.: 11/653/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 17
PGs & Graduates: 29

Research Areas

- Image processing and computer vision
- Water marking and steganography
- Image and video quality assessment
- Perceptual vision
- Parallel algorithms, etc.

Research Outcomes

- Papers published: 246
- Patents filed: 8

- Solar-based thermal robot
- Light harp
- Controlling of street lights based on vehicle movement and many others.

Instruments developed

- Piezoelectric generator
- Four-wheel electric car
- 3D printer
- Solar dryer
- Apparatus and method for detecting the clogging of a fuel filter

Revenue earned by way of licencing products/processes/ prototypes

- Alarm-based control of light for poultry: ₹2,00,000
- Solar-supported automatic lighting: ₹6,000
- Infrastructure provision for competitive examinations: ₹7,63,250
- Industrial timer board: ₹4,25,000

Technical Collaborations

National

Entrepreneurship Development Institute of India, Ahmedabad; IBM India Pvt. Ltd, Bengaluru; Wadhvani Foundation New Entrepreneurship

Network; Bengaluru; RightLink Technologies Pvt. Ltd, Hyderabad; TATA Consultancy Services Ltd, Mumbai; National Small Industries Corporation, New Delhi; Tech Mahindra, Mumbai.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Monitoring environmental pollutants aids in environmental impact assessments of human activities and the natural environment.
- Apparatus to detect clogging of a fuel filter removes abrasive particles from the fuel stream that can upset engine performance. Clogging causes more pollution from vehicle engines which are harmful for the environment. This apparatus helps in early detection of clogging and is an economic method.
- Awareness programmes on keeping the village clean, oral hygiene, general hygiene for young girls in schools, women-related issues, free dental camps, etc., is directly relevant to the Swachh Bharat Mission of the Government of India. 🔍



^ GC-MS facility at the Department of Alcohol Technology

VASANTDADA SUGAR INSTITUTE

Brief Description

The Vasantdada Sugar Institute (VSI), formerly known as Deccan Sugar Institute, performs under one umbrella, all scientific, technical, and educational functions relevant to the sugar industry. VSI's research and development programme aims at assessing and meeting the current as well as future needs of the sugar industry. VSI's current research interests include, the development of promising sugarcane varieties through biotechnology; water-conserving irrigation systems; eco-friendly methods of crop production and crop protection; reduction in sugar losses in sugar factories; electricity power through co-generation; energy audit; pollution abatement; vermi-compost for improving soil fertility and productivity; etc.

R&D Set-up

- Seeds, and experimental farms, including nurseries and orchards, along with check dams, farm ponds with drip irrigation system, and a sugarcane breeding center at Amboli.
- Transgenic greenhouses, Gene gun, -86 °C and -20 °C deep freezers, RT-PCR, hybridization oven, lyophilizer, high speed refrigerated centrifuges, laminar air flow units, MPAES (Microwave plasma atomic emission spectroscopy), and many more.

Sources of income for R&D

- Government agencies
- Consultancy
- Testing and training

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 3,694.42

FY 2015-16 = 2,597.52

FY 2016-17 = 3,434.34

R&D Achievements

Products developed

VSI has developed around 11 products and a few of these are given below:

- Micronutrient VSI- Microsol, this is a solid-water-soluble micronutrient mixture
- Banana micropropagation, this is a micropropagation protocol which was modified for the Grande Naine variety of banana

Processes developed

- New formula for estimation of heat transfer coefficient (htc) in multiple effect evaporators
- Development of potential yeast strains with enhanced tolerance for ethanol and recycled spent wash, thereby, reducing the pollution load
- Controlling bacterial and wild yeast contamination in molasses fermentation

Revenue earned by way of licensing products/processes/prototypes (₹ in lakhs)

FY 2014-15 = 396.27

FY 2015-16 = 434.95

FY 2016-17 = 520.42

Registered Office

Vasantdada Sugar Institute,
Manjari (Bk), Haveli,
Pune 412 307, Maharashtra
T: 020-26902131
E: vsilib@vsnl.com /
shivajikhengare09@gmail.com
W: www.vsisugar.com

Recognition Status

File No.: 11/4/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 23
PGs & Graduates: 91

Research Areas

- Seed varieties
- Soil and plant health
- Micro irrigation
- Sugar quality
- Renewable energy
- Environment
- Software and weather monitoring system

Research Outcomes

- Papers published:
 - » National: 26
 - » International: 5
- IPRs held
 - » Patents filed: 10

Commercialization potential of products/processes developed

Sugarcane harvester, a whole-cane sugarcane harvester developed in collaboration with M/s Rane Agro, Pune, and Indian Council of Agricultural Research, New Delhi, is at commercialization stage.

Technical Collaborations

National

Bhabha Atomic Research Centre (BARC), Mumbai; ICAR- Sugarcane Breeding Institute, Coimbatore; National Chemical Laboratory, Pune; Central Pollution Control Board, New Delhi; Sanghvi, Pune; Indian Sugar Exim Corporation Ltd, New Delhi; ICAR - National Research Centre for Grapes, Pune

International

Massachusetts Institute of Technology, Boston; Fiji Sugar Corporation, Fiji

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Mass production of different liquid biofertilizers, liquid biocontrol agents, decomposing culture and special grade decomposing culture are helpful in saving chemical fertilizers and pesticides while decomposing culture and special-grade decomposing cultures are useful in waste management in the Swachh Bharat Mission.
- Sugarcane micro-propagation, banana tissue culture plants, Quality seed improved the yield and recovery which ultimately resulted in higher income by farmers. This also has relevance to the 'Make in India scheme of the Government of India.
- The weather-monitoring system is relevance to programmes, such as Digital India, Swastha Bharat, Environmental Clearance Work, and obtaining Micro-meterological data. 🔍



^ Research facilities at VSF

VASTUSHILPA FOUNDATION FOR STUDIES AND RESEARCH IN ENVIRONMENTAL DESIGN

Brief Description

The activities in Vastushilpa Foundation for Studies and Research in Environmental Design include documentation and theoretical research, applied research, and the demonstration and dissemination through training and publications.

R&D Set-up

Infrastructure, such as computers, printers, scanners, projectors, TV, camera, etc. are available for research and the dissemination of research findings.

Sources of income for R&D

- Donation
- Interest on investments

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 153.53

FY 2015-16 = 28.11

FY 2016-17 = 14.56

R&D Achievements


Research Outcomes

- Post-occupancy studies and documentation of housing typologies and the study of user participation will help in the designing of future housing. The outcomes are accessible through videos/publications and exhibitions.
- The International Habitat Design Studio gives exposure to students

and fresh graduates through design practice.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Nalanda University's, net-zero design strategy has been envisaged for this sustainable campus and has a key component, which is the use of biomass-fuelled generators for electricity. The collection of biomass (agricultural waste) from the surrounding villages furthers their economic sustainability and helps build bridges between the university and local communities. Similarly, food for the population in the university as well as wood for the construction of the future phases of the campus, all offer possibilities of furthering the economic collaboration between the local communities and the university. 

Research Areas

- Human settlements
- Appropriate technology
- Sustainable built environment
- Heritage conservation

Research Outcomes

- Papers published:
 - » National: 1
 - » International: 1

Registered Office

Vastu-Shilpa Foundation
for Studies and Research in
Environmental Design
Sangath, Thaltej Road,
Ahmedabad 380 054, Gujarat
T: 079-27451555,
E: vsf@sangath.rg,
W: vastushilpa.org

Recognition Status

File No.: 11/148/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 1
PGs & Graduates: 5



^ Development of an intelligent hybrid driver hypo vigilance system

VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES

Brief Description

The Vels Institute of Science, Technology and Advanced Studies (VISTAS) is a non-government organization registered under a trust. It strives to be an epitome of excellence in higher education by effectively providing its students with high standards of education and rigorous training to promote positive change.

R&D Set-up

The Centre for Advanced Research and Development (CARD) has been established to promote research amongst faculty members, research scholars, and students. The primary objective of the CARD is to create a research culture amongst the stakeholders. A structured cadre has been established for promoting research. A contingent of 45 persons belonging to all disciplines, such as engineering, life sciences, pharmaceutical sciences, basic sciences, and management, are devoting their full time to research and development.

- The team is working on wind and solar energy, environmental engineering, alternative fuel, nanotechnology, plant tissue culture, animal biotechnology, fish immunology, stem cell research, drug designing and drug testing, digital innovations, big data, virtualization, etc.

They also have an artificial intelligence (AI) lab, where AI programmes are held and they comprise a

multidisciplinary group of researchers conducting theoretical, experimental, and applied investigations of intelligent systems.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 50.00

FY 2015-16 = 60.00

FY 2016-17 = 125.00

R&D Achievements

Products developed

- Smart cost-effective tele-surgical robot for surgery
- Eco-friendly smart cost-effective welding system
- Multicrop thresher
- Smart beacon light
- Gas-leak detector
- Temperature indicator
- Cost-effective scanner
- Fire-combat bot
- SMART wheel chair
- Mobile-control combat vehicle
- Analytical tablets and capsules
- Wind power system
- SMART home security control system
- Beam steerable antenna
- Oral hearing aid machine
- Aqua fuel kit
- On-road dust extractor
- Water-quality evaluator
- Disaster-recovery kit
- Dust-recovery system

Registered Office

Vels Institute of Science,
Technology and Advanced
Studies, Velan Nagar PV
Vaithiyalingam Road Pallavaram
Chennai 600 117, Tamil Nadu
T: 044-2266 2500
E: registrar@velsuniv.ac.in
W: www.velsuniv.ac.in

Recognition Status

File No.: 11/609/2013-TU V
Initial Recognition: 2013
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 204
PGs & Graduates: 300

Research Areas

- Chemical and biosensors
- Immunology
- Lifesciences
- Biotechnology
- Biochemistry
- Pharmaceutical science
- Computing science and engineering
- Electronics, electrical instrumentation, and artificial intelligence

Research Outcomes

- Papers published: 1554
- IPRs held
 - » Patents filed: 20
- Technologies transferred/commercialized: 5

- ATM auto controller
- Fire fighting vehicle
- Building power conservator

Prototypes developed

- SMART Home Security
- Automation system for homes
- Energy metre
- Power conservator
- Water-quality evaluator
- Self-activated disaster recovery kit
- Firefighting kit
- Rescue robot kit
- Smart home security-control kit

Commercialization potential of products/processes developed

There are 5 products and services commercialized by the institute out of which three are products and two are services.

Technical Collaborations

National

Arcomm Tech Solutions, Chennai; Super Auto Forge; Apollo Shine; HCL Infosystems; IBM India; Maples ESM; BSNL; Microsoft IT; CDAC; NIWE

International

RTW LLC Dubai; QUT Australia; PAL Alto Networks USA; SIAM Thailand; Asia Pacific Malaysia; City of Glasgow UK; Taylors Malaysia; Sheffield Hallam UK; Mari state Russia

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Arcomm ATM Auto Controller is filed for patent by ARCOMM Tech

Solutions Pvt. Ltd The device was initially installed at PBB LHO ATM and Shankar Nethralaya ATM, Nungambakkam, and proved its efficient working by conserving 5 units of electricity per day per ATM, respectively.

- By cutting off the power to the ACs during 22:00 to 06:00 hrs (8 hrs), the production of highly harmful 'greenhouse gases' by ACs is prevented which depletes the ozone layer thus preventing 'global warming'.
- By reducing the working hours of the loads connected to the device, the load's longevity is improved.
- The device can now conserve around 10–12 units of electricity per day per ATM and an average of ₹9,000 per ATM per EB bill cycle.
- Through research, it has been proved that there are around 250,000 ATMs in India. By reducing the usage time of the ACs and lights in the ATM consoles alone, at least around ₹600 crore for the banks and 60 crore electrical units to the Government of India can be saved.
- As of now, this device is working and saving energy in an enormous amount in over 200+ ATMs in and around Chennai, the State Bank of India ATMs, Vellore, and the Indian Bank ATMs in Coimbatore (proven by the institute and appreciated by the concerned branch managers). 🔍



VEL SHREE R RANGARAJAN DR SAKUNTHALA EDUCATIONAL ACADEMY

Brief Description

Vel Shree R Rangarajan Dr Sakunthala Educational Society is registered as a trust. Its areas of research are organic chemistry, synthetic chemistry, material sciences, automotive engines, and many others.

R&D Set-up

Research labs/centres of the society are as follows:

- Composite research centre
- Organic chemistry research centre
- Metallurgical and materials laboratory
- Synthetic chemistry research centre
- Centre for computational fluid flow modelling
- High speed bearing test
- Material science research centre
- Centre for autonomous research centre
- Automotive engine test facility
- Gas turbine engine test facility
- E-waste recycling facility
- Bio technology research centre
- Wabco – vehicle control technology centre
- Centre for design, engineering and manufacturing – dassault systems
- 3D printing and 3d scanning centre
- Centre for development of advance computing
- Ibm cyber security centre

Sources of income for R&D

- Grant-in-aid
- Government funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 134.67

FY 2015-16 = 137.75

FY 2016-17 = 91.17

R&D Achievements

Products developed

- Boat lighting solution
- Automobile and industrial benchmarking solution
- Application of UAV in agriculture
- Developed micro weight gear trains for ornithopter
- Developed underwater UAV for surveillance
- Developed novel extrusion system for making indigenous filaments for FDM systems
- Novel methodology identified for heavy metal removal from effluents
- Online tyre service
- Automobile benchmarking software
- Green vehicle for waste collection
- Mobile application development
- Small satellite for aerial imagery
- Vibratory finishing unit
- Vapour smoothing unit for thermoplastic parts
- Formulation of Effective microorganism for

Registered Office

Vel Shree R. Rangarajan
Dr Sagunthala Educational
Academy, No.24, Santi Sudha,
Archbishop Mathias Avenue,
Chennai, Tamil Nadu
T: 9445049400

Recognition Status

File No.: 11/613/2013-TU V
Initial Recognition: 2013
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 163
PGs & Graduates: 17

Research Areas

- Composite research
- Organic chemistry
- Metallurgical and material
- Synthetic chemistry
- Centre for computational fluid flow modelling
- Material science
- Uav/ robotics
- Automotive engine
- Gas turbine engine
- E-waste recycling
- Bio technology
- Alternate fuel

Research Outcomes

- Papers published: 1,027
- IPRs held
 - » Patents filed: 85
- Technologies transferred/commercialized : 9

bio-composting (mesophiles and thermophiles)

- Formulation of face wash from natural resources
- Formulation of natural facial cream

Prototypes developed

- Mileage enhancing device
- Developed digital fuel metre
- Many prototypes using 3D-printing and 3D-scanning facility

Commercialization potential of products/process developed

There are nine products commercialized by the academy:

- Outcome-based software tool
- Plastic waste to gardening pot
- Products and SAAS (Web and mobile apps) using Zoho Creator
- Finding the right match of courses offered by top universities and also arranging finance via scholarships/ education loans
- Full-scale automotive benchmarking service provider
- Products for in location customers engagement
- Comprehensive gaming in the real world
- Admatic street: Location-based e-commerce and local search engine by bringing local shops/sellers online automatically in seconds to connect with local buyers

- Online shopping portal which provides all daily-use products, such as personal care, cosmetics, stationery, bakeries, fast food, and other households products, at the customer's doorstep.

Technical Collaborations


National

Ministry of Micro, Small & Medium Enterprises, Government of India; Computer Sciences Corporation India Pvt. Ltd (CSC); Management Training Institute, SAIL, Ministry of Steel, Government of India; UCAL FUEL SYSTEMS LIMITED; Information and Library Network Centre (INFLIBNET); NASSCOM; Global Automotive Research Centre Under National Automotive Testing and R&D Infrastructure Project (NATRIP).

International

Hamburg University of Applied Sciences; Hochschule Bochum University; Hochschule Bonn-Rhein-Sieg University of Applied Sciences; IZFP – Fraunhofer Institute; Leibniz Universität Hannover Leibniz Universität Hannover.

Societal Relevance

The various programme organized in Vel Shree Society aim to promote safe disposal of e-waste and recycling. 



Research activities in the computer lab

VEL TRUST

Brief Description

The VEL Trust Group of educational institutions was established in 1990 to develop industries and international trade, and conducts research in biomedical waste management, bioactive bacteria, antibodies, etc.

It is a non-governmental organization registered as a trust in the name of VEL Trust.

R&D Set-up

The following research facilities and infrastructures available in the organization for use in research and development (R&D) are regularly used by individuals and academicians.

- Laminar air flow cabinet
- Carbon dioxide incubator with digital temperature
- Centrifuge HS Max 17300 RPM
- Autoclave Vertical 450 mm * 600 mm
- Deep Freezer Horizontal Model RQF 265
- Liquid nitrogen container
- Filtration assembly membrane filter disc
- Zoom stereo digital microscope
- UV-visible spectro photometer double beam UV VIS
- N9914A - Handheld 6.5 GHz RF Vector Network Analyser
- Software (CASPOC) power electronics and electrical drivers

Sources of income for R&D

Government funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 58.69

FY 2015 -16 = 41.79

FY 2016 -17 = 9.11

R&D Achievements

Processes developed

Since 2014, the following processes have been developed by the organization:

- Isolation of marine bacteria from sea fans and screening of Isolates for antimicrobial activity
- Isolation of marine bacteria from corals and screening of Isolates for antimicrobial activity.

Technical Collaborations


National

Central Power Research Institute, Bengaluru; Central Leather Research Institute, Chennai; National Small Industries Corporation - Technical Service Centre, New Delhi; Ramco Steels Pvt. Ltd, Faridabad; Developing Library Network, New Delhi; Global Coal & Mining Pvt. Ltd, Haryana; Bengaluru Integrated Systems Solutions Pvt. Ltd (BISS), Bengaluru; and others.

International

Carnegie Mellon University Pittsburgh, USA

Societal Relevance

They have developed a novel drug compound in order to prevent various resistive pathogens and fight against deadly human diseases. 

Research Outcomes

- Papers published: 101
- IPRs held
 - » Patents filed: 121

Registered Office

VEL Trust, 38 (Old 24),
Santi Sudha, ABM Avenue,
Raja Annamalaipuram,
Chennai 600 028, Tamil Nadu
E: principal@veltechmultitech.org
W: www.veltechengg.com

Recognition Status

File No.: 11/632/2014-TU-V

Initial Recognition: 2014

Valid Until: March 31, 2020

R&D Manpower

PGs & Graduates: 6

Research Areas

- Peptide antibiotics
- Bioactive novel bacteria
- Network security
- Biomedical waste treatment
- CMT welding process



^ Water soluble botanical formulations

VITTAL MALLYA SCIENTIFIC RESEARCH FOUNDATION

Brief Description

The Vittal Mallya Scientific Research Foundation (VMSRF), a non-profit research organization, was established by the UB Group in 1987 as an independent centre for applied research with biotechnology as its main thrust. The objectives of VMSRF are—to carry out research in frontier areas of biotechnology and organic chemistry; to develop newer processes/products; to enter into collaborative research programmes with various national and international bodies for developing cost-effective technologies, etc.

It is registered under Karnataka Societies.

R&D Set-up

The research facilities and infrastructure used for research includes the following.

- Maxi cold, rotavapour, carbon dioxide (CO₂) incubator, fluid bed dryer, tubular centrifuge, bio spectro photometer, Elisa reader, Spectrophotometer, HPLC, etc.

