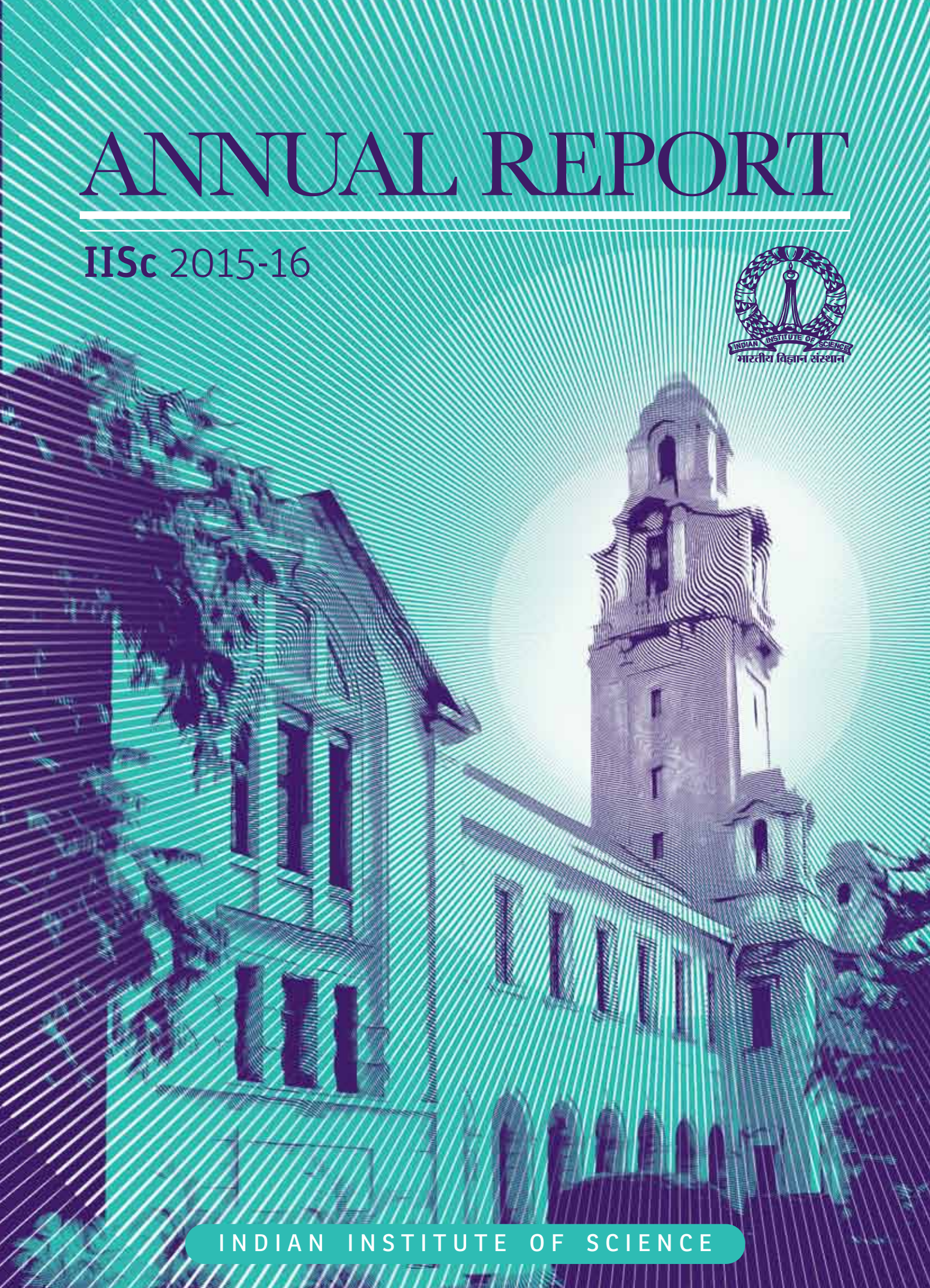
ANNUAL REPORT

IISc 2015-16



INDIAN INSTITUTE OF SCIENCE

VISITOR

The President of India

PRESIDENT OF THE COURT

K Kasturirangan

CHAIRMAN OF THE COUNCIL

P Rama Rao

DIRECTOR

Anurag Kumar

DEANS

SCIENCE: **T N Guru Row**

ENGINEERING: **M Narasimha Murty**

UG PROGRAMME: **Umesh Varshney**

REGISTRAR

V Rajarajan

IISc ranked India's top University

In 2016, for the first time the NIRF (National Institutional Ranking Framework), under the auspices of the Ministry of Human Resource Development, came out with rankings for Indian Universities and institutions of higher education. Amongst Universities, IISc was ranked Number 1.

Contents

Foreword

The Indian Institute of Science (IISc, or just 'The Institute') was established in 1909 by a visionary partnership between the industrialist Jamsetji Nusserwanji Tata, the Maharaja of Mysore, and the Government of India. Over the 107 years since its establishment, IISc has become the premier institute for advanced scientific and technological research and education in India. Since its inception, the Institute has laid a balanced emphasis on the pursuit of basic knowledge in science and engineering, as well as on the application of its research findings for industrial and social benefit. In the words of its founder, J. N. Tata, the objectives of the Institute are "to provide for advanced instruction and to conduct original investigations in all branches of knowledge as are likely to promote the material and industrial welfare of India."

During the year 2015-16, the Institute participated in national (NIRF) and international rankings (QS and THE), and was invariably the top-ranked institution of higher education in India. The Institute actively pursues a policy of true academic freedom in order to enable academic excellence in all areas of its activities. The Institute faculty, numbering about 500, is active in a broad spectrum of research, in science and in engineering, and maintains a high annual publication output. Several faculty members of the Institute have won national and international awards and honours in recognition of their contributions to the growth of knowledge in science and engineering. Among the current faculty members, there are 51 Shanti Swarup Bhatnagar Awardees, 74 INSA fellows, 97 IASc Fellows, 57 NASI fellows, 50 INAE fellows, and 56 J.C. Bose National Fellows, which is indicative of the high level of academic excellence of the Institute faculty.

Out of a student population of about 4000, about 2600 are enrolled in doctoral degree programs in science and in engineering. In 2011, the Institute introduced an undergraduate program, with separate classrooms, laboratories, and its own Dean. The undergraduate degree is the four-year Bachelor of Science (Research), in which, apart from their course and laboratory work, the students are exposed to research in the laboratories of the Institute. Students in the four-year Bachelor of Science (Research) degree can also choose to graduate with a dual degree (i.e., a Master of Science as well) by putting in a total of five years of study. There are about 500 students enrolled in these undergraduate programs. The Institute also offers several Masters degree programs in engineering (MTech, MTech (Research), MDes, and MMgmt) in which about 900 students are enrolled.

The support for recurring expenses, and also for a part of the annual research expenses, is provided by the Ministry of Human Resource Development, Government of India. The faculty of the Institute also undertake a large number of research projects funded by various agencies, including the Department of Science and Technology (DST), the Department of Biotechnology (DBT), the Council of Scientific and Industrial Research (CSIR), the Defence Research and Development Organization (DRDO), the Ministry of Communications and Information Technology, and many other organizations, in the public and the private sectors. Over the past 10 years, the external funding for such research has grown at an annual rate of about 19.5%. Interactions between the Institute and industry are strengthened through the Centre for Scientific and Industrial Consultancy (CSIC), the Society for Innovation and Development

(SID), and several centres specifically set up for interaction with the government, the society, and the industry.

Substantial expansion of funding is required to catapult the Institute from being the leader in India to being among the best in the world. The Indian Institute of Science was established as a result of a "private-public partnership." In keeping with this history, in the recent years, several initiatives at the Institute have been supported by funding from private sources. Neuroscience research has received a major boost by a Rs. 75 crore grant from the Tata Trusts. Mr. and Mrs. Kris Gopalakrishnan have committed Rs. 225 crores to the establishment of a Centre for Brain Research (CBR) which will be dedicated to translational research on diseases of the aging human brain, and also a sum of Rs. 10 crores for the Shri. K. Vaidyanathan Chair in neuromorphic computing. The IISc Council has permitted CBR to be set up on the IISc campus in a building that will also be developed by Mr. and Mrs. Gopalakrishnan. The Infosys Foundation has endowed international visiting chairs in Physics and Mathematics. Recently major memoranda of understanding have been signed with the Tata Consulting Services (TCS), General Electric (GE), Hewlett Packard (HP), and with Robert Bosch, for promoting a variety of interactions between IISc and these leading companies. The Office of Development and Alumni Affairs (ODAA) was established in 2014-15, and has already been able to tap various private sources of funds for establishing a new Skill Development Centre in the new IISc extension campus at Challakere (Chitradurga District), and for various academic and institutional development initiatives.

In keeping with the founder's vision of promoting "the material and industrial welfare of India," over the past one and a half decades, the Institute has been encouraging its faculty and students to protect their intellectual property, and convert the results of some of their scientific investigations to practice via technology licensing or via entrepreneurship. In the recent past, several technologies, such as gas flow sensors, electrical storage devices and related test instrumentation, and fungal pesticides, have been licensed. Inventors of other technologies such as an enhanced electric gradient based water filtration device, a multi-analyte device for diabetes monitoring, a micro-fluidics based cell counter for diagnostics, and optical fibre sensors for structural monitoring, have chosen to take the "start-up" route.

I am honoured to present the IISc Annual Report which reports the academic output and related achievements during the period 2015-16. The volume of high quality work reported goes to the credit of the intellectual activities of the faculty members and the students, to the support of the technical and administrative personnel, and to financial support from various funding agencies.

As I complete my second year as Director of this unique institution, I place on record my personal gratitude to the Chairman and the Members of the Council of the Institute for their valuable support and guidance.

ANURAG KUMAR
Director

September 2016

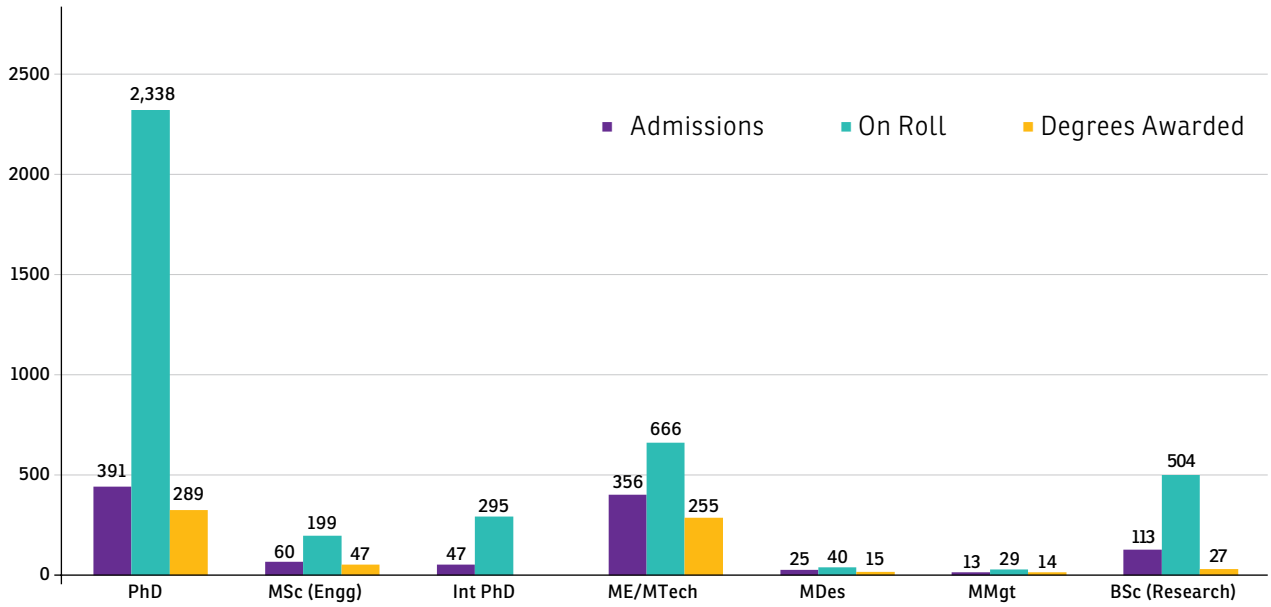
Academic Structure

Division of Biological Sciences	**BC**	Biochemistry
	CAF	Central Animal Facility
	CES	Centre for Ecological Sciences
	CIDR	Centre for Infectious Disease Research
	CNS	Centre for Neuroscience
	MCB	Microbiology and Cell Biology
	MBU	Molecular Biophysics Unit
	MRDG	Molecular Reproduction, Development and Genetics
Division of Chemical Sciences	**IPC**	Inorganic and Physical Chemistry
	MRC	Materials Research Centre
	NRC	NMR Research Centre
	OC	Organic Chemistry
	SSCU	Solid State and Structural Chemistry Unit
Division of Electrical Sciences	**CSA**	Computer Science and Automation
	ECE	Electrical Communication Engineering
	EE	Electrical Engineering
	ESE	Electronic Systems Engineering
Division of Interdisciplinary Research	**BSSE**	Centre for Bio Systems Science and Engineering
	CCS	Centre for Contemporary Studies
	CISTUP	Centre for Infrastructure, Sustainable Transportation and Urban Planning
	CeNSE	Centre for Nano Science and Engineering
	CDS	Computational and Data Sciences
	MS	Management Studies
	ICER	Interdisciplinary Centre for Energy Research
	ICWR	Interdisciplinary Centre for Water Research
	RBCCPS	Robert Bosch Centre for Cyber Physical Systems
	SERC	Supercomputer Education and Research Centre

Division of Mechanical Sciences	AE	Aerospace Engineering
	CPDM	Centre for Product Design and Manufacturing
	CH	Chemical Engineering
	MT	Materials Engineering
	ME	Mechanical Engineering
	CiE	Civil Engineering
	CEaS	Centre for Earth Sciences
	CAOS	Centre for Atmospheric and Oceanic Sciences
	CST	Centre for Sustainable Technologies
	DCCC	Divecha Centre for Climate Change
Division of Physical and Mathematical Sciences	CCT	Centre for Cryogenic Technology
	CHEP	Centre for High Energy Physics
	IAP	Instrumentation and Applied Physics
	MA	Mathematics
	PHY	Physics
Centres under the Director	LIB	JRD Tata Memorial Library
	APC	Archives and Publications Cell
	OIR	Office of International Relations
	CCE	Centre for Continuing Education
	CSSP	Centre for Sponsored Schemes & Projects
	ODAA	Office of Development and Alumni Affairs
	IPTeL	Office of Intellectual Property and Technology Licensing
	CC	Challakere Campus
	CSIC	Centre for Scientific and Industrial Consultancy
	DIGITS	Digital Campus and IT Services Office
Other Centres/ Activities	SID	Society for Innovation and Development
	CBR	Centre for Brain Research
	KVPY	Kishore Vaigyanik Protsahan Yojana
	KSCST	Karnataka State Council for Science and Technology
	IIScAA	IISc Alumni Association

Students

Students – Admissions, On Roll and Degrees Awarded 2015-16



External Registration (199)

Sponsors	
Government/ Undertakings	105
Industries	94

Continuing Education (914)

Participants	
Q.I.P.	34
Short Term	20
Proficience	860

Hostels (2945)

Men	2179
Women	766
Messes (4)	

Scholarships/Fellowships (2,622)

IISc	2081
UGC/CSIR/Others	541

Faculty

Staff (1,058)

	SC/ST	OBC	GN
Teaching (516)			
Academic	9	9	413
Scientific	25	4	56
Technical	15	1	33
Support (493)			
Officers	7	3	10
Administrative	70	8	108
Technical	30	3	48
Maintenance	77	6	119
Other	2	-	2

Interactions

On Campus	
Institute Lectures	17
Conferences	160
Visitors	
National	226
Overseas	176
Delegations	41
Staff	
Visits	786
Conferences	641
Lectures delivered	554
Thesis Examiners	265
Meetings chaired	364

Publications (2,746)

Science	1,143
Engineering	1,315
Interdisciplinary	288

Awards and Distinctions (145)

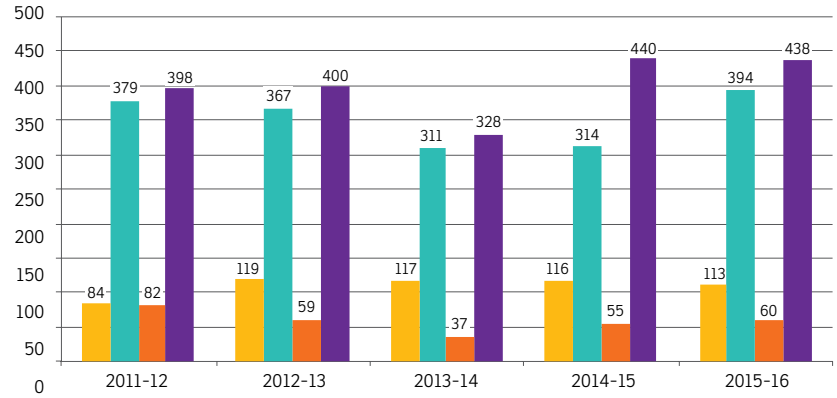
Fellows	
National Academies	7
Others	35
Bhatnagar	**1**
Royal Society	**1**
Awards	**44**
Medals/Prizes	**13**
Others	**44**

Academic Divisions: 6 Departments: 42

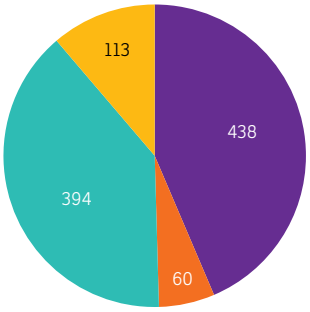
Biological Sciences	8
Chemical Sciences	5
Electrical Sciences	4
Mechanical Sciences	10
Physical & Mathematical Sciences	5
Interdisciplinary Research	10

Students: Admissions, Conferments, On Roll

Student Admissions from 2011 to 2016

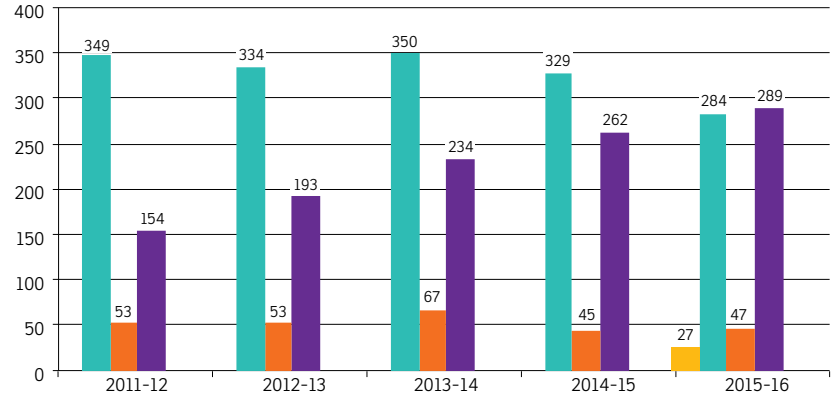


2015-16

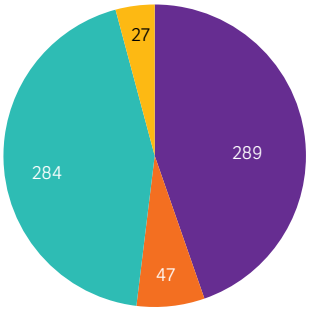


Total: 1,005

Conferments from 2011 to 2016

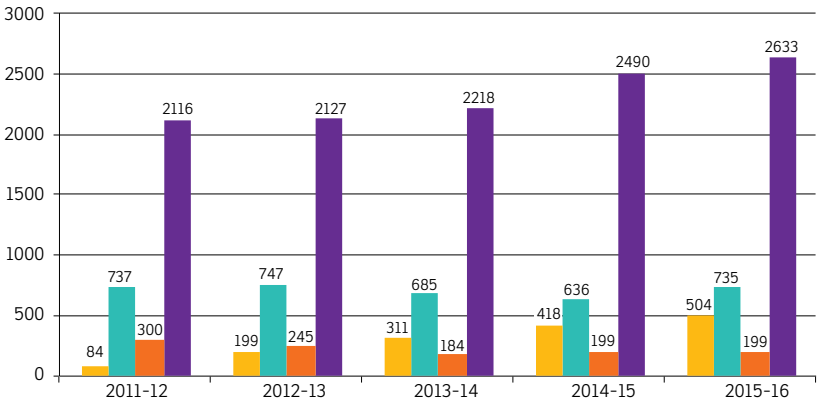


2015-16

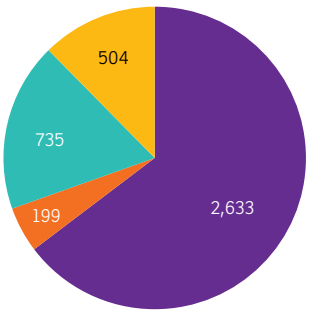


Total: 647

On Roll from 2011 to 2016



2015-16

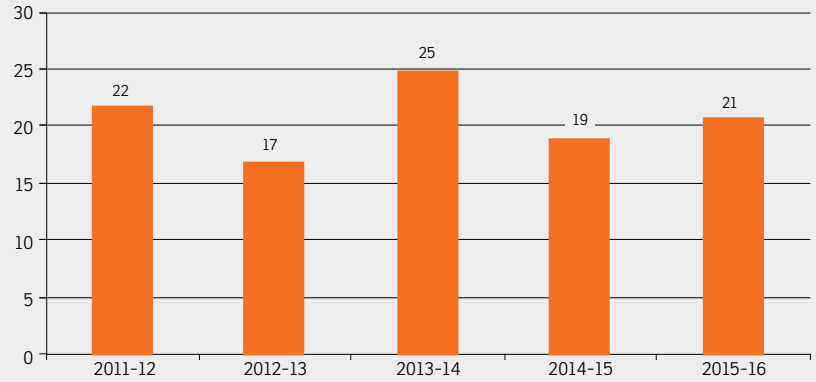


Total: 4,071

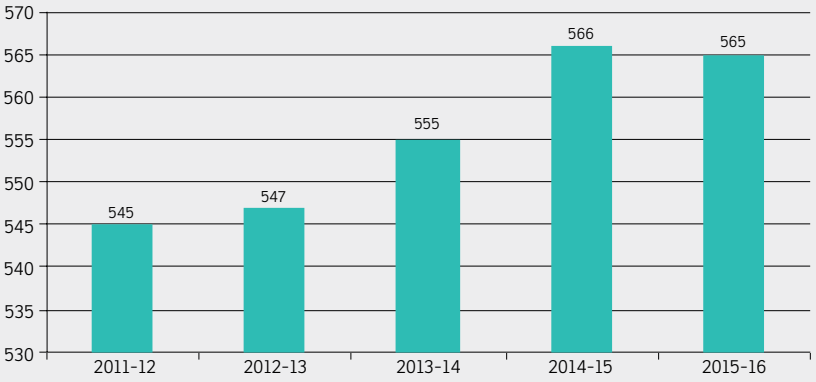
PhD/Int PhD | MSc (Engg) | Master Programme (ME/MTech/MDes/ MMgt) | BSc (Research)

Faculty: Induction, Academic and Technical Staff

New Faculty Inducted during 2011-2016



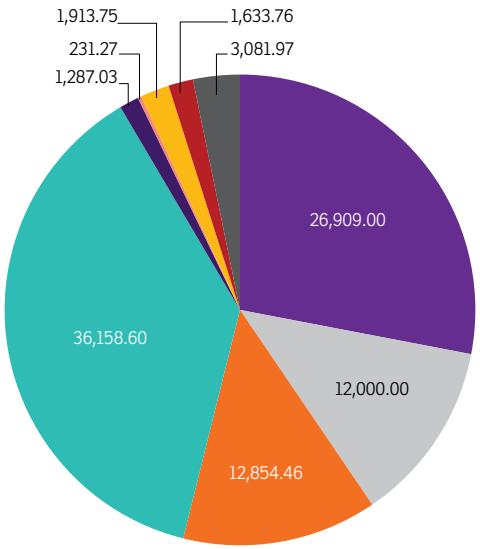
Academic, Scientific and Technical Staff On Roll from 2011-2016



Finance 2015-16

Receipts

(₹ in lakhs)

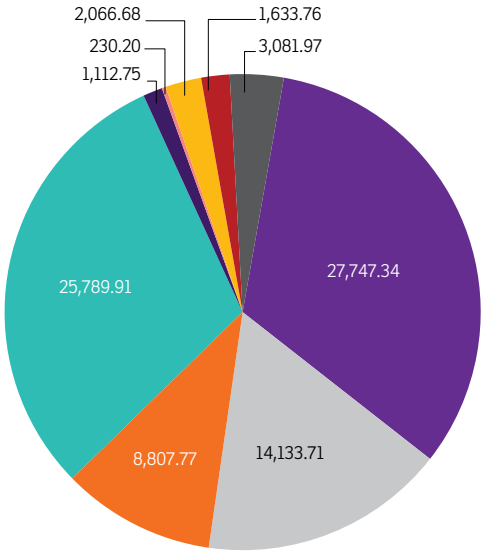


Total: 96,069.84

- Non-Plan Grant – Recurring
- Plan Grants
- Developmental Projects
- Sponsored Research Schemes
- Scientific & Industrial Consultancy
- Continuing Education Programme
- Sponsored Scholarships (CSIR/UGC/AICTE etc)
- Academic/Other Income
- Interest earnings/Project Overheads

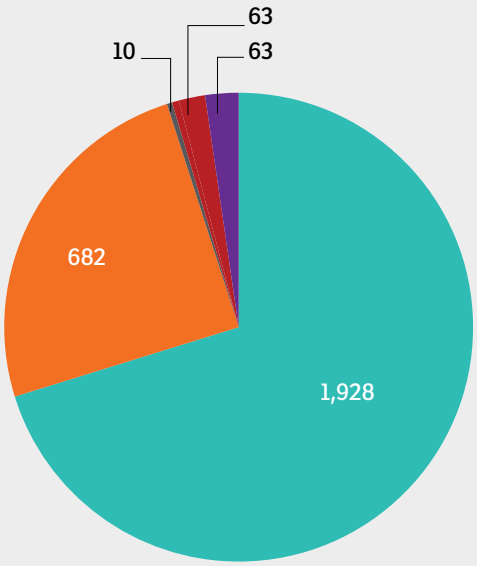
Payments

(₹ in lakhs)



Total: 84,604.09

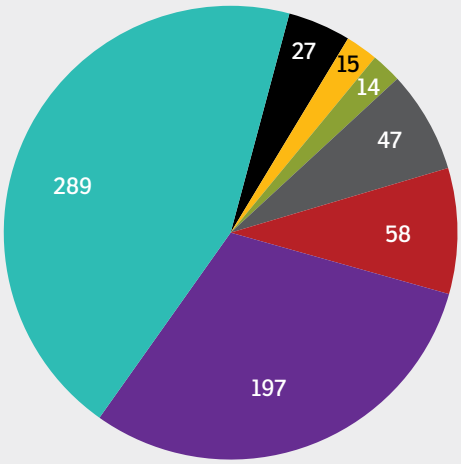
Publications 2015



- Journal Publications
- Conference Publications
- Popular Articles
- Books and Book Chapters
- Reports

Total: 2,746

Degrees Awarded 2015



PhD	289
ME	197
MTech	58
MSc (Engg.)	47
MMgt	14
MDes	15
BSc (Research)	27
Total	**647**

Programmes

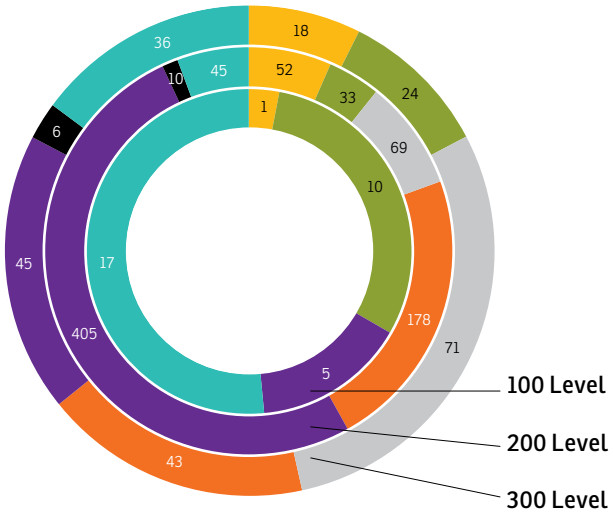
RESEARCH
● PhD ● Int. PhD ● MSc (Engg)

COURSES
■ ME ■ MTech ■ MDes ■ MMgt ✦ BSc (Research)

Science					Engineering				
Biochemistry	●	●			Civil Engineering	●	●	■	■
Ecological Sciences	●	●			Computer Science and Automation	●	●	■	
Microbiology and Cell Biology	●	●			Electrical Engineering	●	●	■	
Molecular Biophysics	●	●			Electrical Communication Engineering	●	●	■	
Molecular Reproduction Development and Genetics	●	●			Electronic Systems Engineering	●	●	■	■
Neurosciences	●				Aerospace Engineering	●	●	■	
Inorganic and Physical Chemistry	●	●			Chemical Engineering	●	●	■	
Materials Research	●	●			Mechanical Engineering	●	●	■	
Organic Chemistry	●	●			Materials Engineering	●	●	■	
Solid State and Structural Chemistry	●	●			Product Design and Manufacturing	●	●		■
Mathematics	●	●			Atmospheric and Oceanic Sciences	●	●		■
Physics	●	●			Instrumentation	●	●		■
Astronomy and Astrophysics	●	●			Computational and Data Science	●	●		■
High Energy Physics	●	●			Nano Science & Nano Technology	●			■
Earth Sciences	●		■		Energy Research	●			
Interdisciplinary Programme	●				Management Studies	●	●		■
Undergraduate Programme				✦	Bio Systems Science and Engineering	●			
					Water Research	●			

Courses Offered 2015-16

Teaching Courses are offered from 100 level to 300 level for undergraduate, postgraduate and advanced research topics.



- Biological Sciences
- Chemical Sciences
- Electrical Sciences
- Interdisciplinary Research
- Mechanical Sciences
- Physical Sciences
- Undergraduate

Total: 1,068

1 The Institute

The Indian Institute of Science is an institution of higher learning and research established in 1909 under the Charitable Endowments Act 1890. With the establishment of the University Grants Commission in 1956, the Institute came under its purview as a Deemed University. The principal authority governing the Institute is the Council, which is advised by the Court in the formulation of policies. The Director is the Chief Executive of the Institute and is assisted in its management by the Senate and the Faculties of Science and Engineering.

1.1 COURT

The membership of the Court is drawn from different cross sections of the country such as Industry, Universities, Scientific Institutions, etc. In addition to eminent persons of science, learning and industry, it also contains the nominees of the Government of India, the Government of Karnataka and the Tata Trusts. The Professors of the Institute and the members of the Council are also ex-officio members of the Court. The following are the members of the Court:

K KASTURIRANGAN
President of the Court
Former Chairman, Governing Council, Raman Research Institute
Bangalore (Nom. Council)

PRADEEP VASANT NAIK
Former Chief of the Air Staff
Pune (Nom. GOI)

RAJINDER SINGH MAKER
Director General
The Employers Federation of India, Mumbai (Rep. Employers Federation of India)

SOM MITTAL
Former President
NASSCOM, New Delhi
(Nom. Visitor)

CHAKRAVARTHY MOHAN
Commissioner
Dept. of Collegiate Education
Bangalore (Nom. GOK)

ANIL D SAHASRABUDHE
Chairman
AICTE, New Delhi
(Rep. AICTE)

SURESH CHANDRA MUKUL
Former Air Marshal
New Delhi (Nom. Visitor)

R K KRISHNA KUMAR
Director, Tata Sons Limited
Mumbai (Nom. Tata Trusts)

GIRISH SAHNI
Director General
CSIR, New Delhi (Rep. CSIR)

VINAYSHEEL OBEROI
Secretary, MHRD
Dept. of Higher Education, GOI
New Delhi (Nom. GOI)

SAROJ K PODDAR
Chairman
Gillette India Ltd.
Kolkata (Rep. FICCI)

HAR SARUP CHAHAL
Former Vice Chancellor of Maharshi Dayanand University
Rohtak (Rep. Indian Universities)

APPARAO MALLAVARARUPU
Chairman and Managing Director
Centum Electronics, Bangalore
(Nom. GOI)

S N AGARWAL
Chairman, Bhoruka Power Corporation Ltd. Bangalore (Rep. All India Orgn. of Ind. Employers)

C K KOKATE
Vice Chancellor
K L E University, Belgaum
(Rep. Indian Universities)

HARISH PADH
Vice Chancellor, Sardar Patel University, Vallabh Vidhyanagar (Rep. Indian Universities)

V S RAMAMURTHY
Former Director, National Institute of Advanced Studies, Bangalore (Nom. Council)

RATAN N TATA
Former Chairman, Tata Sons Ltd., Mumbai (Nom. Council)

L N SATAPATHY
President
IISc Alumni Association
(Rep. Assn. of Past Students)

ANURAG KUMAR
Director (Ex-officio)

ALL PROFESSORS OF THE INSTITUTE
(Ex-officio)

ALL MEMBERS OF THE COUNCIL
(Ex-officio)

V RAJARAJAN
Registrar (Ex-officio Secretary)

During the year, the Court met once on 12th March 2016.

1.2 COUNCIL

The Council is the principal governing authority of the Institute and its membership includes the Nominees of the Court, Parliament, Government of India, Government of Karnataka, Tata Trusts, Representatives of Indian Universities, University Grants Commission and Scientific bodies. The following are the members of the Council:

P RAMA RAO
Chairman of the Council
Former Vice Chancellor
University of Hyderabad
Hyderabad (Nom. GOI)

VINAYSHEEL OBEROI
Secretary, MHRD
Dept. of Higher Education, GOI
New Delhi (Nom.GOI)

PRAVEEN KUMAR
Joint Secretary (Admin), MHRD,
Dept. of Higher Education, GOI,
New Delhi (Nom.GOI)

BHARAT LAL MEENA
Pr. Secretary to GOK
Higher Edu. Dept.
Bangalore (Nom. GOK)

I S N PRASAD
Pr. Secretary to GOK
Dept. of Finance
Bangalore (Nom. GOK)

J J IRANI
Director
Tata Sons Limited,
Mumbai (Nom. Tata Trusts)

R VENKATARAMAN
Executive Trustee
Sir Dorabji Tata Trust
Mumbai (Nom. Tata Trusts)

S K JOSHI
Former Director General
CSIR, Gurgaon, (Rep. UGC)

MURLI MANOHAR JOSHI
Member of Parliament
(Lok Sabha), New Delhi
(Rep. Parliament)

SURESH C ANGADI
Member of Parliament
(Lok Sabha), New Delhi
(Rep. Parliament)

S N AGARWAL
Chairman
Bhoruka Power Corporation Ltd.
Bangalore (Nom. Court)

V S RAMAMURTHY
Former Director
National Institute of Advanced Studies, Bangalore (Nom. Court)

HARISH PADH
Vice Chancellor, Sardar Patel University, Vallabh Vidhyanagar (Rep. Indian Universities)

ANIL D SAHASRABUDHE
Chairman
AICTE, New Delhi
(Rep. AICTE)

GIRISH SAHNI
Director General
CSIR, New Delhi (Rep. CSIR)

ANURAG KUMAR
Director (Ex-officio)

T N GURU ROW
(Ex-officio)
Dean, Science Faculty

M NARASIMHA MURTHY
(Ex-officio)
Dean, Engineering Faculty

V RAJARAJAN
Registrar (Ex-officio Secretary)

The Council met quarterly on 20th Jun 2015, 19th Sep 2015, 19th Dec 2015 and 12th Mar 2016.

1.3 FINANCE COMMITTEE

The following are the members of the Finance Committee:

P RAMA RAO
Former Vice Chancellor
University of Hyderabad,
Chairman of the Council
(Ex-officio)

DARSHANA M DABRAL
Joint Secretary & Financial
Adviser, Dept. of Higher Education
MHRD, GOI (Nom. GOI)

PRAVEEN KUMAR
Joint Secretary (Admin), MHRD
Dept. of Higher Education, GOI
New Delhi (Nom.GOI)

DIPTI ADITYA KANADE
Deputy Secretary
(Budget & Resources)
Finance Department
Bangalore (Nom.GOK)

R F SAVAKSHA
Secretary & Chief Accountant
Sir Dorabji Tata Trust
Mumbai (Nom. Tata Trusts)

BURZIS S TARAPOREVALA
Secretary & Chief Accountant
Sir Ratan Tata Trust
Mumbai (Nom. Tata Trusts)

V S RAMAMURTHY
Former Director
National Institute of Advanced
Studies, Bangalore
(Nom. Council)

L A C SINGH
Pr. Accountant General (G&SSA)
Karnataka, Bangalore
(Ex-officio)

ANURAG KUMAR
Director (Ex-officio)

V RAJARAJAN
Registrar (Ex-officio Secretary)

The Finance Committee met quarterly on 19th Jun 2015, 18th Sep 2015, 18th Dec 2015 and 11th Mar 2016

1.4 SENATE

The Senate is one of the authorities of the Institute that consists of the Director as the Chairman, all Professors and Associate Professors, one elected representative (Assistant Professor) from each of the Faculties, the Librarian, and the Registrar (Secretary). The Senate meets at least once a term.

This principal academic body functions to (a) plan and coordinate the research activities of the Institute; (b) regulate and organize courses of instruction and study, admission of students, examinations, etc; (c) formulate conditions for the award of Degrees of the Institute; and (d) recommend names to the Council for the award of Degrees.

During the year, the Senate met on 19th May 2015, 6th Jul 2015, 23rd Nov 2015 and 22nd Feb 2016.

THE SENATE RECOMMENDED THE AWARD OF VARIOUS DEGREES AS FOLLOWS:

- PhD.....289
- MSc (Engg) 47
- ME/MTech 255
- MDes 15
- MMgt..... 14
- BSc (Research)..... 27

TOTAL..... 647

1.5 FACULTIES

The faculties act as advisory bodies to the Senate and assist in the discharge of its duties. Each Faculty consists of the respective Dean as Chairman, all Professors, Associate Professors, Chief Research Scientists, Principal Research Scientists, Assistant Professors and Senior Scientific Officers as members and the Assistant Registrar as the Secretary.

The Science Faculty met on 22nd Apr 2015 and 14th Oct 2015. The Engineering Faculty met on 23rd Apr 2015 and 15th Oct 2015 during the year.

The Joint meetings of Faculty members were held on 27th Aug 2015 and 11th Jan 2016. The Director chaired the Joint meetings.

2 Staff (Administration)

Director	:	Anurag Kumar
Deputy Directors	:	S Ramakrishnan (Infrastructure and Planning)
		Jayant M Modak (Administration and Finance)
Deans		
Science	:	T N Guru Row
Engineering	:	M Narasimha Murty
UG Programme	:	Umesh Varshney

REGISTRAR
V Rajarajan, MSc
(TNAU,Coimbatore)

JOINT REGISTRAR
K Panneer Selvam
MA (Madras) LLB (Bangalore)
PhD (Gandhigram Rural)

ASSISTANT REGISTRAR
Aparna Kandi, BE (Gulbarga)
V Nagaraja, MA (Mysore)
Veeranna Kammar, MSc (Bangalore)
M C Jayaprakash, MCom, MBA, BL
Joydeep Deb, MSc (Jadavpur)
B N Sreedhar, MBA (KSOU)
P Selva Kumar, MA (KSOU)

SECTION OFFICER (PUBLIC RELATIONS)
N Krishna Murthy, MA (Mysore)

SR. SECURITY OFFICER
M R Chandrasekhar
BSc (Mysore), LLB (Bangalore)

SR. HINDI OFFICER
V Thilagam, PhD (Bangalore)

SR. SPORTS OFFICER
C P Poonacha
BA (Mysore), MPEd (Karnataka)

FINANCIAL CONTROLLER
Indumati Srinivasan, MA (JNU)
MPhil (JNU), PGDPPM (IIMB)

DEPUTY FINANCIAL CONTROLLER
M Krishna Murthy, MCom,
MBA (Bangalore), PGDPM & IR
(Bangalore), PhD (Bangalore)
P Manivannan, MA (Madras)

INTERNAL AUDITOR
P Somasekhar, BE (Bangalore)

OFFICER-IN-CHARGE (HEALTH CENTRE)
C Sathish Rao

MEDICAL OFFICER
Aditya Malladi, MBBS (NTR)
R Nirmala, MBBS (Madras)
C Sathish Rao, MBBS (Mysore)
L Sharada, MBBS, DGO
(CMC, Vellore)

AUTHORIZED MEDICAL OFFICER
Dr. P Subhashini
MBBS (Bellary), MS (Rajiv Gandhi)

Consultants

DENTIST
P Beena BDS (Mysore)

DERMATOLOGIST
A L Shamprasad
MBBS (Bangalore), MD (Bangalore)

ENT
Sanjay B Patil
MBBS (Karnataka), MS (Karnataka)

GYNAECOLOGIST
Manonmani, MBBS (Bangalore)
MD (RGUHS, Bangalore)

OPHTHALMOLOGIST
Malavika Krishnaswamy
MBBS (Bangalore), MS (Bangalore)

PHYSICIAN
S S Kumar, MBBS, MD (Madras)

PSYCHIATRIST
VAP Ghorpade
MBBS, MD (Nimhans)

RADIOLOGIST
M N Srinivasan, MBBS (Mysore)
DMRD (Davangere)
DNB (Bangalore)

PHYSIOTHERAPIST
V Yogesh, BSc, BPT (Mangalore)

PROJECT ENGINEER-CUM-ESTATE OFFICER
M D Satyanarayana, BE (Mysore)

ASSISTANT EXECUTIVE ENGINEER
G Lohithesh Kumar, BE (Kuvempu)
MTech (Visvesvaraya)

TECHNICAL OFFICER
G Radhaswamy, BE (Elec) (Mysore)
B Sridhar
MSc (Hort) (UAS, Bangalore)

Gymkhana

HON. PRESIDENT
R V Ravikrishna, PhD (Purdue)

Hostels

CHAIRMAN – COUNCIL OF WARDENS
Ashok M Raichur, PhD (Nevada)

WARDENS
Abha Misra, PhD (IIT-B)
Aveek Bid, PhD (IISc)
Dipshikha Chakravorthy, PhD (Pune)
Ganesh Nagaraju, PhD (IISc)
M Shekar, PhD (IISc)
P Thilagar, PhD (IIT-K)

ADVISORS (STUDENTS AFFAIRS)
Nagasuma R Chandra, PhD (Bristol)
Satish V Kailas, PhD (IISc)

STUDENTS COUNSELLORS
Vishwesha Guttal, PhD (Ohio State)
Ambedkar Dukkipati, PhD (IISc)
Prabal K Maiti, PhD (IIT/K)
Partha Pratim Mondal, PhD (IISc)
Ravishankar Narayan, PhD (IISc)

GUEST HOUSE
P Selva Kumar MA (KSOU)

3 Departments | Centres | Units

3.1 Division of Biological Sciences

Chairperson: **D Narasimha Rao**

DEPARTMENTS/CENTRES/UNITS

- Biochemistry
- Central Animal Facility
- Centre for Ecological Sciences
- Centre for Infectious Disease Research
- Centre for Neuroscience
- Microbiology and Cell Biology
- Molecular Biophysics Unit
- Molecular Reproduction, Development and Genetics

Core Research Areas

The Division of Biological Sciences forges important links between basic science and innovative research. It is committed to enhancing frontline studies in almost all aspects of modern biology: Neuroscience in health and disease, Infectious Disease, Structural Biology, Oncology, DNA Repair and Genomic Stability, Systems Biology and Bioinformatics, Immunology, Enzymology, Reproductive and Developmental Biology, Diverse Ecological Studies and so on.

Themes

Investigators in the Division focus on numerous processes central to the understanding of life, emphasizing on areas with considerable translational potential, namely, Cognition and Neuronal Reprogramming, Infectious Diseases, Drug and Molecular Design, Diagnostics and Therapeutics in Cancer, Gene Targeting, Genetic Disorders and Genetic Diversity.

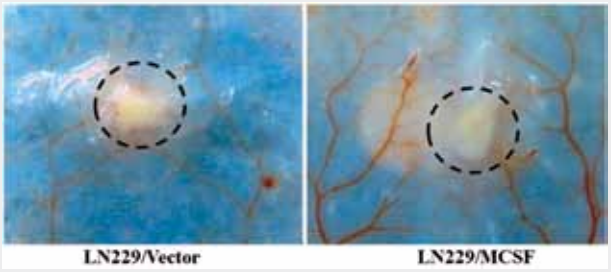
IN NUMBERS

78 Faculty Members

84 Fellowships of Science Academies in India

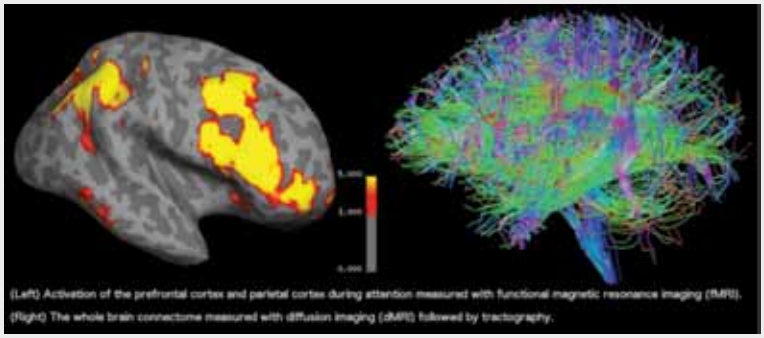
340 PhD students, **65** Integrated PhD students

50 PhD students graduated in 2015-16



- A protein associated with a deadly form of brain tumour called glioblastoma has been discovered. It could serve as a target for new drugs. [REFERENCE: Nijaguna MB, et al., and **Somasundaram K.** Glioblastoma-derived Macrophage Colony-stimulating Factor (MCSF) Induces Microglial Release of Insulin-like Growth Factor-binding Protein 1 (IGFBP1) to Promote Angiogenesis. *J Biol Chem*., 2015, 290(38):23401-15]

- Regions of the prefrontal and parietal cortex which are activated during attention have been identified using fMRI. [REFERENCE: Work in progress in **Sridharan Devarajan's** lab]


(Left) Activation of the prefrontal cortex and parietal cortex during attention measured with functional magnetic resonance imaging (fMRI). (Right) The whole brain connectome measured with diffusion imaging (dMRI) followed by tractography.

- The genome and transcriptome of the Asian elephant has been sequenced. Its comparison with that of the African counterpart has revealed many novel transcripts and variants, some of which may explain differences between the two species of elephants. [REFERENCE: Reddy PC, Sinha I, Kelkar A, Habib F, Pradhan SJ, **Sukumar R** and Galande S. Comparative sequence analyses of genome and transcriptome reveal novel transcripts and variants in the Asian elephant *Elephas maximus. J. Biosci*., 2015, 40 (5): 891-907]

3.1.1 Biochemistry

FACT FILE

Established: 1921
Phone: +91-80-2293 2473
Fax: +91-80-2360 0814
Email: office@biochem.iisc.ernet.in
URL: http://biochem.iisc.ernet.in
Chairperson: C Jayabaskaran
Degree Programs Offered: PhD and Int. PhD

Core Research Areas

Proteins, natural products and metabolic engineering; DNA repair, Genomic stability and RNA transactions; Biology of chaperones; Immunobiology.

Current Research

PROTEINS, NATURAL PRODUCTS AND METABOLIC ENGINEERING

- Non-structural protein (NSm) of Groundnut Bud Necrosis Virus (GBNV) participates in cell to cell movement and spread of the virus.
- The zinc finger transcription factor Mxr1p of the methylotrophic yeast, Pichia pastoris functions as a global regulator of multiple metabolic pathways.
- Curcumin prevents experimental cerebral malaria in a mouse model.
- Mismatch repair helicase, UvrD is important for the process of homologous DNA recombination in the gonorrhoea-causing pathogen, *Neisseria gonorrhoeae. Helicobacter pylori* Topoisomerase I (HpTopoI) participates in natural transformation.
- The anticancer compounds, vincristine and vinblastine were purified in large amounts from endophytic fungi isolated from various tissues of *Catharanthus roseus* and their cytotoxic activity was demonstrated in different human cancer cell lines.
- The effect of human leukocyte antigen (HLA) genotype heterogeneity on possible cytotoxic T-lymphocyte (CTL) response to influenza H1N1 genomes was studied using bioinformatics methods. The work presents a novel

IN NUMBERS

17 Academic Staff	**10** PhD and **3** Int PhD Conferments
84 PhD and **15** Int PhD Students	**111** Publications

conceptual framework towards understanding how genetic heterogeneity influences disease susceptibility in individuals and in populations.

DNA REPAIR, GENOMIC STABILITY AND RNA TRANSACTIONS

- RecBCD enzyme complex is an example of a sequence-regulated, DNA-processing machine. *Mycobacterium tuberculosis* RecD was shown to inhibit DNA strand exchange promoted by RecA and structural studies on *M. tuberculosis* RecA uncovered molecular plasticity and interspecies variability. New telomerase inhibitors were also synthesized that could stabilize human telomeric G-quadruplex DNA.

- RAD51 paralogs regulate DNA damage responses and maintain genome integrity of *Mycobacterium tuberculosis*.

- The functional significance of SUMOylation and SUMO-E3 ligase subunit of the Smc5/6 complex was uncovered by creation of putative non-SUMOylatable variants.

- In the area of chromosomal translocation an *in vitro* cell-free assay system was established to investigate a sub pathway of non-homologous end joining (NHEJ) known as micro homology mediated end joining (MMEJ) which is critical in mitochondrial DNA repair. Several small molecule inhibitors were synthesized that can be used as potential cancer therapeutic agents. Endosulfan, a pesticide used widely in India, induced maximal damage on testes and resulted in male infertility.

- Control of mRNA fate decisions affects many cellular processes. The issue was addressed by focusing on interactions among RNA-binding proteins with RGG-motifs that facilitate the functional transitions of mRNA.

- Five genes were identified whose mRNAs undergo translational read through in endothelial cells. The goal is to understand endothelial cell function and angiogenesis regulation at the level of translation under various pathophysiological conditions.

BIOLOGY OF CHAPERONES

- Diagnostic methods were developed for screening various protozoan infections including Surra, Theileriosis and Babesiosis. These are currently used for field diagnosis in rural parts of Karnataka by the animal husbandry department.

- Novel isoselenazoles that have the potential to be used as therapeutic agents for disorders mediated by reactive oxygen species were synthesized.

- A cage like tetra-facial molecular barrel (Pd8) was designed and synthesized. In clinical research, this is one of the important breakthroughs in terms of drug delivery.

IMMUNOBIOLOGY

- Glycodelin A (GdA) plays an immunomodulatory role by regulating the cytolytic activity of $CD8^+$ T cells in nude mice.

- A region of the HCV E2 protein was identified as the neutralizing epitope using monoclonal antibodies and patient sera.

- A novel response of Interferon-gamma includes inducing aggregation of adherent peritoneal cells during *Salmonella typhimurium* infection in mice.

- HLA-F is induced by the neurotropic virus, Japanese encephalitis virus. This was blocked by inhibitors of NFκ B activation and lentivirus-mediated stable knockdown of NFκ B.

FACULTY

Nagasuma Chandra | PhD (Bristol), Associate Professor

Patrick D'Silva | PhD (IIT Bombay), Associate Professor

Sandeep M Eswarappa | PhD (IISc), Assistant Professor

C Jayabaskaran | PhD (IISc), MNASc, Professor

Anjali Anoop Karande | PhD (Bombay), Professor

Shikha Laloraya | PhD (Wisconsin), Associate Professor

R Manjunath | PhD (IISc), Associate Professor

K Muniyappa | PhD (IISc), FASc, FNASc, FNA, FTWAS, Professor

Ganesh Nagaraju | PhD (IISc), Assistant Professor

Dipankar Nandi | PhD (California-Berkeley), Professor

Sathees C Raghavan | PhD (BHU), Associate Professor

Ram Rajasekharan | PhD (IISc), Professor

Purusharth Rajyaguru | PhD (CCMB), Assistant Professor

PN Rangarajan | PhD (IISc), FASc, FNASc, Professor

D Narasimha Rao | PhD (IISc), FASc, FNASc, FNA, Professor

HS Savithri | PhD (IISc), FASc, FNASc, FNA, Professor

Utpal S Tatu | PhD (IISc), FASc, Professor

HONORARY & EMERITUS PROFESSORS

G Padmanaban | PhD (IISc), Professor

AJ Rao | PhD (IISc), Emeritus Professor

N Appaji Rao | PhD (Rajasthan), Emeritus Professor

T Ramasarma | PhD (Bombay), Professor

3.1.2 Central Animal Facility

FACT FILE

Established: 1971

Phone: +91-80-22932734/22932457

Fax: +91-80-23606569

Email: caf@caf.iisc.ernet.in

URL: http://caf.iisc.ernet.in

Chairperson: Kumaravel Somasundaram

Core Research Areas

The Central Animal Facility breeds and maintains genetically pure inbred strains of different species of animals for research activities. A barrier facility (Class 100,000) with controlled environment and germ free atmosphere is available for experimentation and breeding of special strains of mice such as immuno-compromised mice and knockout mice.

Current Research

- The Central Animal Facility breeds and maintains several strains of genetically pure and inbred strains of different species of animals for biomedical research activities. The animal species includes New Zealand white rabbits, Wistar rats, Sprague Dawley rats and several strains of mice (Swiss albino, BALB/c, FVB/N, CD1, C57BL/6, C3HeJ, 129/SvJ) including knockout mice (B6.129S7-Ifng$^{tm1ts/J}$, B6.129P2-Nos$^{2tm1Lau/J}$, C57BL/6-Tg(TcraTcrb)1100$^{Mjb/J}$, B6.129S6-Cybbt^{m1Din}/J, B6.129-Tlr2^{tm1Kir}/J, FVB-Tg(GFAP-cre)25Mes/J, B6.MRL-*Fas*^{lpr}/J etc.) and mutant mice (Nude HSD-Fox N1 and NOD.CB17-Prkdc^{scid}/J). The research work involving animals is carried out across several departments of Indian Institute of Science (Biochemistry, Microbiology and Cell Biology, Molecular Reproduction, Development and Genetics, Molecular Biophysics Unit, Centre for Neuro Sciences of Division of Biological Sciences, Dept. of Mechanical Engineering, Material Research Centre, Materials Engineering, Inorganic and Physical Chemistry and Centre for Nano Science and Engineering). Currently, 68 faculty members from various departments and approximately 160 research workers which include post-doctoral fellows, research associates, and graduate students use this facility on a regular basis. The research work is carried out in various disciplines of science which includes biochemistry, microbiology, reproductive biology, cell biology, immunology, virology, cancer biology, developmental biology etc.

- A Clean Air Facility (Class 100,000) of 3,500 sq. ft. with controlled environmental conditions was established in 2015 at the CAF for carrying out animal experiments. This facility is being utilized for breeding and maintaining mutant/transgenic animals and also for experimentation

FACULTY

KN Balaji | PhD (IISc)

Kumaravel Somasundaram | PhD (Madurai)

SG Ramachandra | Chief Research Scientist

Ravindranath H Aladakatti | Senior Scientific Officer

3.1.3 Centre for Ecological Sciences

FACT FILE

Established: 1983
Phone: +91-80-2293 2506, 2360 0985
Fax: +91-80-2360 1428
Email: cesoffice@ces.iisc.ernet.in
URL: http: //ces.iisc.ac.in/new/
Chairperson: Renee M Borges
Degree Programs Offered: PhD And Int. PhD

Core Research Areas

Animal behaviour, Evolutionary biology and sociobiology, Community ecology and biogeography, Plant–animal interactions, Visual and chemical ecology, Molecular genetics and Conservation biology, Climate change.

Current Research

ANIMAL BEHAVIOR AND SOCIOBIOLOGY

- Factors influencing evolution of sociality, role of social animals in biological communities, behavioural strategies employed by predators and prey, mechanistic and adaptive bases of collective behaviour, variation in mating systems, etc.

ANIMAL COMMUNICATION AND BIOACOUSTIC

- Research in this field spans the areas of bioacoustics, animal behaviour, community and habitat ecology, and systematics.

APPLIED EVOLUTIONARY ECOLOGY

- The consequences of individual behaviour for populations and the application of approaches from behavioural ecology and evolution towards conservation and mitigation of diseases like malaria.

COMMUNITY ECOLOGY AND BIOGEOGRAPHY

- To understand the distribution and diversity of organisms at various spatial scales from local communities

IN NUMBERS

12 Academic, **1** Scientific and **1** Technical Staff

5 PhD Conferments

43 PhD and **12** Int PhD Students

46 Publications

to macroecological scales, and at various levels of organisation from genes to ecosystems. And to use this understanding to prioritise conservation efforts.

CLIMATE CHANGE AND TROPICAL FORESTS

- Research includes addressing questions of how various forest ecosystems in India sequester carbon, impact of climate change on forests in India, and the potential of forestry as a climate mitigation option.

ECOPHYSIOLOGY

- Understanding how hormonal stress responses vary within and among species along habitat gradients and across geographical areas, and how they in turn affect different behavioral strategies.

FOREST ECOLOGY

- Forest dynamics are being investigated since 1988 within a network of permanent forest plots (one 50-hectare plot and 20 1-hectare plots) in the Nilgiris in the Western Ghats, including the response of plants to various climatic factors and fire.

MATHEMATICAL AND SPATIAL ECOLOGY

- The goal of this area of research is to investigate, analyze and predict ecological patterns in space and time. For example, we study how local interactions among nearby animals lead to collective synchronous motion in animal groups.

MOLECULAR ECOLOGY

- Modern molecular genetic tools in conjunction with new data analysis methods have revolutionized the fields of ecology, evolution, behavior and conservation biology. Research projects have included population genetics of large mammals (Asian elephants, gaur, Nilgiri tahr), marine turtles, phylogeny of Hemidactylus geckos, and many other reptile, amphibian, invertebrate and plant groups.

PLANT- ANIMAL INTERACTIONS AND INTER-SPECIES INTERACTION

- Research questions address the evolutionary ecology of species interactions in pollination, seed dispersal and herbivory systems; the behavioral and chemical bases for such interactions; visual communication between plants and animals, i.e. in the field of visual ecology.

WILDLIFE BIOLOGY

- Studies of Asian elephants have characterized their distribution in relation to forest cover and land-use patterns, impact of ivory poaching on population structure (male: female ratio) and dynamics, aspects of elephant-human conflicts, population genetic structure, and social organization; devising strategies for successful conservation of the Asian elephant. Research is also being carried out on ecology and evolutionary biology of marine turtles, including population biology and genetics, and behavior and movements.

TROPICAL AND TEMPERATE GRASSLAND BIOLOGY

- Understanding ecological processes in tropical and temperate grasslands such as those in the arid regions of Karnataka, and in the Western Himalayas, impact of herbivory and grazing on plants in these habitats.


DO NOT


SILENCE PLEASE

FACULTY

Sumant Bagchi | PhD (Syracuse), Assistant Professor

Rohini Balakrishnan | PhD (TIFR), Professor

DM Bhat | PhD (Karnataka), Principal Research Scientist

Renee M Borges | PhD (Miami), FASc, FNA, Professor

Raghavendra Gadagkar | PhD (IISc), FASc, FNA, FTWAS, Foreign Associate, US Natl Acad Sci, Professor

Vishwesha Guttal | PhD (Ohio), Assistant Professor

Farah Ishtiaq | PhD (Aligarh), Wellcome Trust-DBT Research Fellow

Kavita Isvaran | PhD (Florida), Assistant Professor

NV Joshi | PhD (IISc), Associate Professor

Praveen Karanth | PhD (SUNY, Albany), Associate Professor

NN Janardhanan Pillai | MSc (Kerala), Technical Officer

TV Ramachandra | PhD (IISc), FNESA, FIE, FIEE(UK), FIH

Kartik Shanker | PhD (IISc), Associate Professor (on lien to Ashoka Trust for Ecology and Environment from 2016–2019)

Raman Sukumar | PhD (IISc), FASc, FNA, FTWAS, Professor

Maria Thaker | PhD (Indiana State), Assistant Professor

ASSOCIATE FACULTY

NH Ravindranath | PhD (IIT Bombay), Professor

3.1.4 Centre for Infectious Disease Research

FACT FILE

Established: 2014
Phone: +91-80-2293 3063/3273/3275
Fax: +91-80-2360 6569
Email: office@cidr.iisc.ernet.in
URL: http://cidr.iisc.ernet.in
Chairperson: Dipankar Nandi

Core Research Areas

Basic and Clinical Infectious disease research, Studies using Biosafety level 3 facility, *Mycobacterium tuberculosis*, Redox biology, Human Immunodeficiency virus-Tuberculosis interactions, Malaria parasite biology, Immune cell and cytokine profiling during infectious diseases.

Current Research

MYCOBACTERIUM TUBERCULOSIS

- Dr. Amit Singh's laboratory has provided a new mechanism of persistence of *Mycobacterium tuberculosis (Mtb)*. According to this model, *Mtb* senses acidic pH as a signal to trigger the expression of virulence genes essential to cause the disease. We have further revealed the identity of a sensory protein, which responds to changes in acidic conditions to regulate gene expression and virulence of *Mtb.* Finally, we disrupted the pH sensor and showed its relevance in causing mycobacterial persistence. We have also identified several drugs like molecules which act as adjuvants to increase efficacy of current tuberculosis chemotherapy.

IMMUNOBIOLOGY

- Dr. Annapurna Vyakarnam's laboratory studies the CD4+ T cell response during infections, especially in the context of clinical setting in Indian patients. One goal is to understand the role of the immunoregulatory protein, ps20, a member of the WASP family, which is expressed in CD4+ T cells, in regulating a variety of factors involved in tumor progression.

- The other aspect of the laboratory's interest deals with the roles of BCG vaccination in modulating immunity. This aspect of the work is being done in collaboration with Aryogavaram Medical Centre, Madanapalli and St. John's Hospital, Bangalore. Multi-color flow cytometry of the leukocytes in samples are being analyzed.

IN NUMBERS

5 Publications

FACULTY

Annapurna Vyakarnam | PhD (Cambridge), Ramalingaswami Fellow

Rajmani | PhD (IVRI), Senior Research Scientist

Santosh Podder | PhD (Visva-Bharati University)

ASSOCIATE FACULTY

Saumitra Das | PhD (Calcutta), Professor

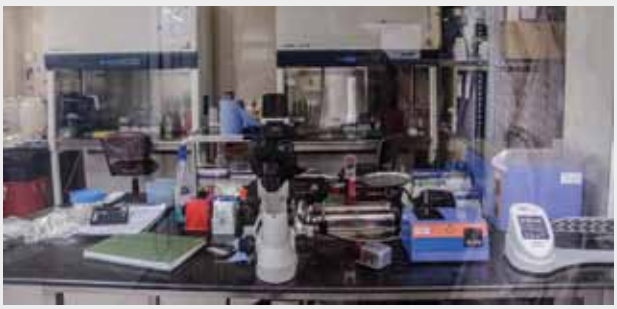
Dipankar Nandi | PhD (California-Berkeley), Professor

D Narasimha Rao | PhD (IISc), FASc, FNASc, FNA, Professor

Amit Singh | PhD (Delhi), Assistant Professor

S Vijaya | PhD (IISc), Professor

Sandhya S Visweswariah | PhD (IISc), Professor



3.1.5 Centre for Neuroscience

FACT FILE

Established: 2009
Phone: +91 80 2293 3431
Fax: +91-80-23603323
Email: office@cns.iisc.ernet.in
URL: http://www.cns.iisc.ac.in/
Chairperson: Aditya Murthy
Degree Programs Offered: PhD and Int. PhD

Core Research Areas

Neurobiology of disease, Brain mechanisms of motor control, Neural development and stem cells, Neuronal basis of object recognition, Neural mechanisms of selective attention, Learning and memory, Neural development, Differentiation and regeneration, Nanoscale organisation and regulation of post synaptic density, Perception, Attention and decision making, Neural correlates of space and memory.

Current Research

- The long term goal of Aditya Murthy's laboratory is to understand the nature of neural representations and brain mechanisms that controls actions. They study how the brain controls sequential eye movements and plan eye-hand movements in primates and humans using behavioural, electrophysiological and computational approaches.

- The laboratory of Vijayalakshmi Ravindranath addresses early pathogenic mechanisms underlying neurodegenerative disorders that would potentially lead to identification of drug targets that can be used to develop rational disease modifying therapies. To this effect, the laboratory adopts a combinatorial approach involving molecular biological, biochemical and histochemical techniques to elucidate pathogenically important cellular pathways in animal models of Parkinson's and Alzheimer's disease.

- The laboratory of Shyamala Mani investigates the signalling pathways during development by which neuronal precursor cells give rise to the different kinds of terminally differentiated neurons that are present in the adult nervous system. They have been working towards establishing human cortical development models to study developmental diseases.