Sources of income for R&D

Royalty, interest, and other income and grants from DBT /DST

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 182.49

FY 2015 -16 = 86.67

FY 2016 -17 = 86.69

R&D Achievements

Products developed

- Water soluble neem products
- Development of dental caries detection formula

Processes developed

- Water soluble powder formulations for botanicals
- Water soluble liquid formulations for botanicals

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The terrace gardening service for waste processing has direct relevance to the need for a clean and safe environment. 🔍

Registered Office

Vittal Mallya Scientific Research Foundation, #23, 5th Main, J C Industrial Layout, Kanakapura Road, Bengaluru 560 062, Karnataka

T: 080-26861769

E: vmsrf@vmsrf.org

W: www.vmsrf.org

Recognition Status

File No.: 11/14/1988-TU-V

Initial Recognition: 1988

Valid Until: March 31, 2018

R&D Manpower

Doctorates: 4

PGs & Graduates: 4

Research Areas

- Biotechnology
- Plant tissue culture
- Synthetic and natural products
- Molecular biology
- Fermentation
- Analytical chemistry

Research Outcomes

- Papers published:
 - » National: 2
 - » International: 14
- IPRs held
 - » Patents filed: 2



^ Laser Ablation Multi Collector Inductively Coupled Mass Spectrometer (LA-MC-ICP-MS) instrument for isotopic studies

WADIA INSTITUTE OF HIMALAYAN GEOLOGY

Brief Description

The mandate of the Wadia Institute of Himalayan Geology (WIHG) is to carry out research towards the development of new concepts and models for the geodynamic evolution of the Himalaya through an interdisciplinary approach.

The Institute plans and coordinates research towards understanding physical processes causing natural disasters, evaluates their hazard potential, and suggests remedial measures.

R&D Set-up

The institute has created many major and unique national facilities and all are used by industries, individuals, and academia.

- 'Multi-Parametric Geophysical Observatory (MPGO)' at Ghuttu, Tehri, and upgradation of seismological network with VSAT connectivity in North West India.
- Centre for Himalayan Glaciology at WIHG to monitor climate change impact on Himalayas.
- A 'National Geotechnical Facility' was also created by DST under the ambit of the institute.
- The institute is equipped with modern analytical laboratory facilities at par with International standards, such as EPMA, XRF, ICP-MS, XRD, Raman Spectrometer, SEM with EDAX, stable isotope mass spectrometer, TL/OSL facilities, GPR, engineering seismograph, etc.
- The institute also has high-end research facilities such as LA-MC-

ICPMS for chronologic studies, MAT 253, Kiel carbonate, laser isotope water analyser, etc.

Source of income for R&D

Government agencies and others

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 4,020.67

FY 2015 -16 = 3,975.83

FY 2016 -17 = 3,631.60

R&D Achievements

- The institute has carried out field and analytical studies of the buried course of River Saraswati and found signature of existence of this river until ~1.5 kilo years before the present.
- The institute has taken up another important study of geothermal springs from the NW Himalaya suggesting that these springs have the potential to degas 2.9×10^7 mol CO_2 per year into the atmosphere and further their reservoir temperatures (42 to 107 °C) indicate their application in space heating and to generate electricity in certain cases.
- The frequency-dependent attenuation of P and S waves in Garhwal Himalaya indicate that the Garhwal region falls under tectonically active areas of the world with dominance of scattering attenuation.
- In and around the Doon Valley, the sonant frequency, the soil

Registered Office

Wadia Institute of Himalayan Geology, 33 GMS Road, Nehru Enclave, Satya Vihar, Ballupur, Dehradun 248 001, Uttarakhand
T: 0135 2525101
E: director@wihg.res.in
W: www.wihg.res.in

Recognition Status

File No.: 11/32/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 53
PGs & Graduates: 3

Research Areas

- Geodynamic evolution
- Natural hazards, glaciers
- Climate-tectonic interaction
- Earthquakes and other geophysical studies
- Geological mapping; structure and tectonic
- Petrology and geochemistry
- Geochronology
- Sedimentology
- Palaeontology/biostratigraphy

Research Outcomes

- Papers published: 191

thickness, and the mean S-wave velocity of the sediments in the uppermost 30 m has been characterized from the ambient noise measurements undertaken at 240 sites in the valley.

- The study of spatio-temporal behaviour of seismicity in Garhwal-Kumaun region of Himalaya suggest that in recent times the seismic activity has increased in the region of northwest Garhwal and Kumaun as compared to the region of southeast Garhwal (low b -value) thereby indicating accumulation of high stresses in the SE Garhwal region.
- Consultancy services rendered

The institute provides scientific inputs to the state and central Government agencies as well as public sector undertakings under the consultancy mode.

Technical Collaborations

National

Indian Institute of Remote Sensing (IIRS), Dehradun; Central Soil and Water Conservation Research Training Institute (CSWCRTI), Dehradun; National Geophysical Research Institute (NGRI), Hyderabad; Defence Research and Development Organization (DRDO); Indian Space Research Organization (ISRO),


Bengaluru; Space Applications Centre, Ahmedabad; National Centre of Seismology, New Delhi; University of Kashmir, Srinagar; UPES, Kumaun, Uttarakhand.

International

Indo-Norwegian bilateral project on Geothermal Energy; University of Iceland, Iceland; University of Savoie, France.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Isotopic and geochemical studies of groundwater from the Ramganga basin and the middle Ganga Plains with their implications for pollution and metal contamination were carried out by scientists at WIHG.
- As part of the Digital India Mission, the Institute continuously generates GPS data of the NW Himalaya and stored at WIHG Dehradun.
- Preparation of database on various geological aspects of societal relevance, such as glaciers, lakes, springs, landslides, mines, etc., in the Himalayas, has been initiated. 



Research facility available for project work

WICMA R&D CENTRE OF WESTERN INDIA CORRUGATED BOX MANUFACTURERS' ASSOCIATION

Brief Description

The Western India Corrugated Box Manufacturers Association (WICMA) is affiliated to the Federation of Corrugated Box Manufacturers of India, an apex body of corrugated manufacturers all over India. WICMA was established with the primary objectives of promoting trade, commerce, and industry connected with corrugated boards and boxes; and to promote and advance commercial and technical education of corrugated packaging. The main objective of the WICMA R&D Centre is to help in terms of technology—members, other corrugators, mills, dealers, raw material suppliers, etc. All technical activities of WICMA are conducted through the WICMA R&D Centre in the areas of coatings, paper, boxes, wires, etc.

R&D Set-up

The following equipments are available in the organization and all these are used by industries:

- Grammage tester, caliper tester, moisture estimator
- COBB value determinator, bursting strength tester (electrically operated)
- Bursting strength tester (micro processor based), crush tester, box compression strength tester
- Tear tester (Elmendorf), puncture, resistance tester, Concora Medium Tester

- Temperature regulated oven, desiccator, drop tester, precision balance
- Humidity chamber with printers facility (Conditioning chamber), pH metre digital, electronic pan balance
- Electronic top pan balance 220 gm capacity, sample cutter, instant temp. Indicator, and others

Source of income for R&D

Donations

Technical Collaborations

International

The Technical Association of Pulp and Paper Industry (TAPPI), USA. [Q](#)

Registered Office

Western India Corrugated Box Manufacturers Association,
138, Mittal Estate No.3,
M VasANJI Road, Andheri (East),
Mumbai 400 059, Maharashtra
T: 022 2850 6716
E: wicma@wicma.com
W: www.wicma.com

Recognition Status

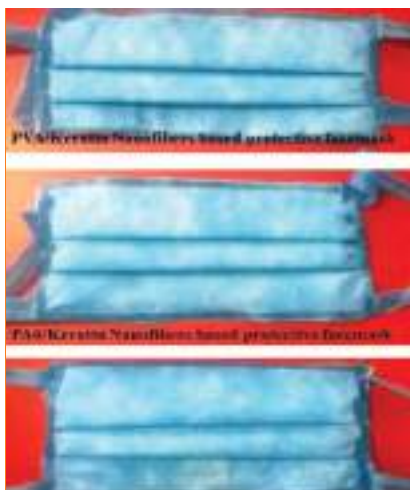
File No.: 11/421/2002-TU-V
Initial Recognition: 2002
Valid Until: March 31, 2020

R&D Manpower

PGs & Graduates: 8

Research Areas

- Paper
- Corrugated boxes and boards
- Starch/adhesives
- Inks
- Coatings
- Stitching wires



^ Photographs of one of the products developed

Registered Office

Wool Research Association,
Kranti Surya Mahatma Phule
Road, PO Sandoz Baug,
Kolshet Road, Thane 400 607,
Maharashtra
T: 022-2586 8109, 022-2586 8398
E: patil.vc@somaiya.com
W: www.wraindia.com

Recognition Status

File No.: 11/95/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 3
PGs & Graduates: 10

WOOL RESEARCH ASSOCIATION

Brief Description

The Wool Research Association (WRA), as an organization, is committed to provide technological and scientific solutions to the woollen sector, e.g., nanotechnology, organic synthesis, textile technologies, environmental engineering, etc.

R&D Set-up

- WRA has been using numerous equipments and instruments for R&D activities.
- Moisture management tester, limiting oxygen index iester, Spectrofluorophotometer, Taber Model Scratch Tester, electro spinning system, evenness tester, Kawabata evaluation system, Inductively coupled plasma spectroscopy (ICP-OES), vertical flammability tester with flammability test cabinet, digital bursting strength tester, rain tester, air permeability tester
- Hot air oven (moisture regain oven), air flow metre, optical fibre diameter analyser (ofda), projection microscope, wrap reel, wrap reel auto, manual twist tester, automatic twist tester, Uster Evenness Tester, Uster Strength Tester, universal tensile strength machine and others.

Source of income for R&D

Government funding and revenue generated by testing, consultancy, etc.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 782.88

FY 2015 -16 = 731.87

FY 2016 -17 = 847.47

R&D Achievements

Projects developed

- Face mask
- Electronic-based wearable t-shirt
- Net fabrics, Elastic nets
- Water-proof breathable laminated fabric
- Flees laminated fabric
- Spacer fabric, elastic space fabric
- Fashion wear
- Machine washable woolen sportswear
- Itch-free woolen sportswear - coloured
- Fancy photochromic garments
- Health parameter monitoring sports garment
- Sports nets of different construction
- Sports bandages
- Sportswear with enhanced moisture management properties

Processes developed

- Use of Ultrasound technology in wool scouring
- Use of fuller earth material in dry wool scouring
- Development of stretching of methods for making Indian wool finer by 2 micron
- Textile effluent treatment using electro-fluccion technique

Research Areas

- Nanotechnology
- Organic synthesis
- Organic synthesis and chemical processing of textiles
- Sportswear product development
- Biotechnology in surfactants
- Leisurewear product development
- Value addition using functional finishing
- Coated textiles
- Smart textiles
- Environmental engineering

Research Outcomes

- Papers published:
 - » National: 1
- IPRs held
 - » Patents filed: 4

- For small sector textile mill a compact effluent treatment plant based on MBR Technology

Commercialization potential of products/processes developed

The following products/processes have a potential for commercialization and are listed below:

- Electronic wearable health monitoring garment
- Protective face mask
- Lamination and coating work
- Flame retardant fabric development

Technical Collaborations

National

Lakshmibai National University of Physical Education, Gwalior; Netaji

Subhash Regional Centre, Guwahati; Sports Goods Manufacturers and Exporters Association, Jalandhar; Sports Authority of India, New Delhi; Textile Department of Institute of Chemical Technology, Mumbai; Dyes Department of Institute of Chemical Technology, Mumbai; Textile Research & Application Development Centre (TRADC); Birla Cellulose, Aditya Birla Group, Kharach, Gujarat

International

RMIT University, Australia; The University of Manchester, United Kingdom; TEMAG, ITU, Turkey; Deakin University, Australia; The Technical University of Liberec, Czech Republic; FOMOSA PLASTIC GROUP, Taiwan. 🔍



^ Red Panda

WORLD WIDE FUND FOR NATURE-INDIA

Brief Description

WWF-India is a science-based organization which addresses issues, such as the conservation of species and its habitats, climate change, water, and environmental education. The research is focussed towards various conservation issues faced in the country. WWF-India is working towards developing and implementing strategies to increase policy influence through events, landmark publications, strong media strategies, networking and alliance building, and sustained stakeholder engagement.

R&D Set-up

The following centres of excellence which are available in the Institute provide the research facilities and infrastructure for use in research and development (R&D) and are regularly used by industries and academicians.

- Centre of Excellence (COE)
 - Electronic Design Automation
 - Software Tools for VLSI/ASIC Design
- COE Embedded System
- COE HPC and Cloud Computing
- COE Nano Science & Technology
- COE in Data Science
- COE in Computer Vision & Network Security
- COE Renewable Energy
- COE in Mechatronics
- COE Industrial Control & Automation
- COE for CAD/CAM
- Wind tunnel Research Lab and others

Sources of income for R&D

- Government funding
- Self-funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 124.00

FY 2015 -16 = 57.90

FY 2016 -17 = 123.00

R&D Achievements

Products developed

One of the products developed by WWF is low-cost solar electric fencing for reducing human–elephant conflict and the process is selective breeding for seed production of non-GMO cotton.

As part of its activities, WWF-India developed the following innovative elements:

The research on Tiger and prey base occupancy survey in the Terai Arc revealed an improvement in tiger population over the past four years insofar as the tiger numbers in TAL was found to be 485, compared to 353 in 2010.

- A pre-assessment of MSC was carried out and a draft action plan has been proposed for improvement of fishery levels. This study will be helpful in Marine stewardship certification of Skipjack Pole & Line Fishery in Lakshadweep.
- Adaptation of building block methodology for calculation of e-flow in rivers by incorporation

Registered Office

World Wide Fund for Nature
172-B, Lodi Estate,
New Delhi 110 003
T.: 011 4150 4803
E: kbhallal@wwfindia.net
W: www.wwfindia.org

Recognition Status

File No.: 11/125/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 28
PGs & Graduates: 110

Research Areas

- Wildlife sciences
- Environmental sciences
- Climate change
- Water and agriculture
- Wetlands

Research Outcomes

- Papers published:
 - » National: 4
 - » International: 5

of socio-cultural elements in the holistic approach.

- Initiated environmental and economic assessment in Terai Arc landscape for developing an alternate development pathway scenario in Uttarakhand with a view to influence policy choices for the future. The initial finding shows that there is more economic value in conservation and sustainable utilization of resources.
- To ascertain the status of Red Panda in Sikkim and Arunachal Pradesh, field surveys are conducted for generating a robust database on red panda presence and distribution in Thembang Bapu CCA. Red Panda presence signs were observed in roughly 26% of sampling and had total 5 Red Panda direct sightings.
- Understanding the GHG emission and water footprint associated with cotton cultivation in cotton-growing regions of India, a sustainable cotton initiative will help in sustainable production of cotton for ensuring economic growth, farm livelihoods, and ecosystem health.

Technical Collaborations

National


Department of Science and Technology (DST); Wildlife Institute of India, Uttarakhand; IIT Kanpur; IIT BHU; The Energy and Resources Institute (TERI), New Delhi; Gujarat Department of Forest and Environment, Government of Gujarat; ICAR - National Centre for Integrated Pest Management, New Delhi

International

University of Aberdeen, Scotland; International Water Management Institute (IWMI), New Delhi; Columbia Water Centre

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The development of the Jalna App is based on the automatic irrigation system concept and the farmers are provided agricultural advisories based on remote sensing and analysis of image processing derived from spectral camera fitted on drone.
- GGRC App—Under this, the farmers of Gujarat are provided automatic agricultural advisories based on remote sensing and weather data. 

SECTION
2

AGRICULTURAL SCIENCES



Department of Scientific & Industrial Research (DSIR)
Ministry of Science and Technology, Government of India, New Delhi



Research facilities

ACADEMY OF LIFE SCIENCES OF THE SOCIETY OF PLANT REPRODUCTIVE BIOLOGISTS

Brief Description

The Academy of Life Sciences of the Society of Plant Reproductive Biologists is a non-governmental society registered as an NGO. The society aims to promote research in the field of plant reproductive biology.

R&D Set-up

The organization has well-equipped research facilities and infrastructures available for advanced research which include: fluorescence microscope, phase contrast microscope, trinocular microscope with micro-photographic attachment, ultracentrifuge, double-beam visible spectrum spectrophotometer, single-pan digital electronic balance, digital pH metre, microtome, thermo cycler, inoculation chamber, BOD incubator, shakers, magnetic stirrers, air curtain and gel doc system, and so on and are being used by industries, individuals, and academicians.

Sources of income for R&D

Grants-in-aid

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 40.75

FY 2015-16 = 53.75

FY 2016-17 = 46.75

R&D Achievements

Products developed

- Plant reproductive biology: Floral biology, pollen biology

and pollen-pistil interaction, pollination biology, breeding systems, post-pollination events in some endemic and endangered plants of the Brij area for their conservation (*Feronia limonia*, *Salvadora persica*, *Capparis deciduas*).

- Male sterility: Biochemical and molecular evaluation of chemically induced male sterile crop plants (*Brassica juncea*) by real-time PCR and sophisticated molecular techniques. Utilization of male sterile plants in hybrid seed production.
- Antimicrobial activity: Some members of the family Bignoniaceae (*Crescentia*, *Dolichandrone*, *Kigelia*, *Millingtonia* and *Tecoma*) were evaluated for their antimicrobial action on susceptible and MDR strains of *M. tuberculosis* in collaboration with the National JALMA Institute of Leprosy and Other Microbial Diseases, Taj Ganj, Agra.
- Aerobiological: Qualitative and quantitative evaluation of mycoflora of indoor (residence in posh and poor localities, libraries, cinema halls, hospitals) and outdoor (historical monuments, markets, and gardens) environment of Agra city and allergenic significance of some microbes.
- Modification of sex expression in plants: Modification of expression of sex in some plants (cucurbits, cannabis, and papaya) by

Registered Office

The Academy of Life Sciences, a Unit of The Society of Plant Reproductive Biologists, 8/13-I Kaushalpur, Bye Pass Road, Agra-282005, Uttar Pradesh
T: 74093 77772
E: svsc071241@gmail.com
W: www.ijprb.com

Recognition Status

File No.: 12/100/2011-TU-V
Initial Recognition: 2011
Valid Until: March 31, 2020

R&D Manpower

Doctorates: 7
PGs & Graduates: 3

Research Areas

- Phenology, floral biology, floral morphology
- Pollination biology and ecology, breeding systems

Research Outcomes

- Paper published: 23

treatments with growth hormones and their biochemical and molecular evaluation.

- Developed seedlings of an endangered tree species *Feronia limonia* by in vitro culture. Developed seedlings and they were taken to their natural habitat.
- Enhanced the number of female plants of papaya by human sex hormones.
- Developed the saplings of *Salvadora persica* in poly packs and taken them back to their natural environment for their conservation.

Technical Collaborations

National

All India Institute of Medical Sciences, New Delhi; National JALMA Institute for Leprosy and other microbial diseases, Agra; Department of Mycology and Plant Pathology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi; Department of Plant Physiology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi; Department of Advance studies in Botany, Calcutta University, Kolkata; Department of Botany, Aligarh Muslim University, Aligarh; Department of Botany, University of Delhi, Delhi.