- The laboratory of S P Arun investigates the neuronal basis of object recognition and its computational underpinnings using both behavioural experiments and neurophysiological experiments. His lab works on understanding how complex visual information is simplified and decoded in Brain.

IN NUMBERS

9 Academic Staff

24 Publications

31 PhD and **2** Int PhD Students

- The laboratory of Supratim Ray investigates the neuronal mechanisms of selective attention using computational and neurophysiological techniques, with a focus on neuronal oscillations thought to play a role in cortical processing. His laboratory focusses on gamma oscillations (30-80 Hz) as a tool to understand attention.

- The laboratory of Balaji Jayaprakash investigates the neuronal basis of learning and memory. His laboratory uses a combination of small animal behaviour, molecular biology and *in vivo* imaging methods to understand memory acquisition.

- The laboratory of Narendrakumar Ramanan is interested in the molecular mechanisms regulating axonal growth during development and after injury. His lab uses a combination of mouse genetics, molecular, biochemical and cell biological approaches.

- The goal of the laboratory of Deepak Nair is to understand the role of organization and recycling of synaptic molecules in transmission and plasticity. His research work utilizes ultra-high resolution imaging approaches to investigate nano-positioning, assembly and regulation of synaptic transmission machinery in real-time.

- The laboratory of Sridharan Devarajan focuses on the neural basis of higher order cognitive phenomenon such as selective attention and decision making. Using electrophysiological and functional imaging Sridharan's lab understands how cognition emerges as a result of neuronal computations.

FACULTY

Aditya Murthy | PhD (Pittsburgh), Associate Professor

SP Arun | PhD (Johns Hopkins), Assistant Professor

Balaji Jayaprakash | PhD (TIFR), Assistant Professor

Deepak Nair | PhD (Leibniz Institute for Neurobiology), Assistant Professor

Naren Ramanan | PhD (NUS), Associate Professor

Shyamala Mani | PhD (SUNY Syracuse), Associate Professor

Sridharan Devarajan | PhD (Stanford), Assistant Professor

Supratim Ray | PhD (Johns Hopkins), Assistant Professor

Vijayalakshmi Ravindranath | PhD (Mysore), Professor

Sachin Deshmukh | PhD (NCBS), Wellcome Trust/DBT Intermediate Fellow

Mini Jose Deepak | PhD (Magdeburg), Ramalingaswami Fellow

Reddy P Kommaddi | Ramalingaswami Fellow

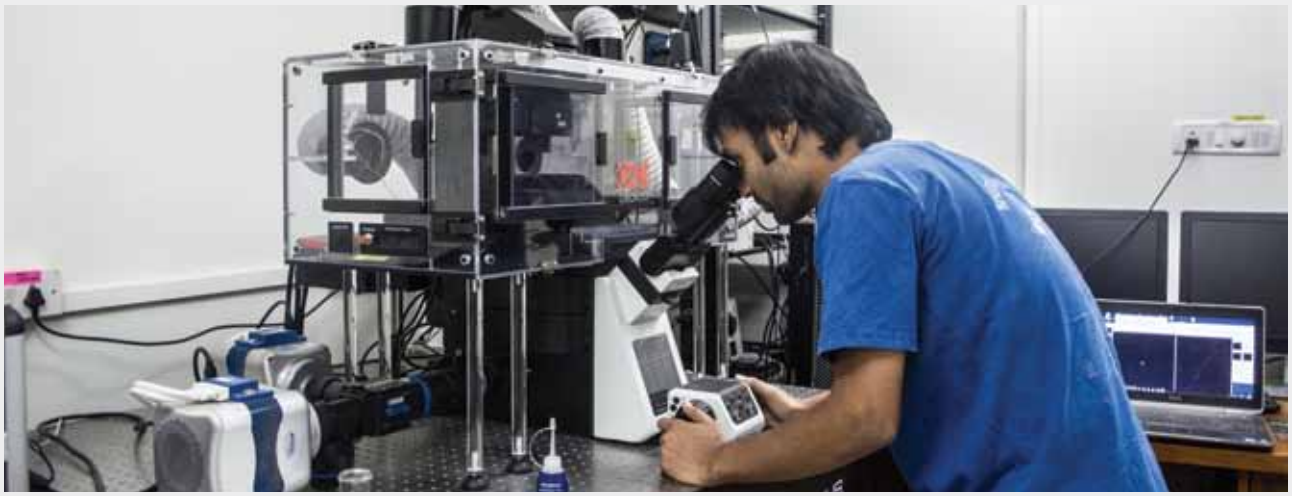
ASSOCIATE FACULTY

Govindan Rangarajan | PhD (Maryland), Professor

Polani B Seshagiri | PhD (IISc), FNASc, FAMS, Professor

CE Veni Madhavan | PhD (IISc), Professor

Chandra Sekhar Seelamantula | PhD (IISc), Associate Professor



3.1.6 Microbiology and Cell Biology

FACT FILE

Established: 1941

Phone: +91-80-2293 2410/2413

Fax: +91-80-2360 2697

Email: office@mcbl.iisc.ernet.in

URL: http://www.mcbl.iisc.ernet.in

Chairperson: Umesh Varshney

Degree Programs Offered: PhD and Int. PhD

Core Research Areas

Infectious diseases; Basic biology of cellular processes including transcription and translation using various models like Drosophila, *C. elegans*, mouse and plants; Mechanism of metabolic disorders like diabetes, heart failure and cancer.

Current Research

STUDIES ON BACTERIAL PATHOGENS/SURROGATES/DISEASES

- Small molecule inhibitors of mycobacterial topoisomerase have been developed; molecular mechanism of how the glycoprotein of *M. tuberculosis* tampers with multiple cells of innate immune system in a differential manner has been investigated.

- It is has been demonstrated that a very small proportion of both pathogenic and non-pathogenic mycobacteria and the enteric bacterium, *Escherichia coli* undergo highly deviated asymmetric cell division to generate a short cell and a long cell from every division. In the context of salmonella pathogenesis, role of community behaviour has been shown to be important for pathogenesis.

STUDIES ON VIRAL PATHOGENS/DISEASES

- Understanding the mechanisms and determinants of virulence of Japanese encephalitis virus (JEV) using the live attenuated vaccine strain.

- Development of highly potent small molecule inhibitors of hepatitis C virus (HCV) from pomegranate fruit *(Punica granatum)*.

- Enteroviruses are a major cause of acute and persistent diarrhoea.

IN NUMBERS

16 Academic and **2** Scientfic Staff	**12** PhD and **1** Int PhD Conferments
93 PhD and **11** Int PhD Students	**69** Publications

- Role of redox chemistry in the context of HIV infection to understand the reasons why HIV infected patients suffer from chronic oxidative stress.

CELLULAR PROCESSES AND CANCER BIOLOGY

- A novel protein that binds uracil in DNA extremely tightly has been discovered; a heterologous protein, Fhs confers survival advantage under microaerophilic conditions of growth.

- Characterization of the miRNA. This study would reveal how these regulatory RNAs themselves get regulated by the turnover pathway in *Caenorhabditis elegans*.

- Studies on splicing of mini- intron containing reporter transcripts have revealed that multiple intronic features confer dependence on fission yeast SpSlu7.

- Elucidation of the role of endosomal SNARE STX13 in regulation of two different trafficking steps from recycling endosomes to melanosomes.

- In the field of cancer biology, department has mostly focused studies on glioma, the most common and aggressive brain tumor. Recent study from the department demonstrated that autophagy inhibition to facilitate astrocyte transformation is achieved by promoter methylation.

- Role of urora kinase in spindle positioning.

GENE REGULATION AND DEVELOPMENT

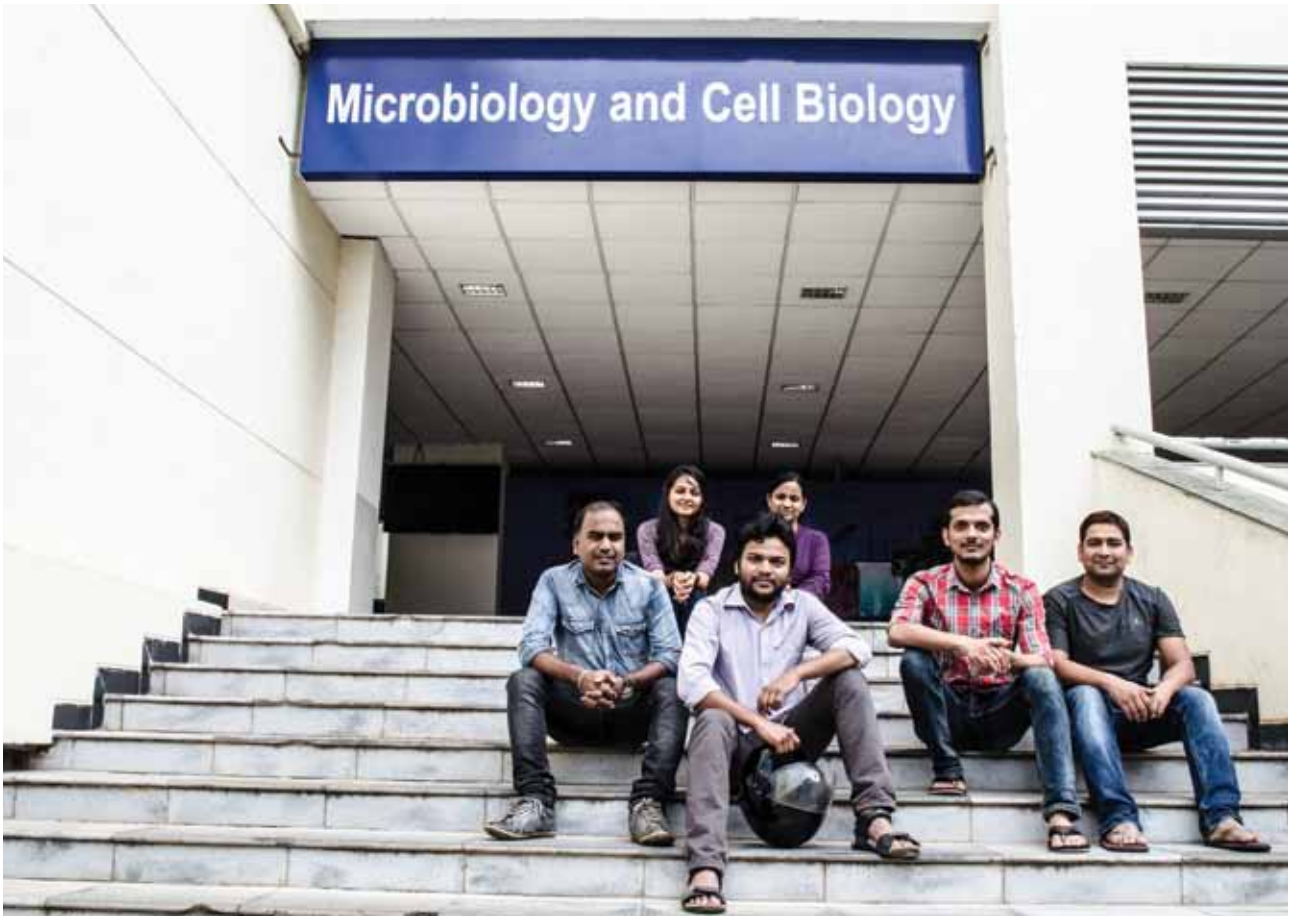
- Analysis of chromatin occupancy of OsMADS1, a rice Sepallata class in rice panicles with developing floral meristems and organ development to decipher some key target genes.

- Demonstration that miR319-targetted *TCP* genes code for transcription factors that regulate leaf morphogenesis in *Arabidopsis.* It has been demonstrated that TCP4 promotes brassinosteroid- dependent cell enlargement and suppresses auxin-dependent cell proliferation in *Arabidopsis* leaves.

- Exploration of the role of SIRT6, a chromatin associated histone deacetylase in aging-related muscle degeneration.

- Initiation of the studies on the molecular signalling pathways that link diabetes to cardiac fibrosis.


MCB


Microbiology and Cell Biology

FACULTY

P Ajitkumar | PhD (IISc), Associate Professor

KN Balaji | PhD (IISc), Professor

Dipshikha Chakravortty | PhD (Pune), Professor

Saibal Chatterjee | PhD (Calcutta), Assistant Professor

Saumitra Das | PhD (Calcutta), FNA, FASc, FNASc, Professor

SS Indi | PhD (Exeter), Senior Scientific Officer

Sachin Kotak | PhD (Frankfurt), Assistant Professor

V Nagaraja | PhD (IISc), FNA, FASc, FNASc, FTWAS, Professor

Utpal Nath | PhD (Bombay), Assistant Professor

C Durga Rao | PhD (IISc), FNASc, Professor

Amit Singh | PhD (Delhi), Assistant Professor

Kumaravel Somasundaram | PhD (Madurai Kamaraj), FNA, FASc, FNASc, Professor

G Subba Rao | PhD (JNU), Assistant Professor

Nagalingam Ravi Sundaresan | PhD (IVRI), Assistant Professor

William R Surin | PhD (JNU), Senior Scientific Officer

Umesh Varshney | PhD (Calgary), FNA, FASc, FNASc, Professor

S Vijaya | PhD (IISc), Professor

Usha Vijayaraghavan | PhD (Caltech), FNA, FASc, Professor

3.1.7 Molecular Biophysics Unit

FACT FILE

Established: 1971
Phone: +91-80-2293 2459
Fax: +91-80-2360 0535
Email: office@mbu.iisc.ernet.in
URL: http://mbu.iisc.ac.in/
Chairperson: Raghavan Varadarajan
Degree Programs Offered: PhD and Int. PhD

Core Research Areas

Spectroscopy and physico-chemical studies of biomolecules; Macromolecular structure determination by X-ray crystallography and Cryo-electron microscopy; Peptides – synthesis, design and conformational studies; Proteins – chemistry, conformational analysis, structure, design and folding; Nucleic acids – Structural basis of gene expression; Membrane and cellular biophysics; Regulation of gene expression in bacteria; Neurophysiology – Patch-clamp electrophysiology, ion channels; Peptide chemical biology; Computational biology; Cryo-electron microscopy of biological macromolecules.

Current Research

The study of structures and interactions of biomolecules is the main theme of research in MBU. Significant results on the structures and functions of mycobacterial enzymes, lectins, toxins; biofilm formation, leads for drug design, and cellular neurophysiology have been obtained in the last year. New computational and experimental methodologies are being formulated.

PROTEIN AND NUCLEIC ACID STRUCTURES

- The crystal structure of *S. aureus* Homoserine dehydrogenase, *M. tuberculosis* uracil DNA glycosylase as well as the structure of a peptide bound at the ATP binding site of the N-terminal domain of Hsp90, have been determined. All these studies provide useful leads for drug and inhibitor design.

- Conotoxins are small peptides which present in cone sail venoms. They are used to develop treatments for pain relief. The three dimensional structure of the conotoxin Mo3964 was determined by NMR and shows a novel structural scaffold. The peptide modulates the activity of voltage gated potassium channels in neurons and voltage gated sodium channels.

- Telomeres are sequences found at the ends of chromosomes and are important in aging and cancer. Structural and molecular details of telomeric repeat containing RNA and its interaction with telomere binding

IN NUMBERS

14 Academic Staff	**11** PhD and **1** Int PhD Conferments
91 PhD and **19** Int PhD Students	**105** Publications

proteins are being worked out to understand their mechanistic roles in telomere maintenance and control of gene expression.

- Structural studies on neurotransmitter transporters and antibiotic efflux mechanisms that are highly relevant in tackling neuropsychiatric disorders and multi-drug resistance in pathogenic bacteria, respectively, have been initiated.

- A new method for comparative modelling of protein-protein complexes has been developed. Advances have been made in understanding the properties of networks of interacting proteins. The method has been explored to understand several problems in structural biology.

BACTERIAL PHYSIOLOGY AND CHEMICAL BIOLOGY

- Bacterial second messengers (p)ppGpp and c-di-GMP were shown to regulate antibiotic drug resistance, biofilm formation, sliding motility and biofilm formation in *Mycobacterium smegmatis* by modulating the synthesis of cell wall components.

- A new robust synthetic protocol to obtain mono to multiply thioamidated peptides on a solid support was developed and was employed in the design of novel peptide hairpins.

- An experimental method termed saturation-suppressor mutagenesis was developed to provide residue contact information in macromolecules. The methodology is generally applicable to many macromolecular systems for and is being used to probe structures and functions of bacterial toxin-antitoxin systems, which contribute to bacterial drug tolerance.

CELLULAR NEUROSCIENCE

- Effects of ion channels on the phase of spikes and local field potentials in the hippocampal region and on synaptic plasticity profiles have been studied.

- Active dendrites were shown to mediate stratified gamma-range coincidence detection in pyramidal neurons.

- Significant variability in state-dependent plasticity of intrinsic properties during cell-autonomous self-regulation of calcium homeostasis has been detected.

These studies have important implications for understanding brain and nervous system functions.


Lab. Companion
RW-0525G

FACULTY

Anand Srivastava | PhD (Ohio State), Assistant Professor

Aravind Penmatsa | PhD (CCMB), Assistant Professor

Manju Bansal | PhD (IISc), FASc, FNASc, FNA, Professor

Jayanta Chatterjee | PhD (Munich), Assistant Professor

Somnath Dutta | PhD (Kolkata), Assistant Professor

B Gopal | PhD (IISc), FASc, FNASc, Professor

MRN Murthy | PhD (IISc), FASc, FNASc, FNA, FTWAS, Professor

Rishikesh Narayanan | PhD (IISc), Assistant Professor

Siddhartha P Sarma | PhD (Maryland), Professor

Sikdar Sujit K | Dr MedSci (Kyushu), FASc, Professor

Mahavir Singh | PhD (Munich), Assistant Professor

N Srinivasan | PhD (IISc), FASc, FNASc, Professor

K Suguna | PhD (IISc), Professor

Raghavan Varadarajan | PhD (Stanford), FASc, FNA, Professor

ASSOCIATE FACULTY

Rahul Roy | PhD (Illinois), Assistant Professor

HONORARY PROFESSORS

M Vijayan | PhD (IISc), FASc, FNASc, FNA, FTWAS, INSA Albert Einstein Research Professor

A Surolia | PhD (Madras), FASc, FNASc, FNA, FTWAS, M-IMBN, Bhatnagar Fellow

Dipankar Chatterji | PhD (IISc), FASc, FNASc, FNA, FTWAS, Professor

EMERITUS PROFESSORS

Saraswathi Vishveshwara | PhD (New York), CSIR Emeritus Scientist, Professor

P Balaram | PhD (Carnegie Mellon), FASc, FNASc, FNA, FTWAS, Emeritus Professor

3.1.8 Molecular Reproduction, Development and Genetics

FACT FILE

Established: 1989
Phone: +91-80-2293 2659/2548
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Email: chairman@mrdg.iisc.ernet.in
URL: http://www.mrdg.iisc.ernet.in
Chairperson: Paturu Kondaiah
Degree Programs Offered: PhD and Int. PhD

Core Research Areas

Cellular and molecular biology, Developmental biology of model organisms, Reproductive biology and stem cell biology, Cancer biology, Bacterial genetics and bacterial physiology, Human genetics.

Current Research

BACTERIAL GENETICS AND PHYSIOLOGY

- Studies on the evolution of novel metabolic capabilities by microorganisms have highlighted the observation that the two phylogenetically closely related organisms *Escherichia coli* and *Shigella sonnei* may employ different trajectories for reaching the same endpoint based on the diversity of transposable elements in their genomes.

- An unusual multidomainal protein has been identified in Mycobacteria that binds DNA and RNA, and contains an adenylyl cyclase domain at the N-terminus. Two component signalling (TCS) cascades in Mycobacteria have been characterized and the intricate networking amongst TCS systems in *M. tuberculosis* has been described.

HUMAN GENETICS AND DISEASE MODELS

- Advances have been made in identifying the causative genes for autosomal recessive genetic disorders, anencephaly (no brain) and primary microcephaly (small brain), and the role of microRNAs in the development of oral cancer and their use as therapeutic targets.

- Novel transgenic mice have been generated with activating mutations in receptor guanylyl cyclase C and their phenotypic and molecular characterization is in progress.

IN NUMBERS

12 Academic Staff	**6** PhD Confernments
55 PhD and **12** Int PhD Students	**85** Publications

- Studies have identified a central role for the cellular energy sensor AMPK in the regulation of stemness and cancer drug resistance. Investigations into the role of endogenously expressed glycan-binding proteins in breast cancer invasiveness, the development of a 3D culture model to study glycan regulation during metastasis in epithelial ovarian carcinoma, and computationally modelling biological pattern (de) formation, are also on going.

- Research is being pursued to examine the mechanism of metabolism related changes in insulin sensitivity during pregnancy and lactation. The data suggests change in expression of glucose transporter and estradiol receptor α and β genes in skeletal muscle participate in the decreased insulin sensitivity during pregnancy.

- The role of G protein coupled receptors (GPCRs) in the cascade of events that occurs when cell's age is being studied. The mechanisms by which GPCRs and receptors of other classes of receptors cross-talk is an area of interest, and is expected to impact understanding of events that govern age-associated inflammation, tissue injury and infection.

DEVELOPMENTAL BIOLOGY

- A neuronal expressed metallosphoesterase in Drosophila has been shown to be important in regulating life span, in a manner that is independent of diet restriction and normal ageing.

- Drosophila flight muscles upon immune challenge produce anti-microbial peptides (AMPs) through the activation of canonical signalling pathways, and it has been shown that these AMPs are essential for survival upon infection. The transcription factor erect wings (Ewg) in Drosophila is involved in muscle patterning by repressing the expression of Cyclin E, which is required for the arrest of myoblast proliferation and initiation of myoblast fusion and terminal differentiation. The spatiotemporal regulation of mitochondrial fusion, and not fission, is critical for Drosophila flight muscle development, maintenance, and function.

- Using two evolving Drosophila Cytoraces, the genetic/evolutionary events that set the trade-off between life span and immunity in motion has been dissected. Finally, efforts towards an understanding of how the nervous system of the round worm Caenorhabditis elegans regulates life span, and innate immune responses or behaviour to pathogenic microbes are on going.


Molecular Reproduction,
Development and Genetics

FACULTY

Arun Kumar | PhD (BHU), DABMG, Professor

Ramray Bhat | MBBS (Calcutta), PhD (NYMC), Assistant Professor

Rajan Dighe | PhD (IISc), FASc, FNASc, FNA, Professor

P Kondaiah | PhD (Osmania), Professor

S Mahadevan | PhD (Tufts), FASc, Professor

R M Medhamurthy | PhD (Saskatchewan), Professor

Upendra Nongthomba | PhD (Mysore), Associate Professor

Annapoorni Rangarajan | PhD (NCBS), Associate Professor

Deepak K Saini | PhD (AIIMS), Assistant Professor

Polani B Seshagiri | PhD (IISc), FNASc, FAMS, Professor

Varsha Singh | PhD (IISc), Assistant Professor

Sandhya S Visweswariah | PhD (IISc), FASc, FNA, Professor

3.2 Division of Chemical Sciences

Chairperson: **P K Das**

DEPARTMENTS/CENTRES/UNITS

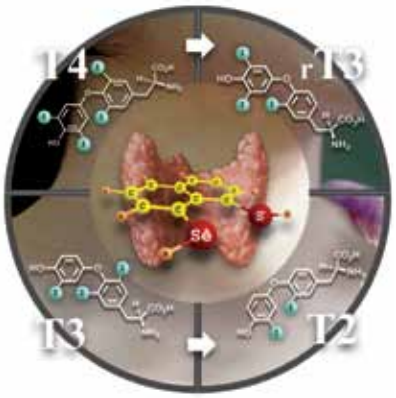
- Inorganic and Physical Chemistry
- Materials Research Centre
- NMR Research Centre
- Organic Chemistry
- Solid State and Structural Chemistry Unit

Core Research Areas

The faculty members of the Division work on all contemporary topics in chemistry, ranging from Chemical Synthesis, Drug Design, Chemical Biology, Materials Chemistry, Surface and interface Science, Nanochemistry, Molecular Spectroscopy, Ultrafast Chemical Dynamics, Computational and Theoretical Chemistry, Solid State Chemistry and Nuclear Magnetic Resonance spectroscopy.

Themes

The Division of Chemical Sciences has consistently maintained its position among the top 50 chemistry departments in world rankings over the past decade. It is a globally competitive Division with clear focus on top quality research in specific current areas such as bio-inorganic chemistry and chemical biology of drugs with a particular aim on disease control and cure, ultrafast spectroscopy and dynamics of molecules towards understanding of structure and reactivity in physical processes related to materials and interfaces, bio-materials for devices to industrial applications, computational materials science, and NMR methods for decoding complex protein structures in solution.



Research Snapshots

- More than 200 million people worldwide suffer from thyroid-related disorders. A compound that can control thyroxine, the hormone secreted by the thyroid gland, has been discovered. The discovery has potential applications in the treatment of hyperthyroidism. [REFERENCE: Raja, K., **Mugesh, G.** Remarkable

IN NUMBERS

51 Faculty Members

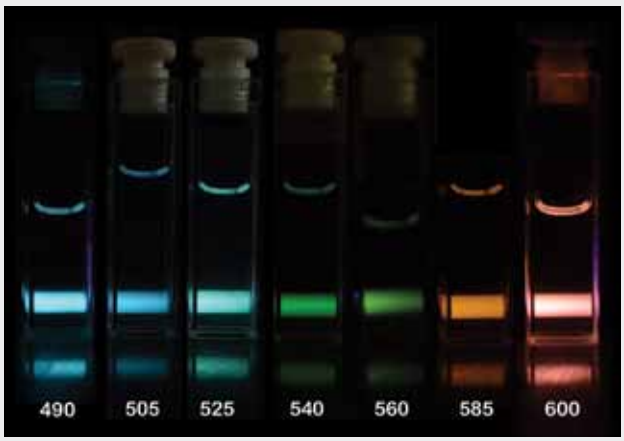
77 Fellowships of Science Academies in India

287 PhD students, **62** Integrated PhD students

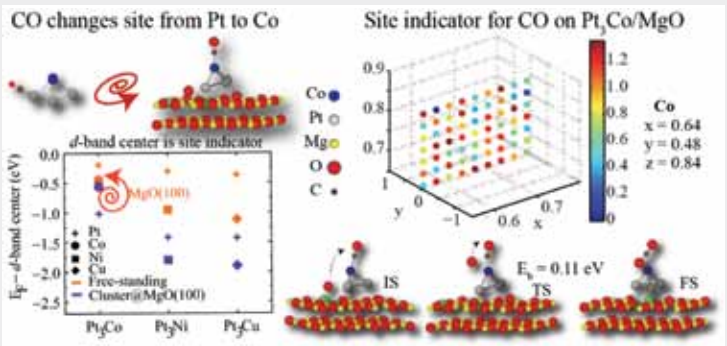
49 PhD students graduated in 2015-16

Effect of Chalcogen Substitution on an Enzyme Mimetic for Deiodination of Thyroid Hormones. *Angew. Chem. Int. Ed.*, 2015, 54, 7674–7678]

- Nanocrystals doped with manganese which combine the advantages of quantum dots and conventional doped phosphorus have been created, thus opening possibilities for a wide range of applications. [REFERENCE: Abhijit Hazarika, **Anshu Pandey,** and **D. D. Sarma,** Rainbow Emission from an Atomic Transition in Doped Quantum Dots, *J. Phys. Chem. Lett.*, 2014, 5, 2208]



- Bimetallic Pt_3Co cluster supported on MgO oxidizes CO more efficiently to CO_2.This paves the way to develop Pt_3Co/MgO as next generation catalytic converter in cars.[REFERENCE: R. Ahmad, and **A. K. Singh,** Pt-Poisoning-Free Efficient CO Oxidation on Pt3Co Supported on MgO(100): An Ab Initio Study, *ACS Catalysis*, 2015, 5:1826]



3.2.1 Inorganic and Physical Chemistry

FACT FILE

Established: 1909
Phone: +91-80-2293 2382
Fax: +91-80-2360 0683
Email: office@ipc.iisc.ernet.in
URL: http://ipc.iisc.ac.in/
Chairperson: S Umapathy
Degree Programs Offered: PhD and Int. PhD

Core Research Areas

Molecular structure, Dynamics & spectroscopy, Quantum chemistry, Laser spectroscopy, Solid state chemistry, Electrochemistry, Chemical kinetics, Polymer chemistry, Boron chemistry, Organometallics, Coordination chemistry, Bioinorganic chemistry, Quantum dynamics, Nanostructured materials, Theoretical chemistry, X-ray crystallography, Magnetic materials, Supramolecular chemistry, Statistical mechanics, Transport in nano-junctions, Solution-phase simulations.

Current Research

- Biomedical research includes understanding the antioxidant activity of synthetic compounds in mammalian cells, the thyroid hormone metabolism and disorders, and the development of molecular probes for the detection of reactive oxygen species in the cells and oxidative stress biomarkers.

- Curcumin-based metal complexes as photo-chemotherapeutic agents are being developed to selectively target the mitochondria or endoplasmic reticulum, as desired by the oncologists, instead of the nuclear DNA to avoid nuclear excision mechanism to be operative.

- Research is also focused in developing new organometallic complexes for carrying out catalytic organic transformations with particular reference to those where chirality transfer is involved and developing metal based anticancer agents suitable for targeted delivery.

- A chemical reaction in confined nanospace of discrete molecular architectures and molecular sensors for explosive nitroaromatics detection is also a topic of interest.

- Several groups in the department are interested in main group chemistry, which involves Boron based molecular materials and also developed tricolor emissive multiple colour emissive and white light emissive molecular materials.

IN NUMBERS

19 Academic and **3** Scientific Staff	**15** PhD and **4** Int PhD Conferments
99 PhD and **29** Int PhD Students	**186** Publications

- Development of new main group catalysts for organic transformations, catalytic additions of boron-element to unsaturated organic molecules, activation of small molecules using organometallic compounds in the hope of realizing catalysts for methane conversion to methanol and synthesizing materials for hydrogen storage applications are also being developed in laboratories.

- Computational quantum chemistry on transition metal organometallics, catalysis, weak interactions, boranes and boron clusters and boron allotropes, aromaticity is also being studied. Further, periodically graftable amphiphilic copolymers have been prepared using a bio-sourced itaconate; the post-polymerization strategy used to place PEG segments helped in finer tuning of the inter-lamellar spacing.

- On-going research on laser technology focuses on the development and applications in the areas of physics, chemistry and biology. The research spans from understanding femtosecond timescale movements of molecules to the study of infectious bacteria and sepsis.

- State of the art experimental and theoretical tools are used to investigate molecular complexes formed at 3 K and are at the forefront of the emerging field of intermolecular bonding.

- In collaboration with the Aerospace Engineering Department, shock tube technologies are being developed to investigate both fundamental and applied areas related to fuels for hypersonic flights.

- Various linear and nonlinear spectroscopic techniques have been used to study nanoparticle interaction with biomolecules and gas phase vibrational spectroscopy of polycyclic aromatic hydrocarbons and their variants.

- In the last one year (2015-1016), the department has built UHV-based surface analysis system equipped with quadrupole mass spectrometer, auger electron spectrometer, gas doser, etc., and high harmonic generation beam-line to produce ultrafast X-ray pulses to study real-time molecular reactions.

- Extensive ab-initio molecular dynamics simulations have been carried out to predict and estimate the dissociation constants of weak acids in water.

- Electron microscopy, spectroscopy and computer simulations are being used to understand the stability of inorganic nano sheets in aqueous and non-aqueous dispersions.

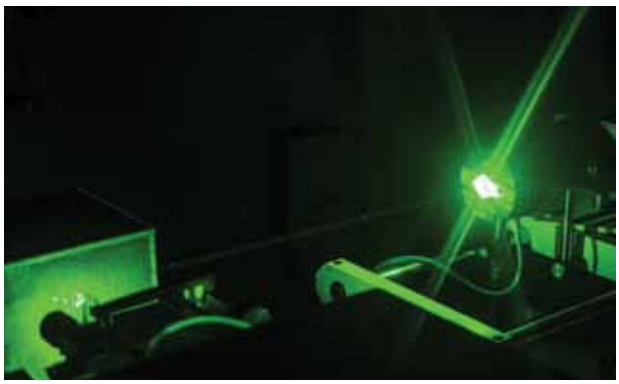
- Quantum mechanical descriptions of molecules in the gas and solution phases is another area of research where recent and ongoing studies include H-bonding, Fermi resonances, diabatic reaction modelling, and conical intersections in specific systems.

- Research activities have been under progress to develop novel electrode materials based on transition metal nitrides, carbides and chalcogenides, LB films and macrocyclic organic molecules in presence of solid / liquid electrolytes to make more efficient batteries, fuel cells, capacitors and sensors.

- Solar driven water electrolysis is being investigated using catalysts based on Co, Mn and Ni for oxygen evolution reaction. The hydrogen generated is an interesting non-conventional fuel.

- Several electrode materials for non-aqueous rechargeable Li, Na and K-batteries are under study.

- New theoretical methods and models are being developed to study stochastic thermodynamics of complex many-body systems, non-equilibrium electron transfer properties of molecular junctions, thermal fluctuations and optical response of quantum junctions.



FACULTY

Arunan E | PhD (Kansas), FASc, Professor

Atanu Bhattacharya | PhD (Colorado), Assistant Professor

AR Chakravarty | PhD (Calcutta), FASc, FNA, Professor

Binny J Cherayil | PhD (Chicago), Professor

PK Das | PhD (Columbia), FASc, Professor

K Geetharani | PhD (Madras), Assistant Professor

Upendra Harbola | PhD (JNU), Assistant Professor

Balaji R Jagirdar | PhD (Kansas), FASc, Professor

ED Jemmis | PhD (Princeton), FASc, FNA, Professor

G Mugesh | PhD (IIT Bombay), FASc, FNASc, Professor

Partha Sarathi Mukherjee | PhD (Jadavpur), Associate Professor

N Munichandraiah | PhD (IISc), Professor

M Nethaji | PhD (Madras), Chief Research Scientist

Sanjay Prasad | MTech (Anna), Scientific Officer

S Ramakrishnan | PhD (U Mass, Amherst), FASc, Professor

Sai G Ramesh | PhD (Wisconsin), Assistant Professor

S Sampath | PhD (IIT Madras), FASc, FNA, Professor

AG Samuelson | PhD (Cornell), Professor

S Sandya | PhD (Kerala), Scientific Officer

P Thilagar | PhD (IIT Kanpur), Assistant Professor

S Umapathy | PhD (Otago), FASc, Professor

S Vasudevan | PhD (IIT Kanpur), FASc, FNA, Professor

HONORARY PROFESSOR

KL Sebastian | PhD (IISc), FASc, FNA, Professor

3.2.2 Materials Research Centre

FACT FILE

Established: 1978

Phone: +91-80-2293 2515

Fax: +91-80-2360 7316

Email: office@mrc.iisc.ernet.in

URL: http://mrc.iisc.ernet.in

Chairperson: Arun M Umarji

Degree Programs Offered: MSc (Engg), PhD and Int. PhD

Core Research Areas

Semiconducting materials for blue LEDs, phosphors for white light applications, absorber for photovoltaic applications, infra-red and UV detection, gas sensing, etc., Biomaterials for orthopaedic and dental applications, Catalytic materials for water splitting, water purification, Energy harvesting and storage materials for thermoelectric, Li-ion/ Na-ion battery, and hydrogen storage, fuel cells.

Current Research

WHITE LIGHT EMITTING DIODES FOR GREEN ENERGY

- MRC faculties are involved in national level research initiatives. One such programme is the development of blue and white LEDs for carbon free solid state lighting and the other one is on development of biomaterials for orthopaedic and dental applications.The LED project evolved for this initiative dealt with "White" LEDs, typically blue LEDs working in conjunction with yttrium aluminium garnet (YAG) phosphor, used for lighting applications. A commercial white LED produces 110 lm/W at an injection current of 700 mA, exemplifies the state-of-the-art in solid-state lighting. Despite these impressive gains, LEDs are still too expensive for most consumers as a replacement for traditional lighting, since the current production is based upon using expensive SAPPHIRE as the substrate. All the leading manufacturers of LEDs are shifting towards the SILICON substrate to replace the existing SAPPHIRE and meet with the technical and economic goals. The work at MRC developed highly efficient white LEDs higher than commercially available LEDs in three phases over the last 6 years in collaboration with an industry. The funding agency invited this group to proceed to 4th phase to integrate this technology onto silicon substrates to be in par with the international standards.

BIOMATERIALS FOR ORTHOPAEDIC AND DENTAL APPLICATIONS

- One of the ongoing projects on biomaterials for orthopaedic and dental applications is related to the acetabular socket materials based on hybrid polymer-ceramic composites, which is already proven to be biocompatible, for Total Hip Joint Replacement (THR) and the deliverables of this specific project hold promise for immediate commercialization for use as acetabular sockets in THR.

IN NUMBERS

11 Academic Staff	**9** PhD and **1** Int PhD Conferments
60 PhD and **5** Int PhD Students	**174** Publications

- In another project, the Zirconia-toughened Alumina (ZTA) based femoral ball head prototype will be developed using integrated manufacturing steps to obtain smoothly polished femoral ball heads with better strength, fracture toughness and wear resistance.

- As part of the development of dental implants, Ti_6Al_4V-based dual ceramic coated abutment and screw implants will be developed and the biocompatibility will be established.

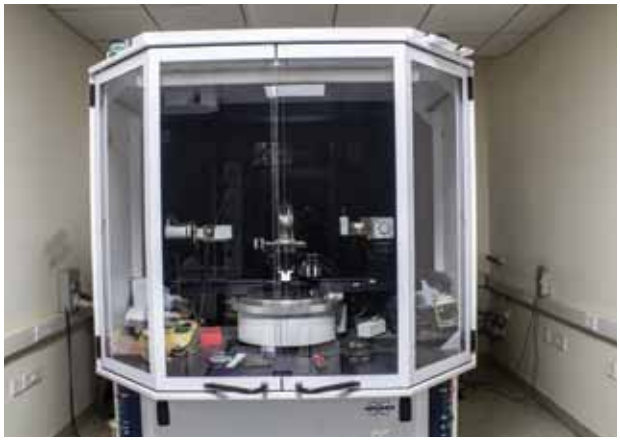
NANOSTRUCTURED MATERIALS FOR ENERGY AND ENVIRONMENT APPLICATIONS

- Faculty of our Centre are involved in designing nanostructured based catalysts for water splitting, water purification and fuel cells. Few faculties are associated with the development of materials for gas sensing applications at room temperature, infra-red and UV detection.

- Faculty of the Centre are also involved in addressing the challenges associated with development of efficient energy harvesting materials using state of the art density functional theory based methods. An extensive study is in progress to develop guidelines for designing high ZT thermoelectric materials and ambient condition efficient hydrogen and Li storage materials. Nano structurization of transition metal silicides is carried out for high temperature thermoelectric application.

- Faculty of the Centre are also working on 2D materials as they are considered as materials for next generation devices. In order to use 2D materials as building blocks in electronic, optical, and sensing applications, their electronic properties need to be modified. A focussed effort aiming towards gaining the ability to modify the band gaps of these materials in a controlled and non-invasive way in currently underway. Meta-structure based on Vanadium oxide phase change materials for perfect absorbers at IR and microwave frequencies is demonstrated.


GLOVE BOX



FACULTY

Prabeer Barpanda | PhD (Rutgers), Assistant Professor

KBR Varma | PhD (Madras), Professor

Bikramjit Basu | PhD (Kuleuven), Professor

SB Krupanidhi | PhD (Delhi), FASc, Professor

SA Shivashankar | PhD (Purdue), Professor

Karuna Kar Nanda | PhD (IOP), Associate Professor

N Ravishankar | PhD (IISc), Professor

Balaram Sahoo | PhD (Duisberg), Assistant Professor

Abishek K Singh | PhD (Tohoku), Associate Professor

Srinivasan Raghavan (Vasu) | PhD (Penn State), Assistant Professor

Arun M Umarji | PhD (IIT Madras), Professor

ASSOCIATE FACULTY

Ashok M Raichur | PhD (Nevada), FRSC, Professor

Navkant Bhat | PhD (Stanford), Professor

V Venkararaman | PhD (Princeton), Professor

EMERITUS PROFESSOR

G Ananthakrishna | PhD (Texas), INSA Senior Scientist

HONORARY PROFESSOR

Rao C N R | DSc (Mysore), PhD (Purdue), DSc (hc), ScD (hc), LLD (hc), Hon FRSC, FASc, NA FRS, Linus Pauling Research Professor, INSA-Albert Einstein Research Professor

3.2.3 NMR Research Centre

FACT FILE

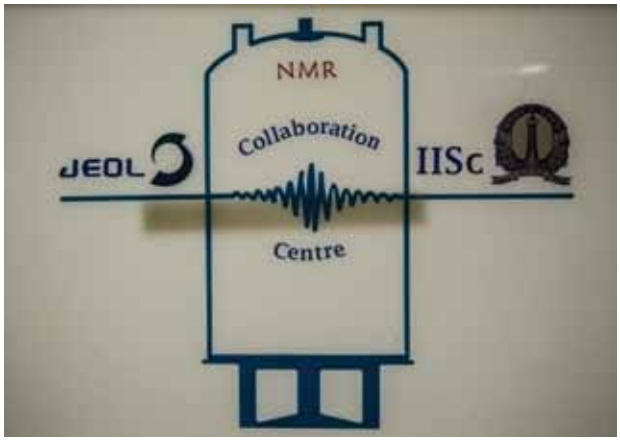
Established: 1977
Phone: +91-80-2293 2536
Fax: +91-80-2360 1550
Email: office@nrc.iisc.ernet.in
URL: http://nrc.iisc.ernet.in
Chairperson: S Vasudevan

Core Research Areas

The primary focus of the NMR Research Centre is the development of new NMR spectroscopic methods and their application to important and challenging problems in Chemistry and Biology.

Current Research

- Development of a pattern recognition based approach for identifying metabolites in NMR based metabolomics.
- Establishing the dynamic nature of protein nano-particle interactions by NMR spectroscopy.
- Development of a facile approach for accurate determination of magnitudes and relative signs of J couplings involving fluorine.
- Sensitivity enhancement in slice-selective NMR experiments through polarization sharing.
- Solution and solid-state NMR investigations of amyloid proteins and designed and bioactive peptides.



IN NUMBERS

4 Academic and **1** Scientific Staff

29 Publications

FACULTY

Hanudatta S Atreya | PhD (Bombay), Associate Professor

PC Mathias | PhD (IISc), Associate Professor

S Raghothama | PhD (IISc), MNASc, Principal Research Scientist

KV Ramanathan | PhD (IISc), FNASc, Professor

N Suryaprakash | PhD (Bangalore), FNASc, Professor

ASSOCIATE FACULTY

Balaji R Jagirdar | PhD (Kansas State), Professor

Jayantha Chatterjee | PhD (Munich), Assistant Professor

Mahavir Singh | PhD (Munich), Assistant Professor

KP Ramesh | PhD (Bangalore), Associate Professor

Siddhartha Sarma | PhD (Maryland), Professor

S Vasudevan | PhD (IIT Kanpur), Professor

3.2.4 Organic Chemistry

FACT FILE

Established: 1911
Phone: +91-80-2293 2403
Fax: +91-80-2360 0529
Email: office@orgchem.iisc.ernet.in
URL: http://orgchem.iisc.ernet.in
Chairperson: N Jayaraman
Degree Programs Offered: PhD and Int. PhD

Core Research Areas

Asymmetric synthesis, Biomolecular chemistry, Carbohydrates, Chemistry of peptides, proteins, nucleic acids and lipids, Macromolecular chemistry, Natural product synthesis, Organic methodology development, Organic synthesis, Organic materials, Organometallic chemistry, Physical organic chemistry, Soft matter chemistry.

Current Research

ORGANIC SYNTHESIS/ MOLECULAR DESIGN

- In the area of organic synthesis, developing strategies for asymmetric synthesis and their application to the stereo-selective total synthesis of natural products of therapeutic significance continues to be central theme.

- In synthetic methodology development, a detailed study of tetrathiomolybdate mediated tandem regio- and stereo-selective ring opening of aziridine, disulfide formation, reduction of disulfide bond and Michael reaction in a one-pot operation was established.

- First synthesis of peptidomimetics containing the 1,3-thiazine (Thi) (the thioimidate analogue of Oxa) motif was accomplished and these Thi analogues were shown to be stable to standard conditions of peptide coupling.

PHYSICAL ORGANIC CHEMISTRY

- A one-pot reaction involving heating a mixture of a carbonyl compound, a phenyl hydrazine, and the cation exchange resin Amberlite IR 120 in refluxing ethanol to prepare indoles was established.

- X-Ray diffraction crystal structures of four derivatives of hexamethylenetetramine - with succinic, (DL)-malic, phthalic and 4-hydroxybenzoic acids - offer insight into the applicability of the anti periplanar lone pair hypothesis (ALPH) in a rigid system.

IN NUMBERS

11 Academic Staff	**9** PhD and **1** Int PhD Conferments
51 PhD and **12** Int PhD Students	**53** Publications

- Flat cyclic analogues of γ-butyrolactone bearing electron withdrawing side chains as potential molecules for taking advantage of bacterial quorum sensing in environmental applications and biotechnology were proposed.

CHEMISTRY OF NEW MATERIALS

- Bile acid-peptide conjugates which are efficient hydrogelators around neutral pH have been developed. A novel, thermally stable precursor of Cd discovered in IISc has been used for the continuous synthesis of high quality CdSe quantum dots in supercritical fluids.

- Research focuses on the development of supramolecular chemistry using two dimensional (2D) material platforms. Recognition and antibacterial activity of surface modified ceMoS2 and potent antibacterial agents using 2D-MoS2 were developed.

- Preferential delivery of siRNAs to target tissues may help minimize adverse 'off target' effects and maximize the efficacy of the therapeutic response. The 'proof of concept' for restricted delivery of therapeutic siRNAs using a target oriented dendrimernano-vector was established.

BIOORGANIC CHEMISTRY/ CHEMICAL BIOLOGY

- A facile hydrogelation of a p-pyridylenevinylene derivative (PV) bearing oxyethylene chains in the presence of orotic acid (OA) occurs via various non-covalent interactions. The self-assembly of p-pyridyl-ended oligo-p-phenylenevinylenes (OPVs) in ethanol leads to the formation of either hollow or solid microrods.

- Nonviral gene delivery using cationic liposomes as promising instruments for the delivery of double-stranded RNA (ds RNA) molecules for successful sequence-specific gene silencing (RNA interference) were developed.

SYNTHETIC METHODOLOGY DEVELOPMENT AND ASYMMETRIC CATALYSIS

- The first catalytic enantio selective iodocyclization of ketone-derived nucleophiles, namely, oximes and hydrazone derivatives was developed. A simple protocol for the direct alkylation of olefinicC(sp2)–H bonds was developed.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BRUKER

FACULTY

Santanu Bhattacharya | PhD (Rutgers), FASc, FNA, FTWAS, Professor

Tushar Kanti Chakraborty | PhD (IIT Kanpur), FNA, FASc, FNASc, Professor

Sosale Chandrasekhar | PhD (London), Professor

S Chandrasekaran | PhD (Madras), FASc, FNA, FTWAS, Honorary Professor

Mrinmoy De | PhD (Massachusetts), Assistant Professor

N Jayaraman | PhD (IIT Kanpur), FASc, Professor

Uday Maitra | PhD (Columbia), FASc, FNA, Professor

Santanu Mukherjee | PhD (Cologne), Assistant Professor

EN Prabhakaran | PhD (IIT Kanpur), Associate Professor

KR Prabhu | PhD (IISc), Associate Professor

Kavirayani R Prasad | PhD (Pune), Professor

ASSOCIATE FACULTY

TN Guru Row | PhD (IISc), Professor

HONORARY PROFESSOR

Srinivasan Chandrasekaran | PhD (Madras), Professor

3.2.5 Solid State and Structural Chemistry Unit

FACT FILE

Established: 1976

Phone: +91-80-2293 2336

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Email: chairman@sscu.iisc.ernet.in

URL: http://sscu.iisc.ernet.in

Chairperson: S Yashonath

Degree Programs Offered: PhD and Int. PhD

Core Research Areas

Physical chemistry (Electrochemistry, Spectroscopy, Quantum chemistry, Biophysical chemistry, Statistical mechanics, and Electronic structure), Organic chemistry (Polymers, Crystal engineering, Mechanical properties of crystals, Material design, Structure prediction, Halogen bonds and Van der waals interactions), Inorganic chemistry (Metal organic frameworks, Magnetism, and Catalysis), Condensed matter (Nanocrystal systems, and Strongly correlated electron systems).

Current Research

MULTIFUNCTIONAL MATERIALS FOR ENERGY, ENVIRONMENT AND BIOTECHNOLOGY

- The focus is on synthesis of materials based on soft matter, inorganic/hybrid tailored nanostructures for potential applications in electrochemical energy storage devices, solar cells, photocatalysis and sensors. The polymer electrolytes synthesized exhibit superior physical and chemical properties and performance in rechargeable lithium-based batteries compared to devices with conventional molecular liquid solvent based electrolytes.

FRAMEWORK MATERIALS

- Hybrid compounds based on transition metals are interesting due to the varying coordination preferences. Some of the transition metals exhibit interesting magnetic properties including ferrimagnetism. The focus is in the broad area of inorganic-organic hybrid compounds to study the effect of time and temperature on the formation of structures possessing classical inorganic structures such as Fluorite, CdCl2etc.

NANO- AND ELECTRONIC MATERIALS RESEARCH

- Experiments are designed to study the properties of highly-correlated transition-metal compounds and optically active semiconductor nanomaterials. In the area of highly correlated electron systems, issues related to metal-insulator transition, magnetism and the coupling of charge and spin degrees of freedom

IN NUMBERS

11 Academic and **6** Scientific Staff	**9** PhD and **4** Int PhD Conferments
60 PhD and **19** Int PhD Students	**131** Publications

are studied to design novel materials. The growth mechanisms of semiconductor nanocrystals is being studied to understand the electronic and optical properties.

ORGANIC PHOTOVOLTAIC MATERIALS

- Research is conducted todesign π-conjugated materials for optoelectronics devices with the goal of improved charge-carrier electron mobility and stability. A chemical route to synthesize coupled dike pyrrolepyrrole-dike pyrrolepyrrole based polymers was developed and these polymers exhibited remarkable improvement in electron charge carrier mobility and stability, generating a tremendous potential for conjugated polymers in optoelectronic devices.

CHEMICAL CRYSTALLOGRAPHY AND MATERIALS DESIGN

- Structural features of compounds, which are liquids at room temperature, have been characterized by using the technique by growing single crystals at low temperatures. This approach allows for different rates in cooling thus providing pathways for generation and fine-tuning of polymorphic modification in materials. Controlled generation of suitable polymorphs in drugs and pharmaceuticals and fabrication of new drug forms is the primary target of this approach.

THEORETICAL PHYSICAL CHEMISTRY/ COMPUTATIONAL BIOPHYSICS

- Diffusion in condensed phases of matter as a function of diffusant radius has been investigated extensively. The studies are able to account for and explain the anomalous diffusivity dependence of ions in solution as a function of ionic radius. Aqueous binary mixtures of osmolytes are important systems in chemistry and biology. These mixtures show unusual composition dependence of thermodynamic and dynamic properties. Molecular dynamics simulations are being carried out to understand the origin of such composition dependence. The osmolytes, which are ampiphilic tend to undergo structural transformations at low concentrations that is reminiscent of a phase separation.

ELECTRONIC BAND STRUCTURE CALCULATIONS

- A new time dependent density matrix renormalization group algorithm is being developed to study the effect of long-range correlations on spin charge separation. The valence Bond method is extended to study excited state tuning in substitute polyenes and tetracene using symmetries present in these systems to carry out studies on systems spanning nearly a billion dimensional Hilbert space.

FACULTY

Biman Bagchi | PhD (Brown), FASc, FNASc, FNA, FTWAS, Professor

Aninda J Bhattacharyya | PhD (Jadavpur), Associate Professor

Gautam R Desiraju | PhD (Illinois), FASc, FNASc, FNA, FTWAS, Professor

A Govindaraj | PhD (Mysore), Principal Research Scientist

V Jayaram | PhD (IISc), Principal Research Scientist

KR Kannan | MSc (Engg) (IISc), Senior Scientific Officer

S Natarajan | PhD (IIT Madras), FASc, FNASc, Professor

Naga Phani B Aetukuri | PhD (Stanford), Assistant Professor

Anshu Pandey | PhD (Chicago), Assistant Professor

Satish A Patil | PhD (Wuppertal), Associate Professor

Govardhan Reddy | PhD (Wisconsin), Assistant Professor

TN Guru Row | PhD (IISc), FASc, FNA, FRSC, Professor

DD Sarma | PhD (IISc), FASc, FNASc, FNA, FTWAS, Professor

R Sathishkumar | MTech (Madras), Scientific Officer

C Shivakumara | PhD (IISc), Senior Scientific Officer

NY Vasanthacharya | PhD (IISc), Senior Scientific Officer

S Yashonath | PhD (IISc), FASc, FNA, Professor

ASSOCIATE FACULTY

Giridhar Madras | PhD (Texas A&M), Professor

S Vasudevan | PhD (IIT Kanpur), Professor

Hanudatta S Atreya | PhD (Bombay), Associate Professor

N Suryaprakash | PhD (Bangalore), FNASc, Professor

EMERITUS PROFESSOR

MS Hegde | PhD (IIT Kanpur), FASc, CSIR Emeritus Scientist

KJ Rao | PhD (IIT Kanpur), FASc, FNASc, FNA, FWIF, Emeritus Professor, Raja Ramanna fellow (Senior)

HONORARY PROFESSORS

Rao C N R | DSc (Mysore), PhD (Purdue), DSc (hc), ScD (hc), LLD (hc), FASc, FNA, Hon FRSC, FRS, FTWAS, Linus Pauling Research Professor, INSA, Albert Einstein Research Professor, National Research Professor, Honorary Professor

Gopalakrishnan J | PhD (IISc, Bangalore), FASc, FNA, FNASc, FWIF, INSA Senior Scientist

HONORARY PROFESSOR

AK Shukla | PhD (IIT Kanpur), FASc, FNAE, FNASc, FNA, UGCBSR Faculty

S Ramasesha | PhD (IIT Kanpur), FASc, FNA, FTWAS, Professor

3.3 Division of Electrical Sciences

Chairperson: **Y Narahari**

DEPARTMENTS/CENTRES/UNITS

- **Computer Science and Automation**
- **Electrical Communication Engineering**
- **Electrical Engineering**
- **Electronic Systems Engineering**

Core Research Areas in the Division

Even while working on high impact artefacts, the Division is assiduously seeking fundamental advances in the following core areas: Signal Processing, Communications, Networks, Microelectronics and Devices, Theoretical Computer Science, Computer Systems and Software, Artificial Intelligence and Machine Learning, Control and Optimization, Power Systems, Power Electronics, High Voltage Engineering, Image Processing, and Computer Vision.

Themes

A feature of the Division's R&D activities is its focus on rigorous innovation in contemporary, interdisciplinary themes: Big Data Analytics, Internet of Things, 5G Technologies, Devices for Healthcare, Electronics for Strategic Sector, Network Science, Cybersecurity, Multicore Computing, Smart Grids, and Renewable Energy.

Research Snapshots

- An algorithm to help match photos with images in different poses and illuminations has been developed. This algorithm has several implications in our fast-changing world with increasing security demands. [REFERENCE: S. P. Mudunuri, **Soma Biswas.** Low Resolution Face Recognition Across Variations in Pose and Illumination. Accepted for publication in *IEEE Transactions on Pattern Analysis and Machine Intelligence* (PAMI), 2015]

IN NUMBERS

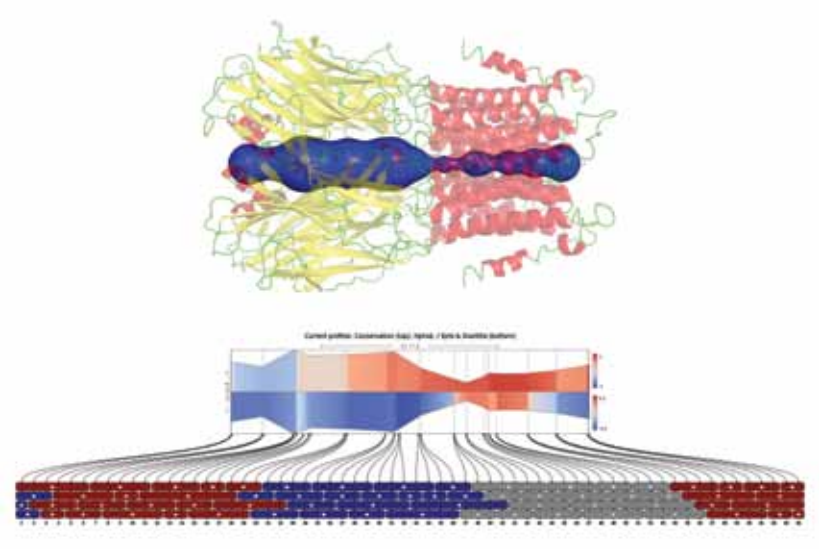
78 Faculty Members, **8** IEEE Fellows

28 Fellowships of Science and Engineering Academies in India

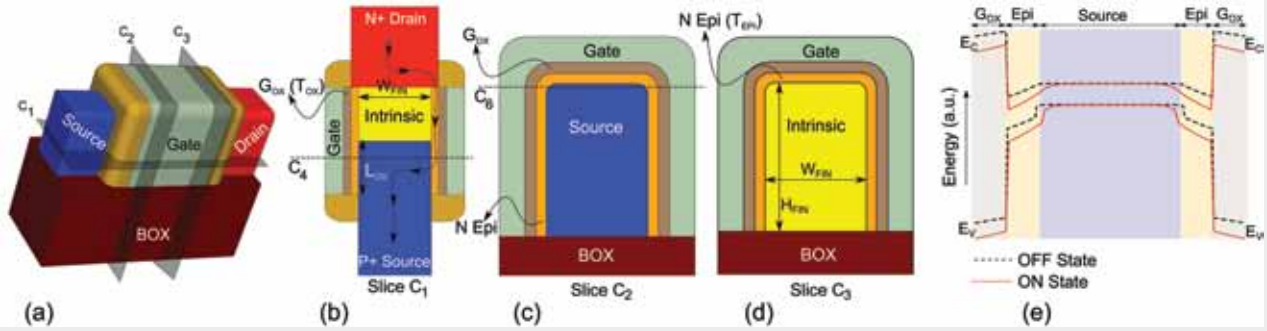
342 PhD students, **392** Master's students

43 PhD students graduated in 2015-16

- Using techniques from bioinformatics, visualization of an ion transport channel in a protein using ChExVis, a high-end tool developed in the Institute for extraction and visualization of bio-molecular channels, has been achieved. [REFERENCE: Talha Bin Masood, Sankaran Sandhya, **Nagasuma Chandra** and **Vijay Natarajan.** ChExVis: a tool for molecular channel extraction and visualization. *BMC Bioinformatics*, 2015, 16:119.



- A Novel Fin tunnel Field-Effect Transistor (FET) device has been patented. It is expected to transform sub-10nm node CMOS technologies.[REFERENCE: KuruvaHemanjaneyulu and **MayankShrivastava,** Fin Enabled Area Scaled Tunnel FET, *IEEE Transactions on Electron Devices*, October 2015, 62:10]



3.3.1 Computer Science and Automation

FACT FILE

Established: 1969
Phone: +91 -080 -2293 2368/2229/2386/2468
Fax: +91-080-2360 2911
Email: office@csa.iisc.ernet.in
URL: http://csa. iisc.ernet. in
Chairperson: Jayant R Haritsa
Degree Programs Offered: PhD, MSc (Engg), ME (Computer Science and Engineering), ME (Systems Science and Automation) (Jointly with EE)

Core Research Areas

Algorithmic algebra, Approximation algorithms, Combinatorial and computational geometry, Computational topology, Cryptography, Formal verification, Graph theory, Logic, Processor architecture, Compilers, Programming languages, Software engineering, Operating and distributed systems, Database systems, Graphics and visualization, Machine learning, Pattern recognition, Data mining, Reinforcement learning, Stochastic optimization and control, Game theory and mechanism design.

Current Research

The Department of Computer Science and Automation (CSA) carries out research in the areas of *Theoretical Computer Science*, which builds mathematical foundations of computing systems; *Computer Systems and Software*, which engineers complex computing environments; and *Intelligent Systems*, which transforms raw data into strategic knowledge.

THEORETICAL COMPUTER SCIENCE

- **Algorithmic Graph Theory:** We developed provable and efficient algorithms for uniform hypergraph partitioning and for determining polynomial representability of functions over finite integer rings. We proved Saito's conjecture regarding hetorochromatic paths in edge coloured graphs, and studied boxicity and cubicity with respect to graph product operations.

- **Computational Geometry:** We introduced and studied a strong variant of the classical centerpoints problem, and obtained tight bounds for various geometric settings. Integrated geometric and topological methods were developed to extract channel structures in biomolecules.

- **Automated Verification:** We proposed a theory of refinement that facilitates compositional reasoning about complex data type implementations. A methodology was designed based on this theory, and the scheduler of

IN NUMBERS

24 Academic, **3** Adjunct/others, **1** Scientific and **1** Technical Staff

8 PhD, **9** MSc (Engg) and **49** ME/MTech Conferments in 2015

97 PhD, **45** MSc (Engg) and **118** ME/MTech Students

146 Publications

FreeRTOS, the popular open-source real-time OS, was formally verified.

COMPUTER SYSTEMS AND SOFTWARE

- **Computing Architectures:** We designed warp scheduling methods for GPUs, which offer tremendous computing power in modern systems, and developed efficient stacked DRAM cache design for multicore CPU architectures.

- **Operating Systems:** We designed and implemented a multi-core version of FreeRTOS, and subsequently verified it using the Spin model-checking tool to detect and eliminate data-races and deadlocks.

- **Software Engineering:** We designed an approach for leveraging run-time savings opportunities in Java programs. A methodology to find errors in file-processing programs, which are at the heart of enterprise software systems, and to restructure these programs automatically, was developed.

- **Database Engines:** We developed a declarative query processing algorithm with provable worst-case performance guarantees. A major advance as compared to the prior literature is that the guarantees depend only on the user query, and not on the data processing environment.

INTELLIGENT SYSTEMS

- **Streaming Data:** An important step forward in designing Markov Chain Monte-Carlo algorithms for streaming data was achieved by extending the notion of Stick Breaking Processes. We derived an algorithm applicable to Bayesian non-parametric models, with applications in Big Data settings.

- **Multi-Armed Bandit Mechanisms:** Modern web applications require learning algorithms that are robust to user manipulations. We are working on extending the multi-armed bandit abstraction to take into account strategic play by the users, and demonstrating that machine learning and game theory can be synergistically used to build powerful web applications.

- **Reinforcement Learning:** An important problem in reinforcement learning is of finding optimal state features for value function estimation. We have developed, for the first time, a provably convergent incremental update algorithm that updates features on the Grassmann manifold of features.

FACULTY

Shivani Agarwal | PhD (Illinois), Assistant Professor

Siddharth Barman | PhD (Wisconsin), Assistant Professor

Shalabh Bhatnagar | PhD (IISc), FNAE, Professor

Arnab Bhattacharyya | PhD (MIT), Assistant Professor

Chiranjib Bhattacharyya | PhD (IISc), FNAE, Professor

L Sunil Chandran | PhD (IISc), FNAE, Associate Professor

Sanjit Chatterjee | PhD (ISI Kolkata), Assistant Professor

Deepak D'Souza | PhD (CMI), Associate Professor

Ambedkar Dukkipati | PhD (IISc), Associate Professor

K Gopinath | PhD (Stanford), Professor

Sathish Govindarajan | PhD (Duke), Associate Professor

RC Hansdah | PhD (IISc), Associate Professor

N Jagadish | BE (Bangalore), Technical Officer

Aditya Kanade | PhD (IIT Bombay), Associate Professor

Bhavana Kanukurthi | PhD (Boston), Assistant Professor

M Narasimha Murty | PhD (IISc), FNAE, FNASc, Professor

Y Narahari | PhD (IISc), FASc, FNASc, FNA, FNAE, FIEEE, Professor

Vijay Natarajan | PhD (Duke), Associate Professor

Arpita Patra | PhD (IIT Madras), Assistant Professor

KV Raghavan | PhD (Wisconsin), Associate Professor

Murali Krishna Ramanathan | PhD (Purdue), Assistant Professor

B Uday Kumar Reddy | PhD (Ohio State), Assistant Professor

Chandan Saha | PhD (IIT Kanpur), Assistant Professor

Shirish K Shevade | PhD (IISc), Associate Professor

YN Srikant | PhD (IISc), Professor

V Susheela Devi | PhD (IISc), Principal Research Scientist

INSA SENIOR SCIENTIST

N Viswanadham | PhD (IISc), FASc, FNA, FNAE, FIEEE, FTWAS

ASSOCIATE FACULTY

Matthew Jacob Thazhuthaveetil | PhD (Wisconsin), Professor

P Vijay Kumar | PhD (USC), FNAE, FIEEE, Professor

Dilip P Patil | PhD (TIFR), Professor

Jayant R Haritsa | PhD (Wisconsin), FASc, FNASc, FNAE, FIEEE, Professor

Partha Pratim Talukdar | PhD (Penn), Assistant Professor

R Govindarajan | PhD (IISc), FNAE, Professor

ADJUNCT FACULTY

Ravi Kannan | PhD (Cornell), Adjunct Professor

Ramesh Hariharan | PhD (Courant), FASc, Adjunct Professor

3.3.2 Electrical Communication Engineering

FACT FILE

Established: 1946
Phone: +91-80-2293 2276/2278
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URL: http://www. ece.iisc.ernet.in
Chairperson: KVS Hari
Degree Programs Offered: PhD, MSc (Engg), ME (Communication & Networks), ME (Signal Processing) jointly with EE, ME (Microelectronics) jointly with ESE

Core Research Areas

Communication theory, Communication networking, Signal processing, Photonics, Electromagnetics, Nanoelectronic devices and VLSI.