International

Plant Breeding Institute, Faculty of Agriculture, Hokkaido University, Sapporo, Japan; University of Pécs, Faculty of Sciences; Komarov Botanical Institute, Russia.

Societal Relevance

The society conducts a number of innovative researches with high-impact value to the researchers. The following are the details of the same:

- Conservation of biodiversity (plantation, plant protection from pests, human activities, protection of rivers).
- Development of saplings (*in situ*) of some endangered species and their *ex-situ* conservation by growing them in their natural habitat.
- Development of seedlings by seed culture *in vitro* and their transplantation.
- The society is also engaged in many governmental mission-oriented projects such as the promotion of cleanliness by collecting garbage for Swachh Bharat and plantation of roadside trees in Agra city. Also promote awareness about Digital India Mission and use of computers. 



^ Innovative technology for producing high-value vegetable crops

Registered Office

Akhil Bhartiya Graameen Vikas Sanstha, D-1, Krishna Apra Building, 3rd Floor, Alpha Commercial Belt, Alpha-1, Greater Noida 201310 Delhi NCR

Recognition Status

File No.: 12/112/2016-TU-V
Initial Recognition: 2016
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 5
PGs & Graduates: 12

AKHIL BHARTIYA GRAMIN SANSTHAN

Brief Description

Akhil Bhartiya Graameen Vikas Sanstha (ABGVS) is a not-for-profit organization based in Delhi. It is registered as a society under the Societies Registration Act. ABGVS mainly works on protected cultivation, micro irrigation, Hi-tech Horticulture, precision farming, and capacity building. It works on innovative technologies for producing high value crops.

R&D Set-up

ABGVS has soil testing lab with sample analysing kit, greenhouse component museum, classrooms, and a R&D and field demonstration centre in Greater Noida.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2016-17 = 5.17

R&D Achievements

Products developed

Crop production module for tomato, cherry, and salad varieties have been developed. The technology for innovative crop production is being disseminated by ABGVS by providing comprehensive hands-on training to thousands of farmers since inception of the Institute of Horticulture Technology (IHT), in 2009, to upgrade their skills and improve the production techniques.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- ABGVS's constituent institute has been empanelled as a resource institute by the Ministry of Agriculture and Farmers Welfare, Government of India, for capacity building of farmers, extension officials, and youth in hi-tech horticulture.
- The Institute of Horticulture Technology, established under aegis of ABGVS, is a training partner NSDC in programmes such as Pradhan Mantri Kaushal Vikas Yojana (PMKVY), and sector skill council trainings (ASCI). [Q](#)

Research Areas

- Protected cultivation
- Micro irrigation
- Hi-tech horticulture
- Precision farming
- Capacity building

Research Outcomes

- Papers published:
 - » National: 4



^ Integrated nutrient management in African marigold

ASPEE AGRICULTURAL RESEARCH AND DEVELOPMENT FOUNDATION

Brief Description

ASPEE Agricultural Research and Development Foundation is a non-governmental organization registered under the Societies Act. Its aim is to conduct scientific research for the extension of knowledge in the field of plant protection and encourage excellence amongst agriculture graduates and progressive farmers. The ASPEE Agricultural Research and Development Foundation, as its prime objective, is 'to try every bit' to 'lend' a 'helping hand' to the farmers who till the 'land' to 'increase agricultural production'.

R&D Set-up

The infrastructure and instruments available in the organization are as follows:

- Field equipments (tractors, cultivators, rotavator, harvester, transplanter, sprayers, dusters, etc.)
- Laboratory (computerized droplet analyser, microscope, meteorological equipment, etc.)
- Plant tissue culture lab (oven, autoclave, laminar flow, electronic balance, chemical and physical balance, distillation unit)
- A farmer's training centre

Sources of income for R&D

Corpus Fund Interest

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 113.59

FY 2015-16 = 145.14

FY 2016-17 = 110.98

R&D Achievements

Products developed

- The Foundation after numerous trials and screening has promoted high yielding varieties namely GR-11 and GR-4 in District Palghar which fit into the requirements of the farmers. These quality seeds are sold at no loss, no profit basis.

Processes developed

- Vegetables, such as chilli, tomato, bottle gourd, etc., are grown on flat beds. Improved methods of growing varieties on raised beds with plastic mulch have been adopted.
- Instead of flood irrigation they have begun the usage of drip irrigation. By doing this, they have saved water up to 50% .
- Adopted farm mechanization: Orchards in the farm are now pruned by pole pruner instead of axe which saves time and labour.
- Nutritional feed (Amul) is given to the cattle by which milk quantity and quality has improved and this has led to an increase in fat percentage.
- Centrifugal blower for low hp tractor operated air assisted sprayer for orchard which is capable of producing a high volume of air flow into which the spray is dispensed. As the sprayer moves through the orchard area, it blows the spray laden air on the crop displacing the original area and deposits the spray material on the leaf surfaces.

Registered Office

ASPEE Agricultural Research and Development Foundation,
 PO Box No. 7602, 'ASPEE House',
 B J Patel Road, Malad (W),
 Mumbai 400 064, Maharashtra
 T: 022-2882 2331, 2882 2332, 2882 2333, 2882 2335
 E: dockadrekar@rediffmail.com,
 swapnil@aspee.net
 W: www.aspeefoundation.org

Recognition Status

File No.: 12/43/1994-TU-V
 Initial Recognition: 1994
 Valid Until: March 31, 2020

R&D Manpower

Doctorates: 2

Research Areas

- Agriculture-based research
- Varietal evolution of watermelon
- Gladiolus
- Study on crop sequence based on rice/wheat
- Nitrogen
- Spacing between rows

Research Outcomes

- Papers published:
 - » National: 3
 - » International: 9


Technical Collaborations

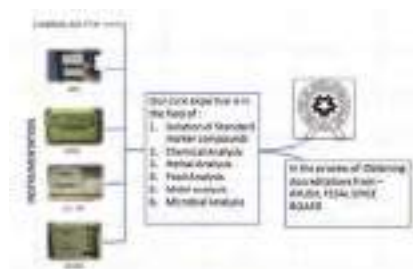
National

Dr B S Konkan Krishi Vidyapeeth, Dapoli; Navsari Agricultural University, Navsari; Anand Agricultural University, Anand; Junagadh Agricultural University, Junagadh

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Kharif Farmers' Day on October 11, 2014, on 'Integrated weed management in field crops'
- Rabi Farmers' Day on February 21, 2015, on 'Use of biofertilizer and biopesticide in India'
- Mahila Krushi Shibir-cum-Sammelan on May 21, 2015, on the motive to encourage women for 'Kitchen Garden'
- Kharif Farmers' Day on October 15, 2015, on 'Modern farming and new technology'
- Rabi Farmers' Day on March 03, 2016, on 'Tuber crop cultivation technique' 



^ Analytical facilities

ASTHAGIRI HERBAL RESEARCH FOUNDATION

Brief Description

The Asthagiri Herbal Research Foundation's (AHRF) is a not-for-profit organization registered as a society. Its vision is to develop a holistic laboratory for analytical, biotechnology, and synthetic chemistry; and establish a technical training centre catering to herbal technology from crop cultivation to product development. AHRF's mission is to understand herbs and reform life, by analysing plant chemistry, correlating with therapeutic or other values, and developing products.

It is an AYUSH approved drug testing and ISO 17025 and ISO 17034 certified laboratory.

R&D Set-up

The research facilities and infrastructure available in the organization used by industries, individuals, and academia are enumerated as follows:

- High-performance liquid chromatography (HPLC)
- High-performance thin-layer chromatography (HPTLC)
- Flash chromatography
- Atomic absorption spectroscopy (AAS)
- Enzyme-linked immunosorbent assay (ELISA)

Sources of income for R&D

- Grants from government agencies
- International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 41.14

FY 2015-16 = 52.26

FY 2016-17 = 67.59

R&D Achievements

Products developed

- Ninety molecules are developed and 8 are potential molecules selected for phase I trial Anupana herbal drink
- Analytical methods have been developed by AHRF since 2014.
- Ayurvedic biology and nutrigenomics principles and Anupana herbal drink developed.
- New principles have been developed/under development in the area of Ayurvedic biology, nutrigenomics principles, etc.

Technical Collaborations

National

Rai Technology University, Karnataka; Hexion Speciality Chemicals (Mumbai) Pvt. Ltd, Mumbai.

Research Areas

- Nutritional facts
- Anti-oxidant property
- Anti-bacterial property
- Herbal technology
- New drug discovery
- Analytical chemistry
- Pheromone-crop protection

Research Outcomes

- Papers published:
 - » International: 4
- IPRs held
 - » Patents filed: 24
 - » Patents awarded: 2

Registered Office

Asthagiri Herbal Research Foundation, 14/1, Second Main Road, Jaya Nagar, Tambaram Sanatorium, Chennai 600 047 Tamil Nadu
 T: 044-2496 7645, 2496 7646
 E: asthagiri.herbal@gmail.com
 W: www.ahrf.co

Recognition Status

File No.: 12/80/2003-TU-V
 Initial Recognition: 2003
 Valid Until: March 31, 2018

R&D Manpower

Doctorates: 6
 PGs & Graduates: 6



^ Evaluation of maize landraces

BAIF DEVELOPMENT RESEARCH FOUNDATION

Brief Description

The BAIF Development Research Foundation is a non-governmental organization registered as a trust. It is committed to provide sustainable livelihood to the rural poor through climate-resilient agriculture, management of natural resources, livestock development, watershed development, and agri-horti-forestry as major income generation activities. BAIF has evolved innovative models of micro-enterprises to ensure inclusive development through dairy husbandry, goat production, agri-horti-forestry, and sustainable agricultural production for food security and poverty alleviation. Formation of Producers' Groups, empowerment of women, and environmental sustainability cut across all these programmes.

R&D Set-up

- Digestion assembly, Fibertech Machine for Crude Fibre Estimation, multi-parameter portable metre, glass distillation unit, digital bomb calorimeter, semi auto biochemistry analyser, Soxhlet apparatus, weighing balances, RT PCR with Laptop.
- MagMax, pH metre-1, nano drop with computer, lyophilizer, deep freeze, air curtain, and many more.

Sources of income for R&D

- Grant-in-aid
- Donation
- Pvt. organizations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 1,118.47

FY 2015-16 = 1,124.20

FY 2016-17 = 1,093.93

R&D Achievements

Products developed

- BNH-10, a Bajra Napier hybrid for high green fodder biomass was promoted amongst the dairy farmers and the farmers have benefitted through results
- BAIF NPK Kit Biofertilizer for Cereal Crop
- BAIF NPK Kit Biofertilizer for Leguminous Crop
- BAIF NPK Kit Biofertilizer for Grasses
- BAIF Biocontroller

Processes developed

- Standard operating process and protocol for biofertilizer production in which we use selective media for the growth of microorganisms.
- Harvesting media for protection and shelf life of microorganisms
- Cell arresting media for the dormant stage of microorganism in a particular stage

Technical Collaborations

National

University of Agricultural Sciences, Dharwad; Indian institute of Millet Research (IIMR), Hyderabad;

Registered Office

BAIF Development Research Foundation, Pune Central Research Station, Kamdhenu Nagar, Uruli Kanchan, Pune 412 202, Maharashtra
T: 020-2692 6248
E: crsbaif@baif.org.in
W: www.baif.org.in

Location of R&D Units

- New Delhi
- Pune, Maharashtra
- Jind, Haryana

Recognition Status

File No.: 12/10/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 20
PGs & Graduates: 65

Research Areas

- Livestock, agriculture, and natural resource management
- Biotechnology, community health and research, energy

Research Outcomes

- Papers published:
 - » National: 67
 - » International: 22
- IPRs held
 - » Patents filed: 1
 - » Patents awarded: 1
- Technologies transferred commercialized: 127

National Center for Cell Sciences, Pune; Rajiv Gandhi Science and Technology Commission (RGSTC), Maharashtra; Agharkar Research Institute, Pune; Indian Council of Agricultural Research, New Delhi; National Bank for Agriculture and Rural Development (NABARD), Pune; Indian Grassland and Fodder Research Institute, Jhansi, and others.

International

Bill & Melinda Gates Foundation, USA; GMBH, Germany; International Livestock Research Institute, Kenya and others.

Societal Relevance

The following services and technologies provided by the institute helped the farmers in various ways:


Services

- About 15 lakh stem cuttings are supplied to the farmers every year in different parts of the country.
- Under the Maharashtra Gene Bank Project, milk recording in Dangi, Gaolao, and Lalkandhari has been carried out along with 900 artificial inseminations (AI) and the birth of 360 calves. Growth measurements

of 92 Sangamneri and Berari kids, true to type bucks of Sangamneri and Berari selected for breeding. One hatchery established for Satpudi poultry.

- Under the genetic approach for natural enrichment of the β -carotene content in milk to reduce Vitamin A deficiency in India, sponsored by the Bill & Melinda Gates Foundation, USA.

Technologies

- Package of practices for cultivation of BNH-10 was developed and popularized among the farmer community.
- Under the breeder seed production programme, 45 Q breeder seed of Maize African Tall, BAIF Bajra-1, and Oat-Kent was produced.
- Thirty-five Forage Technology Demonstrations (FTD) were established in the farmer's field. Two varieties, one each of Lucerne and Desmanthus, contributed in AICRP trials at the national level.
- Quality breeder seed of A. Tall, Baif Bajra-1, and Kent varieties of fodder crops were available for further multiplication. 



^ R&D activities in the organization

BIOVED RESEARCH SOCIETY

Brief Description

The Bioved Research Society is an international research organization registered under the Society. It also helps in implementing developmental programmes and is devoted to promote the researches of the biosciences, namely life sciences, agriculture, and nematology.

R&D set-up

The research facilities available in the organization are as follows:

- A well-equipped laboratory with hydrobiological and soil analysis kit, advance research microscope, BOD incubator, laminar flow, Biological value analyser, oven, pH metre, monopan balance, water bath, sets of sieves for nematode extraction, autoclave, freezer, centrifuge (electrically as well as manually operated), plant extraction unit, environmental test chamber, video photography attached microscope, Bomb calorimeter, etc.
- Seed germinator computerized research facilities and a well-equipped culture room having facility of multiple use.
- A greenhouse has been developed containing pot experiments with infected and healthy plants.
- It also has provision to grow and observe development of flora and fauna in natural condition.

Sources of income for R&D

- Government funded projects, corporate contributions

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 6,054.21

FY 2015-16 = 1,730.84

FY 2016-17 = 102.17

R&D Achievements

Some of the innovative technologies developed by the institution are innovation through lac culture, fresh-water pearl culture, soil testing programme, spirulina cultivation, medicinal plant cultivation, integrated fish, poultry and dairy farming, plant tissue culture, bullock energy based research, plant parasitic nematode management, hi-tech nursery farming, and so on. The organization also studies the value addition of bio-resources and agri-wastes materials.

Products/processes/ prototypes developed

- The organization has developed 350 new products (value addition of different bio-resources and wastes materials); three new process (bullock energy-based pump set, flow mill, paddy thresher); five new prototypes (different local strains of antagonistic pathogens).
- Single-window centre for a need-based, resourceful, eco-friendly, agri-technology for demonstration and training purposes.

Commercialization potential of products/processes developed

- Cow urine- and cow dung-based,

Registered Office

Bioved Research Society.
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Uttar Pradesh 211 002
T: 0532 2465678
E: bioved2003d@yahoo.com
W: www.bioved.co.in

Recognition Status

File No. : 12/44/1994-TU-V
Initial Recognition: 1994
Valid Until: March 31, 2018

R&D Manpower

Doctorates : 9
PGs & Graduates: 37

Research Areas

- lac cultivation
- Freshwater pearl cultivation
- Spirulina cultivation
- Stevia cultivation
- Integrated dairy-fish-duck-poultry farming
- Hitech nursery farming
- Mushroom cultivation
- Apiculture
- Sericulture

Research Outcomes

- Papers published: National: 9
- IPRs held 20
- Technologies transferred/commercialized: 400
- New-crop varieties developed and registered: 37

waste paper-based, dead animal-waste, soil-based, sugarcane bagasse-based, bamboo-based, eucalyptus wood-based lac value-added products

- Bionema, biodhan, blopaculin, biopain bam, bio spray, bioderma, and so on
- Soya milk-processing unit, modern dairy farm and automatic milking parlour machine, agri wastes management and value-addition unit. Biocontrol mass production unit. Disease-resistant banana culture unit, lac value-addition unit

Technical Collaborations

National

Mahatma Gandhi Chittrakoot Gramoday Vishwavidyalaya, Chittrakot; ISD, Allahabad; Nehru Gram Bharati University, Allahabad; U P Rajarshi Tandon Open University, Allahabad; Integrated University, Lucknow; Indian Institute of Natural Resins and Gums (IINRG), Ranchi

International

UNDP-CEE

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Technologies developed from agri-waste materials and bioresource management; value additions of spirulina cultivation, medicinal plant cultivation, stevia cultivation, mushroom cultivation; ornamental fish breeding has connection with the Swachh Bharat and Skill India Missions. Relevance of the lac value-added products preparation project is to reduce pollutants and pests problems. Also, promote the use of natural providing and domestic consumption through the

implementation of R&D activities, and to provide self-employment and additional income generation to the farmers.

- The technologies, such as Soil-testing Programme; lac culture Technology; Integrated Fish-Duck-Poultry and Dairy Farming come under the Make in India mission, which also has relevance to portable, low-cost soil-testing kit for soil analysis of different parameters.
- Jatropha Cultivation Technology comes under the Clean Energy Mission for biodiesel (clean production). A new germplasm of *Jatropha curcas* variety for maximum production of its seed and oil at its centre, is grown at a larger scale for demonstration and further propagation through seed and vegetative methods. Many waste and barren land in and around the Allahabad district are being utilized for its cultivation, hence increase in soil productivity.
- Mobile agricultural technology comes under the Digital India Mission. This has relevance to the demonstration of modern techniques of agriculture at their own village.
- The society is organizing an Agricultural Scientists & Farmers Congress since 1999 regularly in collaboration with several universities with the central theme of 'Recent Advances, Issues and Priorities in Different Disciplines of Agricultural Sciences'. Specific problems of the farmers and their management are being done through KISAN ADALAT. Promotion of recent technologies in different disciplines of agricultural sciences through video film, booklet, posters, charts and other devices are being made. 🔍



▲ Zoantherian on rockpool wall at Bhatkarwada

BOMBAY NATURAL HISTORY SOCIETY

Brief Description

The research programmes of the Bombay Natural History Society (BNHS) has greatly helped Indian wildlife biology make the transition from exploration, big game, and natural history, to rigorous field biology, conservation, and restoration ecology studies, using modern methods of data collection and analysis. The scientists at BNHS have been working in protected areas as well as other biodiversity rich community-managed areas, whose conservation is of significance at the local, national, and international levels.

The BNHS is a non-governmental organization registered as a society.

R&D Set-up

- Research on vulture conservation is carried out in Pinjore (Haryana), Rajabhatkhawa (West Bengal), Rani (Assam), Bhopal (Madhya Pradesh), and Bikaner (Rajasthan).
- Bird Migration Study Centres are at Point Calimere (Tamil Nadu) and at Chilika (Odisha).
- Research on marine and coastal biodiversity carried out at Vadodara (Gujarat), Ratnagiri (Maharashtra), Lakshadweep, and Andaman and Nicobar Islands.
- Research and conservation on Satpuda at Nagpur (Maharashtra).

Sources of income for R&D

- Grant-in-aid
- Foreign contribution
- Donations
- Interest on investments

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 1,153.06

FY 2015-16 = 972.72

FY 2016-17 = 1,035.70

Technical Collaborations

National

Wildlife Institute of India, Dehradun; University of Mumbai; University of Pune; Environmental Information System Centre affiliated to Ministry of Environment Science and Climate Change, Government of India; The Salim Ali Centre for Ornithology and Natural History (SACON).

International

Bird Life International, UK; Royal Society for the Protection of Birds, UK; US Fish and Wildlife Service, USA; Zoological Society of London, UK; Natural History Museum, UK; Department of Natural History, University of Bergen; Department of Biology, Pennsylvania State University.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- BNHS specimen collection at Hornbill House is 150 years old and is open to students, researchers, and amateur nature lovers with prior appointment.
- The Conservation Education Centres based at Mumbai, Delhi, and Nagpur work for creating awareness about the environment amongst students and citizens. Over 50,000 students earn

Registered Office

Bombay Natural History Society,
Hornbill House, Dr Salim Ali
Chowk, Opposite Lion Gate,
Shaheed Bhagat Singh Road,
Mumbai 400001, Maharashtra
T: 022-22821811
E: info@bnhs.org,director@bnhs.org
W: www.bnhs.org

Recognition Status

File No.: 12/2/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 15
PGs & Graduates: 46

Research Areas

- Wildlife conservation
- Marine and coastal biodiversity
- Ornithology
- Conservation policy
- Environmental education
- Entomology
- Herpetology
- Mangrove conservation

Research Outcomes

- Papers published:
 - » National: 20
 - » International: 19

the benefit of environmental awareness through these centres.

- The BNHS Satpuda Landscape conservation programme reaches over 10,000 tribal students across 6 protected areas in central India each year.
- Several distance learning courses impart education on various aspects of natural history. The Flamingo Festival is organized

every year to create awareness about birds and over 15,000 people participate each year.

- The BNHS's educational programmes run by Conservation Education Centres at Mumbai, Delhi, and Nagpur promote the concept of Swachh Bharat and Clean Energy through various campaigns and activities. 🔍



▲ Chilly seedlings uninoculated (left) and inoculated (right) with microbial consortia

CENTRE FOR NATURAL BIOLOGICAL RESOURCES AND COMMUNITY DEVELOPMENT (CNBRCD)

Brief Description

The Centre for Natural Biological Resources and Community Development is a non-profit organization, established in 2001. It works primarily in the domains of technology, food & nutrition, health, energy & environment, education, and agriculture.

R&D Set-up

The equipments available in the centre are laminar air flow, grinder, autoclave (vertical), refrigerators, water softening units, packing & sealing machine, trinocular research, binocular microscope, stereo microscope, digital vernier caliper, spectronic, incubator, refrigerated centrifuge (table top), reciprocal water bath shaker, vortex mixers, pcr machine, finnpipette variable volume, orbital shaker, computer, magnetic stirrer, water distillation unit, and many more. These research facilities and infrastructure is being used by industry, individuals, and academia.

Sources of income for R&D

- Grants from government agencies
- Academic institutions
- International and national biotechnology companies

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 36.92

FY 2015-16 = 31.51

FY 2016-17 = 12.30

R&D Achievements

Products developed

- CNBRCD has developed nursery technology involving microbial consortia which supply not only N and P to plants but protect them from root diseases, for many crops important in agriculture/ horticulture. Inoculated plants exhibited enhanced growth, nutrition and yield compared to uninoculated plants with lesser input of chemical fertilizers.
- After screening several mycorrhizal fungi and PGPR, the best for inoculating various crops/ plants important in agriculture, horticulture and forestry has been developed. The list of plants for which such consortia has been developed are tomato, capsicum, french bean, chilly, papaya, pomegranate, gauva, banana, syngonium, spathiphyllum, cardamom, mango root stock (Nekkare), lemon, papaya, mulberry, citrus root stock, coffee, chrysanthemum, marigold, china aster, soybean, cotton, maize, finger millet, rice, cowpea, sugarcane, patchouli, *Ashwagandha*, *Tulasi*, *Coleus barbatus*, Kalmegh, *Coleus forskohlii*, *Coleus aromaticus*, *Coleous forskohlii* and many more.
- The process for producing enriched vermicompost enriched with beneficial organisms, such as N fixers, P solubilizers, and

Registered Office

Centre for Natural Biological Resources and Community Development (CNBRCD),
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Bengaluru 560 024, Karnataka
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E: djbagyaraj@gmail.com
W: www.sathire.com

Recognition Status

File No.: 12/90/2006-TU-V
Initial Recognition: 2006
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 8
PGs & Graduates: 23

Research Areas

- Soil microbiology
- Mycorrhizal symbiosis
- Biofertilizers
- Biocontrol
- Plant-microbe interactions
- Soil health

Research Outcomes

- Papers published:
 - » National: 1
- Technologies transferred/commercialized: 2

biocontrol agents, has been developed.

Commercialization potential of products/processes developed

The protocol developed by CNBRCD for the mass production of AM fungi is adopted by M/s Zytex Biotech Pvt. Ltd, Mumbai, Maharashtra, and M/s. Rajshree Sugars and Chemicals Ltd, Theni, Tamil Nadu.

Technical Collaborations


National

Rajshree Sugars Pvt. Ltd, Theni, Tamil Nadu; Zytex Biotech Pvt. Ltd, Mumbai, Maharashtra; National Institute of Plant Health Management,

Hyderabad, Telangana; Novozymes India Pvt. Ltd, Bengaluru, Karnataka.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Use of microbial inoculants recommended to the farming community, based on the research findings, resulted in enhanced income generation for the marginal farmers.
- Sale of enriched vermicompost fetches higher income for the producer compared to the regular vermicompost. 



^ Vertical autoclave

Registered Office

Community for Social Works (CSW), 84 Rabindrapally, Shyamnagar, District North 24 Parganas 743 127, West Bengal
T: +91 3217 2460 2601
E: somenath_saha53@rediffmail.com

Recognition Status

File No.: 12/109/2015-TU-V
Initial Recognition: 2015
Valid Until: March 31, 2020

R&D Manpower

PGs & Graduates: 5

Research Areas

- Agricultural science, socio-economic issues of environment, environmental pollution
- Science popularization, biotechnology, natural resource management, waste management

COMMUNITY FOR SOCIAL WORK

Brief Description

Community for Social Works (CSW) is a non-profit, non-governmental organization under the West Bengal Society Registration Act, 1961. CSW has expertise in agricultural sciences, biotechnology, etc. The organization has accomplished projects on inclusion of diversified multiple cropping system, integrated farming system in degraded coastal land areas of West Bengal, and its socioeconomic and environmental impact on people.

R&D Set-up

Research facilities and infrastructure are as follows:

- Inoculation chamber, laminar air flow cabinet, Soil Testing Laboratory, bacterial inoculation chamber, automatic package machine, mixer (grinder + broth).
- Soil testing kits, autoclave (horizontal and vertical), double decker rotary shaker, bod incubator, shaking water bath, microscope binocular, powder mixture, lenord jar, colony counter and other.

Sources of income for R&D

- Donation
- Community collection
- Grants from government agencies

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 50.16

FY 2015-16 = 51.80

FY 2016-17 = 54.32


R&D Achievements

Products developed

CSW developed two existing products, namely Azophos (nitrogen containing biofertilizer) and Phosphate Solubilizing Bacteria

- Enrico Bio NPK (Component – *Azospirillum*, *Azotobactor*, *Rhizobium*)
- Enrico – F (Component – *Trichoderma viridi* and *Pseudomonas Florescence*)

Processes developed

- Land shaping for improving drainage facility, rainwater harvesting, and enhancing productivity of low lying degraded land
- Cultivation of diversified crops, including horticultural crops and their varieties for degraded saline affected lands
- Integrated cultivation of crops and fishes (freshwater and brackish water fishes)
- They have also developed new technique under organic farming followed by production of dhaincha seed on the bunds, use of biogas slurry for compost / vermicompost/enriched compost making. 

Research Outcomes

- Technologies transferred/ commercialized: 2



^ Picture of the laboratory

DAYANAND SAGAR INSTITUTIONS OF MAHATMA GANDHI VIDYA PEETH TRUST

Brief Description

Dayanand Sagar Institutions (DSI) offer quality research training experience for its students with state-of-the-art facilities in various departments. DSI maintains its relevance to world-class research by linking with industry, business, and leading R & D organizations through local and international research networks. Some of the important research areas are large-scale tissue culture production of banana plants and transfer of technology to banana plants. The organization is registered as the trust.

R&D Set-up

Research infrastructure is being used by industry (through MoU), academia (UG and PG students, research scholars registered through our R&D centres, and faculty doing research), and individuals (through Incubation cell). MoUs signed between industry and academia has encouraged sharing resources in terms of equipment, projects, through industry visits, internships as the need arises.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY2014-15 = 122.83

FY2015-16 = 117.53

FY2016-17 = 282.91

R&D Achievements

Products developed

- Siderophore monooxygenase – A potent drug targeted for

tuberculosis and other bacterial diseases.

- Heavy metal ions removal from wastewater using nanoparticles – Applicable to treatment of metal ions-contaminated water.
- DNA methylation studies on glioma tissue samples using high-resolution melting based quantitative analysis
- Design and fabrication of a walking chair using linkage mechanism and many more.

Processes developed

- Influence of stress on metabolites with nutritional value and protective function of Indian and Bulgarian soybean genotypes obtained by biotechnology and genetic methods
- Pollution mechanisms in urban aquifers of Bruhat Bengaluru Mahanagara Palike area by integrated geophysical, remote sensing and GIS techniques.
- Farmfit – Application for farmers to sell the crops directly to customer
- Preparation and studies on thin films relevant for electronics and solar cells applications
- Defect prediction in software projects using genetic algorithm based fuzzy C - means clustering and random forest classifier
- Large-scale tissue culture production of banana plants and transfer of technology to banana plants
- Dynamic security approaches for mobile cloud computing and many more.

Registered Office

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W: dayanandasagar.edu/dsce

Recognition Status

File No.: 12/101/2011-TU-V

Initial Recognition: 2011

Valid Until: March 31, 2018

R&D Manpower

- Doctorates: 32

Research Areas

- Medical image processing
- Software engineering
- Space communication
- Cryptosystems
- VLSI and embedded systems
- Applications of solar cells
- Quantum physics
- Wireless communication
- Solid waste management
- Groundwater management
- Nanomaterials
- Fuel testing
- Lean manufacturing
- Design of structures

Research Outcomes

- Paper published:
 - » International: 14
- IPRs held
 - » Patents filed: 5


Technical Collaborations

National

GE, Bengaluru; SIEMENS, Bengaluru; Water Literacy Foundation & Rain Water Concepts(I) Pvt. Ltd, Bengaluru; Infosys Campus Connect, Bengaluru; etc.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Under Make in India initiative, Medical Imaging Research Centre develops intelligent, accessible, and portable scanners. 



^ Zoantherian on rockpool wall at Bhatkarwada, Ratnagiri

DR B V RAO INSTITUTE OF POULTRY MANAGEMENT & TECHNOLOGY

Brief Description

Dr B V Rao Institute of Poultry Management & Technology (Dr BVR IPMT) and Technology, one of its kind, was established in 1984 as a public trust and non-profit making organization. The institute primarily conducts three regular and four short-duration, specialized courses to meet the immediate requirements of the present and prospective poultry farmers. The institute undertakes experiments and research in various areas of poultry science especially applied research, which will reduce the cost of product and increase the margin of profit of poultry farmers. The institute is supported by Pune-based Venkateshwara Hatcheries Group.

R&D Set-up

The campus provides infrastructure and facilities such as layer farm with 47,000 layer bird capacity, broiler farm with 36,000 broiler bird capacity, well-stocked library with large number of technical books on poultry science and audio-visual section with audio and video cassettes on poultry. They also have pathology, microbiology, meat technology, and poultry processing and advanced nutrition laboratories, with latest analytical facilities and feed mill.

Sources of income for R&D

- Grant-in-aid
- Trial fees and experimental realization

R&D expenditure(₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 28.79

FY 2015-16 = 23.83

FY 2016-17 = 27.48

R&D Achievements

The institute work on SPF eggs, chicken and eggs processing, broiler and layer breeding, genetic research and poultry diseases diagnostic, poultry vaccines and feed supplements, vaccine production, bio-security products, poultry feed & equipments, nutritional health products, soya bean extract, etc.

Societal Relevance

Dr BVR IPMT has facilities to impart training to women. The institute has trained more than 7,500 persons, both men and women from India and abroad. 🔍

Research Areas

- SPF eggs
- Chicken and eggs processing
- Broiler and layer breeding
- Genetic research and poultry diseases diagnostic
- Poultry vaccines and feed supplements, vaccine production, bio-security products and
- Poultry feed & equipments
- Nutritional health products
- Soya bean extract

Research Outcomes

- Research projects completed from 2014-17: 18
- Ongoing research projects from 2017-18: 6

Registered Office

Dr BV Rao Institute of Poultry Management & Technology, Village Khamgaon, Post Urulikanchan, Pune 414 202, Maharashtra
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 W: www.venkys.com

Recognition Status

File No.: 12/52/1996-TU-V
 Initial Recognition: 1996
 Valid Until: March 31, 2019

R&D Manpower

PGs & Graduates: 2



^ Insect trap cum bin

INDIAN INSTITUTE OF FOOD PROCESSING TECHNOLOGY

Brief Description

The Indian Institute of Food Processing Technology (formerly Indian Institute of Crop Processing Technology) is a pioneer research and development institute under the Ministry of Food Processing Industries. Its chief objective is to gain an increased understanding of living organisms with a view to increasing its application in the grain industry. The Institute's core focus areas revolve around developing a strong human resource capacity for the processing industry, generate and upgrade scientific knowledge in the area of food grains for their maximization, conservation, and utilization. This institute is an autonomous society.

R&D Set-up

Research facilities and infrastructure available in the institute are as follows:

- Bulk storage silo designed and developed at IIFPT along with fumigating provisions during storage of grains
- Cocoon bags for storing grains outside storage conditions
- Developed various hermetic bins for storing pulses at the farm and household levels

Sources of income for R&D

Science and Engineering Research Board (SERB)
Institutional funding, etc.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 39.40

FY 2015-16 = 23.00

R&D Achievements

Processes developed

- Hermetic storage of pulses using multi-layered bags and bulk storage cocoon bags for storing pulses under open storage condition without usage of chemicals; hermetic storage also prevents insect infestation and maintains grain quality compared to traditional storage methods.

Prototypes developed

- Developed various types of hermetic bins, such as single wall, insulated, and perforated bins for storing pulses at farm and household levels
- Two-in-one bin-cum-trap to monitor and trap pulse beetle, *Callosobruchus chinensis* during storage of pulses
- Use of natural insect repellents to deter insects during storage
- In-bin traps and stack probe traps to physically eliminate insects without usage of chemicals pesticides at farms and warehouses

Consultancy services rendered

- Hermetic storage technology is well adopted by many farmer producer organizations (FPOs), including Erode Farmer Producers Organization & Rajaraja Chozhan Farmers Producers Organization, Thanjavur, for long term storage of turmeric and pulses.

Registered Office

Indian Institute of Food Processing Technology, Pudukottai Road, Thanjavur 613 005, Tamil Nadu
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E: director@iifpt.edu.in
W: www.iifpt.edu.in

Recognition Status

File No.: 12/33/1990-TU-V
Initial Recognition: 1990
Valid Until: March 31, 2018

R&D Manpower

PGs & Graduates: 3

Research Areas


- Generation of technology forecasting, technology assessment, and technology market survey reports.

Research Outcomes

- Papers published: 2
- Technologies transferred/commercialized: 4

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Safe storage guidelines for black gram has relevance in creating awareness for farmers when the grain needs to undergo post-harvest treatments.
- Hermetic bulk storage of black gram prevents qualitative losses that occur during grain storage.
- Insect traps aid in early detection of the infestation. 



^ IBR laboratory

INSECT BIOPESTICIDE RESEARCH CENTRE

Brief Description

Society of Biopesticide Sciences, India and Insect Biopesticide Research Centre (IBRC) is an interdisciplinary professional society working in the field of biopesticides. It was founded in 1996 as a non-profit-making society, registered under the Societies Act. The research centre endeavours to promote all fields of biopesticide sciences, including environmental aspects through the interaction between researchers from diverse disciplines of entomology, toxicology, agriculture, biotechnology, biochemistry, chemistry, and biological sciences related to biological pesticides.

R&D Set-up

- The centre has well-equipped laboratory to conduct research on plant products for pest management.

Sources of income for R&D

- Project grants

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 5.02

FY 2015-16 = 2.94

FY 2016-17 = 1.67

R&D Achievements

Products developed

- Volatile formulations based on essential oil the compounds have been developed for post-harvest pest management. Large-scale

experiments up to 5 kg grains have been conducted using some gelatine capsule formulations for continuous release of volatile compounds under storage conditions under different temperature regimes.

- The centre has done substantial basic research on natural products, specifically on essential oils and established the synergism amongst various naturally occurring compounds.

The centre has established three basic hypotheses in neem research. These are as follows:

- Hypothesis I: Azadirachtin, being the most potent compound in neem and efficacious at very low concentrations; it is not influenced by any other neem allelochemical.
- Hypothesis II: Mixtures of moderately active non-azadirachtin limonoids do show increased activity if they are different structurally, as well as having different modes of action and compounds with very close stereo-chemistry must compete for the same target site.
- Hypothesis III: Mixed formulations for pest management could be developed that will ensure a variety of toxic, growth inhibitory and antifeedant effects. Such complexities are desirable in that the target spectrum is widened, because different species respond differently to individual compounds. These mixtures are likely to reduce the potential

Registered Office

Insect Biopesticide Research Centre (Society of Biopesticide Sciences, India),
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W: www.koulresearch.org

Recognition Status

File No. : 12/74/2002-TU-V
Initial Recognition: 2002
Valid Until : March 31, 2019

R&D Manpower

Doctorates : 3
PGs & Graduates : 1

Research Areas

- Biopesticide development
- Natural products
- Insect chemical ecology
- Toxicology and integrated pest management

Research Outcomes

- Books: 18
- Papers published: 250

for the development of genetic resistance or development of behavioural desensitization.

Technical Collaborations

National

CCS Haryana Agriculture University, Hisar; Punjab State Council of Science and Technology, Chandigarh; CSIR-Institute of Himalayan Bioresource Technology, Palampur; Punjab Agricultural University, Ludhiana;

Guru Nanak Dev University, Amritsar; Institute of Himalayan Bioresource Technology, CSIR, Palampur; Indian Agricultural Research Institute, New Delhi; North Maharashtra University, Jalgoan; Guru Nanak Dev University, Amritsar

International

University of Oklahoma, USA; University of British Columbia, Canada; Kasetsart University, Bangkok. 🔍



Research activities in the institute

INTERNATIONAL INSTITUTE OF BIOTECHNOLOGY AND TOXICOLOGY

Brief Description

The International Institute of Biotechnology and Toxicology (IIBAT) was established as a farm in 1978 as "The Coromandel Indag Farm" and was later renamed as Fredrick Institute of Plant Protection and Toxicology (FIPPAT). Thereafter, in May 2002, FIPPAT became IIBAT. It serves as a link between Industry and Regulatory System in providing GLP based non-clinical health and environmental safety data on crop care/protection actives/formulations, biocides, chemicals for control of household nuisance pests and for control of pests of public health importance, industrial chemicals, herbal /phyto molecules, plant growth regulators, drugs and pharmaceuticals meant for use in clinical and veterinary medicine, transgenic crop/food, r-DNA, biopharmaceuticals and biotech based products, to facilitate risk assessment. At IIBAT, studies are conducted adhering to the principles and guidelines of OECD, KCR, ICH, OPPTS, Schedule Y and others as applicable. It is a non-governmental registered society.