Current Research

COMMUNICATION NETWORKING

- Ad-hoc wireless and sensor networks, Static , mobile and opportunistic networks, wireless sensor networks, quality of service techniques for IEEE 802.11 WLAN, MIMO Communication Networks, Modelling, analysis, control, optimisation. Network Management, Mobile Agents, Computational Intelligence, Multimedia systems, Ubiquitous Computing, Social Networks, VANET, MANET, Energy efficient Protocol, Protocol Engineering, Ubiquitous Learning, Social Networking in Higher education, Content delivery network, cognitive radio network. Network Monitoring, Wireless LAN Software and Intellectual Property Wireless sensor network, Resource allocation in wired and wireless network.

COMMUNICATION THEORY

- Queueing Theory, Statistical Estimation Theory, Source channel, error control and Space-Time coding, Network coding, codes for storage systems, Information Theory, Coding for data communications, storage; Discrete applied mathematics. Application of information theory to security, interactive communication, statistical learning, Multiuser Information theory. Stochastic Control, Machine Learning, Performance Analysis and Modelling, game theory, estimation and detection theory, combinatorics, probability theory, cellular communication standards, energy harvesting, green wireless sensor networks, cognitive radio, cooperative communications, multi-antenna technologies, multiple access protocols, coding for distributed storage networks, wireless sensor networks, intrusion detection in outdoor environments.

IN NUMBERS

25 Academic, **6** Scientific and **1** Technical Staff

25 PhD, **2** MSc (Engg) and **30** ME/MTech Conferments in 2015

136 PhD, **15** MSc (Engg) and **82** ME/MTech Students

184 Publications

SIGNAL PROCESSING

- Algorithms for MIMO communications, Space-Time Coding and Signal Processing, Cooperative Communication, Network Coding, multiuser MIMO detection, CDMA, OFDM/OFDMA, opportunistic communications, energy conscious communications, Multiuser Information Theory, Network Coding. Compressed Sensing, statistical signal processing, Sparse Signal Processing, Sensor Array Signal Processing, Neuroscience, Living Systems for Healthcare, pattern recognition for speech and audio, enhancement, auditory modelling, HuBot Communication, Acoustic Scene Analysis, Hearing Aids, algorithms for sparse signal recovery, multiple antenna communications, energy harvesting, underwater acoustic communications, big-data signal processing.

PHOTONICS

- Integrated optics, optical communications, MOEMS sensors, Biomedical, Fiber-optic CDMA networks, Routing in optical networks, Design of WDM systems, Coherent Optical Networks and Systems.

ELECTROMAGNETICS

- Computational Electromagnetics, Electronic Design Automation for high-speed chip-package-systems, Radio-Frequency sensing, Antenna analysis and design, Parallel processing for many-core CPU, GPU, FPGA and cloud computing, Microwave Antennas, Fractals Microwave circuits, RF energy harvesting and Wireless power transfer circuits, Microwave Materials, RF MEMS, Micro machined antennas, Phased array antenna, Millimeterwave Circuit Design.

NANOELECTRONICS AND VLSI

- Semiconductor, optoelectronic and nanoelectronic devices, ferroelectric multiferroic materials, high density memories, analog, mixed signal and RF integrated Circuits, cognitive radios, millimeter wave integrated circuits, sensor interface circuits, Analog and Mixed Signal Integrated Circuits, Circuits and Systems, Low Power Computing.

FACULTY

T Badrinarayana | PhD (IISc), Principal Research Scientist

Gaurab Banerjee | PhD (Washington), Assistant Professor

Bharadwaj Amrutur | PhD (Stanford), FNAE, Professor

A Chockalingam | PhD (IISc), FNAE, FNASc, FNA, FASc, Professor

K Elizabeth Rani | BTech (JNTU), Technical Officer

Ambarish Ghosh | PhD (Brown), Associate Professor

Anandi Giridharan | MSc (Engg) (IISc), Senior Scientific Officer

SV Gopalaiah | MSc (Engg) (IISc), Senior Scientific Officer

Aditya Gopalan | PhD (Texas), Assistant Professor

Dipanjan Gope | PhD (Washington), Assistant Professor

KVS Hari | PhD (UC San Diego), FIEEE, Professor

Malati Hegde | PhD (IIT Kanpur), Principal Research Scientist

Himanshu Tyagi | PhD (Maryland), Assistant Professor

Navin Kashyap | PhD (Michigan), Associate Professor

Kausik Majumdar | PhD (IISc), Assistant Professor

Anurag Kumar | PhD (Cornell), FASc, FNAE, FNA, FIEEE, FTWAS, Professor

P Vijay Kumar | PhD (USC), FIEEE, FNAE, TATACHEM Chair, Professor

Neelesh B Mehta | PhD (Caltech), FNASc, FNAE, Associate Professor

Utpal Mukherji | ScD (MIT), Associate Professor

Chandra R Murthy | PhD (UC San Diego), Associate Professor

Parimal Parag | PhD (Texas A&M), Assistant Professor

Rajan, Sundar B | PhD (IIT Kanpur), FASc, FNAE, FNASc, FNA, FIEEE, Professor

MK Ravishankar | MSc (Engg) (IISc), Senior Scientific Officer

Vinod Sharma | PhD (Carnegie Mellon), FIETE, FNAE, Professor

ES Shivaleela | PhD (IISc), Principal Research Scientist

Rajiv Soundararajan | PhD (Texas), Assistant Professor

TV Sreenivas | PhD (TIFR Bombay), Professor

Talabattula Srinivas | PhD (IISc), Associate Professor

Rajesh Sundaresan | PhD (Princeton), Associate Professor

Manoj Varma | PhD (Purdue), Assistant Professor

Varun Raghunathan | PhD (UCLA), Assistant Professor

KJ Vinoy | PhD (Penn State), FNAE, Associate Professor

ASSOCIATE FACULTY

Sripati P Arun | PhD (John Hopkins), Associate Professor

Navakanta Bhat | PhD (Stanford), Professor

HONORARY PROFESSOR

P Venkataram | PhD (Sheffield), FIEE, Professor

3.3.3 Electrical Engineering

FACT FILE

Established: 1911

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Fax: +91-80-2360 0444

Email: chairman@ee.iisc.ernet.in

URL: http://www.ee.iisc.ac.in/

Chairperson: A G Ramakrishnan

Degree Programs Offered: PhD, MSc (Engg), ME (Electrical Engineering), ME (Systems Science & Automation) jointly with CSA, ME (Signal processing) jointly with ECE

Core Research Areas

Power system analysis and control, Protection, Smart grid, Industrial drives, Distributed generation, Grid integration, Matrix converters, Lightning modelling, Transformer diagnostics, Pollution control by plasma, Speech processing and recognition, Medical image reconstruction, Computer vision, Pattern recognition and machine learning, Embedded systems, Convex optimization.

Current Research

TRANSFORMER DIAGNOSTICS

- Generalized, analytical solution for diagnosing mechanical damages in a transformer winding based on frequency response measurements.

POLLUTION CONTROL

- Control of gaseous pollutants in the exhaust of diesel engines by electrical discharge techniques aided by industrial wastes.

ELECTROMAGNETICS

- Investigation on the corona electrodynamics, leading to complex wave propagation modes on the transmission lines. Galerkin's finite element method for the analysis of electromagnetic flowmeters.

DEFENCE APPLICATIONS

- Ultra-wideband electromagnetic weapon design. Effect of intense microwave fields on electronic circuits. Polymer material for EM shielding. Detection of buried landmines using pulsed EM fields. Chemical explosive based intense pulsed power generator.

IN NUMBERS

20 Academic, **5** Scientific and **1** Technical Staff

10 PhD, **6** MSc (Engg) and **39** ME/MTech Conferments

87 PhD, **30** MSc (Engg) and **76** ME/MTech Students

111 Publications

SMART GRID
- Estimation and application of synchrophasors. Simulation of large power grids. Strategies for quick arresting of blackout propagation.

POWER SYSTEM PROTECTION
- DSP and AI applications, with FACTS compensated lines.

LOAD FLOW ALGORITHMS
- Satisfy a long-felt need in power industry: simultaneously incorporate all the adjustments (limits) required at the problem formulation stage and provide the solutions directly.

RENEWABLE ENERGY
- Modeling, protection and control of microgrids. Grid integration, along with storage.

POWER CONVERTERS
- High voltage and medium frequency link converters, topology. Matrix converters and derived topologies. Design and control: magnetics, gate driver, filters.

MOTOR DRIVES
- Modulation and control of induction motor & switched reluctance drives including stability studies. Pulse width modulation strategies to reduce pulsating torque and acoustic noise.

POWER ELECTRONICS
- Design of high speed electric machines. Distributed generation, high voltage power electronics. Characterisation of new power semiconductor devices.

EMBEDDED SYSTEMS
- System design using DSP processors and FPGA. Sensor interfacing for remote monitoring and data gathering. Real time scheduling and analysis of algorithms.

SPEECH PROCESSING
- Analysis and modeling of speech production with applications to language learning and healthcare, audio-visual synthesis. speech enhancement and information extraction and applications in auditory neuroscience. Speaker and background change detection.

SPEECH RECOGNITION
- New features and approaches for analysis and recognition of speech containing two languages. Signal processing and deep learning methodologies.

FAST ALGORITHMS
- For non-linear and high-dimensional image filtering, novel convex optimization models and fast solvers, sensor network localization from range measurements.

SIGNAL AND IMAGE PROCESSING
- Phase retrieval, wavelets, time-frequency analysis, links between deep learning and sparsity, diagnosis in endoscopy, glaucoma assessment.

MACHINE LEARNING
- A sufficient condition on the loss function is derived for risk minimization to be robust to class label noise in the training data; learning algorithms based on these theoretical results.

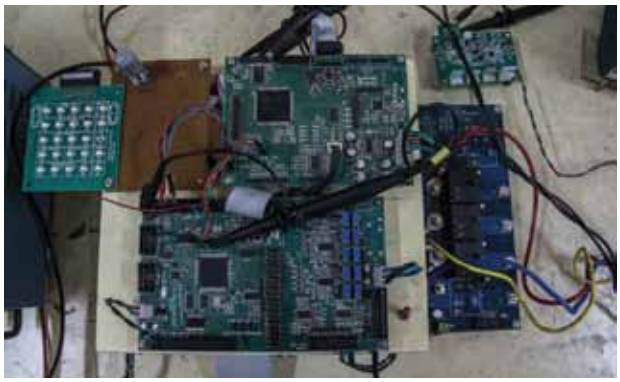
FACE RECOGNITION
- In uncontrolled environment for surveillance. text-image and near-infrared to visible image matching. Deep learning architectures for action recognition across pose. Acceleration using GPU and FPGA.

IMAGE RECONSTRUCTION

- New regularization forms for optimal reconstruction and restoration of medical images. Sparsity- driven reconstruction for ultrasound, radar, and sonar imaging.

COMPUTER VISION

- Theoretical and practical dimensions of recovering accurate 3D representations using image and depth cameras.



FACULTY

Soma Biswas | PhD (Maryland), Assistant Professor

MK Champaka | MSc (Engg) (IISc), Scientific Officer

Chandra Sekhar Seelamantula | PhD (IISc), Associate Professor

Kunal Narayan Chaudhury | PhD (EPFL), Assistant Professor

Sriram Ganapathy | PhD (John Hopkins), Assistant Professor

Prasanta Kumar Ghosh | PhD (USC), Assistant Professor

Gurunath Gurrala | PhD (IISc), Assistant Professor

Vinod John | PhD (Wisconsin-Madison), Associate Professor

M Joy Thomas | PhD (IISc), Assistant Professor

Muthuvel Arigovindan | PhD (EPFL), Assistant Professor

G Narayanan | PhD (IISc), Professor

BS Rajanikanth | PhD (IISc), Professor

K Rajgopal | PhD (IISc), Professor

AG Ramakrishnan | PhD (IIT Madras), Professor

Kaushik Basu | PhD (Minnesota), Assistant Professor

Sarasij Das | PhD (Western Ontario), Assistant Professor

GN Rathna | PhD (IISc), Principal Research Scientist

PS Sastry | PhD (IISc), FNAE, FNASc, Professor

L Satish | PhD (IISc), Professor

U Jyachanra Shenoy | PhD (IISc), Principal Research Scientist

B Subba, Reddy | PhD (IISc), Principal Research Scientist

PV Suryanarayana | MSc (Engg) (IISc), Scientific Officer

Bhaskar K | MCA (Bangalore), Technical Officer

Udaya Kumar | PhD (IISc), Professor

Venu Madhav Govindu | PhD (Maryland), Associate Professor

ASSOCIATE FACULTY

Supratim Ray | PhD (Johns Hopkins), Assistant Professor

3.3.4 Electronic Systems Engineering

FACT FILE

Established: 1974
Phone: +91-80-2293 2246
Fax: +91-80-2360 2290
Email: office@dese.iisc.ernet.in
URL: http://dese.iisc.ernet.in
Chairperson: Joy Kuri
Degree Programs Offered: PhD, MSc (Engg), MTech and ME

Core Research Areas

Communication networks, Microelectronics and nanoelectronics, Power electronics, Signal and information processing, Mechatronics, Embedded systems, Energy harvesting.

Current Research

COMMUNICATION NETWORKS

- Network Science- Activities include theoretical and experimental work in areas of: cellular-WiFi convergence and offloading, throughput delay trade-offs in mobile opportunistic networks, capacity of data center networks, test-bed development for tactile Internet, multi-packet reception and content placement strategies on shared publication media.

- Network Systems- Researchers are engaged in theoretical as well as practical issues relevant to networked systems. Focus areas include performance optimization of wireless and sensor networks, demand management and load balancing in smart grid, and campaign optimization in social networks.

MICRO & NANO ELECTRONICS

- Computational Nano electronics- Research is focused in the modeling carrier transport in nano-material based transistors at different levels of abstraction: atomic, device and circuit level. They are also involved in modeling electrothermal properties of nanomaterials.

- Device Research- Activities are focused in the design and fabrication of 2D material based high performance transistors, GaN based high power devices and reliability assessment of state of the art CMOS technology.

IN NUMBERS

9 Academic and **4** Scientific Staff

5 PhD, **3** MSc (Engg) and **31** ME/MTech Conferments

71 PhD, **4** MSc (Engg) and **72** ME/MTech Students

56 Publications

POWER ELECTRONICS

- Multiphase Drives- Research focused in developing methods for controlling asymmetrical (split-phase) six-phase induction motor drives, based on the current source inverter fed scheme as well as a single voltage source inverter supply. The existence of fully decoupled dynamic control of two machines has been demonstrated both theoretically and experimentally.

- Multilevel Inverters- Research objective is to achieve common-mode voltage elimination accompanied by capacitor voltage balancing for a general N-level inverter structure, by using only the sampled reference phase voltage amplitudes.

SIGNAL PROCESSING

- In the area of two-dimensional magnetic recording (TDMR), our research is driven by signal processing approaches, with minimal changes to existing magnetic head media structures, covering all aspects of advanced signal processing and coding for physical data storage. Moreover, we have implemented the algorithms, yielding actual circuits and prototypes.

MECHATRONICS

- Research and development activities are focused in wide areas encompassing experience mapping based prediction controller, ferrofluid pump, drug delivery pump, painless needle for trans-dermal drug delivery, active walker for cerebral palsy children, compliance monitored clubfoot brace (patented as Padmapaada), and milk tester for adulteration.

EMBEDDED SYSTEMS

- Hardware accelerator - Research involves in designing high-performance hardware architectures for acceleration of computation in the field of Computer Networking, Bioinformatics and Machine Learning using FPGAs and GPUs.

- Cyber Physical Systems - Building hardware, developing lightweight real-time software stack and addressing network security related issues in Healthcare and Smart Grid application domains. Activities also include remote surgery and vehicle platooning applications in the context of 5G networks.

ENERGY HARVESTING

- In Photovoltaics, researchers are engaged in designing and prototyping systems that interface highly variable energy-sources with the power grid. Activities also include Nanoscopic rectifying antenna based RF energy harvesting systems and power management algorithms.

FACULTY

Haresh Dagale | MSc (Engg) (IISc), Principal Research Scientist

NS Dinesh | PhD (IISc), Professor

K Gopakumar | PhD (IISc), FIETE, FNAE, FIEEE, Professor

HS Jamadagni | PhD (IISc), Professor

Joy Kuri | PhD (IISc), Professor

Kuruvilla Varghese | MTech (IISc), Principal Research Scientist

Santanu Mahapatra | PhD (EPFL), Professor

GV Mahesh | MSc (Engg) (IISc), Principal Research Scientist

TV Prabhakar | PhD (TU Delft), Principal Research Scientist

Shayan Garani Srinivasa | PhD (Georgia Tech), Assistant Professor

Chandramani Singh | PhD (IISc), Assistant Professor

Mayank Srivastava | PhD (IIT Bombay), Assistant Professor

L Umanand | PhD (IISc), Professor

3.4 Division of Interdisciplinary Research

Chairperson: **Govindan Rangarajan**

DEPARTMENTS/CENTRES/UNITS

- Centre for Biosystems Science and Engineering
- Centre for Contemporary Studies
- Centre for infrastructure, Sustainable Transportation and Urban Planning
- Centre for Nano Science and Engineering
- Computational and Data Sciences
- Management Studies
- Interdisciplinary Centre for Energy Research
- Interdisciplinary Centre for Water Research
- Robert Bosch Centre for Cyber Physical Systems
- Supercomputer Education and Research Centre

Core Research Areas

Interdisciplinarity is the characteristic feature of the research carried out in this Division. Specific research areas include Bioengineering, Urban infrastructure and transportation, Nanoscale materials, Nano devices and systems, Economics, Finance, Human resource management, Marketing, Optimization, Public policy, Energy, Water, Internet of things, Distributed sensing, Computer systems, Computational science, Data sciences and bioinformatics.

Themes

Interdisciplinary research has emerged as a crucial part of the research landscape in recent years. By breaking down departmental barriers, interdisciplinary research facilitates novel breakthroughs that may not be possible within the confines of a particular discipline. The Division of Interdisciplinary Research has a wide range of Departments/Centres with the common theme of a strong interdisciplinary focus.

IN NUMBERS

32 Faculty members

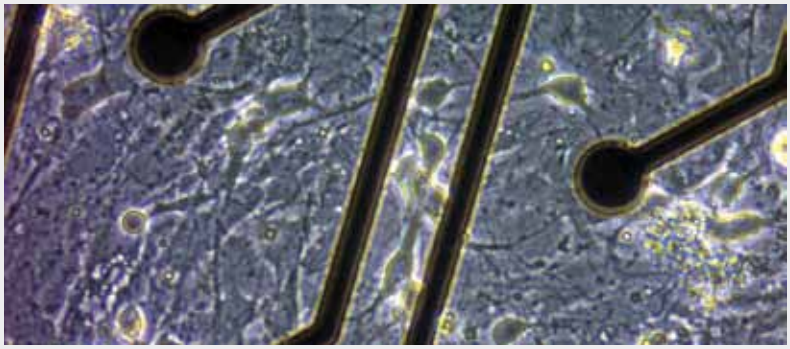
12 Fellowships of Science and Engineering Academies in India

141 PhD students, **95** Master's students

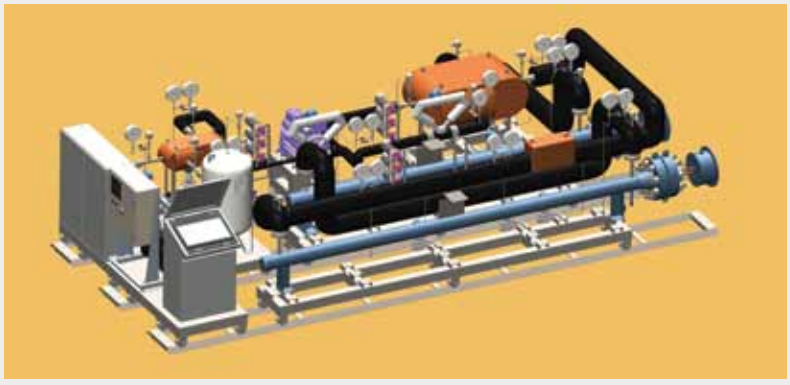
20 PhD and **49** Master's students graduated in 2015-16

Research Snapshots

- A plate of brain cells of a rat grown on a specialized tiny glass plate covered with multiple electrodes, which interface to sensors and actuators, are taught how to control a robot [REFERENCE: Jude Baby George et al. and **Bharadwaj Amrutur.** Robot navigation using neuro-electronic hybrid systems. *28th International Conference on VLSI Design and 14th International Conference on Embedded Systems, 2015*]



- A solar plant at a laboratory-scale to more efficiently generate power has been set up [REFERENCE: Pardeep Garg, **Pramod Kumar, Pradip Dutta,** Thomas Conboy and Clifford Ho. Design of an Experimental Test Facility for Supercritical CO2 Brayton Cycle. *ASME Proceedings. Geothermal, Ocean, and Emerging Energy Technologies.* doi:10.1115/ES2014-6549]



3.4.1 Centre for BioSystems Science and Engineering

FACT FILE

Established: 2015
Phone: +91 80 2293 2624
Email: sunanda@be.iisc.ernet.in
URL: http://www.be.iisc.ernet.in
Chairperson: G K Ananthasuresh
Degree Programs Offered: PhD

Core Research Areas

Biomaterials: drug-delivery, scaffolds for cell-culture, and implants; Biomechanics: measuring mechanical responses of cells and correlating them to their biological responses for diagnostics and therapeutics; Computational bioengineering: Modeling biological networks and simulation of biomolecular behaviour; Neural engineering: understanding the mechanisms underlying neuro-muscular control and coordination.

Current Research

- Research on biomaterials aims to develop and use materials for biological and medical applications. Nanoscale materials are being developed for delivery of drugs to treat cancer and infectious diseases. Nanomaterials are also used as contrast agents in imaging techniques such as magnetic resonance imaging (MRI), fluorescence, and infra-red for clinical diagnostics. Researchers in BSSE are also developing improved and long-lasting biomedical implants, especially for the treatment of orthopaedic and cardiovascular diseases. To better understand the biological mechanisms of cancer and gastrointestinal disorders, biomaterials are being used to prepare lab-bench models that mimic the environment inside the human body and thus find alternatives to using animals for drug testing.

- Biomechanics is a broad area of research wherein mechanics of biological molecules, cells, tissue, organs, and organisms is studied. Currently, at the tissue level, aneurisms in arteries, which lead to cardiovascular diseases, are studied to understand the causes behind their formation and progression. At the cell level, the focus is on breast cancer cells with a view to relate the efficacy of anti-cancer drugs to their mechanical stiffness. This is likely to lead to a simple miniature tweezers-based technique to determine patient-specific dosage in chemotherapy. Also studied at the cell level is the effect of Hepatitis C Virus on liver cells wherein change in mechanical stiffness of the cell nuclei is traced to the down-regulation of a protein. This is an example of mechanical response leading to biologically significant discovery.

IN NUMBERS

1 Academic Staff

16 Publications

24 PhD Students

- An example of computational bioengineering is to elucidate features of tuberculosis such as virulence, pathogenesis, and drug-resistance and thereby design potent strategies of intervention. Other studies aim to understand the behaviour of a cell membrane, which acts as a gateway to the interior of the cell. The interactions of the cell-membrane with specific phospholipids, proteins, and synthetic polymers as well as pore-forming toxins on the cell-membrane are studied with the aim of developing biocompatible sensors. Additionally, a biological cell is modelled as a mechanical structure to understand its mechanical response in relation to the biochemical response with a view to develop novel techniques in diagnosis and prognosis of diseases.

- Neural engineering is a new area of research where the functioning of the neural system is studied using innovative experiments. Muscular control and coordination, hand-eye coordination and neural control are studied with a view to understand how bran works. This understanding is likely to help in treating neuro-muscular diseases.


BIOENGINEERING

FACULTY

Siddharth Jhunjhunwala | PhD (Pittsburgh), Assistant Professor

ASSOCIATE FACULTY

GK Ananthasuresh | PhD (Michigan), Professor

Sandhya S Visweswariah | PhD (IISc), Professor

Ganapathy Ayappa (Chemical Engineering) | PhD (Minnesota), Professor

Bikramjit Basu (Materials Research Center) | PhD (Katholieke), Professor

Dipshikha Chakravortty (Microbiology and Cell Biology) | PhD (NCCS), Professor

Nagasuma Chandra (Biochemistry) | PhD (Bristol), Professor

Kaushik Chatterjee (Materials Engineering) | PhD (Penn State), Assistant Professor

Saumitra Das (Microbiology and Cell Biology) | PhD (Kolkata), Professor

Narendra Dixit (Chemical Engineering) | PhD (Illinois), Associate Professor

Namrata Gundiah (Mechanical Engineering) | PhD (Berkeley), Associate Professor

Ashok M Raichur (Materials Engineering) | PhD (Nevada), Professor

Annapoorni Rangarajan (Molecular Reproduction, Development, and Genetics) | PhD (NCBS), Associate Professor

Rahul Roy (Chemical Engineering) | PhD (Illinois), Assistant Professor

Deepak Kumar Saini (Molecular Reproduction, Development, and Genetics) | PhD (AIIMS), Assistant Professor

3.4.2 Centre for Contemporary Studies

FACT FILE

Established: 2004
Phone: +91-80-2360 6559; 2293 2486
Fax: + 91-80-2360 7253
Email: ccs.iisc@gmail.com
URL: http://ces.iisc.ernet.in/hpg/ragh/ccs/welcome.html
Chairperson: Raghavendra Gadagkar

Core Research Areas

Comparison between natural and social science, history and philosophy of science, interdisciplinary pedagogy.

Current Research

PRODUCTION OF KNOWLEDGE- A COMPARISON BETWEEN NATURAL AND SOCIAL SCIENCE

- The Centre for Contemporary Studies initiated the experiment of facilitating dialogue between two seemingly isolated areas of knowledge—Natural and Social Science, in 2006. It is being conducted biennially. The endeavour has been to bring to the campus some of the best national and international practitioners of different disciplines in the Human Sciences, such as philosophy, sociology, economics, law, literature, poetry, art, music, cinema etc. Students, faculty and staff of the institute as well as general members of the public attend these lectures. The aim of this experiment is to forge useful and meaningful interaction between the natural sciences and human sciences with special focus on understanding the diverse research methodologies of different disciplines and create opportunities to rethink the foundations of our own disciplines.

HISTORY AND PHILOSOPHY OF SCIENCE

- CCS is engaged in philosophical debates regarding scientific knowledge and scientific methods. The attempt is to explore the questions like: What is Science? How is it different (or whether it is different) from non-Science? Is there a specific method for doing Science? Along with the debates around Logical Empiricism, Induction and Deduction, Falsification, Realism and Relativism etc, research is also done on critiques of Science through discussions on Non-Western Sciences, Feminist Studies of Science and Science's relation to Colonialism.

INTERDISCIPLINARY PEDAGOGIC PRACTICE

- CCS conducts the Humanities course at Indian Institute of Science-Undergraduate Programme. These courses are not to teach Humanities as a series of distinct disciplines. But are designed to create an

IN NUMBERS

40 Publications

intellectual milieu in which the students learn science. It is an opportunity to bring about synergy between the Humanities and Social Sciences with the Natural Sciences.

ARTING SCIENCE

- The Centre for Contemporary Studies attempts to push disciplinary boundaries in order to explore newer and dynamic frontiers of knowledge. Research on representing Science through art is being conducted in this direction.

PASSENGER INDIANS IN SOUTH AFRICA

- The historical experience of Indians in South Africa is customarily seen through the lens of movement led by Mohandas Karamchand Gandhi. This study, based on archival research in Surat, Mauritius and South Africa invokes another perspective, namely that of 'passenger Indians', (migrants mainly from Gujarat and Tamil Nadu who paid their own fare unlike bonded or indentured workers). By recasting the experience from one defined by struggle to one defined by opportunism, this study challenges prevailing notions of migration, empire and Gandhi.

INDIA- CREATING AND SUSTAINING THE MEGA STATE

- With a sixth of humanity contained within its borders, is India remaining one, a nationalism issue or a global concern? This study addresses the building and sustaining of India as a nation.
- A novel response of Interferon-gamma includes inducing aggregation of adherent peritoneal cells during Salmonella typhimurium infection in mice.

ASSOCIATE FACULTY

Raghavendra Gadagkar | PhD (IISc), FASc, FNA, FTWAS, Foreign Associate, US Natl Acad Sci, Professor

HN Chanakya | PhD (UAS), Chief Research Scientist

Rudra Pratap | PhD (Cornell), Professor

S Ramakrishnan | PhD (Massachusetts), Professor

3.4.3 Centre for Infrastructure, Sustainable Transportation and Urban Planning

FACT FILE

Established: 2009

Phone: +91-80-22932521/2043/3251/3252, +91-80-2346 8207

Fax: +91-80-2346 8207

Email: chairman@cistup.iisc.ernet.in

URL: http://cistup.iisc.ac.in

Chairperson: J M Chandra Kishen

Core Research Areas

Sustainable transportation, intelligent and smart systems and urban planning; Traffic management systems and traffic demand; Environmental, ecological and water sciences which are useful for city planning and development; Development of smart and cities, disaster management and environment management.

Current Research

- The Centre for infrastructure, Sustainable Transportation and Urban Planning (CISTUP) was established in the year 2009 at the Indian Institute of Science with the support of several departments of the Government of Karnataka. The main objectives of the Centre are to conduct basic and applied research, organize training programs, capacity building and develop expertise in the areas of infrastructure, transportation and urban planning. The centre currently focuses on four major thrust areas of research involving sustainable and transportation, development of smart and cities, disaster management and environment management.