R&D Set-up

IIBAT is having good laboratory practice (GLP) certified laboratories by German government and National Good Laboratory Practice Compliance Monitoring Authority (NGCMA), Government of India. The research facilities and infrastructure available in the organization is used by industries and academicians.

Sources of income for R&D

- Grants from government
- Testing fees

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 2,008.80

FY 2015-16 = 2,242.81

FY 2016-17 = 2,200.88

R&D Achievements

IIBAT has conducted research on:

- Research on efficacy of new insecticide coded formulations on the aphids (*Myzus persicae*S.) of Potato (*Solanum tuberosum* L.) under field conditions.
- Research on efficacy trial of new insecticide coded formulations on the whitefly (*Bemisia tabaci* Genn.) of cotton (*Gossypium hirsutum* L.) under field conditions.
- Research on eEfficacy trial of Debug-ON (Oil of Neem) @ 0.75 gallon (2.84 l litres) per acre on Powdery Mildew Disease of Okra (*Abelmoschus esculentus* L.) caused by *Erysiphe cichoracearum* under Field Conditions.
- Research on efficacy trial of NCF - 161 on powdery mildew disease of cucurbits - Ivy gourd (*Coccinia grandis*) caused by *Erysiphe cichoracearum* under field conditions.
- Efficacy trial of NCF - 161 on powdery mildew disease of grapevine (*Vitis vinifera*) caused

Registered Office

International Institute of Biotechnology and Toxicology (IIBAT), BDO Office Road, Padappai 601 301, Kancheepuram (District), Tamil Nadu
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W: www.iibat.com

Recognition Status

File No.: 12/31/1990-TU-V
Initial Recognition: 1990
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 18
PGs & Graduates: 51

Research Areas

- Agrochemicals
- Transgenic crops
- Toxicity
- Safety assessment and many more

Research Outcomes

- Papers published:
 - » National: 35
- IPRs held
 - » Patents filed: 1

by *Uncinula necator* under field conditions (Karnataka Location)

- Efficacy of NCF - 224 (Amisulbrom 20% SC) against downy mildew disease of Grapevine (*Vitis vinifera* L.) caused by *Plasmopara viticola* under field conditions
- Acute contact toxicity of *Trichoderma virens* formulation to honeybee, *Apis mellifera* L.
- Effect of Potassium dichromate on the growth of green alga, *Pseudokirchneriella subcapitata*
- Effect of 3, 5-dichlorophenol on the growth of *Lemna gibba*

- Boric acid: Effects on reproduction and Growth of the earthworm, *Eisenia fetida*, in artificial soil.
- OCION PX10 - Effect on the growth of green alga, *Pseudokirchneriella subcapitata*

Technical Collaborations

National

Department of Science and Technology, Ministry of Science and Technology, New Delhi. 🔍



↗ Laboratory work going on in Jai Research Foundation

JAI RESEARCH FOUNDATION

Brief Description

Jai Research Foundation (JRF) India is a not-for-profit non-governmental organization registered as a society under the Societies Act. It offers integrated services for evaluating products for their chemical properties, eco-toxicological and environmental fate, and mammalian safety. In addition, the foundation also provides regulatory guidance to minimize the testing time and efforts.

R&D Set-up

JRF is having good laboratory practice (GLP) certified laboratories by National Good Laboratory Practice Compliance Monitoring Authority (NGCMA), Government of India. For conducting various research activities in the field of toxicology, chemistry, and e-fate, a total of 170,000 sq ft built-up area is available with most modern equipment and these are being used by industries.

Sources of income for R&D

Sponsored projects

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15: 4,311.57

FY 2015-16: 4,429.16

FY 2016-17: 4,936.19

R&D Achievements

There are around 336 processes developed by the organization where various analytical methods are developed and validated.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The registered pharmaceuticals are used by the general public for health purposes. The agrichemicals are used by the general public for household insects, vectors, and farmers for crop protection.
- Most of agrochemicals are used for pre- and post-harvest technologies for protecting crops from insects, pests, grains, and vectors.
- They also providing guidance to farmers for safe technologies to handle the agrochemicals and the best use of pesticides and agrochemicals under good agricultural practices. 🔍

Research Areas

- Preclinical research in the areas of toxicology
- Ecotoxicology
- Chemistry and environmental fate and metabolism
- Pharmaceuticals, fine, and industrial chemicals

Registered Office

Jai Research Foundation,
Near Daman Ganga Bridge,
NH No. 08, Valvada 396 105,
District Valsad, Gujarat
T: 0260-6540242
E: bd@jrffonline.com
W: www.jrffglobal.com

Recognition Status

File No.: 12/11/1989-TU-V
Initial Recognition: 1989
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 25
PGs & Graduates: 115



^ Observing lung cancer cells at 10X

LOYOLA CENTRE FOR RESEARCH AND DEVELOPMENT OF XAVIER RESEARCH FOUNDATION

Brief Description

The Loyola Centre for Research and Development (LCRD) is a non-governmental trust involved in research education and extension work. The LCRD has since been active in research, professional computer education, and implementing projects in rural areas. The research wing has several components, such as the chemical sciences laboratory, arts research cell, saturnino braganza library, industrial training units, xplant company, and so on.

R&D set-up

- The organization has advanced instruments for research includes: phyto chemistry lab, plant tissue culture lab, DNA fingerprinting lab, chemical fingerprinting lab, c. Elegans lab, environmental science lab, microbiology lab, arun patel chemistry lab, animal cell culture lab, fermentation lab, research students lab, molecular biology lab, industrial training labs for biotechnology and industrial chemistry, entrepreneur Laboratory for MSME incubates.
- The LCRD has adequate ancillary staff for fabrication of the special equipment needed for research.
- Other equipment include: pH metre, air purifier, autoclave, chromatographs, HPLC, rotary vacuum evaporator, centrifuge of different types, homogenizer, TLC scanner, HPTLC plate heater, UV transilluminator, and so on.

Sources of income for R&D

- Interest from corpus
- Grants from government agencies
- Projects
- Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 52.87

FY 2015-16 = 71.82

FY 2016-17 = 95.36

R&D Achievements

Products developed

The organization has developed nine innovative products which includes

- Multiplication of *C. orchioides* bulbil to develop plantlets
- *C. orchioides* cell suspension extract for use as energy drink
- Ferulic acid production from agro waste
- TSRP-based kit for the treatment of industrial effluents
- Production of Rosmarinic acid for anti-viral treatment
- MPA from solid substrate fermentation

Processes developed

- Direct rhizogenesis of *C. orchioides*
- *C. orchioides* bulbil production in shake flask
- Cell suspension culture of *C. orchioides* for the production of energy drink

Registered Office

Loyola Centre for Research and Development (LCRD),
C/o Xavier Research Foundation (XRF),
St. Xavier's College Campus,
Navrangpura,
Ahmedabad 380 009, Gujarat
T: (L) 917926300386
E: lcrd@xrf.res.in
W: www.xrf.res.in

Recognition Status

File No. : 12/107/2013-TU-V
Initial Recognition: 2013
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 5
PGs & Graduates: 11

Research Areas

- Plant tissue culture
- Ageing memory
- Bioremediation
- Environmental monitoring
- Microbiology
- Cancer research
- Molecular biology
- Phytoremediation
- Bioenergy

Research Outcomes

- Papers published:
 - » National: 3
 - » International: 3
- IPRs held 1
- New crop varieties developed and registered: 1

Prototypes developed

- Make and Break laboratory prototype – a production unit for transferring technology of production of *Curculigo orchioides* by micropropagation, from lab to land

Commercialization potential of products/processes developed

Total products commercialized: 3

- Mycophenolic acid
- Energy drink
- Plantlets of *Curculigo orchioides*

Technical Collaborations

National

H K Acharya & Company, Ahmedabad; Rasna Pvt. Ltd, Ahmedabad; Jay Chemicals Industries Ltd, Ahmedabad; Infomed Tech & Marketing, Ahmedabad; DialougeMakers, Ahmedabad; Human Development and Research Centre (HDRC), Ahmedabad; Skyquest Technologies, Ahmedabad; Pandit Deendayal Petroleum University (PDPU), Gandhinagar.

International

Fairfield University, Connecticut, USA; John Baylon, USA

Societal Relevance

The following R&D outcomes are of national/societal significance:

The following technologies developed by the LCRD has relevance to national missions, such as Skill

India, Swastha Bharat, Make in India, and the Swachh Bharat

- Low-cost production of ferulic acid using an agro-industrial by product
- Utilization of thermophilic bacterial consortium, preparation of a kit a for biosulphidogenesis and their bioaccumulation in industrial-effluent treatment
- Enhanced production of Rosmarinic acid for antiviral treatment from *Salvia officinalis*
- Plant tissue culture of *Curculigo orchioides*: Farming of medicinal plant by Adivasi groups for sale to pharmaceuticals, Ayurvedic doctors, and so on.
- Production of Mycophenolic Acid from *Penicillium brevicompactum* using solid-state fermentation (SSF) for drug development and health care.
- Production of anti-hypertensive combination product from the hairy roots of *Rauwolfia serpentina* and *Coleus forskohlii*.
- Cost-effective Biosurfactant production from renewable feedstock.
- Development of an energy drink to act as a health booster.
- Plantlets of *Curculigo orchioides* are currently in the process of being produced for distribution to about 200 farmers, and continuous production through poly houses is being explored in the coming year. 🔍



Research work in the biotechnology sector in the institute

M S SWAMINATHAN RESEARCH FOUNDATION

Brief Description

M S Swaminathan Research Foundation (MSSRF), established in 1988, is a not-for-profit trust. MSSRF was envisioned and founded by Professor M S Swaminathan, an agriculture scientist. The foundation aims to accelerate use of modern science for sustainable agricultural and rural development. MSSRF focuses specifically on tribal and rural communities with a pro-poor, pro-women, and pro-nature approach. The foundation applies appropriate science and technology options to address practical problems faced by the rural populations in agriculture, food, and nutrition.

R&D Set-up

The research facilities and infrastructure available in the organization are being used by the scientists and research scholars of the MSSRF and the scholars of institutions located closed to the MSSRF as well as institutions carrying out similar research work at the national level:

- Deep-freezer (-20 °C, -80 °C), centrifuge with refrigeration, inverted microscope with imaging facility, horizontal laminar flow, and shaker (with temperature control)
- Culture racks, refrigerator, pipettes, pH metre, gel documentation system, freeze dryer, automatic ice machine, uv-vis spectrophotometer
- Laminar air flow, gas – chromatograph, cryomicrotome, autoclave, power pack,

electrophoresis, water bath, fume hood, microwave, balance, etc.

Sources of income for R&D

- Grants from government agencies
- The World Bank

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 3,536.84

FY 2015-16 = 2,611.16

FY 2016-17 = 2,753.05

R&D Achievements

Products developed

- Microbial products for enhancing soil health
- Pharmaceutical-relevant compounds from lichens and medicinal plants
- Salinity-tolerant rice varieties through molecular breeding
- Biofortified rice varieties with zinc and iron through conventional breeding
- PAN India Fisher Friend Mobile Application

Prototypes developed

- Integrated mangrove fishery farming system
- Farming system for Nutrition
- Genetic garden of halophytes

Instruments developed

- A solid state fermenter (SSF) has been developed in collaboration with Kannur University for the mass multiplication of biopesticide (*Trichoderma*). This fermenter is

Registered Office

M S Swaminathan Research Foundation, Third Cross Street, Institutional Area, Taramani, Chennai 600 113, Tamil Nadu
T: 044 2254 1229
E: swami@mssrf.res.in, chairpersonpa@mssrf.res.in
W: www.mssrf.org

Recognition Status

File No.: 12/36/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 31
PGs & Graduates: 166

Research Areas

- Coastal ecosystems
- Agrobiodiversity
- Biotechnology
- Ecotechnology
- ICT for development
- Food and nutrition security

Research Outcomes

- Papers published: 69
- IPRs held
 - » Patents filed: 6
 - » Patents awarded: 2

portable, can be established in the field conditions without electricity requirements. Production standardization with various agriculture wastes is being done.

Technical Collaborations

National

Indian Institute of Food Processing Technology, Thanjavur; National Institute for Research in Tuberculosis (NIRT), New Delhi; Cancer Institute, Chennai; National Botanical Research Institute, Lucknow; Agharkar Research Institute, Pune; University of Agricultural Sciences, Bengaluru; University of Agricultural Sciences, Dharwad; University of Agricultural and Horticultural Sciences, Shivamogga; Tamil Nadu Agricultural University, Coimbatore, and many more.

International

University of Tasmania, Australia; University of Basel, Switzerland; and World Food Programme, Rome.

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Integrated mangrove fishery farming system: The MSSRF developed an innovative coastal aquaculture system called Integrated Mangrove Fishery Farming System to restore abandoned shrimp farms and to put saline-affected coastal areas into productive purpose. In this system, space is created in the farm of inner bunds and mounds

within the aquaculture ponds to grow mangrove trees and the remaining space is used for fish culture. Leaves and litter from mangroves act as feed for fish, whereas fish excreta is used as nutrient for mangroves. Apart from this, mangrove plantation provides ecological security by acting as a barrier to cyclonic winds and storm surges, whereas fish culture ensures livelihood security.

- Farming system for nutrition: Location-specific farming system for nutrition (FSN) was developed and demonstrated to improve the diversity of household diets and nutrition outcomes.
- Fisher Friend Mobile Application: It is an android-based mobile application available in all the regional languages of coastal India. It has been designed to provide easy access to all relevant information and knowledge related to marine fishing to the small-craft fishers. It provides information on the potential fishing zone, ocean conditions, including wind speed and direction, wave height, market information, government schemes etc. It also provides information related to disaster alerts in advance, navigation route from shore to fishing zone by using an in-built Global Positioning System (GPS) and figuring out danger zones, such as rocks, sunken ships, and dead coral reefs. 🔍



Research work underway in the organization

MAHARASHTRA STATE GRAPE GROWERS' ASSOCIATION

Brief Description

The Maharashtra State Grape Growers Association, a non-governmental trust was established in 1960, originally at Baramati, for the sole purpose of addressing the problems of grape growers on a single platform. The main objectives of the association comprise the provision of technical back up to growers through research and development, extension services, arranging seminars and group discussions, importing and distributing some important viticulture inputs, such as, like gibberellic acid, which were earlier not available to the growers in India, studying and adopting new technologies, and adoption of improved varieties.

R&D Set-up

- The research facilities available include high-tech polyhouse to propagate imported grape vines and root stock
- Research equipments, such as HPLC, GC, AAS, UV, and visible spectrophotometer, etc., are available.

Sources of income for R&D

- Donations
- Grants from government agencies

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 279.85

FY 2015-16 = 427.63

FY 2016-17 = 483.36

R&D Achievements

Processes developed

- Hardwood grafting of rootstocks with choice stonic variety of grapes.
- Doses and timing of GA-3, of grapes to be exported to the Middle East and European markets were fixed.
- Dose and time of the application of CPPU and 6BA were fixed.
- Grape bunches to be kept per unit area for export was estimated.
- Changing of old practices with new practices for the production of export quality grapes.
- Appropriate doses of fertilizer and manure and proper time of application to grape vines.
- Fertilizer recommendations on the basis of analytical report.

Technical Collaborations

National

National Research Center for Grapes, Pune; Mahatma Phule Krishi Vidyapeeth, Rahuri; National Chemical Laboratory, Pune; National Institute of Abiotic Stress Management, Baramati; Agharkar Research Institute, Pune

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The problems of grape growers were taken into consideration and accordingly the research trials were conducted. The findings are communicated through training programme, seminar, field visit

Registered Office

Maharashtra Rajya Draksha Bagaitdar Sangh "Draksha Bhavan",
E-4, Market Yard, Gultekadi,
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T: 020-2426 7910
E: mrdbscho@gmail.com
W: www.maharashtragrafes.com

Recognition Status

File No.: 12/24/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 4
PGs & Graduates: 20


Research Areas

- Introduction of new grapes varieties with high demand in the international market
- Providing services for production of residue-free quality grapes
- Research on soil, water, and fertilizer management for quality grape production

Research Outcomes

- Papers published: 13

and monthly magazine to 30,000 members.

- Supply of inputs like gibberellic acid, CPPU, and other PGR's to the member grape growers.
- Providing advisory services to the grape growers by analysing soil, water, plant samples received from grape growers and, accordingly fertilizers recommendations are issued to them.
- New technology in the field of viticulture is communicated to grape growers through monthly magazines, radio talk, and Doordarshan programmes.
- To bring awareness in the grape growers, regular workshops are organized at different grape-growing locations. 



^ Laboratory work during the product development

MUSTARD RESEARCH AND PROMOTION CONSORTIUM

Brief Description

The Mustard Research and Promotion Consortium (MRPC) is a non-governmental, non-profit R&D organization, registered as a society mainly works for the development of the mustard crop to improve its yield as well as the crop production and the quality of mustard. The aim of the MRPC is to conduct R&D for the increasing production of mustard, enhance oil quantity and quality, and modification of agro technologies to suit the particular conditions; to conduct R&D for developing hybrid of mustard crop with greater disease resistance, frost tolerance, drought tolerance, and saline soil acceptability; to find out various possibilities through R&D for diversifying the utilization of mustard crop and its allied products for value addition of this crop; to conduct various mustard oil-related R&D and explore its benefits because of the presence of natural antioxidants, healing properties, and diverse medicinal uses; to carry out R&D for the isolation of various biochemicals from mustard seeds for various industrial and analytical purposes and explore consumption of mustard oil cake for human beings and its uses in bakery products as well.

R&D Set-up

MRPC has biochemical, oleo chemical, and microbiological set-up with installed equipments and all these are used by individuals and academia.

Sources of income for R&D

- Project funding
- Membership
- Consultancy
- Training

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 7.84

FY 2015-16 = 12.13

FY 2016-17 = 13.98

R&D Achievements

Products developed

- 'Greenex' hard surface cleaner: mustard oil-based hard-surface cleaner
- Shakti massage oil: mustard oil based medicinal massage oil
- 'Sparkel' low-absorptive mustard oil: low-absorbing mustard oil by the degumming of mustard oil without refining
- Mustard volatile oil-based mosquito repellent liquid vaporizer

Processes developed

- Process developed for the hydro distillation of mustard seed to obtain essential oil
- Extraction of allylisothiocyanate (active ingredient) from mustard seed and cake to be utilized for various agricultural and pharmaceutical purposes
- Extraction and purification of isolated mustard protein for human consumption

Registered Office

Mustard Research and Promotion Consortium,
307, Jyoti Shikher Building,
8 District Centre, Janakpuri,
New Delhi 110 058
T: 011-25557587
E: mrpc_india@redifmail.com
W: www.mrpc.co.in

Recognition Status

File No.: 12/76/2002-TU-V
Initial Recognition: 2002
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 1
PGs & Graduates: 2

Research Areas

- Mustard crop research
- Post-harvest value addition in mustard
- Oleo chemicals
- Oil extraction
- Bioactive compounds Isolation
- Essential oil extraction technology

Research Outcomes

- IPRs held
 - » Patents awarded: 3

- Development of technology for detoxification of mustard oil cake for value added products
Standardized technology of mustard processing
- Isolation of lecithin from mustard oil to prevent foaming of oil during cooking
- Biodiesel from fatty acid of mustard oil
- Intersterified low calorie structured lipid
- Low absorptive mustard oil
- Enzymatic extraction of oil from seed
- Oleo splitting with the use of enzyme to target the bond of interest to get desired fatty acid

Prototypes developed

- Mosquito repellent from mustard essential oil

Technical Collaborations

National

All India Institute of Medical Sciences,
New Delhi

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Products developed by MRPC helped in lowering the protein deficiency in the country.
- Services provided to oil manufacturers by MRPC helped them to assess the quality of their product/produce.
- Innovations carried out by the organization to make the Indian mustard oil industry world class level by upgradation of the age old process of mustard seed crushing by electrical driven *ghanies / kolhus*.
- Training for organic cultivation has been given to farmers and now they are producing the vermicompost at their farm. Beside this, they are also applying biopesticides in the field along with biofertilizer. 🔍



^ New species *Commelina badamica*

NAOROJI GODREJ CENTRE FOR PLANT RESEARCH

Brief Description

The Naoraji Godrej Centre for Plant Research (NGCPR) was established in 1992 as a non-profit organization. Its objectives are to carry out purposeful research in the areas of plant biodiversity and conservation. The NGCPR carries out purposeful research in plant biodiversity and conservation with special reference to endangered and threatened species of medicinal plants endemic to the Western Ghats. The NGCPR has pioneered plant conservation studies in Maharashtra and has conducted conservation studies on two globally endangered plant species.

R&D Set-up

NGCPR has a distinct infrastructure at its Shirwal, Satara premises which includes a research laboratory, library and office, herbarium, discussion room, and storeroom. The research block is completely utilized for the NGCPR research activities. In addition, the centre has 2.5 acres of experimental research garden. The research laboratory is occasionally used by PhD research students and MSc dissertation fellows from S P University, Pune, and Shivaji University, Kolhapur.

Sources of income for R&D

- Project grants
- Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 24.71

FY 2015-16 = 23.70

FY 2016-17 = 16.20

R&D Achievements

Products developed

Two new species have been discovered in the genus *Commelina* and *Murdannia* from Karnataka and Maharashtra, respectively. Both are apparently endemic to India and both the species are of botanical and taxonomic interest, due to their restricted habitat.

Technical Collaborations

National

Savitribai Phule University, Pune; Shivaji University, Kolhapur; The Foundation of Medical Research, Mumbai; Botanical Survey of India, Western Circle, Pune

Societal Relevance

The following R&D outcomes are of national/societal significance:

- A mobile application, 'Endemic Plants of Sahyadri', has been developed for ease-of-field identification and conservation assessment and as a unique application contains pictorial,

Registered Office

Naoraji Godrej Centre for Plant Research (NGCPR), Lawkim Motors Group, Godrej & Boyce Mfg. Co. Ltd Plant 19A, Pirojshanagar, Vikhroli, Mumbai 400 079, Maharashtra
T: 022-69244401
E: spunekar@godrej.com
W: www.ngcpr.org

Location of R&D Units

- Satara District, Maharashtra

Recognition Status

File No.: 12/63/1998-TU-V
Initial Recognition: 1998
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 2
PGs & Graduates: 3


Research Areas

- Plant taxonomy and conservation
- Diversity and documentation
- Ecology
- Phytochemistry
- Ethnobotany

Research Outcomes

- Papers published:
 - » National: 2
 - » International: 8

distributional, and ecological data along with the description of native plants of the northern Western Ghats, which is helpful to botany enthusiasts, the forest departments and research students and thus is directly relevant to the digital india mission.

- Cost effective floating bamboo islands for bioremediation through the vetiver plants. More than 10 bamboo islands have been provided to lawkim motors. 



^ Onion production under drip irrigation

Registered Office

National Horticultural Research & Development Foundation (NHRDF), Bagwani Bhawan, Plot. No. 47, Institutional Area, Pankha Road, Janakpuri, New Delhi 110 058
T: 011-2852 4150
E: delhi@nhrdf.com
W: www.nhrdf.org

Location of R&D Units

- Nashik & Lasalgaon, Maharashtra
- Karnal, Haryana
- Rajkot, Gujarat
- Indore, Madhya Pradesh
- Deoria, Uttar Pradesh

Recognition Status

File No.: 12/9/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 13
PGs & Graduates: 53

NATIONAL HORTICULTURAL RESEARCH & DEVELOPMENT FOUNDATION

Brief Description

The National Horticultural Research & Development Foundation (NHRDF) is a Society registered under the Societies Act. The aim of the establishment of NHRDF was to guide the farmers, exporters, and others concerned for improving the productivity and quality of horticultural crops in order to make available a sufficient quantity for domestic requirement and also to boost up the export of onion and other such export-oriented horticultural crops in the country. The NHRDF is engaged in research and developmental programmes. The research projects are carried out to enhance the quality of onion, garlic and other vegetable crops during the kharif, late kharif, and rabi seasons at regional research stations.

R&D Set-up

The NHRDF initially established a plant pathology laboratory at Nashik during 1979–80. Plant protection, physiology, biochemistry and soil testing were established at the Nashik and Karnal Centre and the Mushroom Spawn Production & Seed Testing Laboratory at Bagwani Bhawan. The Bio-Control Laboratory, Wine Analysis and Pesticides Residue Analysis Laboratory at Chitegaon, Nashik, were also established.

R&D Achievements

Products developed

NHRDF has developed 10 varieties each of onion and garlic and out of

these 6 varieties of onion as well as 10 varieties of garlic have been released by the Central Sub-committee on Crop Standards, Notification and Release of Varieties of Horticultural Crops, Department of Agriculture & Cooperation, Ministry of Agriculture & Farmers' Welfare, Government of India.

Details of onion variety

- NHRDF Red-4 (L-744), developed by the NHRDF has been notified by Ministry of Agriculture, Government of India, vide notification number SO-3666 (E) dated 06/12/2016 and has been released for cultivation during the *rabi* season in zones III of the country.
- The onion collection L-819 has been identified during 8th Group Meeting of the ICAR- AINRPOG at Durgapura, Jaipur on 1–2 July 2017 for release by the Ministry of Agriculture & Farmer's Welfare, Government of India.
- Promising onion lines viz namely, L-863, L-883, and L-857, have shown better performance in yield, quality, and bulb size. All the three lines are under the pipeline for release after multi-locational trials under AINRPOG.

Details of garlic variety

- Garlic variety, Yamuna safed 8 (G-384) developed by the NHRDF, has been notified by the Ministry of Agriculture & Farmer's Welfare, Government of India vide, notification number S.O. 268 (E)

Research Areas

- Plant genetic resources
- Crop improvement
- Crop production
- Plant protection
- Post-harvest management
- Seed production of onion and garlic

Research Outcomes

- Papers published: 48

dated 28/01/2015 and has been identified for cultivation in Zone II.

- Garlic variety, Yamuna safed 9 (G-386) developed by the NHRDF, Karnal, has been notified by the Ministry of Agriculture & Farmer's Welfare, Government of India, vide notification number S.O. 3666 (E) 06 dated 06/12/2016 and identified for cultivation in Zone II.
- Garlic variety, Agrifound Parvati (G-313) developed by the NHRDF Karnal, has been notified by the Ministry of Agriculture & Farmer's Welfare, Government of India, vide notification number S.O. 268 (E) dated 28/01/2015 and released for cultivation in zone-I.
- Garlic variety, Agrifound Parvati 2 (G-408), developed by the NHRDF Karnal, has been notified by the Ministry of Agriculture & Farmer's Welfare, Government of India, vide notification number S.O. 268 (E) dated 28/01/2015 and released for cultivation in zone-I.
- Garlic genotype, G-389, identified for earliness has been registered with the Plant Germplasm

Registration Committee (PGRC), NBPGR, New Delhi, of ICAR on January 31, 2014.

- Promising garlic lines viz. G-304, G-363, G-404 and G-417 have shown good performance in yield, number of cloves in the and bulb size. All the lines are pipeline for release after multi-locational trials under the AINRPOG.


Technical Collaborations

National

Department of Agriculture, Government of Maharashtra; Indian Council of Agricultural Research

Societal Relevance

The following R&D outcomes are of national/societal significance:

The NHRDF has connectivity with the national programmes of the Government of India, namely, Agriculture Skill Development in India Programme (ASCI), including bulb crop cultivator, gardeners training, gardeners-cum-nursery raising, honey bee keeping, and mushroom production. 



^ Vermicompost production through waste recycling

NIMBKAR AGRICULTURAL RESEARCH INSTITUTE

Brief Description

The Nimbkar Agricultural Research Institute is an NGO and non-profit research and development institute, registered under the Societies Registration Act XII of 1860 and the Bombay Public Trust Act of 1950. The Institute undertakes research and development in agriculture, renewable energy, animal husbandry, and sustainable development with the intention of sustainably improving the lives of Indians in rural areas.

R&D Set up

This Institute has 40 ha of well-developed farm for conducting experiments. In addition, well-equipped laboratories to carry out parasitology, cytology, pathology, and chemical and analysis work.

Housing for 400 ewes and their lambs, sheep race and handling facilities, 12 ha of pastures and tree fodder, and a molecular biology laboratory with the basic equipment for carrying out the DNA test for the FecB gene.

Sources of income for R&D

- Donations
- Grant-in-aid
- International funding

R&D expenditure (₹ in lakhs)

FY 2014-15 = 180.27

FY 2015-16 = 189.78

FY 2016-17 = 225.60

R&D Achievements

Products developed

- Solar water purifier with a sari cloth filter for inactivation of coliforms to produce safe drinking water; Highly fecund 'NARI Suwarna' and 'NARI composite' breeds of sheep.

Processes developed

- Diesel as a household fuel for clean cooking and lighting via 'Lanstove'; Artificial insemination in goats on a large scale under field conditions.

Commercialization potential of developed products/processes

- **Agriculture:** Safflower and sweet sorghum varieties and hybrids are already under commercial cultivation in the country. In last three years, more than 2 T safflower seeds and 0.5 T sweet sorghum seeds have been purchased by the farmers.
- **Renewable Energy:** Low concentration alcohol stove technology has been transferred to a company in Indonesia with exclusive rights for manufacturing and selling in ASEAN countries (Rs. 10 lakhs).
- **Animal Husbandry**
 - » Establishment of a buck and ram semen freezing laboratory in India following which the frozen semen is disseminated to livestock owners all over India.

Registered Office

Nimbkar Agricultural Research Institute,
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P. O. Box 44, Phaltan 415 523,
Maharashtra
T: 9168937964

E: nariphaltan@gmail.com

W: <http://www.nariphaltan.org>

Recognition Status

File No.: 12/5/1988-TU-V

Initial Recognition: 1988

Valid Until: March 31,2018

R&D Manpower

Doctorates: 4

PGs & Graduates: 15

Research Areas

- Agriculture – Safflower improvement
- Sweet sorghum improvement, Renewable Energy
- Animal Husbandry

Research Outcomes

- Papers published:
 - » National: 7
 - » International: 6
- IPRs held
 - » Patents awarded: 6
- New crop varieties developed & registered: 2

- » Development of suitable technology for cervical artificial insemination of goats under field conditions.
- » Multiplication and popularization of high quality, high yielding fodder varieties.
- » Technique for rooting of cuttings of KX2 (NARI *Nirbeeja*) hybrid *Leucaena*.

Technical Collaborations

National

National Chemical Laboratory; Bharati Vidyapeeth, Pune; MARICO, Mumbai; Indian Institute of Oilseeds Research; Indian Institute of Millets Research, Hyderabad; Department of Animal Husbandry, Government of Karnataka; The Goat Trust, Lucknow; Maharashtra Animal and Fishery Sciences University (MAFSU), Nagpur

Societal Relevance

- Work in safflower and sweet sorghum to enhance productivity and profitability of these crops and raise economic well-being of the farmers in rain-fed tracts of India is underway. Solar Water Purifier for village-level application, so that 30,000-40,000 liters of water can be made potable daily for its residents.
- The new sheep breed can increase the efficiency and profitability of sheep rearing enterprises. It can increase the availability of sheep meat, leading to improvement in nutrition.
- Supply of seeds and semen of improved varieties and breeds to the farmers and goat keepers. 



^ Somatic embryogenesis

PEERMADE DEVELOPMENT SOCIETY

Brief Description

The Peermade Development Society (PDS), registered as a non-governmental organization under the Travancore–Cochin Literary and Charitable Societies Act of 1955, is involved in various developmental activities in the fields of organic farming, Ayurveda and traditional medicine, medicinal plants conservation, tribal development, women's development, etc.

R&D Set-up

- The laboratories available in the organization are enumerated below and all are well equipped with the latest equipment:
- Soil testing laboratory; tissue culture laboratory; microbiology laboratory; food processing unit
- Apart from the laboratories, the following infrastructure is also available:
- Atomic absorption spectrophotometer (double beam); autoclave; BOD incubator;; conductivity metre; deep fat fryer; distillation unit; dough mixer; EC metre(field scout); flame photometer; homogeniser; juicer; laminar flow chamber; light metre; magnetic stirrer; microbalances; microscope with PC support; mixing machine; oven; ph metre; plant growth chamber; refractometer; sealing machine; shaker; soil compaction metre; soil moisture metre; spectrophotometer; stereo zoom microscope; tray drier; UV visible spectrophotometer.

Sources of income for R&D

- Government sources
- Donations
- International funding, etc.

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 101.59

FY 2015 -16 = 123.70

FY 2016 -17 = 115.67

R&D Achievements

Products developed

There are many products developed or under developed by the organization since 2014, these have been listed below:

- Semiautomatic polyhouse roof washer
- Coffee-harvesting basket
- Pepper harvester
- Spreading tool
- Continuous cardamom washing machine
- Banana de-fingering tool
- Mosquito coil-making machine for small-scale producers
- Low-cost cloth drier
- Readymade growth substrate for mushroom cultivation
- Vetiver box

Processes developed

- Somatic embryogenesis in black pepper
- Shoot tip culture in vanilla
- Seed germination in black pepper

Registered Office

Peermade Development Society,
PB No: 11, Idukki District,
Kerala 685 531
T: 4869232197
E: pds@pdspeermade.com
W: www.pdspeermade.com

Location of R&D Units

- Satara District, Maharashtra

Recognition Status

File No.: 12/63/1998-TU-V
Initial Recognition: 1998
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 5
PGs & Graduates: 23

Research Areas

- Somatic embryogenesis in *Piper nigrum*
- Shoot tip culture in *Vanilla planifolia*
- Inflorescence tip culture in banana
- Biocontrol agents and mushroom cultivation
- Spices processing and harvesting machineries
- Grassroots innovations
- Ayurveda
- Multilayer farming
- Sustainable agriculture

Research Outcomes

- Technologies transferred/commercialized: 12
- New crop varieties developed and registered: 2

- Decapitation technology in banana for low cost High Density Planting
- Rejuvenation technology in black pepper
- Lateral bud initiation in black pepper
- Intra-specific grafting technology in coffee
- Multi-layer farming in rubber plantations

Besides, certain modifications, were also carried out in terms of farmer innovation techniques:

- Cardamom-washing machine
- Arrowroot-grinding machine
- Cardamom-polishing machine
- Nutmeg decorticator

The following new concepts were designed for spices processing:

- Tribrid machine (a three-in-one machine for cardamom polishing, washing, and drying)
- Mechanized trolley to carry load on steep, narrow, and uneven roads.
- Low-cost and durable water-harvesting system

Prototypes developed

- Pepper harvester
- Coffee-harvesting basket
- Spreading tool for plantation crops

- Banana de-fingering machine
- Polyhouse roof washer

Technical Collaborations

National

Indian Institute of Spices Research, Calicut; NITI Aayog, Delhi; Tropical Botanic Garden and Research Institute, Kerala; Labline Industries, Mumbai

International

Karl Kübel Foundation, Germany; Food and Agriculture Organization, Italy; Botanic Gardens Conservation International, UK

Societal Relevance

The following R&D outcomes are of national/societal significance:

- The products developed by PDS, such as energy-efficient *chulah* and electro tyre rethreading technology have helped in reducing carbon emissions.
- Service developed by PDS 'Twin tank method in vermicomposting' helped in low cost method for organic manure production and solid waste management.
- Organic farming technologies developed by the PDS helped in reducing pollution, conservation, and healthy food to society. 🔍



▲ Aquaponics and beneficial bacteria

Registered Office

Prof. G M Reddy Research Foundation,
4-123/E, Swaroopnagar, Uppal, Hyderabad 500 039, Telanana
T: 9063920123
E: info@gmrrf.org
W: www.gmrrf.org

Recognition Status

File No.: 12/57/1997-TU-V
Initial Recognition:1997
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 2
PGs & Graduates: 1

Research Areas

- Screening for cancer variants in the Indian population
- Biomarker studies
- Approaches towards the development of novel biopesticides and organic inputs
- RAPD studies for the identification of germplasm variation

Research Outcomes

- Technologies transferred/commercialized: 1

PROF. G M REDDY RESEARCH FOUNDATION

Brief Description

G. M. Reddy Research Foundation (GMRRF), is a non-profit autonomous research organization. It was registered as a society. The GMRRF serves the cause and well-being of the farmers and improves the employment opportunities of the rural poor through the technology transfer and 'know how' of conventional, modern biotechnological innovation allied with participatory technology development.

R&D Set-up

The research facilities and infrastructure of the institution are being used by the academia and individuals. These include a detailed list of equipment which are as follows:

- Submarine agro gel system; auto clave double walled; analytical balance orbital shaking; incubator; constant temperature water bath; auto clave 35 X 55 Cm; laminar air flow horizontal; colony counter; digital balance; magnetic stirrer; vortex mixer; monocular microscope

Sources of income for R&D

Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 5.0
FY 2015-16 = 8.6
FY 2016-17 = 6.0

R&D Achievements

Products developed

- Isolation and characterization of bacteria related to aquaponics and the development of biofertilizer.
- Identification of cancer SNP variant data in the Indian population using next-generation tools.
- Biofertilizers from aquaponics is under development.
- Identification of cancer SNP-variant data in the Indian population using nex-generation tools in is process.