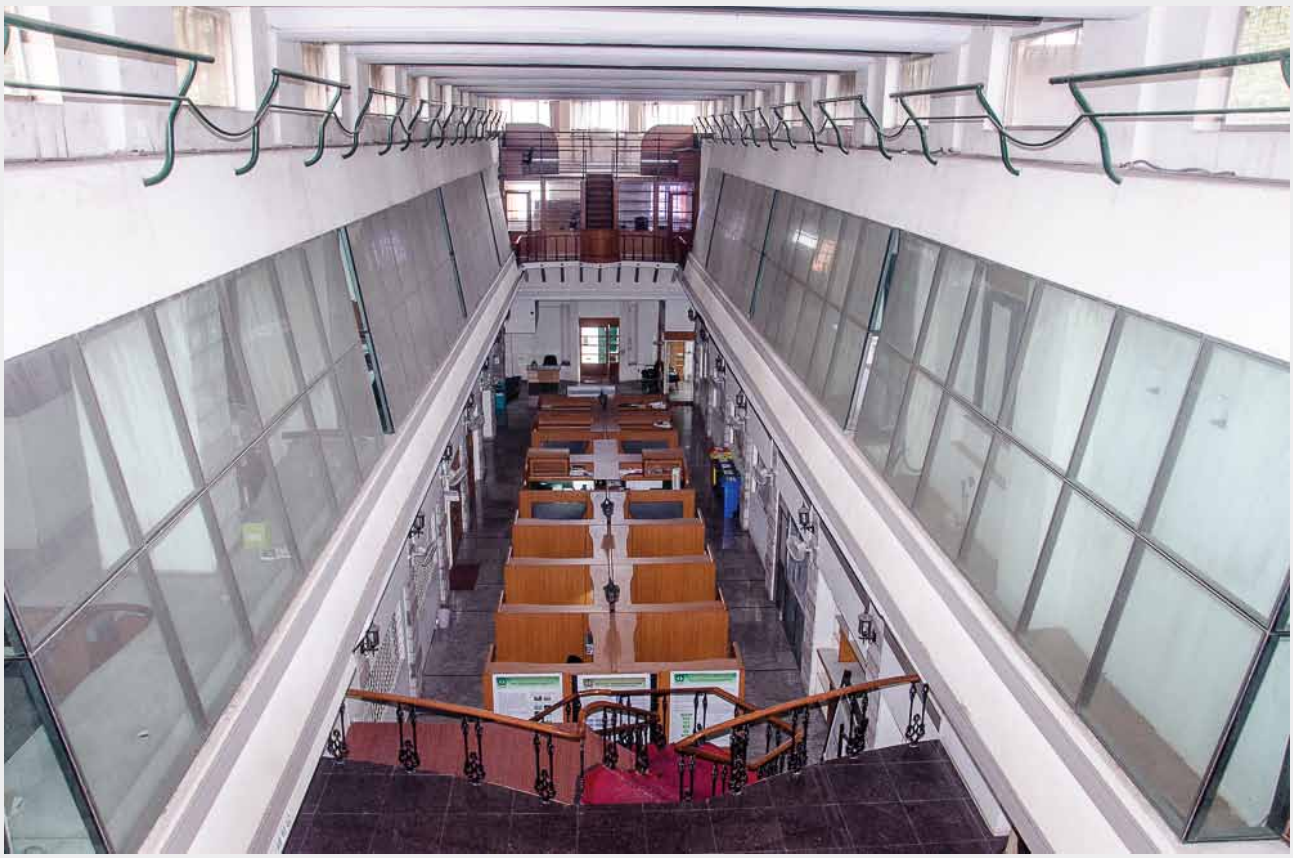
- The Centre has undertaken a solid waste management initiative for IISc campus (SWaMII) with the main aim of providing an end-to-end solution to the waste generated at IISc through an environmentally sound processing and disposal technology. The final goal is to have "zero" waste taken out of IISc campus for disposal into municipal landfills. The waste-to-energy concept would be promoted in order to process the organic waste generated.

- Studies involving pedestrian underpasses, vehicular overpasses, solid waste management, mitigating air pollution from transportation sources, traffic assessment at different junctions, bus stop and bus bays, auto rickshaw sector, all related to the city of Bangalore have been carried out at this Centre. Detailed reports highlighting recommendations for improving the quality of life of the people have been prepared and submitted to the concerned Government authorities.

- The Transit Oriented Development (TOD) technique has been used to determine the existing population densities in the city of Bangalore and the strategies needed to promote ridership and additional density

around the newly introduced metro system have been determined. To minimize private vehicular dependencies and promote public transit ridership in the areas around the metro stations, an integrated land use transport station area plan (LTSAP) has been developed. A methodology to access the extent of socio-economic inequality within Bangalore urban agglomeration is developed in order to help academicians and policy makers to strengthen the integrated functioning of the local level Governments with the metropolitan level. This would help in achieving a platform of policies and programs aiming at minimization of the extent of inequality within Bangalore urban agglomeration.

- CiSTUP conducts training programs for capacity building and also develops expertise and provide complete technological and planning solutions for urban renewal and development related to urban transportation and infrastructure engineering. Furthermore, CISTUP also actively participates in meetings and discussions organized by the various government departments including the department of urban land transport, Bangalore metropolitan transport corporation, Karnataka state road transport corporation, Bangalore development authority besides others for the planning and maintenance of urban centres in the state of Karnataka.




CiSTUP
Centre for Infrastructure, Sustainable Transportation and Urban Planning


MEETING HALL
TOILET
TOILET

ASSOCIATE FACULTY

JM Chandra Kishen | PhD (Colorado), Professor

Caleb Ronald Munigety | PhD (IIT Bombay), Research Scientist

TG Sitharam | PhD (Texas), Professor

M Sudhakar Rao | PhD (Pune), Professor

MH Balasubramanya | PhD (ISEC), Professor

B Gurumoorthy | PhD (Carnegie Mellon), Professor

MS Mohan Kumar | PhD (IISc), Professor

Shalabh Bhatnagar | PhD (IISc), Professor

Ananth Ramaswamy | PhD (Louisiana State), Professor

Bhardwaj Amrutur | PhD (Stanford), Professor

GL Sivakumar Babu | PhD (IISc), Professor

HS Jamadagni | PhD (IISc), Professor

L Umanand | PhD (IISc), Associate Professor

M Sekhar | PhD (IISc), Professor

Monto Mani | PhD (IIT Madras), Professor

Gurtoo Anjula | PhD (IIM Ahmedabad), Professor

Parthasarathy Ramachandran | PhD (Oklahoma State), Professor

Ashish Verma | PhD (IIT Bombay), Assistant Professor

Anbazhagan (Chemical Engineering) | PhD (IISc), Assistant Professor

HN Chanakya | PhD (UAS), Chief Research Scientist

KS Nanjunda Rao | PhD (IISc), Principal Research Scientist

Parmeshwar Iyer | PhD (California), Principal Research Scientist

TV Ramachandra | PhD (IISc), FNESA, FIE, FIEE(UK), FIH, Scientific Officer

3.4.4 Centre for Nano Science and Engineering

FACT FILE

Established: 2010
Phone: +91-80-2293 3291/3276
Email: chairman@cense.iisc.ernet.in
URL: http://www.cense.iisc.ernet.in
Chairperson: Rudra Pratap
Degree Programs Offered: MTech, PhD

Core Research Areas

Synthesis and study of nanomaterials and structures; III-nitride materials, devices, technology development; Post-silicon (nano) electronics, including 2D materials; MEMS, NEMS, and gas sensors; Photonics: Photovoltaics, fibre lasers, integrated silicon photonics, optical sensing, plasmonics, metamaterials, optical communications; Nano-biotechnology: biosensors, nanoswimmers, biomolecular interactions, mechanobiology; Microfluidics: Lab-on-a-Chip, droplet-based devices, interfacial microfluidics; Neuroelectronics; Technology development.

Current Research

NANOMATERIALS/ STRUCTURES

- Nanomaterials/Structures are being synthesised by various techniques, in the solution and vapour media, both in powder and thin film form, and studied by different microscopies and spectroscopies, for a range of potential applications.

POWER ELECTRONICS

- A team of 6-7 faculty members from across IISc are working @CeNSEon multi-disciplinary aspects of power transistors based on gallium nitride, the material of which white LEDs are made. The effort spans material growth to circuit fabrication and packaging, directed towards establishing an indigenous "foundry" and a new power electronics industry in India.

NANOELECTRONICS

- Nano-electronics pertains to the investigation of transport and behaviour of electrons at the nanoscale, leading to realization of technologically critical devices, besides presenting an excellent platform for exploring exciting physics. Especially so because of the recent emergence of one-dimensional and two-dimensional materials: carbon nanotubes and graphene (single layer of carbon atoms), and others. CeNSE is busily engaged with all these. An area of focus is "solar cells on steel sheets".

IN NUMBERS

11 Academic Staff

148 Publications

35 PhD Students

MEMS, NEMS, SENSORS

- Microelectromechanical systems (MEMS), which are everywhere today – in cell phones and cars, in sensing motion and controls- are a major focus of R&D at CeNSE, including gyroscopes and cantilevers that can sense single molecules. Work is under way to understand and learn from the flight and songs of crickets, and inmechanobiology, the study of vibrations of muscles and cells to discern disease conditions. Sensors for gases, moisture, temperature, etc. – integral part of the Internet of Things and more productive agriculture – are a major focus.

PHOTONICS

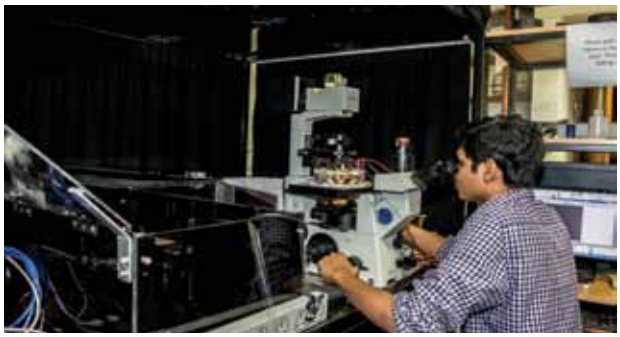
- In Photonics, light (electromagnetic radiation) is deployed the way electrons are in electronics, for example through photonic integrated circuits (PIC), in which photons are manipulated on a sub-micron scale, enabling faster, robust computation and communication. Significant effort is devoted at CeNSE to PIC and to fibre lasers, which have become technologically and strategically very important. *Plasmonics*, the study of interaction of matter and light at small length scales, is being developed further, for example, to attain unprecedented sensitivity in the detection of chemical species through surface-enhanced Raman scattering.

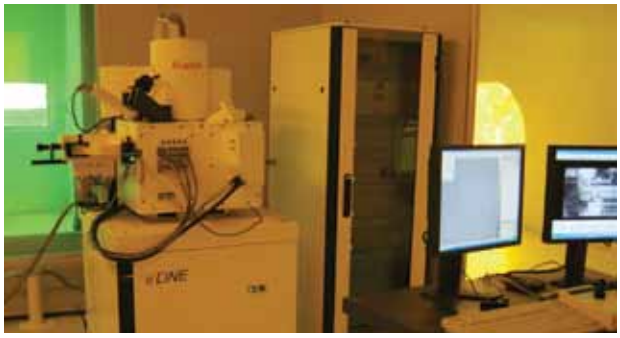
NANO-BIOTECHNOLOGY

- The central theme of nano-biotechnology research @CeNSE is to use nanoscale devices, systems, and technologies to understand complex biological phenomena and to develop novel diagnostic and therapeutic solutions for biomedical applications. These include optical biosensors based on high-precision refractive index sensing; novel electrochemical sensors for glycated albumin, glycated haemoglobin, and albumin-to-creatinin ratio, being developed for diabetic and kidney condition monitoring and early detection of diabetes.

MICROFLUIDICS

- Micro-nanofluidics involves phenomena related to fluids, their interfaces and complex interaction with matter on the micro-nano scale. Research is directed at studying interfacial microfluidics, developing droplet-based devices, Lab-on-a-Chip, and the delivery of drugs to specific locations via "nanoswimmers" using small, homogenous magnetic fields.






EQUIPMENT DEVELOPMENT


COMPex Pro

FACULTY

Navakanta Bhat | PhD (Stanford), Professor

Rudra Pratap | PhD (Cornell), Professor

Ambarish Ghosh | PhD (Brown), Associate Professor

Manoj Varma | PhD (Purdue), Associate Professor

Srinivasan Raghavan | PhD (Penn State), Associate Professor

Akshay Naik | PhD (Maryland), Assistant Professor

N Digbijoy Nath | PhD (Ohio State), Assistant Professor

Prosenjit Sen | PhD (California), Assistant Professor

Shankar Kumar Selvaraja | PhD (Ghent), Assistant Professor

Sushobhan Avasthi | PhD (Princeton), Assistant Professor

VR Supradeepa | PhD (Purdue), Assistant Professor

ASSOCIATE FACULTY

Sujit Kumar Sikdar | Dr. Med. Sci. (Kyushu), Professor

KJ Vinoy | PhD (Penn State), Professor

Ajay Kumar Sood | PhD (IISc), Professor

GK Ananthsuresh | PhD (Michigan), Professor

V Venkataraman | PhD (Princeton), Professor

PS Anil Kumar | PhD (Pune), Associate Professor

C Ramamurthy Praveen | PhD (Clemson), Associate Professor

Gaurab Banerjee | PhD (Washington), Assistant Professor

Arindham Ghosh | PhD (IISc), Associate Professor

Bharadwaj Amrutur | PhD (Stanford), Professor

HONORARY PROFESSOR

Kamino Chattopadhyay | PhD (BHU)

3.4.5 Computational and Data Sciences

FACT FILE

established: 2015

phone: +91-80-2293 2789

email: office@cds.iisc.ac.in

URL: http://cds.iisc.ac.in/

Chairperson: Phaneendra Yalavarthy

Degree Programs Offered: MSc (Engg), MTech and PhD

Core Research Areas

Computational methods for: Compressed domains, dynamical systems, finite elements, Natural language processing, Numerical analysis, Signal/image processing, and statistics; Architectures and platforms for: Big data, Cloud computing, Databases, GPU and accelerators, High performance computing, and Reconfigurable architectures; Application to: Climate modeling, Electromagnetics, Electrodynamics, Fluid mechanics, Internet of Things, Knowledge harvesting, Medical imaging, Photonics, Structural biology and interaction networks, and Video analytics.

Current Research

METHODS FOR COMPUTATIONAL AND DATA SCIENCES

- The faculty in this area investigates on theoretical and computational methods for dynamical systems, signal/image processing, finite elements, numerical analysis and statistics. They are also engaged in multiscale/multigrid methods and inverse problems, with parallel algorithms for free surface and multi-phase flows and fluid mechanics. Research into simulation, control and optimization of constrained dynamical systems leverage differential-algebraic equation systems. Matrix algebra, photonics, and physics of condensed matter are also of interest.

- Techniques for imaging and vision are being investigated, including multi-modal imaging and medical image reconstruction techniques, radiation therapy and neuroimaging. This also extends to signal processing, compression and compressed domain processing for image and video processing.

- Computational methods for biological systems are also being studied. Key areas include structural biology and biocomputing, statistical crystallography, protein structure and conformation, genome-wide function annotation, and interaction networks in biology.

- We also advance data science foundations for natural language processing, neuro-semantics, and scalable graph algorithms, including graph-based learning and time-evolving dynamic graphs.

IN NUMBERS

16 Academic Staff

71 Publications

33 PhD, **20** MSc (Engg) and **26** ME/MTech Students

ARCHITECTURES AND PLATFORMS FOR COMPUTING AND DATA SYSTEMS

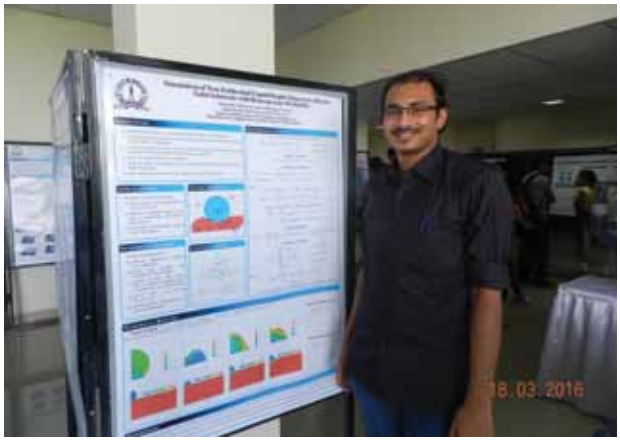
- Faculty in computer systems conduct research into the effective design and use of *advanced computing hardware and systems software.* These involve design, development and performance optimization of *High Performance Computing (HPC)*, using clusters, general-purpose accelerators and GPUs, and dynamically reconfigurable systems. *Middleware* and runtime systems allow parallel applications to use these high performance systems with fault tolerance and scalability.

- Research is being performed into *Cloud computing infrastructure* and virtualization, including scheduling and energy management. Distributed systems to support data science applications are also being examined. These include programming models, algorithms and software architectures for scalable and resilient *Big Data platforms.* Systems for relational databases, information extraction, knowledge harvesting, stream processing and graph analytics are a key focus.

APPLICATIONS TO BIG COMPUTE AND BIG DATA APPLICATIONS

- This research is motivated by and applied to novel *scientific and engineering applications* that advance science and benefit society. These span climate modelling, drug discovery, electromagnetics, electrodynamics, fluid mechanics, Internet of Things, knowledge harvesting, medical imaging, photonics, structural biology and interaction networks, and video analytics.

- Besides our strong publication record, faculty have also contributed mathematical *libraries* for parallel finite element analysis, *middleware* for scheduling in Grids and Clouds, tools for automatic knowledge harvesting, query optimizers for databases, *scalable platforms* for graph and stream processing, and software fabrics for Internet of Things.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FACULTY

Sivaram Ambikasaran | PhD (Stanford), Assistant Professor

Sashikumaar Ganesan | PhD (Otto-von-Guericke), Assistant Professor

Jayant R Haritsa | PhD (Wisconsin-Madison), Professor

K Sekar | PhD (Madras), Associate Professor

Atanu Mohanty | PhD (Brooklyn Polytechnic), Associate Professor

Debnath Pal | PhD (Jadavpur), Associate Professor

R Govindarajan | PhD (IISc), Professor

R Venkatesh Babu | PhD (IISc), Assistant Professor

Soumyendu Raha | PhD (Minnesota), Professor

SK Nandy | PhD (IISc), Professor

Yogesh Simmhan | PhD (Indiana), Assistant Professor

Matthew Jacob Thazhuthaveetil | PhD (Wisconsin-Madison), Professor

Partha Pratim Talukdar | PhD (Penn), Assistant Professor

Sathish S Vadhiyar | PhD (Tennessee), Associate Professor

Murugesan Venkatapathi | PhD (Purdue), Assistant Professor

Phaneendra Yalavarthy | PhD (Dartmouth College), Associate Professor

3.4.6 Management Studies

FACT FILE

Established: 1985
Phone: +91-80-2293 2378
Fax: +91-80-2360 4534
Email: office@mgmt.iisc.ernet.in
URL: http://mgmt.iisc.ernet.in
Chairperson: M H Bala Subrahmanya
Degree Programs Offered: PhD and MMgt

Core Research Areas

Economics and innovation management, Marketing and strategic management, Reliability theory and financial econometrics, Environment and energy management.

Current Research

ECONOMICS AND INNOVATION MANAGEMENT

- An important area of research in the Department in SMEs and start-ups. How do SMEs benefit out of the external technologies acquired by them is analyzed and substantiated by examining their economic performance. The role of technological innovation in the growth of firm size of SMEs is examined and substantiated by means of survey data as well as case studies. The emergence of new generation start-ups in India and its implications for employment generation and economic growth is analyzed in the national context.

MARKETING AND STRATEGIC MANAGEMENT

- Another area of research focused on "Strategic Marketing and Innovation Performance of Indian MSMEs" to identify strategy gaps; and On line consumer market analysis to understand the psycho-graphics of consumer behaviour.

RELIABILITY THEORY AND FINANCIAL ECONOMETRICS

- Reliability Theory and Financial Economics continue to be another research area. In Reliability Theory, after completing the work on simple independent component life series systems, we are now working on the dependent component life systems. Apart from a couple of publications previous year on the topic, this year the work on maximum likelihood analysis with log-Normal component lives, got published. There are a couple more accepted journal publications with DOI on the topic, but are not included here.

IN NUMBERS

6 Academic and **4** Scientific Staff	**6** PhD and **14** MMgt Conferments
90 PhD and **29** MMgt Students	**45** Publications

- In Financial Economics, we are currently looking into both shot and long horizon event studies. This year's publications in this area include a study on the long-term effect of financial derivatives introduction, on the liquidity of the securities listed in NSE, India, since its inception. Another long-horizon study that is ongoing, pertains to the area of Initial Public Offerings of shares of companies in NSE, again almost since its inception. The work in ongoing, on both these problems.

ENVIRONMENT AND ENERGY MANAGEMENT

- Energy, environment and technology management is the other area of research. Research in energy, environment and technology management has focused on sustainability assessment of various sub-systems of the Indian economy. The subsystems included for assessment are megacities, urban mobility, national and rural energy systems, corporate sector and urban waste. Research has also focused on design of policy and institutional mechanisms, and development & demonstration of hybrid energy enterprise models for productive and livelihood access to modern energy carriers for rural population in India.


MANAGEMENT STUDIES

FACULTY

KB Akhilesh | PhD (IISc), Professor

MH Bala Subrahmanya | PhD (ISEC), Professor

P Balachandra | PhD (IISc), Principal Research Scientist

Gurtoo, Anjula | Fellow (IIM Ahmedabad), Associate Professor

P Parameshwar Iyer | PhD (California), Principal Research Scientist

M Mathirajan | PhD (IISc), Chief Research Scientist

C Mukhopadhyay | PhD (Missouri), Professor

Parthasarathy Ramachandran | PhD (Oklahoma State), Associate professor

R Srinivasan | FIIM (IIM Bangalore), Professor

Yadnyvalkya | MS (Engg) (Moscow), MA (Russian) (CIEFL), Principal Research Scientist

3.4.7 Interdisciplinary Centre for Energy Research

FACT FILE

Established: 2012
Phone: +91 80 2293 3521 / 3522
Fax: +91-80-2360 1975
Email: office@icer.iisc.ernet.in
URL: http://www.icer.iisc.ernet.in
Chairperson: Giridhar Madras
Degree Programs Offered: PhD

Core Research Areas

Concentrating solar power (CSP), Next generation solar photovoltaic (PV), High storage density battery, Green buildings, Sustainable technologies, Combustion science and technology.

Current Research

SOLAR ENERGY RESEARCH INSTITUTE FOR INDIA AND THE UNITED STATES (SERIIUS)

- Focus efforts on high-impact fundamental and applied research and development (R&D) to create disruptive technologies in PV and CSP.
- Identify and quantify the critical technical, economic, and policy issues for solar energy development and deployment in India.
- Overcome barriers to technology transfer by teaming research institutions and industry in an effective project structure—cutting the time from discovery to technology development and commercialization, through effective coordination, communication, and intellectual property management.
- Create a new platform for bi-national collaboration using a formalized R&D project structure, along with effective management, coordination, and decision processes.
- Create a sustainable network from which to build large collaborations and foster a collaborative culture and outreach programs. This will include the use of existing and new methodologies for collaboration based on advanced electronic and Web-based communication to facilitate functional international focused teams.
- Create a strong workforce development program in solar energy science and technology.

NATIONAL CENTRE FOR COMBUSTION RESEARCH AND DEVELOPMENT (NCCRD)

- Promote Academic Research in Combustion and Develop trained researchers.
- Coordinate Research work formulated to address the following key industry sectors - Automotive Combustion, Thermal Power, Aerospace Propulsion and Fire Suppression.
- Promote collaboration with industry - Explore problems in relevant Industrial research.
- Reach out to Researchers in combustion from various Institutions & Industry and work with them in collaborative mode.
- Create Knowledge Network among institute and industry.

RESEARCH CENTRE FOR SOLAR POWER IN CHALLAKERE CAMPUS

This project, supported by Karnataka Government, is for research and development activities to set up a test and research facility which can evaluate and test small scale distributed solar power generation systems. Such distributed systems would be ideal for rural and semi urban areas where grid facility may be absent, or reliable grid power may not be available continuously. This requires evaluation of existing technologies and development of parameters for long term reliability as well as design and prototype systems with new concepts which can yield viable technologies under the conditions present in Karnataka. The primary focus of this programme is to set up research test beds in PV as well as distributed CSP for cutting edge solar power technologies which include activities such as data generation, controls and monitoring of performance.


50
100
150
200
300
100
400
500
40
60
20
80
0
100
200
300
100
400

ASSOCIATE FACULTY

HN Chanakya | PhD (UAS), Chief Research Scientist

Chattopadhyay Kamanio | PhD (BHU), Professor

Pradip Dutta | PhD (Columbia), Professor

Giridhar Madras | PhD (Texas A&M), Professor

Charlie Oommen | PhD (IISc), Principle Research Scientist

Praveen C Ramamurthy | PhD (Clemson), Professor

RV Ravikrishna | PhD (Purdue), Professor

BN Raghunandan | PhD (IISc), Professor

DD Sarma | PhD (IISc), Professor

3.4.8 Interdisciplinary Centre for Water Research

FACT FILE

Established: 2015
Phone: +91 80 2293 2669
Fax: +91 80 2360 0404
Email: chairman@icwar.iisc.ernet.in
URL: http://www.icwar.iisc.ernet.in/
Chairperson: P P Mujumdar

Core Research Areas

Adaptive responses to climate change for water systems, Hydrologic extremes - floods and droughts, Contaminant transport in ground water and vadose zone, Use of nanomaterials for water treatment, Removal of flouride and arsenic: drinking water applications, Waste water treatment technologies, Hydro-meteorologic regionalization, Contaminant transport in water distribution systems, Isotope hydrology.

Current Research

RESEARCH WORK HAS BEEN CONDUCTED ON THE FOLLOWING TOPICS:

- Climate Change Impacts on Hydrology
- Retrieving the evapo-transpiration (ET) using MODIS RS data based on surface energy balance and validating it with the flux tower measurements

OUR RESEARCH HAS IMPLICATIONS FOR THE FOLLOWING:

- Urban water management
- Irrigation water allocation and efficient use of groundwater in agriculture
- Urban floods

A technical report entitled "Chennai Floods 2015 - A Rapid Assessment" was published by the Centre with authors from IIT Madras and IIT Bombay, in May 2016.

The devastating floods that hit Chennai city and other parts of Tamil Nadu during November- December 2015 have claimed more than 400 lives and caused enormous economic damages. This has posed a challenge to the scientific community in developing a comprehensive understanding of the event. To seek even partial understanding of the complex event, it is vital that all available information and data are compiled and

IN NUMBERS

3 Publications

ASSOCIATE FACULTY

PP Mujumdar | PhD (IISc), Professor

Ashok M Raichur | PhD (Nevada), Professor

Govindasamy Bala | PhD (McGill), Professor

MS Mohan Kumar | PhD (IISc), Professor

D Nagesh Kumar | PhD. (IISc), Professor

M Sekhar | PhD (IISc), Professor

VV Srinivas | PhD (IIT), Professor

S Subramanian | PhD (Mysore), Professor

M Sudhakar Rao | PhD (Pune), Professor

Prosenjit Ghosh | PhD (Devi Ahiliya Vishwa Vidhyalaya, Indore), Professor

V Venugopal | PhD (Minnesota), Professor

Ramananda Chakrabarti | PhD (Rochester), Assistant Professor

presented in a coherent manner. Such a compilation of information immediately after the event is of immense importance, since the information is likely to be lost soon. The objective of this report is to provide such a compilation of data and information along with an informed rapid assessment of the event based on first-cut, untested results of preliminary analyses. The report is prepared with a view to provide a rapid assessment of the event, useful for more rigorous scientific studies that should be taken up in the country to address the increasing urban flooding problems.

3.4.9 Robert Bosch Centre for Cyber Physical Systems

FACT FILE

Established: 2011
Phone: +91-80-2293 2046/3430
Fax: +91-80-2293 2046
Email: contact@cps.iisc.ernet.in
URL: https://rbccps.org/
Chairperson: Bharadwaj Amrutur

Core Research Areas

Modeling, simulation and analytics; Optimization, control and policy; Large scale sensing and actuation systems; Systems Engineering.

Current Research

FIBRE BRAGG GRATING BASED SENSOR PLATFORM

- The main objective of this project is to develop a personal health diagnostic device based on a distributed sensor based on an array of individual sensing elements that have been functionalized in different ways (polyelectrolyte coatings with multiple receptors). Recently, this platform has been used for detecting various biomarkers for diagnosing cardiovascular diseases.

WEARABLE FOR NEW-BORNS

- Project on wearable for new-borns has secured additional funding from Bill and Melinda Gates Foundation to produce small volumes of the wearable device (200 in number) and make it available to other researchers in India and other developing countries.

MEMBRANE-LESS WATER FILTRATION

- The Membrane-less water filter project has led to a new start up, which has secured funding from DBT as well as additional funding from RBCCPS, to commercialize the technology.

SMART CAMPUS FOR WATER

- This project is developing an open source IoT stack which will allow distributed complex event processing. In addition, novel water related sensors, communication stacks and water distribution related analytics are being worked on. The project is part funded by DeitY, Govt of India and the centre.

IN NUMBERS

34 Publications

ENERGY ANALYTICS FOR CONSUMERS IN KERALA STATE ELECTRICITY BOARD

- This project is planning to develop analytics based guidance for energy consumers of the Kerala State Electricity Board, with an aim to help them reduce/manage their energy consumption. The project has received significant funding from the Shakti Foundation.


FIRE EXIT
Robert Bosch Centre for
CYBER PHYSICAL SYSTEMS

TECHNICAL STAFF

Ashish Joglekar | PhD (IISc), Member of Technical Staff

Vasanth Rajaraman | MSc Computer Science (Aalto), Member of Technical Staff

Venkatesh N Sheshadri | PhD (Madras), Member of Technical Staff

Vishnu Prasad | PhD (Madras), Member of Technical Staff

Alok Rawat | PhD (IISc), Member of Technical Staff

ASSOCIATE FACULTY

Bharadwaj Amrutur | PhD (Stanford), FNAE, Professor

Manoj Varma | PhD (Purdue), Associate Professor

GK Ananthasuresh | PhD, (Michigan), Professor

Rajesh Sundaresan | PhD (Princeton), Associate Professor

MS Mohan Kumar | PhD (IISc), Professor

Shalabh Bhatnagar | PhD (IISc), FNAE, Professor

Chiranjib Bhattacharyya | PhD (IISc), FNAE, Professor

Amaresh Chakrabarti | PhD (Cambridge), Professor

S Asokan | PhD (IISc), FNASc, Professor

3.4.10 Supercomputer Education and Research Centre

FACT FILE

Established: 1970

Phone: +91-80-2293 2737/2738

Fax: +91-80-2360 2648

Email: office@serc.iisc.ernet.in

URL: http://www.serc.iisc.in

Chairperson: R Govindarajan

Core Research Areas

The Supercomputer Education and Research Centre (SERC) at IISc provides the state-of-the-art computing environment, which compares well with the top computing centres anywhere in the world, and is undoubtedly the country's leading computing centre. The facilities at SERC cater to the ever-increasing demands of high performance computing for scientific and engineering research, and is a symbiosis of computing, high speed storage, sophisticated software packages, graphics, and visualization.

Current Research

The flagship system of SERC, **SahasraT** is a Cray XC40 system that combines the capabilities of Intel's latest Xeon Haswell processors for the CPU cluster and Nvidia's K40 series of GPU cards and Intel's Xeon-Phi 5120 cards for the accelerator cluster connected using Cray's own Aries high speed interconnect on a dragonfly topology with a 2 PetaByte DDN's high performance storage units. The CPU cluster consists of 1376 nodes, connected using Cray Aries interconnect, comprising a total of 33024 Haswell 2.5 GHz processor cores, with 176 TeraByte of RAM, achieving a peak compute performance of 1.32 PetaFLOPS. The system also consists of two accelerator clusters one with Nvidia GPU K40 cards (44 nodes) and the other with Intel Xeon-Phi 5120 cards (48 nodes) for the accelerator clusters. The system hosts architecture specific parallel libraries like OpenMP, MPI, CUDA and Intel Cluster software, as well as. Extensive range of parallel Scientific and Mathematical libraries like BLAS, LAPACK, Scalapack, fftw, hdf5, netcdf, PETSc, Trilinos, the DDT parallel debugger and profiler tool, etc. The system is currently the fast computing system in India, and ranked 110 in the world (as of June 2016).

In addition to SahasraT, SERC also hosts a number of other HPC clusters, including the Tyrone Cluster (800 cores), Tesla Cluster, Delta Cluster, and Dell Cluster. In addition the centre supports a wide variety of software packages, ranging from numerical packages to special-purpose application packages. The entire computing infrastructure is supported by a reliable data centre which has a 4 x 500 KVA UPS, 5 x 100 TR Chiller Units, and backed by 3 x 750 KVA DG sets.

Besides providing computing facilities, the Centre leads several national initiatives and provides industrial consultancy and research services.

IN NUMBERS

1 Academic, **5** Scientific and
4 Technical Staff

5 PhD, **12** MSc (Engg) and
14 ME/MTech Conferments

81 Publications


SERC
CRAY
IISc


DataDirect Networks

FACULTY

R Govindarajan | PhD (IISc), Professor

H Krishnamurthy | ME (IISc), Chief Research Scientist

Filbert Minj | MTech (JNU), Principal Research Scientist

J Lakshmi | PhD (IISc), Principal Research Scientist

MR Muralidharan | MTech (Mysore), Principal Research Scientist

Yogendra Kumar Negi | MTech (Delhi), Scientific Officer

KP Raghuraman | MSc (Bharatidasan), Technical Officer

TA Chandrappa | MSc (Bangalore), Scientific Assistant

KH Gowranga | MSc (Engg) (IISc), Scientific Assistant

Nalini Sreeshylan | MSc (Bangalore), Scientific Assistant

ASSOCIATE FACULTY

S Yashonath | PhD (IISc), Professor

Vijay Natarajan | PhD (Duke), Associate Professor

Matthew Jacob Thazhuthaveetil | PhD (Wisconsin), Professor

HONORARY PROFESSORS

N Balakrishnan | PhD (IISc), Professor

V Rajaraman | PhD (Wisconsin), Professor

3.5 Division of Mechanical Sciences

Chairperson: **Vikram Jayaram**

DEPARTMENTS/CENTRES/UNITS

- Aerospace Engineering
- Centre for Product Design and Manufacturing
- Chemical Engineering
- Materials Engineering
- Mechanical Engineering
- Civil Engineering
- Centre for Earth Sciences
- Centre for Atmospheric and Oceanic Sciences
- Centre for Sustainable Technologies
- Divecha Centre for Climate Change

Core Research Areas

Geotechnical Engineering, Civil & Aerospace Structures, Transportation, Water Resources, Environmental Engineering and Sustainable Habitat, Climate, Structural and Functional Materials, Manufacturing, Design Theory and Methodology, Geochemistry, Tectonics, Planetary Evolution, Remote Sensing and GIS Applications, Aerodynamics, Combustion, Navigation and Guidance, Solid Mechanics, Fluid Mechanics, Thermal Sciences, Acoustics, Robotics, Dynamics, Biomolecular Engineering, Catalysis, Colloids and Interfacial Science, Nanotechnology, Thermodynamics and Simulations across length scales.

Themes

Research work in the Division encompasses diverse areas. Seismology and climate change -- modelling as well as paleo studies -- are focus areas, which lead naturally to work on environmentally sustainable materials and design and on waste management. The work on materials includes study and modelling of biomaterials, polymers and photovoltaics. Fluid dynamics, including shock waves and other phenomena at hypersonic

IN NUMBERS

119 Faculty members

84 Fellowships of Science and Engineering Academies in India

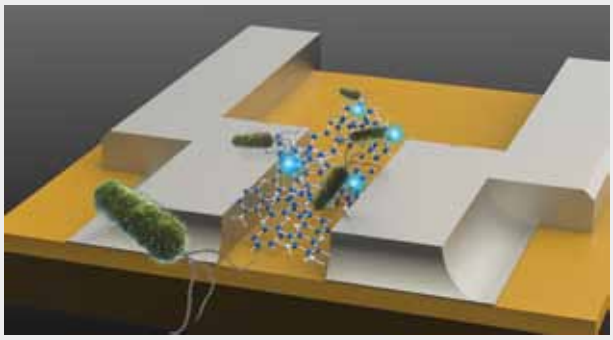
602 PhD and **295** Master's students

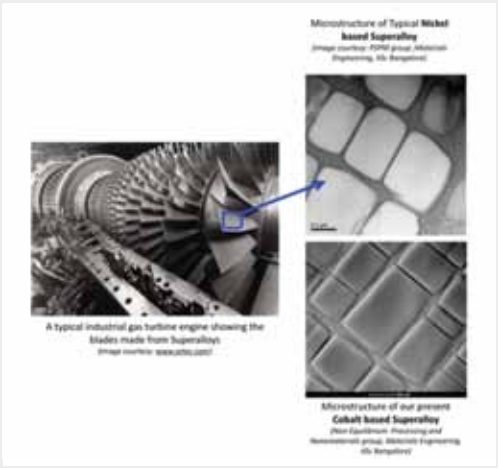
88 PhD and **107** Master's students graduated in 2015-16

speeds, is another key area of study that cuts across the various departments in this Division. Researchers in this Division also work on identifying novel drug and vaccine targets for viral infections such as HIV, hepatitis C and dengue.

Research Snapshots

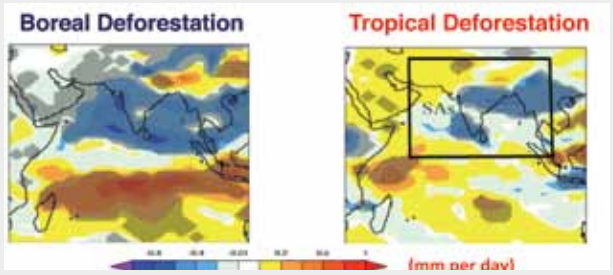
- An *E. coli* sensor, made of a polymer whose resistance changes with minute changes in the number of *E. coli*, has been developed. [REFERENCE: Ashwini N Mallya and **Praveen C Ramamurthy,** Conjugated molecule based resistive sensor for microbial detection in water with E. coli as a case study. Communicated, *ACS Sensors*]





- Cobalt-based superalloys which are corrosion resistant have been synthesized for use in jet engines, thus permitting the use of "greener" fuels. [REFERENCE: S.K. Makineni, B. Nithin and **K. Chattopadhyay.** Synthesis of a new tungsten-free γ–γ′ Cobalt-based superalloy by tuning alloying additions. *Acta Materialia*, 2015, 85:85–94.

- A computer simulation has demonstrated rainfall in India is affected more by deforestation in higher latitudes than local deforestation. [REFERENCE: N. Devaraju, **Govindasamy Bala,** and Angshuman Modak. Effects of large-scale deforestation on precipitation in the monsoon regions: Remote versus local effects. *PNAS*, 2015, 112(11): 3257–3262.



3.5.1 Aerospace Engineering

FACT FILE

Established: 1942
Phone: +91-80-2293 2417
Fax: +91-80-2360 0134
Email: office@aero.iisc.ernet.in
URL: http://aero.iisc.ernet.in
Chairperson: S Gopalakrishnan
Degree Programs Offered: PhD, MSc (Engg) and ME

Core Research Areas

Wave propagation of structures and materials; Nanostructure; Optimization, Fatigue and fracture mechanics; Composite manufacturing; Structural dynamics; Aero elasticity; Structural health monitoring; Helicopter dynamics, Guidance and Navigation; Unmanned Aerial Vehicles (UAVs); Turbulent combustion and Solid rocket propellants; Combustion instability; Biofuel sprays; Hypersonic shock wave dynamics; Turbulent and high speed flows; Computational Fluid Dynamics; Aeroacoustics; Magneto plasmadynamics; Flight Mechanics.

Current Research

AEROSPACE STRUCTURES

- The group has been working on many research areas of aerospace structures such as Wave propagation studies for bifurcation in triatomic granular cyclic chains, nonlinear dynamics, wave stability analysis and structural dynamics.
- Isospectral continuous systems and discrete systems, electroactive polymers.
- A robust design approach for placing flaps on the helicopter.
- Nano-composite materials for thermal protection, mechanical strengthening and integrated sensing.
- Thermo-elastic wave generation using high power laser beam for structural health monitoring, non-destructive evaluation of hygro-thermal effects.
- Failure Mechanism based failure theory.
- Qualitative assessment of 3-D failure criteria.
- Damage tolerance analysis, fatigue and failure, fracture mechanics, vibrations, aeroelasticity.

IN NUMBERS

25 Academic and **8** Scientific Staff

154 PhD, **29** MSc (Engg) and **68** ME/MTech Students

207 Publications

14 PhD, **5** MSc (Engg) and **22** ME/MTech Conferments

COMBUSTION AND PROPULSION

- The combustion and propulsion group carries out research on various aspects of combustion fundamentals in flames, liquid-droplet dynamics, propellant characterization, and novel electric propulsion methods.

- New energetic materials are being developed for application as rocket propellants. These include nano-materials for energetic compositions, and green propellants, liquid jet/sheet instability, ligament breakup, spray-wall interaction, and secondary atomization, Impact dynamics of liquid drops, computational investigations and stability analyses.

- New facilities are created for PIV in reacting and non-reacting flows, high speed combustion to support SCRAMJET, a three cup swirl rig for gas turbine combustion, an optical based spray drop size measurement system (SPRAYTEC).

AERODYNAMICS

- The group involved in the research areas of hydrogen-oxygen combustion based fluid jet delivery method, the feasibility of using alternate thermal protection systems including mass transfer cooling for re-entry vehicles.

- Large Eddy simulation of evaporating dilute sprays with explicit filtering approach, aeroacoustics of shrouded supersonic jets, convective-absolute instability boundary of compressible, swirling pipe flows.

- Combination of shockwave therapy along with antibiotics. The facilities available are Vertical Shock tube, PLIF System(OH, NO, acetone), DiCam Pro- ICCD Camera, High Vacuum system and test section – HST2 , FPST, dual tube vertical shock tube, Carbon Nano Tube (CNT) sensors, Elliptic Sharp Tipped Shallow (ESTS) lobed nozzle, shock/ blast tube.

GUIDANCE AND CONTROL

- The group has worked on various aspects of aerospace guidance and control methods as follows: MPSP (model predictive static programming) based techniques and "Partial IGC" techniques. Novel guidance methodologies were proposed for rendezvous of same speed unmanned aerial vehicles (UAVs) based on deviated pursuit geometry.

- Path following is critical for autonomous UAV operations and a trajectory shaping based guidance law was developed.

- Novel solutions for achieving impact angle and time constraints for missile engagements, guidance for seeker-less missiles, radar deception using electronic combat aerial vehicles, and broadcast algorithms in multi-UAV systems.

FACULTY

N Balakrishnan | PhD (IISc), Associate Professor

M Ramachandra Bhat | PhD (IISc), Chief Research Scientist

M Seetharama Bhatv PhD (IISc), FNAE, Professor

Swetaprovo Chaudhuri | PhD (Connecticut), Assistant Professor

Ranjan Ganguli | PhD (Maryland), FNAE, Professor

Debasish Ghose | PhD (IISc), FNAE, Professor

S Gopalakrishnan | PhD (Purdue), FASc, FNAE, Professor

Dinesh Kumar Harursampath | PhD (Georgia Tech), Assistant Professor

Santosh Hemchandra | PhD (Georgia Tech), Assistant Professor

Gopalan Jagadeesh | PhD (IISc), FNAE, Professor

SB Kandagal | PhD (IISc), Principal Research Scientist

PS Kulkarni | PhD (IISc), Chief Research Scientist

KN Lakshmisha | PhD (IISc), Professor

V Mani | PhD (IISc), Professor

Joseph Mathew | PhD (MIT), FNAE, Professor

G Narayana Naik | PhD (IISc), Principal Research Scientist

SN Omkar | PhD (IISc), Chief Research Scientist

Charlie Oommen | PhD (IISc), Principal Research Scientist

Radhakant Padhi | PhD (Missouri), Associate Professor

NKS Rajan | PhD (IISc), Chief Research Scientist

ON Ramesh | PhD (IISc), Associate Professor

S V Raghurama Rao | PhD (IISc), Associate Professor

Ashwini Ratnoo | PhD (IISc), Assistant Professor

KPJ Reddy | PhD (BITS-Ranchi), Professor

Mahapatra D Roy | PhD (IISc), Associate Professor

Arnab Samanta | PhD (Illinois), Assistant Professor

S Saravanan | PhD (IISc), Principal Research Scientist

TS Sheshadri | PhD (Georgia Tech), Associate Professor

D Sivakumar | PhD (IISc), Associate Professor

Suhasini Gururaja | PhD (Washington), Assistant Professor

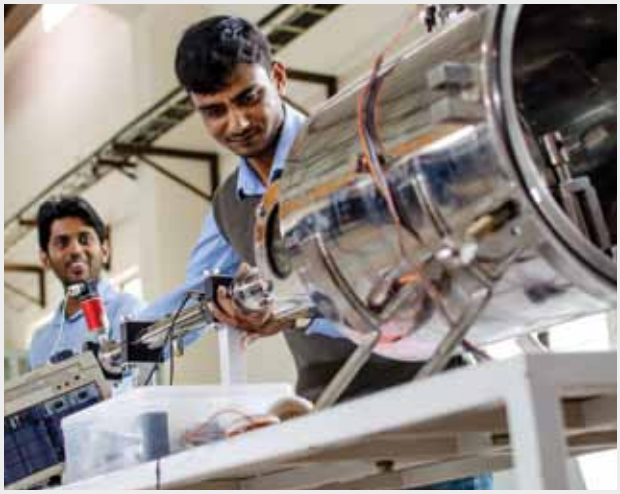
V Surendranath | MSc (Engg) (IISc), Principal Research Scientist

B Vasudevan | MASc (Toronto), Principal Research Scientist

Kartik Venkatraman | PhD (IIT Madras), Associate Professor

HONORARY PROFESSOR

N Balakrishnan | PhD (IISc), FASc, FNAE, FNASc, FNA, FTWAS, Professor



3.5.2 Centre for Product Design and Manufacturing

FACT FILE

Established: 1998
Phone: +91-80-2293 2359
Fax: +91-80-2360 1975
Email: office@cpdm.iisc.ernet.in
URL: http://cpdm.iisc.ac.in
Chairperson: Amaresh Chakrabarti
Degree Programs Offered: PhD, MSc (Engg) and MDes

Core Research Areas

Automotive, Aerospace, Agricultural, Biomedical-Systems.

Current Research

PROCESSES AND INFORMATICS IN PD

- Research into PD-processes involves developing systematic processes for PD, especially for supporting creativity in early stages. Biomimetic tools are being developed to support inspiration from nature to improve ideation fluency. Research in product informatics has typically resulted in gains in time and cost of product development through tools developed for bringing down-stream constraints (e.g. from manufacturing) into play during design itself. One research objective in product informatics is to enable knowledge acquisition through the product life-cycle that can then be used to impact new PD.

HUMAN- FACTORS IN PD

- Products/manufacturing-systems have stakeholders with various physical/cognitive abilities and constraints. Research in this area includes all aspects of products/systems where humans are involved, a thinking that supports humans during the whole product life-cycle. Many systems have user-interfaces that must interact with the user in a functional, aesthetic and meaningful manner. Research includes usability-engineering, digital-human- modelling, clinical/rehabilitative engineering, and developing UI/UX guidelines, tools and modalities of interaction to enhance human-factors performance of products. Tools are also being developed to predict/test human-performance during manufacturing/usage of products, e.g. assessment/improvement of design-for-assembly.

SUSTAINABILITY IN PD

- With increased population/consumption and dwindling resources, public-opinion/regulations are ever stricter on compliance to sustainability in all aspects – social, environmental and economic. Sustainability

IN NUMBERS

6 Academic and **1** Scientific	**5** PhD and **15** MDes Conferments
39 PhD, **8** MSc (Engg) and **40** MDes	**43** Publications

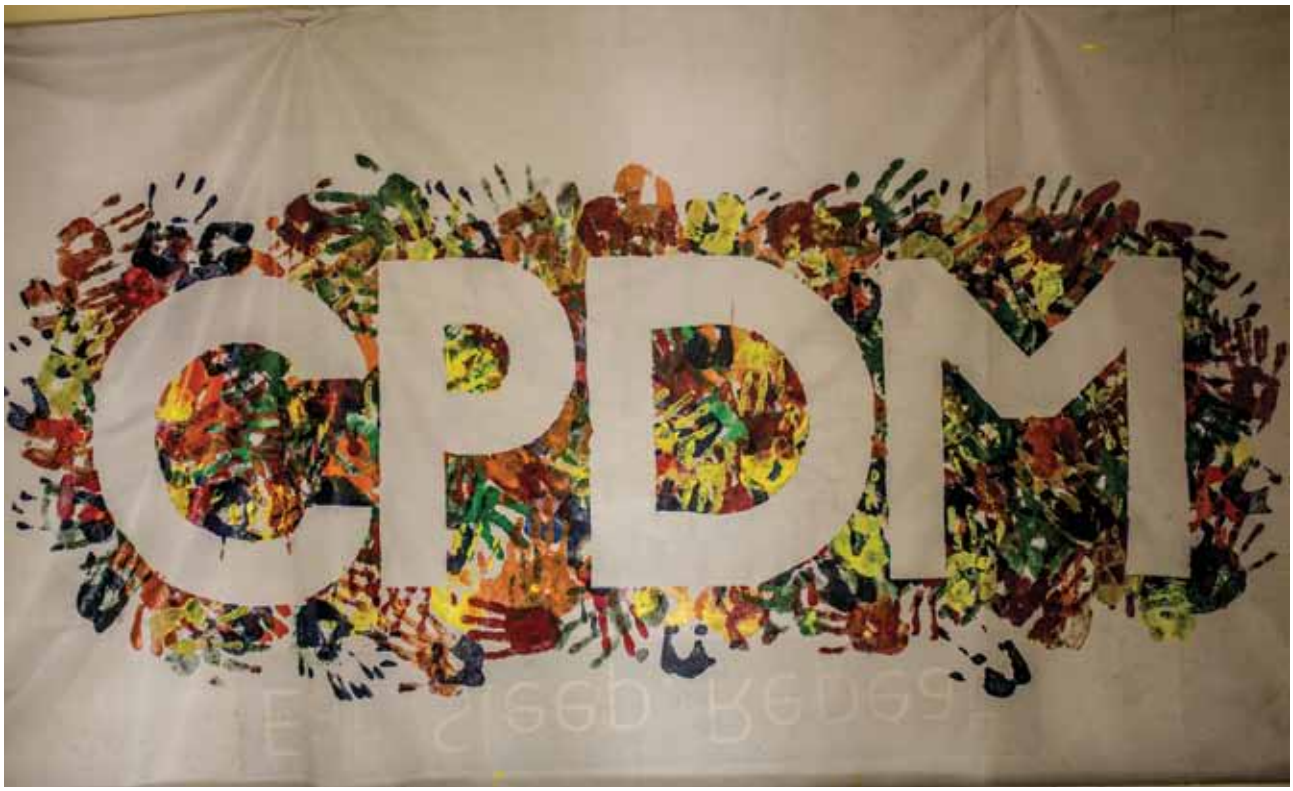
must therefore be addressed during PD. Current research involves developing advanced models for assessing impacts and associated uncertainty, for lifecycle-processes of complex, spatio-temporally distributed products/manufacturing-systems, and visualisations for these processes; use of such tools led to over 25-times reduction in environmental-impacts in systems created using such tools. Biocomposites research involves using natural-materials in developing composites with similar performance as that of artificial-composites, with reduced environmental-impacts.

TECHNOLOGY-INTEGRATION IN PD

- Products have no disciplinary boundaries; intended purpose determines technologies that constitute a product. Selection/integration of right, and often diverse, technologies is critical for products to operate seamlessly to serve their purpose. Product concepts must be embodied/detailed well, addressing the multiple factors of importance, selecting appropriate technologies and integrating these. Tools are being developed for selection/integration of technology/components/materials/processes, for computer-aided-engineering (CAE), for optimization, for improving manufacturability and assembly, for development of medical-devices, etc. for supporting development of products and manufacturing-systems that are more functional, feasible, robust and reliable.

ADVANCED MANUFACTURING

- Design and manufacturing must go hand in hand. With focus on design and digitalization, this area focuses on developing technologies/tools for advanced-manufacturing, currently in Smart-Manufacturing, Additive-Manufacturing, Sustainable-Manufacturing, and Computational-Metrology. CPDM established the first 'Smart-Factory' laboratory in India to integrate people, product, processes, tools and environment within a manufacturing system, to carry out acquisition/analytics of data on these for monitoring, prognostics/diagnostics and prevention/remediation of issues, enhancing productivity, reliability and safety. Sustainable-manufacturing aims to make manufacturing less resource-intensive and more environmentally-benign. Computational-metrology aims to automate inspection/testing, esp. for parts with complex-geometry.


CPDM

FACULTY

Amaresh Chakrabarti | PhD (Cambridge), Professor

Anindya Deb | PhD (New York), Professor

B Gurumoorthy | PhD (Carnegie Mellon), Professor

Dibakar Sen | PhD (IISc), Associate Professor

Rina Maiti | PhD (IIT Bombay), Assistant Professor

Manish Arora | PhD (Twente), Assistant Professor

ND Shivakumar | ME (Bangalore), Principal Research Scientist

ASSOCIATE FACULTY

GK Ananthasuresh | PhD (Michigan), Professor

Jaywant Arakeri | PhD (Caltech), Professor

Ashitava Ghosal | PhD (Stanford), Professor

Satish Vasu Kailas | PhD (IISc), Professor

Monto Mani | PhD (IIT Madras), Professor

Mary Mathew | PhD (IISc), Professor

NV Chalapati Rao | Principal Research Scientist

3.5.3 Chemical Engineering

FACT FILE

Established: 1943
Phone: +91-80-2293 2318
Fax: +91-80-2360 8121
Email: office@chemeng.iisc.ernet.in
URL: http://chemeng.iisc.ernet.in
Chairperson: Ganapathy K Ayappa
Degree Programs Offered: PhD, MSc (Engg) and ME

Core Research Areas

Biomolecular engineering, Catalysis and reaction engineering, Colloids and interface science, Complex fluids and transport processes, Nanotechnology, Energy science and engineering, Environmental engineering, Thermodynamics, Statistical mechanics and Molecular simulations.

Current Research

BIOMOLECULAR ENGINEERING

- A combination of mathematical modelling and sophisticated experiments are used to study transmission and treatment strategies for HIV, hepatitis C and dengue. Data from patients are used to improve drug therapies. Metabolic engineering of bacteria for bioreactors is being exploited to produce biofuels and degrade environmentally harmful effluents.

CATALYSIS AND REACTION ENGINEERING

- Using knowledge from catalytic chemistry, reaction mechanisms, reaction kinetics, and transport processes, researchers in the department are trying to improve reactions that span from polymer degradation to biomass conversion, bioprocessing, and catalysts for organics degradation and enzymatic catalysis in supercritical carbon dioxide.

COLLOIDS AND INTERFACE SCIENCE

- Synthesis of nanoparticles, nanowires, and nanorods, and formation of arrays and super lattices of nanoparticles for a variety of applications are controlled by manipulation of colloidal interactions. The formation of monolayers and bilayers and modulation of their properties for lubrication and oral care applications through sub-nanoscale chemical substitutions is a focus area.

IN NUMBERS

11 Academic and **1** Scientific Staff	**54** Publications
45 PhD, **7** MSc (Engg) and **30** ME/MTech Students	**3** PhD, **2** MSc (Engg) and **9** ME/MTech Conferments

COMPLEX FLUIDS AND TRANSPORT PROCESSES

- Complex fluids find applications in food grains and processed foods, paints and mineral slurries, hygiene and cosmetic products. We are engaged in the study of granular flows, fluidized beds, solid-liquid and liquid-liquid dispersions, and liquid-crystalline mesophases. Our tools of experimentation include rheometry, high-speed imaging, confocal microscopy, and the use of soft micro channels for synthesis and mixing of fluids.

NANOTECHNOLOGY

- We investigate the role of various mechanisms to develop better and efficient nanoparticle synthesis methods. Extending these for generation of functional nanoscale architectures with guided self-assembly to form 2D and 3D super lattice is a key theme. Design and characterization of polymers at the nanoscale has led to the development of new materials with unique structure and function.

ENERGY SCIENCE AND ENGINEERING

- Methane and natural gas storage using novel adsorbents such as metal organic frameworks (MOFs) and covalent organic frameworks (COFs) is currently being pursued. Continuum and molecular modelling studies are helping us improve the design and performance of rechargeable batteries and super-capacitors. These new storage systems are required to harness power from solar and other renewable resources.

ENVIRONMENTAL ENGINEERING

- Several promising photocatalysts have been developed to degrade pollutants in waste water from industries. Supercritical solvents have been developed for enzymatic reactions to produce compounds used in the pharmaceutical and food industries. Activated carbon fabric and modified granular activated carbon have been tested for the removal of gases such as CO_2, NO, CO. Columns have been tested for the removal of fluoride from drinking water.

THERMODYNAMICS, STASTICAL MECHANICS AND MOLECULAR SIMULATIONS

- Understanding phenomenon at the molecular scale allows one to tailor products using a bottom-up approach. We study a wide variety of phenomenon this approach to provide a molecular understanding of adsorption and separations processes, catalysis, energy storage for transportation, novel drug synthesis protocols, nanoparticle engineering, biomembrane function and transport in complex fluids.

FACULTY

Ganapathy Ayappa | PhD (Minnesota), Professor

M Giridhar | PhD (Texas A&M), Professor

Jayant M Modak | PhD (Purdue), Professor

K Kesava Rao | PhD (Houston), Professor

V Kumaran | PhD (Cornell), Professor

Prabhu R Nott | PhD (Princeton), Professor

Sanjeev Kumar Gupta | PhD (IISc), Professor

Narendra M Dixit | PhD (Illinois), Associate Professor

Sudeep Punnathanam | PhD (Purdue), Associate Professor

Rahul Roy | PhD (Illinois), Assistant Professor

S Venugopal | PhD (Purdue), Assistant Professor

PT Raghuram | MSc (Engg) (IISc), Senior Scientific Officer

3.5.4 Materials Engineering

FACT FILE

Established: 1945

Phone: +91-80-2293 2259

Fax: +91-80-2360 0472

Email: office@materials.iisc.ernet.in

URL: http://materials.iisc.ernet.in

Chairperson: TA Abinandanan

Degree Programs Offered: PhD, MSc (Engg), ME and BS

Core Research Areas

Deformation and fracture in metallic alloys and glasses, ceramics, coatings, and micropillars; Texture and grain boundary engineering; Metal-matrix composites; Implants and tissue engineering; Polymer blends and nanocomposites; Electroactive polymers, organic photovoltaics, sensors, and printed electronics; Ferroelectrics and multiferroics; Mechanochemistry and Li-ion batteries; Bioremediation and process metallurgy; Diffusion, solidification, phase transformations and phase field modeling.

Current Research

Materials research in the department covers a wide range of themes and topics including biomaterials, structural and functional ceramics, polymers and nanocomposites, alloy development, electronic packaging, materials in energy, mechanical behaviour of coatings and bulk metallic glasses, mineral processing, process metallurgy, solidification, phase transformations, and computational modeling. Some of the research highlights of 2015 are presented below.

ELECTROLITHOGRAPHY

- In collaboration with faculty in CeNSE, a new lithography technique, named Electrolithography, has been invented. A pointed stylus carrying electric current of high density is moved over a very thin metal layer (< 20 nm thick) on a polymer substrate (~200 nm thick); Joule heating melts the metal, and liquid electromigration removes the liquefied metal away, creating a trench in the metal. The polymer layer below the metal layer is, thus revealed which can then be etched by acetone or other suitable solvent. Once the polymer layer is removed, the pattern "written" by the stylus is transferred to the substrate - which can be Si or glass. As a proof of concept Ti and Au lines of width ranging from 40 nm to 2,000 nm have been deposited using a single set-up at very high throughput rate. Compared to conventional techniques such as photolithography and e-beam lithography, Electrolithography has the potential for greatly lowering installation and operational costs.

IN NUMBERS

22 Academic and **5** Scientific Staff

7 PhD, **16** ME/MTech Conferments

119 PhD, **1** MSc (Engg) and **45** ME/MTech Students

225 Publications

POLYMER MEMBRANE RESEARCH

- New and interesting results have come up in the field of polymer membrane research. It has been possible to design nanoporous membranes by selective etching of phases in PE/PEO and PVDF/PMMA polymer blends. Efforts are underway to functionalize these membranes with various nanoparticles for enhancing their antibacterial and antifouling properties. Impregnation of Ag@ TiO_2-CNT nanocomposites in PVDF/PMMA derived membrane has shown much promise. This strategy has also been used to design antibacterial membranes for water purification using PE/PEO blend derived membranes.

SURFACE MODIFICATION

- The efficacy of surface modification for improving the corrosion fatigue strength has been demonstrated in implant grade stainless steel (316L SS) by surface mechanical attrition treatment. Fine scale crystallization induced by such a process also has the beneficial effect of enhancing osteoblast attachment and proliferation.

HEAT TREATMENT SOFTWARE

- On the technology transfer front, a heat treatment software developed at IISc has been given to a company for marketing. Similarly, efforts are underway to transfer the technology for an optimized process for manufacturing boron carbide.

ALLOY DEVELOPMENT

- In the field of alloy development, a tungsten-free, cobalt-base superalloy (with gamma and gamma-prime phases in the microstructure) has been developed. This alloy has superior resistance to hot corrosion by oxygen and sulphur at elevated temperatures. In another novel line of work, involving faculty across different disciplines, an innovative combination of polymer 3D printing and computational modeling was used explain how the shapes of sea shells serve a functional purpose of effecting load distribution to protect the animal inside.

FACULTY

TA Abinandanan | PhD (Carnegie Mellon), Professor

GS Avadhani | PhD (IISc), Principal Research Scientist

Dipankar Banerjee | PhD (IISc), FASc, FNA, FNAE, FNASc, FIIM, Professor

Suryasarathi Bose | PhD (IIT Bombay), Assistant Professor

Kaushik Chatterjee | PhD (Penn State), Assistant Professor

Atul H Chokshi | PhD (USC), FASc, FNASc, FNA, FNAE, FIIM, Professor

Abhik N Choudhury | PhD (Karlsruhe), Assistant Professor

Subho Dasgupta | PhD (TUD, Germany), Assistant Professor

RJ Deshpande | MSc (Engg) (IISc), Senior Scientific Officer

Govind S Gupta | PhD (Wollongong), Professor

Vikram Jayaram | PhD (Stanford), FASc, FNASc, FNAE, FACerS, FIIM, Professor

S Karthikeyan | PhD (Ohio State), Associate Professor

Praveen Kumar | PhD (USC), Assistant Professor

Subodh Kumar | PhD (London), Professor

BV Narayana | PhD (SVU), Principal Research Scientist

P Padaikathan | MSc (Engg) (Bangalore), Senior Scientific Officer

Aloke Paul | PhD (Delft), Associate Professor

Ashok M Raichur | PhD (Nevada), FRSC, Professor

Praveen C Ramamurthy | PhD (Clemson), Associate Professor

U Ramamurty | PhD (Brown), FNA, FNAE, FASc, Professor

Rajeev Ranjan | PhD (BHU), Associate Professor

R Ravi | PhD (IISc), Principal Research Scientist

Vijay Sethuraman | PhD (South Carolina), Assistant Professor

Chandan Srivastava | PhD (Alabama), Associate Professor

S Subramanian | PhD (Mysore), FIIM, Professor

MK Surappa | PhD (IISc), FNAE, FNA, Professor

Satyam Suwas | PhD (IIT Kanpur), Professor

EMERITUS PROFESSORS

Kishore | PhD (IISc)

KA Natarajan | PhD (Minnesota), DSc (IISc), FASc, FNASc, FNAE, FIIM

KT Jacob | PhD (London), DSc (Engg) (London), FASc, FNASct FNA, FNAE, FIIM

S Ranganathan | PhD (Cambridge), FASc, FNA, FNASc, FNAE, FTWAS, FIIM

HONORARY PROFESSOR

Kamanio Chattopadhyay | PhD (BHU), FASc, FNASc, FNA, FNAE, FIIM

3.5.5 Mechanical Engineering

FACT FILE

Established: 1945
Phone: +91-80-2293 2332
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Email: office@mecheng.iisc.ernet.in
URL: http://mecheng.iisc.ernet.in
Chairperson: Pradip Dutta
Degree Programs Offered: PhD, MSc (Engg) and ME

Core Research Areas

Mechanical systems and design, Materials and manufacturing, Thermal science and fluid mechanics, Technical acoustics and I.C. engines.

Current Research

SOLID MECHANICS

Fracture behavior of magnesium alloys and bulk metallic glasses:

- Critical experiments conducted to assess the role of tensile twins on fracture behavior of a magnesium alloy have demonstrated that they provide a dominant mode of plastic deformation and toughening. This contests the claim made in earlier research works that tensile twinning may be detrimental to the fracture resistance of magnesium alloys. Key observations pertaining to twin-twin interactions, twin widening and coalescence near a notch tip have enabled understanding their influence on the mechanisms of fracture in magnesium.

- Strain rate jump tests conducted using nanoindentation technique on a Zr-based bulk metallic glass corresponding to various structural states (as-cast, shot-peened and structurally relaxed) have established that strain rate sensitivity index m is negative over a wide temperature range (300-420 K). Consequently, shear band dominated inhomogeneous plastic flow governs the deformation mode. This suggests that positive values of m reported in earlier research may be erroneous due to incorrect estimation of hardness values.

FLUID MECHANICS

- Bubbly turbulent flows are of interest in a wide variety of practical problems. These interactions are relatively complex and hence a number of fundamental questions remain. We have investigated an idealization of this problem, namely, the interaction of a single bubble with a single vortical structure, namely a vortex ring, formed in the continuous phase (water). Measurements of both the bubble dynamics and vorticity

IN NUMBERS

18 Academic and **5** Scientific Staff

124 PhD, **22** MSc (Engg) and **47** ME/MTech Students

136 Publications

14 PhD, **5** MSc (Engg) and **22** ME/MTech Conferments

dynamics have been done to help understand the two-way coupled problem. Our experiments show that the interaction results in not only break-up of the bubble, but under the right conditions, also result in fragmentation of the core of the ring with a large decrease in enstrophy. These idealized experiments exhibit many phenomena also seen in bubbly turbulent flows, which suggest that the present experiments can be helpful in better understanding interactions of bubbles with eddies in turbulent flows.