Revenue earned by way of licensing products/processes/ prototypes

- ₹5 lakh per annum

Commercialization potential of products/processes developed

- Rhizobium
- Phosphate solubilizing bacteria
- Trichoderma viride
- Bacillus subtilus

Technical Collaborations

National

Bioclues, Hyderabad; Virtue Biologics, Hyderabad; AV College, Hyderabad

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Training students with cutting-edge technology in next-generation sequencing data analysis, clinical research data analysis, and molecularbiology. 🔍



^ Maize nursery in SMSF

Registered Office

S M Sehgal Foundation,
Plot# 34, Sector 44,
Institutional Area, Gurugram,
Haryana 122 002
T: 0124-4744100
E: smsf@smsfoundation.org
W: www.smsfoundation.org

Recognition Status

File No.: 12/84/2005-TU-V
Initial Recognition: 2005
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 2
PGs & Graduates: 5

Research Areas

- Maize breeding
- Maize pathology
- Maize biotechnology

S M SEHGAL FOUNDATION

Brief Description

S M Sehgal Foundation (SMSF) is a non-governmental organization registered as a trust. This foundation team works together with rural communities to create sustainable programmes for managing water resources, increasing agricultural productivity, and strengthening rural governance. The team's emphasis on gender equality and women's empowerment is driven by the realization that human rights are central to developing every person's potential.

R&D Set-up

The SMSF signed an MoU with the ICRISAT and utilizes its infrastructure of ICRISAT for its research programme on maize. The SMSF utilizes land, glass house, biotech laboratory, office space, etc. of the ICRISAT and pays user charges in USD. SMSF has its own germplasm cold storage facility at the ICRISAT.

Source of income for R&D

International funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 161.28

FY 2015 -16 = 199.52

FY 2016 -17 = 225.58

R&D Achievements

Products developed

- Maize germplasm hybrids are under evaluation and hybrid development and evaluation is a long process.
- Foundation has distributed more than 10,000 seed samples free of

cost to the scientific community and also to the NBPGR, CIMMYT, DMR (now IIMR), etc.

R&D Projects Undertaken

- Phytochemical and microbial biopesticides: a multicomponent defense study for insect control
- Biopesticide strategies in pest management
- Phyto-oil allelochemical synergy for post-harvest pest management
- Sugar esters as potential biopesticides for insect pest management
- Pest management: from green revolution to gene revolution
- Essential oil allelochemicals and their derivatives as biorational insecticides.

Technical Collaborations

International

Partner for ICRISAT, Patancheru; University of Hohenheim, Germany; Kasetsart University, Thailand; IMIC (an initiative by CIMMYT ASIA member. [Q](#))

Research Outcomes

Collection, multiplication and characterisation and utilization of new-maize germplasm from various parts of the world. As its outcome, they conducted four field days and distributed 10,000 maize seed samples free of cost to public and private sector scientists. Development of superior maize hybrids with stable yields and tolerance to major diseases.



^ Field view of the BGREI programme at Allahabad and the Kaushambi district

SAM HIGGINBOTTOM UNIVERSITY OF AGRICULTURE, TECHNOLOGY AND SCIENCES

Brief Description

The Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS) is established and administered by the Sam Higginbottom Educational and Charitable Society registered under the Societies Registration Act. The university upholds and strives to achieve sustainable development, it linking learning and research with the life and needs of the poor, provides justice to the minorities, and other weaker sections of the society, especially to women and the rural poor.

R&D Set-up

The well-equipped specialized labs available in the university are as follows:

- Naini Agricultural Institute
- College of Forestry
- Vaugh Institute of Agricultural Engineering and Technology
 - » Farm machinery laboratory
 - » Farm power laboratory
 - » Renewable energy and ergonomics laboratory
 - » Robotics laboratory
 - » Design and development centre
 - » Soil and water engineering laboratory
 - » Water resource engineering laboratory and others
- Warner College of Dairy Technology
 - » Dairy technology lab
 - » Dairy engineering lab
 - » Food & dairy microbiology lab
 - » Food & dairy chemistry lab
 - » Food science and technology lab
- Jacob Institute of Biotechnology and Bioengineering
- Molecular biology research lab
- Tissue culture laboratory
- Green nanotechnology and agri nanotechnology lab
- Greenhouse and medicinal plant conservatory
- Microbiology and fermentation laboratory
- Bioinformatics laboratory
- Ethlind college of home science
 - » Food and nutrition lab
 - » Multimedia lab
 - » Shepherd institute of engineering & technology
 - » Computerized numerical control lab
 - » Theory of machines lab
 - » Metallurgy lab
 - » Measurement and metrology lab
 - » Heat and mass-transfer lab
 - » Refrigeration and air-conditioning lab
 - » Solar energy lab
 - » Thermodynamics lab
 - » Computer-aided design lab
 - » Automobile lab and others

Registered Office

Sam Higginbottom University of Agriculture, Technology & Sciences, PO Agricultural Institute, Rewa Road, Allahabad 211 007, Uttar Pradesh
T: 05322684296
E: shailesh.marker@shiats.edu.in
W: www.shuats.edu.in/default.asp

Recognition Status

File No.: 12/96/2008-TU-V
Initial Recognition: 2008
Valid Until: March 31, 2017

R&D Manpower

Doctorates: 273
PGs & Graduates: 175

Research Areas

- Agricultural research
- Biological sciences
- Dairy and forestry research
- Biotechnological research
- Engineering and technology

Research Outcomes

- IPRs held
 - » Patents awarded: 11

- School of basic sciences
- Centers of excellence
 - » Center of excellence in maize
 - » Center of excellence in small farm implements
 - » Center for transgenic studies
 - » Center for geospatial technologies

Sources of income for R&D

- Grant-in-aid
- Government funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014 -15 = 200.00

FY 2015 -16 = 182.00

R&D Achievements

Products developed

- Products developed by dehydrated green leafy vegetables, carrots, *bathua* leaves, onion stalks, spinach, beetroot leaves, figs, mushroom flours, herbs, drumstick leaves, and cauliflower leaves
- Low-calorie desserts by using Stevia for diabetes.
- Product formulation by using foxtail millets for diabetes.
- Low glycemic foods development by Kodo millets.
- Preparation of low-fat *paneer* and ice cream.
- Wheat bran-based products such as biscuits
- Utilization of multi-mixed flour in the preparation of gluten-free snacks
- Standardization and formulation of ready-to-eat recipes from soya flour

- Paneer preparation from casein-enriched milk
- Nutritional enrichment of milk

Prototypes developed

- Agricultural machinery popularized and commercialized at SHUATS
- Animal energy technology developed, popularized, and adopted

Technical Collaborations

National

Vivekanand Parvatiya Krishi Anusandhan Sansthan, Almora; National Research Centre for Litchi, Muzaffarpur, Bihar; J K Agri Genetics, Ltd; National Botanical Research Institute, Lucknow ; U.P. Council of Agricultural Research, Lucknow; International Crops Research; Institute for the Semi-Arid, Patancheru; Regional Research Laboratory, Jorhat; Jain Irrigation Systems Ltd, Maharashtra; Caritas India Ltd; Guru Tegh Bahadur Khalsa College, University of Delhi, Delhi

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Model organic farm related to the swachh bharat mission
- Soil testing lab has direct relevance to the soil health
- Card mission
- Web portals for students/staff/farmers is connected with digital india
- Crop varieties of rice aim at bringing green revolution in eastern India. 🔍

SUN AGRO BIOTECH RESEARCH CENTRE

Brief Description

The Sun Agro Biotech Research Centre is a non-governmental organization registered as a society. It undertakes and promotes scientific research through biotechnology, with specific emphasis on biocontrol agents, bio-pesticides, bio-fertilizers, and bio-inputs.

R&D Set-up

- Insect-rearing laboratory
- Insect-behaviour study lab
- Insect bio assay unit, and many more

R&D Achievements

Instruments developed

- Improved para pheromone trap for fruit flies. This trap can improve the numbers of fruit flies trapped for the same quantity of the attractant (methyl eugenol) used over a six to eight-week period in several tree fruit crops, such as mango and guava. Through this, the farmers acquire 50% more impact in pest control.
- Improved, waterless pheromone trap (delta plus) can avoid dependence on water and is, therefore, more user friendly at the farm level. It also catches more adult insects (moths) of major pest-like borers in rice vegetables and sugarcane. This has already been validated as a more efficient and user-friendly alternative to the presently recommended water basin trap in sugarcane across six sugar factory areas and four sugarcane research stations in South India.

Technical Collaborations

National

DECE of Karunya University, Coimbatore; Ayya Food Life Care; Tropical Agro System Pvt. Ltd; and many others

International

Intellisense Corporation, USA; University of Massachusetts Lowell, USA; Purdue University College of Engineering

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Improved and user-friendly pheromone trap design
- The waterless pheromone trap (delta plus) has been demonstrated for sugarcane borers in six sugar factories. 🔍

Registered Office

Sun Agro Biotech Research Centre
3/1978, Mugalivakkam, Main Road,
Madanandapuram,
Chennai 600 125, Tamil Nadu
T: 09884104036
E: sabrcchennai@yahoo.co.in
W: www.sunagrobiotech.com

Recognition Status

File No.: 12/78/2002-TU-V
Initial Recognition: 2002
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 4
PGs & Graduates: 6

Research Areas

- Agricultural biotechnology
- Bio-pesticides
- Bio-fertilizers
- Bio-control agents
- Pheromone trapping

Research Outcomes

- Papers published:
 - » National: 30
- IPRs held
 - » Patents filed: 2



^ Infrastructure available for R&D activities

TAMIL NADU AGRICULTURAL UNIVERSITY

Brief Description

The Tamil Nadu Agricultural University is a state university in Tamil Nadu. The Directorate of Research was established in June 1971 to co-ordinate all research activities in Tamil Nadu Agricultural University (TNAU) and to administer and monitor the activities of research stations situated in different parts of Tamil Nadu.

R&D Set-up

The research facilities and infrastructure of the organization are available at many places in India with proper equipments and lab facilities:

- High-throughput Genotyping Platform consists of automated tissue lyser unit, automated DNA extraction system and automated capillary electrophoresis unit
- New technology green house
- DNA microarrays (affymetrix)
- University innovation cluster laboratory
- Liquid handling system
- SNP Genotyping system comprising EPI reader, IFC controller, and FC cyclor
- Cryo conservation vessels and accessories
- Liquid nitrogen generator
- Differential scanning calorimetry
- AAS (atomic absorption spectrophotometer)
- Inductively coupled plasma atomic emission
- Flash extraction chromatography

- Gel documentation system
- Ultra centrifuge and many more

Sources of income for R&D

Government funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 10,150.86

FY 2015-16 = 9,150.52

FY 2016-17 = 12,352.12

R&D Achievements

Products developed

Crop varieties

- Rice TPS 5
- Blackgram MDU 1
- Fodder sorghum CO 31
- Butter pear Ooty 1
- Rice TKM 13
- Rice CR 1009 Sub1
- Rice MDU 6
- Sorghum K 12
- Cluster bean MDU 1
- Coconut hybrid VPM 5
- Wheat CO W 3
- Pearl millet CO 10
- Blackgram VBN 8
- Groundnut VRI 8
- Cotton CO 14 and many more.

Technical Collaborations

National

DECE of Karunya University, Coimbatore; Ayya Food Life Care; Tropical Agro System Pvt. Ltd; and many others

Registered Office

Tamil Nadu Agricultural University, Coimbatore 641 003
Tamil Nadu
T: 04222431788
E: vctnau@tnau.ac.in
W: www.tnau.ac.in

Location of R&D Units

- Coimbatore, Tamil Nadu
- Kumulur, Tamil Nadu
- Trichy, Tamil Nadu
- Bhavanisagar, Tamil Nadu
- Ooty, Tamil Nadu

Recognition Status

File No.: 12/37/1992-TU-V
Initial Recognition: 1922
Valid Until: March 31, 2020

R&D Manpower

Total : 1,174

Research Areas

- Agriculture technologies
- Evolving crop-production strategies
- Encouraging youth in agriculture


Research Outcomes

- IPRs held
 - » Papers published: 262
 - » Patents filed: 45

Societal Relevance

The following R&D outcomes are of national/societal significance:

The relevance of the products and processes developed is given below:

- Biomass hot air generation system integrated with solar tunnel dryer
- Biochar production
- Improved boiling system for turmeric
- Mechanical dryer for turmeric
- Turmeric washer
- Dust-proof turmeric polisher. 



^ Biochemical laboratory

TAMILNADU FOODGRAINS MARKETING YARD

Brief Description

The Tamil Nadu Foodgrains Marketing Yard (TFMY) is a non-governmental organization registered under the Societies Act. The organization renders technical advice and guidance on a day-to-day basis for improving food grains processing/trading activities. It aims in upgrading the pre- and post-processing steps for rice milling, wheat milling, dhall milling, besan, oil crushing, and jaggery-making units which presently work in a traditional way and produce poor quality end products with a lot of wastage.

R&D Set-up

TFMY has plenty of equipments available for research work, such as Air screen cleaner, computerized hot air seed drier, laboratory aspirator, blower, gravity separator, indent cylinder separator, grain/rice sizing device, rice husker, mcgill type rice miller, broken separator, handy moisture metres, and many more. They also have pre-processing machineries and packing facilities and an insulated warehouse and cold storage.

Sources of income for R&D

- Research fund from individuals
- R&D Lab activities
- Testing fee
- Charges contribution from institution

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 3.92

FY 2015-16 = 6.35

R&D Achievements

Products developed

- Techniques for reduction in basmati rice processing for more head rice recovery
- Processing method for organically clarified jaggery
- Reasons for chillies, colour development and its pungency loss were identified
- Prediction of weight-loss assessment in storage of paddy due to moisture loss
- Stacking methods for maintaining the quality of paddy in warehouse storage
- The paddy varieties cultivated in and around Madurai were screened for the export market based on its consistency and quality

Commercialization potential of products/processes developed

Technologies commercialized by the organizations include parboiling techniques for Basmati rice processing to reduce breakage, equation developed to predict quantity loss on moisture loss in storage, and paddy-storage stacking method to improve shelf life in the warehouse.

Technical Collaborations

National

Fatima College, Madurai; Thassim Beevi Abdul Kader College for Women, Kilakkarai; Industrial

Registered Office

Tamilnadu Foodgrains Marketing Yard, Sikkandar Chavadi, Alanganallur Road, Madurai 625 018, Tamil Nadu
T: 04526542215
E: marketingyard@grainscluster.com
W: www.grainscluster.com

Recognition Status

File No.: 12/111/2016-TU-V
Initial Recognition: 2016
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 1
PGs & Graduates: 2

Research Areas

- Pre-processing of food grains
- Prevention of losses in storage of food grains
- Value addition of food grains

Research Outcomes

- Papers published: 5
- Technologies transferred/commercialized: 3


Development Bank of India; Indian Institute of Crop Processing Technology (Ministry of Food Processing Industries, Government of India) Thanjavur

Societal Relevance

The national and societal relevance of the products, processes, and technologies developed by the organization are as follows:

- The parboiling technique developed for the reduction of breakage in basmati rice milling

has made more head rice available for export purpose as a Made in India product.

- Organically clarified jaggery reduces the chemical hazard in food.
- Parboiling process technology developed aids in reducing the soak water pollution problem.
- The of about non-basmati rice and the role of farmer producer companies in value chain integration. 



^ Quality control laboratory, Siliguri

TEA BOARD

Brief Description

Tea Board is functioning as a statutory body of the central government under the Ministry of Commerce, Government of India. The origin of the Tea Board dates back to 1903 when the Indian Tea Cess bill was passed. The Bill provided for levying a cess on tea exports, the proceeds of which were to be used for the promotion of Indian tea. It regulates, cultivation and export of tea in the country.

R&D Set-up

The centre consists of four divisions, namely, Agro-botany, Soil Science, Plant Protection, and Tea Quality and Manufacturing. A farm division also exists to look after the experimental farm and one automated weather station is installed at the centre.

- As an extension of the centre, quality control laboratory (QCL) has been set up in the Tea Park, Siliguri. The laboratory aims to provide services related to the testing of quality-related biochemical parameters of tea as per the Food Safety and Standards Authority of India (FSSAI), Pesticide residue (MRLs), Metal contaminants, bio-pesticides, bio-fertilizers, etc.

Source of income for R&D

Grant from government agencies

R&D Achievements

Products developed

- Bio-fertilizer suitable for Darjeeling tea soil

- Quality control through conventional and non-conventional methods

Commercialization potential of products/processes developed

- The organization has an experimental farm wherein green leaves are sold on a regular basis to the commercial Tea Garden.
- Soil testing:** Existing soil-testing facility of DTR&DC is under process of upgradation for more number of soil parameters and testing more samples, including soil health card for the Darjeeling tea industry.
- Tea nursery:** A commercial Tea Nursery is under process for the development in DTR&DC to supply the quality planting materials required for the Darjeeling tea industry. The nursery will produce both clonal and seed planting material.
- Seed bari:** A commercial Seed bari will be developed for the production of seeds to be used for developing seed planting material for supply to the industry.

Consultancy services rendered

A small section will be created to start consultancy services with the useful scientific information generated by the DTR&DC scientists.

Registered Office

Tea Board of India
Acharya Bhanu Path, Kurseong
734 203, Darjeeling, West Bengal
T: 03322351331
E: pdteaboard@gmail.com,
dtrdcteaboard@gmail.com
W: www.teaboard.gov.in

Recognition Status

File No.: 12/70/2000-TU-V
Initial Recognition: 2000
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 1
PGs & Graduates: 17

Research Areas


- Agro-botany, plant physiology, and breeding
- Genomics, plant protection, soil science, and nutrient management
- Tea quality and manufacturing
- Analytical services

Research Outcomes

- Papers published:
 - » National: 11
 - » International: 12

Technical Collaborations

National

Tea Research Association, Assam; UPASI Tea Research Foundation, Tamil Nadu; Indian Council of Agricultural Research, New Delhi; and Council of Scientific & Industrial Research, New Delhi. 



↗ Process development in the institute

Registered Office

The Cashew Export Promotion Council of India (CEPCI), CEPCI Laboratory & Research Institute, Cashew Bhavan, Mundakkal West, Kollam 691 001, Kerala
T: 0474-274 2704
E: cepci@cashewindia.org
W: www.cepclab.org.in

Recognition Status

File No.: 12/105/2013-TU V
Initial Recognition: 2013
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 2
PGs & Graduates: 16

Research Areas

- Bioremediation of environmental pollution
- Phytochemical screening
- Recycling of food industry waste
- Antimicrobial properties

THE CASHEW EXPORT PROMOTION COUNCIL OF INDIA

Brief Description

The Cashew Export Promotion Council of India (CEPCI) is registered as a section 8 company as per companies act 2013. The objective is to promote exports of cashew kernels and cashewnut shell liquid from India. The Council provides the necessary institutional framework for performing the different functions that serve to intensify and promote India's exports of cashew kernels, cashewnut shell liquid, cardanol, and allied products.

R&D Set-up

The CEPC lab is equipped with the most modern analytical instruments and associated facilities for carrying out basic, applied, and advanced research in chemistry, biochemistry, biotechnology, food technology, microbiology, and environmental sciences. It houses state-of-the-art equipments, such as LC-MS/MS, GC-MS/MS, HPLC, HPTLC, AAS, RT-PCR, FTIR, and a fully automated microbial analytical system.

Minor instruments, such as pH metre, Conductivity metre, UV-VIS Spectrophotometer, Poly photometer, UV –TLC view cabinet, Hybridization apparatus, Gel documentation system, sonicator, sigma refrigerated centrifuge, research microscope, incubators, table top shaker with UV lamp and digital timer, adhesive matting bench top shaker, stereo-microscope.

Sources of income for R&D

- Projects
- Testing fees
- Training

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 50.91

FY 2015-16 = 47.43

FY 2016-17 = 82.46

R&D Achievements

Processes developed

- Production of protease and lactase enzyme from cashew processing industry soil.
- Isolation and characterization of phenol degrading bacteria from cashew processing industry soil.
- Isolation and characterization of catechol degrading bacteria from cashew processing industry soil.
- Isolation and characterization of CNSL degrading bacteria from marine microbes

Technical Collaborations

National

Directorate of Plant Protection, Quarantine & Storage, Ministry of Agriculture, Government of India; National Accreditation Board for Testing and Calibration Laboratories (NABL), New Delhi; Bureau of Indian Standards (BIS), New Delhi; Kerala State Pollution Control Board. 🔍

Research Outcomes

- Papers published: 7
- IPRs held
 - » Patents held: 9



^ Sugarcane in a wide-row method of planting

THE K J SOMAIYA INSTITUTE OF APPLIED AGRICULTURAL RESEARCH

Brief Description

The K J Somaiya Institute of Applied Agricultural Research (KIAAR) was established in 1971 with the objectives to encourage and assist the farmers in the backward district of Vijayapur to take up sugarcane cultivation along scientific lines; to test the varieties of sugarcane under agro-climatic conditions of North Karnataka to select and multiply seeds of such varieties as are found suitable and supply to the farmers disease free healthy seeds for commercial cultivation; to evolve and popularize soil and water management practices; to educate and train farmers in various aspects of scientific agriculture; to devise and popularize labor saving agricultural implements and machines suited to the region. It is a not-for-profit organization registered as a Society under the Societies Registration Act.

R&D Set-up

The following equipment are available in the organization and these are used by individuals and academia:

- Centrifuge, laminar flow, rotary shaker, vertical autoclave, precision weighing balance
- Farm implements, air curtains and air conditioners, tractors and irrigation, nitrogen distillation unit
- Spectrophotometer, flame photometer, atomic absorption spectrophotometer, ph and ec metres, aerated steam therapy unit, chemicals and glasswares and others.

Source of income for R&D

Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 133.87

FY 2015-16 = 148.37

FY 2016-17 = 107.43

R&D Achievements

Products developed

- Co 2001-13
- Co 2001-15
- Co 07015
- Co 09004
- Sugarcane seedlings in a wide-row method of planting

Technical Collaborations

National

Indian Institute of Sugarcane Research, Lucknow; Sugarcane Breeding Institute, Coimbatore; University of Agricultural Sciences, Dharwad; K J Somaiya Institute of Engineering and Information Technology, Mumbai. 🔍

Research outcomes

They have done various innovative projects such as varietal evaluation under the All-India Coordinated Research Project. Fourteen varietal trials comprising 6 initial varietal and 8 advanced varietal trials involving 86 entries were conducted. The advanced varieties were planted for 2 plant, one ratoon, and others.

Registered Office
 The K J Somaiya Institute of Applied Agricultural Research (KIAAR),
 Sameerwadi, Tal. Mudhol,
 District Bagalkot 587 316
 Karnataka
 T: 08350260046, 08350260047
 E: patil.vc@somaiya.com

Recognition Status
 File No.: 12/8/1988-TU-V
 Initial Recognition: 1988
 Valid Until: March 31, 2018

R&D Manpower
 Doctorates: 2
 PGs & Graduates: 13

Research Areas

- Sugarcane crop
- Agricultural technology
- Soil testing
- Tissue culture
- Farming community



^ SIMA-5 plant

THE SIMA COTTON DEVELOPMENT AND RESEARCH ASSOCIATION

Brief Description

The Southern India Mills Association Cotton Development And Research Association (SIMA CD&RA) is a non-government not-for-profit organization registered as Society under the Societies Act. Its main objective is to promote the development of cotton farming for enhancing cotton productivity, production, and quality and make available raw cotton at a reasonable price to the textile mills.

R&D Set-up

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 215.29

FY 2015-16 = 346.78

FY 2016-17 = 364.02

R&D Achievements

- Evaluation of high yielding barbadense culture, screening of germplasm, evaluation of high yielding barbadense cultures
- Restoration of purity, yield, ginning outturn and fibre quality characters of MCU-5 and Suvin, Development of sucking pest tolerant culture, Development of long and medium staple cultures, Synthesis of new cotton hi-tech hybrid combinations and breeding lines of backcross combinations.
- Development of high density planting system for machine

pickint, development of short staple cultures.

Products developed

- ELS intra-hirsutum variety SIMA-5
- 8 intra-barbadense variety
- SHSM-55 variety nominated for AICRP trial and ranked 7th in the central zone
- SHC-32 high density plant
- Shakthi Bt variety
- Pest-tolerant culture

Societal Relevance

The following R&D outcomes are of national/societal significance:

Arranging awareness programmes on cotton production technology which has proved extremely useful for the farmers. 🔍

Registered Office

The SIMA Cotton Development & Research Association, 41, Race Course, Post Box No.3871, Coimbatore 641 018, Tamil Nadu
T: 0422-2220 079
E: info@simacdra.org
W: www.simacdra.org

Recognition Status

File No.: 12/49/1995-TU-V
Initial Recognition: 1995
Valid Until: March 31, 2018

R&D Manpower

Doctorates: 1
PGs & Graduates: 4

Research Areas

- Cotton seed varieties and hybrids
- Biofertilizers
- Soil fertility
- Seed multiplication

Research Outcomes

- Papers published:
 - » National: 5
- New crop varieties developed: 5



^ Equipment used for R&D activities in UPASI foundation

UPASI TEA RESEARCH FOUNDATION

Brief Description

The United Planters' Association of Southern India (UPASI) Tea Research Institute is a non-government organization registered as a trust. It has seven divisions, namely Botany, Soil Chemistry, Entomology, Pesticide Residue, Plant Pathology & Microbiology, Plant Physiology & Biotechnology, and Tea Technology and all of these work on research and development in their respective sectors.

R&D Set-up

There are various rare equipments available in the organization, such as Ion chromatograph; atomic absorption spectrophotometer; uv - vis spectrophotometer; flame photometer; nitrogen analyser (Kel plus); millipore water distillation system (millipore direct Q3); digital electronic balance; mettlar ae 160; NSW-143; water bath; muffle furnace; double distillation unit; mechanical shaker; environmental rotary shaker; GPS – garmin map 76 csx; B.O.D incubator; nitrogen analyser (kel plus); millipore water distillation system, and many more.

Sources of income for R&D

- Self-funding
- Grant-in-aid
- Government funding

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 426.00

FY 2015-16 = 452.00

FY 2016-17 = 422.00

R&D Achievements

Products developed

- Production of wine from tea waste: Tea waste from the factory was collected and subjected to fermentation along with sugar, yeast, etc., with different concentration. The treatment was allowed for fermentation for ten days and fifteen days and thereafter, the content was filtered. The resultant wine was sent for taster evaluation and the taster's positive comments on wine led to an analysis of its microbial content.
- Production of wine from coarse leaves (leaves left out on segregation): Coarse leaves which were left out on segregation in the field were collected and these have been processed as per the standard CTC process and analysed for its quality and FSSR requirements.
- Production of wine from TRI 2043 clone: TRI 2043 contains a high amount of anthocyanin content which has high medicinal properties too. Since, it has been taken for wine preparation, the leaves were cut into small pieces and allowed for fermentation. Wine produced from TRI 2043 showed a good appearance and colour.

Processes developed

- Tea waste as fuel in tea manufacture: The calorific value of CTC tea waste was analysed and it stands somewhere around 4100 Cal/g. The calorific value of tea waste is nearer to coal and it

Registered Office

UPASI Tea Research Foundation,
Nirar Dam Bo, Valparai 642127,
Coimbatore District, Tamil Nadu
T: 4253-235301
E: director@upasitearesearch.org
W: www.upasitearesearch.org

Recognition Status

File No.: 12/15/1988-TU-V
Initial Recognition: 1988
Valid Until: March 31, 2019

R&D Manpower

Doctorates: 6
PGs & Graduates: 33

Research Areas

- Genetics & plant breeding
- Agronomy and weed research
- Soil science & plant nutrition
- Entomology, biological control, and pesticide residues
- Plant pathology
- Microbiology, biological control, and bio fertilizers
- Plant physiology and biotechnology, tea technology, and tea chemistry


Research Outcomes

- Papers published: 115
- IPRs held
 - » Patents filed: 2

can be utilized as an alternative fuel in the tea industry. The tea waste after extraction of wine has been analysed for its calorific value, ash content, and moisture. The analytical report revealed that the tea waste after wine extraction also has a high calorific value between 3592 and 3825 Cal/g. This can also be used as fuel in tea manufacture.

- Pheromone traps for TMB
- Kairomone traps for SHB
- Yellow stickers for thrips

Societal Relevance

The recommendations issued to the tea industry based on research results from time to time have been adopted by the tea industry successfully. 



▲ Varanashi sand and plastic barrage a temporary dam designed to store water during summer months.

VARANASHI RESEARCH FOUNDATION

Brief Description

Varanashi Development and Research Foundation (VDRF) is a non-government organization registered as a trust. It aims at simulating the diversity and eco-friendliness of the natural forests in farming and farm practices. The research technologies developed in the Foundation, especially on organic farming, are being field-tested at a macro-level in Varanashi Farms (VF), before being advocated for wide-scale adoption.

R&D Set-up

The research facilities and equipments available in the organization are as follows:

- Steam sterilizer (1200 L capacity)
- Microscope, pH metre, Spectro photometer, Flame photometer
- Furnace, Hot air oven, E.C. metre,
- Chemical and physical balance, Personal computer with printer, UPS

Sources of income for R&D

Self-financed

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 4.65

FY 2015-16 = 3.71

FY 2016-17 = 11.17

R&D Achievements

- Selection of good quality jackfruit varieties, till recently systematic cultivation of jackfruit is never done VRF along with a group of farmers initiated identification of

Jackfruits with desired traits For further study a clonal mother plot has been established.

- Trails on standardization of organic vegetable cultivation, observation trials have been done on use of various organic inputs during various vegetable cultivation.

Societal Relevance

- VRF along with a group of farmers initiated identification of jackfruits with desired traits. For further study a clonal mother plot has been established. 🔍

Research Areas

- Crop production with special emphasis on eco-friendly techniques
- Low cost technologies development
- Agriculture
- Production and distribution of high quality crop seeds and plants
- Method of composting
- Organic farming

Research Outcomes

- Books: 1
- Conference proceedings and presentations:
 - » National: 1

Registered Office

Varanashi Development and Research Foundation,
 PO Adynadka 574 260,
 D.K., Karnataka
 T: 8255-270254
 E: info@varanashi.com
 W: www.varanashi.com

Recognition Status

File No.: 12/53/1996-TU-V
 Initial Recognition: 1996
 Valid Until: March 31, 2019

R&D Manpower

Doctorates: 2
 PGs & Graduates: 1



^ Wet Lab area for R&D

VARUN HERBALS

Brief Description

Varun Herbals Research Laboratories is an independent, non-profit, self-supporting R&D (Research & Development) & contract research organization registered under Section 25/8 company. Its main vision is to accomplish interdisciplinary research in pharmaceuticals, AYUSH Pharmaceuticals, biotechnology & CAM through synergistic and complementary partnerships and collaborations with academia and industry and to create stellar learning opportunities for research scholars by creating novel and visionary educational/training and research programmes.

Varun Herbals is a non-profit contract research company under Section 25 of the Indian Companies Act 1956.

R&D Set-up

The organization has plenty of research facilities and infrastructure available for R&D work and these are used by industries, individuals, and academicians; a few of these are enumerated below:

- Thin layer Chromatography Chamber with Accessories & UV Cabinet
- Ultra Pure Water System – Barnstead Easy Pure-RF
- Column Chromatography
- Spectrophotometer Model 106, Systronics.
- Atomic Absorption Spectrophotometer (AAS)
- Research Microscope with camera-Zyduz and others

Sources of income for R&D

- Government funding and donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 10.32

FY 2015-16 = 10.82

FY 2016-17 = 12.15

R&D Achievements

Products developed

- Naturalle Herbal Prawn Feeds
- Cardorium standardization research
- Rx Homoeopathy single drug syrups
- Aloe vera-based Cosmoceuticals
- Appa Health care Musculo skeletal pain oil & poultice

Processes developed

- RX Homoeopathy – novel drug delivery syrup-based mother tinctures for the export market

Revenue earned by way of licencing products/processes/ prototypes

- Through the commercialization of the products, such as Herbal Prawn Feeds, KSM66 ashwagandhaa, etc., they have generated around ₹5 lakhs of revenue

Commercialization potential of products/processes developed

- There are plenty of the products developed which have a potential to be commercialized. Products and processes which are already

Registered Office

Varun Herbals, 5-8-293/A, Mahesh Nagar, Chirag Ali Lane, Abids, Hyderabad 500 001, Telangana
T: 040-23200129

E: varunherbals@gmail.com

W: www.varunherbals.com

Recognition Status

File No.: 12/82/2004-TU-V

Initial Recognition: 2004

Valid Until: March 31, 2018

R&D Manpower

Doctorates: 2

PGs & Graduates: 4

Research Areas

- Analytical research
- Technology adaptation
- Clinical research
- Pharmaceuticals
- Biotechnology
- Natural products
- Indian systems of medicine
- AYUSH
- Complementary and alternative medicine

Research Outcomes

- Papers published:
 - » International: 3
- IPRs held
 - » Patents filed: 1

commercialized are herbal prawn feeds, KSM66 ashwagandhaa, ENTUBE, etc.

Consultancy services rendered

- They have also offered R&D consultancy and formulation standardization and development services for various AYUSH MSMEs/Manufacturers while giving importance to biodiversity, medicinal plant sustainability, and product formulation standardization & safety.

Technical Collaborations

National

Naturalle Herbal Remedies Pvt. Ltd, Hyderabad; Ixoreal Biomed Pvt. Ltd, Hyderabad; Alakanada Herbals Pvt. Ltd, Hyderabad

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Herbal Prawn Feeds: Green technology/Made in India/ replacing harmful antibiotics with herbs—All these help shrimp farmers and also enable

other farmers to grow more medicinal plants/herbs with buyback arrangements with the manufacturer-Naturalle Herbal Remedies Pvt. Ltd By replacing harmful chemicals with herbs, they indirectly contribute to Swasth Bharat, Make in India, and Clean Energy programmes.

- Awareness programmes conducted by the organization provide public awareness on AYUSH product adulteration with steroids, analgesics, and other modern medicine drugs. The farmers' importance of medicinal plant farming and suggestion of cow-based ingredients for farming, such as jeeva amritham and beeja amritham, via sustainable farming methods. These include inter-cropping with medicinal plants and fodder trees, etc., for additional income; adulteration issues in puja material, for example, Hexamine adulteration in Camphor, Azo dyes in kumkum, and metanil yellow in turmeric, thereby creating public awareness on natural product adulteration. 🔍



^ VIB has extended its support to Gour Mohan Sachin Mandal Mahavidyalaya, Madhabpur, for vermi-compost production through waste recycling

VIVEKANANDA INSTITUTE OF BIOTECHNOLOGY

Brief Description

The Vivekananda Institute of Biotechnology (VIB) is registered as a non-government society, is engaged in development, innovation, modulation, and adaptation of appropriate rural technologies, and transferring the selected technologies to the farming community of the Sundarbans area through training, awareness building, and follow up programmes.

R&D Set-up

The laboratories available in VIB are listed as follows:

- Microbiology Lab; Tissue Culture Lab; Soil Testing Lab; Mushroom Lab; Biopesticide Lab; Aquaculture Lab; Botanical Lab; Common Facility Centre (Honey)

Apart from the laboratories, they have the following equipments:

- Atomic absorption spectrophotometer; autoclave; centrifuge; colorimeter; conductivity meter; gas chromatography chamber; gel-electrophoresis; incubator; laminar air flow cabinet; microscope; muffle furnace; ph meter; single pan balance

Sources of income for R&D

- Government sources
- Donations

R&D expenditure (₹ in lakhs)

The SIRO is maintaining separate accounts for R&D.

FY 2014-15 = 60.01

FY 2015-16 = 89.06

FY 2016-17 = 96.50

R&D Achievements

Products developed

- Liquid biofertilizer
- Sunderban Honey under the brand name "Sunderini"
- Fish feed from natural resources

Processes developed

- Production and application of liquid biofertilizer (Azotobacter) as foliar spray
- Low-cost production method of bio-pesticide Trichoderma using local resources
- Seed Tuber Production in Elephant Foot Yam (EFY)
- Integrated fish farming: Fish, duck, hen- horticulture
- Induced breeding for production of fish spawn
- Fuel-efficient trolley for street vendors
- Production of biogas for cooking from domestic fuel
- Experimental bio methanation power generation plant-based on FVSW

Technical Collaborations

National

Burdwan University, West Bengal; Calcutta University, West Bengal; Sundarban Milk Union Ltd, West Bengal

International

The World Bank

Registered Office

Vivekananda Institute of Biotechnology (VIB),
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West Bengal 743338
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E: bkdattasranvib@rediffmail.com
W: www.vibsrn.org

Recognition Status

File No.: 12/75/2005-TU-V
Initial Recognition: 2005
Valid Until: March 31, 2017

R&D Manpower

Doctorates: 6
PGs & Graduates: 10

Research Areas

- Soil
- Water and manure chemistry
- Biofertilizer technology
- Biopesticides
- Botanical pesticides
- Vermicompost and waste recycling
- Microbial diversity of soil
- Plant tissue culture
- Mushroom
- Non-conventional energy
- Aquaculture

Research Outcomes

- Papers published:
 - » National: 2
 - » International: 1
- Technologies transferred/commercialized: 16

Societal Relevance

The following R&D outcomes are of national/societal significance:

- Vermicompost, biofertilizers, biopesticides, and biogas production from kitchen waste—these products and technologies are used by the farmers to avoid or minimize the use of chemical fertilizer and pesticides which has a direct relevance to the Swachh Bharat Mission.
- In relevance with the Digital India Programme, they work as a business correspondent of State Bank of India by developing

Customer Service Points at the remote non-banking areas of Sunderbans and also other districts of West Bengal.

- In relevance with Clean Energy Programme, they are promoting the micro solar dome, solar drier, and biomass drier (for fish drying).
- In relevance with the Skill India Programme, they provide competency-based training to the rural people on Integrated Nutrient and Pest Management of crops, apiary, roch bee hone collection, nursery, scientific management of ponds, and mushroom production. 🔍

About SIRO Scheme

The Department of Scientific and Industrial Research (DSIR) is the nodal government department for granting recognition to not-for-profit Scientific & Industrial Research Organisations (SIROs). The organisations eligible for recognition are Registered Trusts, Registered Societies, Companies incorporated as section 8 (erstwhile section 25) of the Companies Act, 2013, Universities, etc. having the objective of undertaking scientific and/or industrial research.

The Recognition Scheme for SIROs aims to bring together voluntary organizations operating in non-commercial sector with a view to promote their activities in the area of scientific and industrial research, design and development of indigenous technology to achieve technological self-reliance. The SIROs recognised by DSIR are eligible for customs duty exemption and concessional Goods & Services Tax (GST) under various Notifications issued & as amended by Ministry of Finance from time to time. The recognition would help them to evolve research infrastructure by way of overall administrative support assistance and other assistance as may be necessary for the efficient working of a research-oriented organization.



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Department of Scientific & Industrial Research (DSIR)

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