COMBUSTION

Phenomenon of Spray in Crossflow

- Significant progress has been made towards studying the phenomenon of spray in crossflow which is of relevance in gas turbine combustor development. The current work focuses on spray in crossflow rather than the liquid jet in crossflow from the standpoint of enhancing fuel dispersion and mixing. Laser-based diagnostic techniques such as Particle/Droplet Image Analysis (PDIA) and Particle Tracking Velocimetry (PTV) are utilized. Overall, the experiments and computations have provided significant insight into the spray in crossflow phenomenon, and have yielded useful results in terms of validated spray trajectory correlations, droplet evaporation lifetimes under forced convective conditions, and a methodology for simulation of airblast sprays.

Combustion Characteristics of Syngas Fuel

- Progress has also been made in the understanding of combustion chemistry of syngas fuel, which is a product of biomass or coal gasification, containing H2 and CO among other diluents. Laser-based diagnostic techniques have also been utilized to obtain high-fidelity data of temperature, OH and NO species concentrations in syngas-air counterflow flames. Overall, these quantitative measurements serve as a valuable reference for validation of H2/CO chemical kinetic mechanisms, and the detailed numerical studies while providing an insight into the kinetics and reaction pathways, have identified key reactions that need further refinement.

THERMAL SCIENCES

Adsorption based Solar Cooling: Prototype field unit with 10 kW cooling capacity:

- Earlier, a two-stage laboratory scale prototype (1 kW cooling capacity with dual effect of cooling and desalinated water) was developed. Based on the performance outcome, a cost-effective scaled up field unit (10 kW cooling capacity) was built on the roof top, with solar heat captured with evacuated tube solar collector.

Development of a volumetric solar receiver:

- A small scale volumetric receiver with SiC ceramic as the absorber material is developed and fabricated. This work is in collaboration with BHEL. The receiver has a quartz window and uses BHEL's recrystallized silicon carbide porous channels as volumetric solar receiver material.

TECHNICAL ACOUSTICS

- A perforated-baffle three-chamber hybrid muffler configuration has been analyzed for acoustic as well as back-pressure performance so as to adapt it for reducing the exhaust noise of automotive engines.

TRIBOLOGY

- A new high strength polymer-derived ceramic composite of copper has been developed using Friction Stir Processing. Also developed is an integral single material heat exchanger with no thermal contact resistance between the fin and tube.

FACULTY

GK Ananthasuresh | PhD (Michigan), Professor

Ashitava Ghosal | PhD (Stanford), Professor

Chandrasekhar S Jog | PhD (Urbana), Professor

Jayawant H Arakeri | PhD (Caltech), Professor

R Narasimhan | PhD (Caltech), Professor

Pradip Dutta | PhD (Columbia), Professor

R V Ravikrishna | PhD (Purdue), Professor

Satish V Kailas | PhD (IISc), Professor

K R Yogendra Simha | PhD (Maryland), Professor

M S Bobji | PhD (IISc), Associate Professor

Namrata Gundiah | PhD (California), Associate Professor

Raghuraman N Goverdhan | PhD (Cornell), Associate Professor

Saptarshi Basu | PhD (Connecticut), Associate Professor

Venkata R Sonti | PhD (Purdue), Associate Professor

Gaurav Tomar | PhD (IIT Kanpur), Assistant Professor

Pramod Kumar | PhD (IISc), Assistant Professor

Ratnesh K Shukla | PhD (California), Assistant Professor

Ramsharan Rangarajan | PhD (Stanford), Assistant Professor

GSVL Narasimham | PhD (IISc), Chief Research Scientist

C Dharuman | MSc (Engg) (IISc), Senior Scientific Officer

M Himabindu | PhD (Anna), Senior Scientific Officer

MK Venkataraman | MSc (Engg) (IISc), Scientific Officer

R Thirumaleswara Naik | PhD (IIT Delhi), Scientific Officer

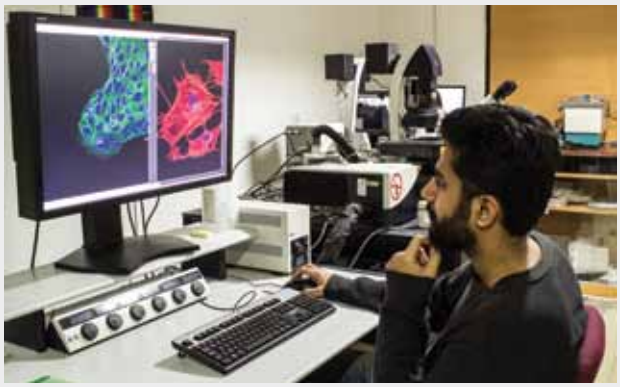
HONORARY PROFESSOR

ML Munjal | PhD (IISc)

ASSOCIATE FACULTY

B Gurumoorthy | PhD (Carnegie Mellon), Professor

Dibakar Sen | PhD (IISc), Associate Professor



3.5.6 Civil Engineering

FACT FILE

Established: 1950

Phone: +91-80-2293 2324

Fax: +91-80-2360 0404

Email: office@civil.iisc.ernet.in

URL: http://civil.iisc.ernet.in

Chairperson: Sudhakar M Rao

Degree Programs Offered: PhD, MSc (Engg), ME (Civil Engineering with specialization in Geotechnical Engineering, Structural Engineering, Water Resources & Environmental Engineering) and MTech (Transportation & Infrastructure Engineering)

Core Research Areas

Geotechnical engineering, Structural engineering, Transportation engineering, Water resource, Environmental engineering.

Current Research

CLIMATE HYDROLOGY

- A fingerprint-based detection and attribution (D&A) analysis is carried out to detect the human influence on extreme precipitation over India. Methodologies are developed for detecting the change in flood return levels under climate change, regionalization of hydrometeorological variables and regional frequency analysis of floods.

GRANULAR MECHANICS

- Macrolevel manifestation of microscopic physical phenomena like intergrain cohesion in granular materials is studied through advanced laboratory tests and constitutive modelling of cemented sands. Effect of vibration cycles on shear modulus and damping of sand is studied using resonant column tests.

COMPUTATIONAL MECHANICS

- A non-local model called "A Micropolar Peridynamic Theory in Linear Elasticity" is developed for the analysis of problems like mechanical behaviour of materials with prominent microstructure. Closed-form solutions are developed for gravity-loaded beams using inverse problem approach, which can be used to design gravity-loaded cantilever beams having a pre-specified fundamental natural frequency.

IN NUMBERS

21 Academic and **5** Scientific Staff

107 PhD, **5** MSc (Engg) and **50** ME/MTech Students

145 Publications

26 PhD, **1** MSc (Engg) and **14** ME/MTech Conferments

UNCERTAINITY AND RISK MODELLING

- To deal with the problem of global response sensitivity analysis for modelling the system uncertainties, a conceptual framework which can provide relative importance of individual variables or groups of variables is developed. A reliability based mathematical model is developed to evaluate the migration of contaminants and radionuclides from near-surface disposal facilities to the nearest geosphere and biosphere.

ENVIRONMENT ENGINEERING

- To address the problem of nitrate contamination of groundwater due to infiltration of leachate from pit toilets, a permeable reactive barrier (PRB) containing Bentonite-Enhanced Sand is proposed to remove nitrates. A mathematical model is developed to simulate the co-transport of viruses and colloids in unsaturated porous media under steady-state flow conditions. Effect of land use on the concentration and flux of dissolved silica is studied through investigations on riverine waters collected from Kaveri River Basin.

SEISMIC HAZARD ANALYSIS

- Seismic hazard maps of Patna district and design response spectra for Agartala city are developed considering region-specific ground motion parameters. These results could be used as direct inputs for earthquake resistant design of structures in these regions.

IMAGE BASED MEASUREMENTS

- Low velocity stick-slip phenomena at soft adhesive interfaces are examined using high-speed imaging to understand the adhesive mechanisms of frictional instabilities in natural and engineered systems. Effect of sand particle size and morphology on surface changes in geomembranes in interface shear tests is studied through 3D micro-topographical analysis. Micro-level properties of different self-compacting concrete mixes with and without mineral admixtures are obtained by applying micro indentation technique on SEM images.

SMART MATERIALS

- Application of Fiber Reinforced Polymer (FRP)-confinement on the masonry and use of geo-polymers to build retaining walls and roads which can withstand high cyclic loads are investigated.

TRANSPORTATION PLANNING

- A comparative analysis of activity-travel behaviour of non-workers in low, medium and high income households in Bangalore city, India is carried out using a primary activity-travel survey data.

FACULTY

Ananth Ramaswamy | PhD (Louisiana), Professor

JM Chandra Kishen | PhD (Colorado), Professor

Debasish Roy | PhD (IISc), Professor

Gali Madhavi Latha | PhD (IIT Madras), Professor

Jayant Kumar | PhD (IISc), Professor

CS Manohar | PhD (IISc), Professor

MS Mohan Kumar | PhD (IISc), Professor

PP Mujumdar | PhD (IISc), Professor

D Nagesh Kumar | PhD (IISc), Professor

M Shekar | PhD (IISc), Professor

Sitharam G Thallak | PhD (Waterloo), Professor

GL Siva Kumar Babu | PhD (IISc), Professor

PV Sivapullaiah | PhD (IISc), Professor

VV Srinivas | PhD (IIT Madras), Professor

M Sudhakar Rao | PhD (Pune), Professor

BV Venkata Rama Reddy | PhD (IISc), Professor

Debraj Ghosh | PhD (Johns Hopkins), Associate Professor

P Anbazhagan | PhD (IISc), Assistant Professor

Ashish Verma | PhD (IIT Bombay), Assistant Professor

Narayan K Sundaram | PhD (Purdue), Assistant Professor

Tejas Gorur Murthy | PhD (Purdue), Assistant Professor

KS Nanjunda Rao | PhD (IISc), Principal Research Scientist

P Raghuveer Rao | M Sc (Engg) (Bangalore), Principal Research Scientist

R Vidya Sagar | ME (Bharatiyar), Principal Research Scientist

S Venkatesha | BE (Bangalore), Senior Scientific Officer

S Shantha Kumar | BE (Bangalore), Scientific Assistant

3.5.7 Centre for Earth Sciences

FACT FILE

Established: 2007

Phone: +91-80-2293 3405

Email: office@ceas.iisc.ernet.in

URL: http://ceas.iisc.ernet.in

Chairperson: D Nagesh Kumar

Degree Programs Offered: PhD, MSc (Engg) and MTech

Core Research Areas

Paleoclimatology, Isotope geochemistry, Geobiology, Isotope hydrology, Climate-tectonics; Earthquake processes, Subduction zone tectonics; Dynamo theory and models, Planetary magnetism, Magneto hydrodynamics, Vortex dynamics; Origin and evolution of solar system, Crust-mantle processes, Early life signatures; Solid Earth Geophysics, Mantle convection, Lithosphere dynamics; Microchronology tectonics, Metamorphism and crustal processes; Remote sensing & GIS applications in climate hydrology.

Current Research

BREAKSEAL- THE NATURAL ALGORITHM USING STABLE ISOTOPES

- Nature follows its own algorithm in governing environmental changes which is still enigmatic to modern society. Stable isotope technique acts as a powerful tool to unravel the mystery behind such transformations in historical and geological past. Operation and Application of Stable isotope System (OASIS) group at CEaS studies the carbon cycle measuring the greenhouse gases from air over the ocean and terrestrial atmosphere. We study climate of the past by measuring isotope ratios in carbonates, organic matters and clay minerals from various natural archives. We measure isotope ratios in water to understand the hydrological cycles. Our motivation is to understand the present climate and reconstruct the past with an objectivity to predict the future.

UNDERSTANDING EARTHQUAKE PROCESSES ALONG PLATE BOUNDARIES

- The India-Eurasia collision features active continental and oceanic convergent boundaries. Our research focuses on earthquake source mechanisms along the Himalaya and the Andaman-Sumatra plate boundaries. We use tele seismic waveform modelling to develop slip models, which are used to infer rupture mechanisms. Research is also on the Indian Ocean intraplate earthquakes, which we interpret as related to fossil ridge-transforms and relic hot-spot trails.

IN NUMBERS

6 Academic Staff	**2** PhD and **5** ME/MTech
29 PhD, **1** MSc (Engg) and **6** ME/MTech Students	**53** Publications

DYNAMICS OF THE EARTH'S CORE

- The Earth's magnetic field is produced by dynamo action in its liquid iron outer core. Convection in the core gives rise to a dipole-dominated magnetic field that is measured on the surface by direct observation or by satellites. The Earth's field has varied considerably over geological time, showing flux anomalies and polarity reversals. Our research is aimed at understanding the dynamics of the Earth's core by a combination of theory, computations and laboratory experiments.

ORIGIN AND EVOLUTION OF THE SOLAR SYSTEM

- Equipped with a state-of-the-art clean laboratory and mass spectrometers (ICPMS, TIMS), we use major, trace element geochemistry, radiogenic isotope systematics (e.g. Rb-Sr, Sm-Nd,), non-traditional stable isotopes of Ca and Cr to understand early Solar System processes, petrogenesis of igneous rocks, provenance of ancient sediments, impact cratering, modern-day aquatic processes, as well as paleo-climate reconstruction.

THE DEEP EARTH AND SURFACE PROCESSES

- It is believed that many of the processes that we see on the surface, such as earthquakes, mountain building, movement of tectonic plates, are caused by forces deep below the surface. But how these convecting forces within the Earth's mantle couple with the surface is still an open question. In our computational geodynamics group, we use numerical modelling to understand the contribution of the deep Earth in shaping the face of the planet.

METAMORPHIC PETROLOGY

- Insights obtained on tectonic correlation of India and Madagascar; CO_2 migration during charnockites genesis modelled; evidence of crustal-scale subduction in Neo-Archean from high P-T granulites of Scotland and from chromite-silicate chemistry of the Sittampundi complex of southern India.

FACULTY

Kusala Rajendran | PhD (South Carolina), Professor

Binod Sreenivasan | PhD (Cambridge), Associate Professor

Prosenjit Ghosh | PhD (DAV, Indore), Associate Professor

Sajeev Krishnan | PhD (Okayama), Associate Professor

Attreyee Ghosh | PhD (Stony Brook), Assistant Professor

Ramananda Chakrabarti | PhD (Rochester), Assistant Professor

ASSOCIATE FACULTY

CS Manohar | PhD (IISc), Professor

PP Mujumdar | PhD (IISc), Professor

D Nagesh Kumar | PhD (IISc), Professor

Debasis Sengupta | PhD (Bombay), Professor

Venugopal Vurputur | PhD (Minnesota), Associate Professor

Jai Sukhatme | PhD (Chicago), Assistant Professor

Subramanian S | PhD (Mysore), FIIM, Professor

3.5.8 Centre for Atmospheric and Oceanic Sciences

FACT FILE

Established: 1982

Phone: +91-80-2293 2505

Fax: +91-80-2360 0865

Email: office@caos.iisc.ernet.in

URL: http://caos.iisc.ernet.in

Chairperson: Ravi S Nanjundiah

Degree Programs Offered: PhD, MSc (Engg) and MTech (Climate Science)

Core Research Areas

Monsoon variability, Land-atmosphere interaction, Aerosol physics and observation, Aerosol-cloud interaction, Ocean observation and dynamics, Satellite meteorology, Climate change, Carbon cycle, Glacier physics and observation, Geophysical fluid dynamics.

Current Research

MONSOON VARIABILITY

- We used observations and numerical model simulations to understand the variability of Indian monsoon at different time scales ranging from diurnal through decadal.

LAND- ATMOSPHERE INTERACTION

- Presence of different soil and vegetation types, including urban areas, make land surfaces more heterogeneous and ocean in terms of interaction with the overlaying atmosphere. We undertake studies to understand such interaction, especially under the profound change in land-use and land-cover over India in recent decades.

AEROSOL PHYSICS AND OBSERVATION

- Several national and international projects are undertaken to measure aerosol concentration all over India and its surroundings, and further understand aerosol composition-chemistry.

AEROSOL- CLOUD INTERACTION

- We carry out studies related to the impact of aerosols on clouds and radiation, and thus on the Indian and global monsoon system.

IN NUMBERS

9 Academic Staff

48 Publications

33 PhD, **7** MSc (Engg) and
9 ME/MTech Students

2 MSc (Engg) and
4 ME/MTech Conferments

OCEAN OBSERVATION AND DYNAMICS

- Large international projects are carried out to observed and understand the dynamics of Bay of Bengal, Arabian Sea, north Indian Ocean. Studies are also carried out to understand the impact of river water on summer monsoon.

SATELLITE METEROLOGY

- High-resolution satellite data are used to understand the climate of the globe, its relation to radiation at the top of the atmosphere and surface.

CLIMATE CHANGE

- Detailed studies are undertaken to quantify and understand the reason behind climate change. This includes model simulation, analysis of observed changes in temperature and rainfall, and quantifying the role of aerosols on radiation budget.

CARBON CYCLE

- Global carbon sources and sinks are identified and their relative roles are quantified through numerical model simulations to understand the past and future climate change scenarios.

GLACIER PHYSICS AND OBSERVATION

- Detailed studies are carried out that quantify changes of the Himalayan glaciers and modelling glacier mass balance.

GEOPHYSICAL FLUID DYNAMICS

- Mathematical models are written and used to understand the flows of the atmosphere and ocean at different spatial and temporal scales.

FACULTY

G Bala | PhD (McGill), Professor

GS Bhat | PhD (IISc), FASc, Professor

Arindam Chakrabarthy | PhD (IISc), Associate Professor

Ravi S Nanjundiah | PhD (IISc), Professor

PN Vinayachandran | PhD (IISc), FASc, FNA, Professor

Venugopal Vurputur | PhD (Minnesota), Associate Professor

SK Satheesh | PhD (Kerala), FASc, FNASc, FNA, Professor

Debasis Sengupta | PhD (Bombay), Professor

Jai Sukhatme | PhD (Chicago), Assistant Professor

ASSOCIATE FACULTY

Prosenjit Ghosh | PhD (Devi Ahiliya Vishwa Vidhyalaya, Indore), Associate Professor

HONORARY PROFESSOR

Sulochana Gadgil | PhD (Harvard), Honorary Professor

EMERITUS PROFESSOR

J Srinivasan | PhD (Stanford), FASc, FNAE, FNA, Emeritus Professor

3.5.9 Centre for Sustainable Technologies

FACT FILE

Established: 1974
Phone: +91-80-2293 2447/2762/3015
Fax: 91-80-2360 0683/0085
Email: chairman@astra.iisc.ernet.in
URL: http://astra.iisc.ernet.in
Chairperson: HN Chanakya
Degree Programs Offered: PhD and MSc (Engg)

Core Research Areas

Bio-methanation and anaerobic digestion, Gasification for energy, Energy efficient wood burning devices, Alternative & green building technologies, Sustainable architecture, Building integrated photovoltaics, Drinking water treatment including defluoridation, Sanitation, Waste management, Turbo machinery for renewable energy, Forestry, Bioenergy, Climate change.

Current Research

The Centre for Sustainable Technologies, established in 1974 as ASTRA – Application of Science and Technology for Rural Areas, is an interdisciplinary research and technology development centre pursuing cross-cutting collaborative research in the areas of sustainable energy, buildings and environment. The Centre is working towards developing sustainable solutions for a host of global concerns while focusing on sustainability tailored for local conditions. Current research focuses on: efficient use of primary resources, development of low energy buildings, building integrated photovoltaics, waste & sanitation, clean & renewable energy, waste management including sanitary land filling, waste to energy, waste recycling &waste disposal, bio-mass for energy, plasma technology, bio-methanation, turbo machinery research for energy& water pumping, and climate change & response, energy access. The details are provided below.

- Anaerobic digestion of biomass for energy and treatment of wastewater has been key research areas. Anaerobic biofilms built on biomass treats xenobiotic dosed grey water <24h to achieve <15mg BOD – achieving grey water recycling. Methods to convert biogas liquid and digested residue to mushroom, fibres, pest repellents and grain fumigants are developed.

- Focus has also been in the fundamental research on thermo-chemical conversion of biomass involving experiments and modelling of processes leading to pure hydrogen for PEM fuel cell, fuelling of SOFC with producer gas, FT synthesis and developing technology packages. Bioenergy systems for energy access for rural and industrial applications are also studied.

IN NUMBERS

4 Academic, **1** Scientific and **2** Technical Staff	**5** PhD Conferments
24 PhD and **1** MSc (Engg) Students	**71** Publications

- Research and development of turbomachinery for low temperature cycle, steam, supercritical CO_2 and gas turbine cycle are pursued. Turbomachinery for low head pumped hydro energy storage for stabilizing renewable energy grid is pursued along with efficiency improvement of domestic/irrigation pumps for rural areas.

- Research interest towards sustainability in human settlements includes sustainability studies in architecture and design, climate-responsive studies in buildings, thermal-performance studies, building integrated photovoltaics (BIPV) and sanitation. Sustainable waste to energy, waste recycling using plasma technology is pursued. Efficient use of plasmas for syngas cleaning/ enrichment for energy and other applications are being developed.

- Bioenergy systems for sustainable energy access in India specifically towards participatory approach for consensus building, business models for commercializing energy services and value added products are being researched. Research is also focused on design of policies and institutional mechanisms for scale-up & financial sustainability of hybrid bioenergy systems.

- Scientific management of landfills is examined by characterization of municipal solid waste, leachate and landfill gas. Model bioreactors are setup and their performance is analyzed against available literature models. Design of landfill components such as liners, covers, leachate collectors and site location are studied using risk and reliability analysis principles.

- Assessment of climate change projections at national, state and district levels, impacts of climate change on forests and biodiversity, vulnerability and adaptation strategies to climate risks, greenhouse gas emissions inventory from land use sectors and analysis of implications of Paris agreement on climate change is pursued.


ASTRA
CST

FACULTY

NH Ravindranath | PhD (IIT Bombay), Professor

S Dasappa | PhD (IISc), Associate Professor

Monto Mani | PhD (IIT Madras), Associate Professor

Punit Singh | PhD (Karlsruhe), Assistant Professor

HN Chanakya | PhD (UAS), Chief Research Scientist

HI Somashekhar | MSc (UAS), Technical Officer

D Venkatakrishnappa | MSc (Bangalore), Scientific Assistant

ASSOCIATE FACULTY

Jayant M Modak | PhD (Purdue), Professor

K S Nanjunda Rao | PhD (IISc), Principal Research Scientist

G L Siva Kumar Babu | PhD (IISc), Professor

M Sudhakar Rao | PhD (Pune), Professor

BV Venkata Rama Reddy | PhD (IISc), Professor

TV Ramachandra | PhD (IISc), FNESA, FIE, FIEE(UK), FIH, Scientific Officer

P Balachandra | PhD (IISc), Principal Research Scientist

3.5.10 Divecha Centre for Climate Change

FACT FILE

Established: 2009

Phone: +91-80-22932075/3425

Fax: +91-80-22933425

Email: chairman@dccc.iisc.ernet.in

URL: www.dccc.iisc.ernet.in

Chairperson: S K Satheesh

Core Research Areas

Impact of climate change on glaciers, glacier models, monitoring of glaciers from space; Impact of aerosols on climate change; Renewable energy and new applications of photovoltaic technology.

Current Research

GLOBAL WARMING

- The importance of mitigating carbon dioxide emissions in relation to black carbon emissions has been examined. If the mitigation of black carbon emissions is delayed, then there will be a need to mitigate carbon dioxide emission more rapidly in the future.

GLACIOLOGY

- The thickness of debris cover on a glacier has been estimated from remote sensing. The debris cover in a glacier acts as an insulator and hence prevents the rapid melting of the glacier. A general method for estimating the thickness of snow on the ground has been developed based passive microwave radiometer data.

RENEWABLE ENERGY

- The use of flexible photovoltaic panels for lighting of passenger compartments in Indian railways has been demonstrated. A trial run was conducted between Chennai and Mysore. The Indian Railways is planning a large scale implementation of this concept for reducing diesel consumption. A low cost method for the fabrication of semi-transparent photovoltaic cells has been developed.

IN NUMBERS

14 Publications

ASSOCIATE FACULTY

G Bala | PhD (McGill), Professor

GS Bhat | PhD (IISc), FASc, Professor

Arindam Chakrabarthy | PhD (IISc), Associate Professor

Prosenjit Ghosh | AP/CEaS, Associate Faculty

Anil V Kulkarni | PhD (Kolhapur), Distinguished Visiting Scientist

PP Mujumdar | PhD (IISc), Professor

Ravi S Nanjundiah | PhD (IISc), Professor

Sheela K Ramasesha | PhD (IISc), Consultant Scientist

NH Ravindranath | PhD (IIT Bombay), Professor

SK Satheesh | PhD (Kerala), FASc, FNASc, FNA, Professor

Debasis Sengupta | PhD (Bombay), Professor

J Srinivasan | PhD (Stanford), FASc, FNAE, FNA, Emeritus Professor

Raman Sukumar | PhD (IISc), Professor

PN Vinayachandran | PhD (IISc), FASc, FNA, Professor

Venugopal Vurputur | PhD (Minnesota), Associate Professor

3.6 Division of Physical and Mathematical Sciences

Chairperson: **Rahul Pandit**

DEPARTMENTS/CENTRES/UNITS

- Centre for Cryogenic Technology
- Centre for High Energy Physics
- Instrumentation and Applied Physics
- Mathematics
- Physics

Core Research Areas

Research in the Division covers a wide variety of areas in the Physical Sciences, including fundamental investigations in String Theory, Particle Phenomenology, Field Theory, Condensed Matter Physics, both theoretical and experimental, Soft-Matter and Complex Systems, Biology-Inspired Physics, Biomolecular Structure and Biophysics, Atomic and Optical Physics, Astronomy and Astrophysics, and cutting-edge Applied Physics research including MEMS-based and Fibre-Optic Sensors, Multifunctional Materials, such as graphene and carbon nanotubes, Super-Resolution Fluorescence Microscopy, Nano-Scale Imaging, Optics and Microfluidics, Energy- and Health-Monitoring Instrumentation, and Cryogenic Technologies, including Cryocoolers, Cryogenic Instrumentation, and Cryogenic treatment on materials. Research in Mathematics covers major areas, both pure and applied, including Probability, Partial Differential Equations, Analysis, Geometry, Topology, Algebra, Algebraic Geometry, and Analytic Number Theory.

Themes

Given the diversity of this Division, there is a diversity of themes in research. These can be gleaned from the core research areas mentioned above. Many of these areas lie in the exact sciences, both theoretical and experimental. Along with these, there are growing interdisciplinary programmes, such as in Mathematical Biology and Nanoscience. Translational research is also being carried out and products, based on innovative and cutting-edge technologies, are being brought into the market by faculty entrepreneurs in the division.

IN NUMBERS

73 Faculty members

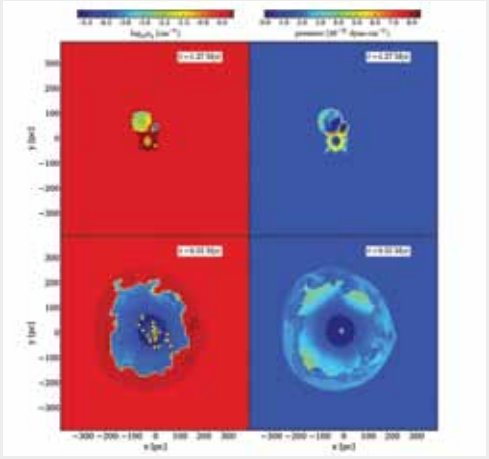
58 Fellowships of Science Academies in India

262 PhD, **16** Master's and **94** Integrated PhD students

39 PhD and **2** Master's students graduated in 2015-16

- A malignant cell surveillance system suitable for cancer screening, combining microfluidic microscopy and digital cytology, has been developed. [REFERENCE: G. Gopakumar, V.K. Jagannadh, **S.S. Gorthi,** & G.R.K.S. Subrahmanyam, Framework for Morphometric Classification of Cells in Imaging Flow Cytometry, *Journal of Microscopy*, 2016, 261(3): 307-319.

- How supernovae make the transition to superbubbles has been demonstrated using SahasraT, IISc's petaflop computer. [REFERENCE: N. Yadav, D. Mukherjee, **P. Sharma,** and B.B. Nath, Supernovae under microscope: how supernovae overlap to form superbubbles, arXiv:1603.00815, 2016]



3.6.1 Centre for Cryogenic Technology

FACT FILE

Established: 1971

Phone: +91-80-2260 1612, 2293 2339

Fax: +91-80-2360 1612

Email: office@ccf.iisc.ernet.in

URL: http://ccf.iisc.ernet.in

Chairperson: V Venkataraman

Core Research Areas

Cryocoolers, Cryogenic instrumentation, Cryogenic systems, Helium re-condensation systems, Vortex tube studies, Cold electronics, Cryogenic treatment on metals, Cryo grinding, He II flow studies, Thermal insulation studies, Cryotribology.

Current Research

CRYOCOOLERS

- A pulse tube cryocooler for a small scale helium recondensation system has been was designed and developed for the project funded by the Department of Science and Technology (DST). Efforts to improve the efficiency and achieve acoustic matching with the pressure wave generator are continued.

- Under the BRFST funded project, an experimental setup has been developed for the pumping speed studies of a cryocooler based cryosorption pump integrated with a small scale commercial cryopanel at 4.5K. This experimental set up consists of a two stage Janis GM Cryocooler, a charcoal Panel, a Calibrated Leak Valve and Lakeshore Temperature Indicator. This research work is mainly helpful in estimating the pumping speeds for hydrogen and helium used in fusion applications.

- A cryocooler based experimental set up has been developed for the measurement of thermal conductivity of various materials in the range of 300K down to 4.5 K. The system consists of a two stage GM Cryocooler (Make: Leybold) along with necessary instrumentation. Data acquisition is carried out by LabVIEW software.

CRYOGENICS INSTRUMENTATION

- As in the recent past, ISRO continues to utilize the calibration facility to calibrate LOX and LH2 cryogenic level sensors. In this year, calibration of four liquid level sensors have been completed and delivered to LPSC, Bangalore. These sensors were successfully utilised during the recent launch of GSLV.

IN NUMBERS

2 Academic and **2** Scientific Staff

5 Publications

1 PhD Students

- The facility to calibrate temperature sensors for the department of space is in continuous mode. In this year, more than hundred temperature sensors have been calibrated in the range of 300-4.2K for the Liquid Propulsion System Centre (LPSC) both in Mahedragiri and Bangalore. The calibration procedure is stream lined by developing a new and reliable Lab view program.

- A novel method to measure the superconducting parameters like critical temperature and residual resistivity ratio (RRR) has been developed using planar transformers as the primary sensing element. This technique was used to measure the RRR value of a thin film coated Niobium superconductor with high degree of accuracy.

CRYOGENIC TESTING OF MATERIALS

- With the financial support from M/S Ingersoll Rand, Bangalore, an experimental setup has been developed based on the adsorption of water on silica gel. The system uses a twin adsorption beds to provide continuous refrigeration at approximately 10 Celsius. The system will be tuned to utilize waste heat to provide useful refrigeration for industrial applications.


CRYOFAB

FACULTY

R Karunanithi | PhD (IISc), Associate Professor

DS Nadig | MTech (IIT Kharagpur), Principal Research Scientist

Upendra Behera | PhD (IISc), Principal Research Scientist

ASSOCIATE FACULTY

V Venkataraman | PhD (Princeton), Professor

3.6.2 Centre for High Energy Physics

FACT FILE

Established: 2004

Phone: +91-80-2293 2266

Fax: +91-80-2360 0106

Email: office@cts.iisc.ernet.in, userid@chep.iisc.ac.in

URL: http://chep.iisc.ac.in//index.html

Chairperson: B Ananthanarayan

Degree Programs Offered: PhD and Int. PhD

Core Research Areas

Quantum field theory, The standard model of particle physics and beyond, New particle searches, Collider data analysis, Detector physics and fabrication, QCD and lattice gauge theories, Quantum gravity, String theory and black holes, Non-commutative geometry, Quantum computation, Condensed matter systems in low dimensions.

Current Research

- Quantum field theory- Non-perturbative method of conformal boot strap and its application to extract critical exponents. Role of boundary conditions in quantum field theories in determining the spectrum.

- Standard Model of Particle Physics and Beyond- Aspects of high precision calculations in the Standard Model, evaluation of pseudo-scalar meson scattering and comparison with lattice QCD simulations. Study of Dark Matter in the context of particle physics.

- New Particle Searches and Collider Data Analysis- Dark matter searches with heavy quarks at collider experiments. Exploration of Deep Learning techniques for object identification and searches at the collider experiments. Higgs boson physics at the CMS experiment at CERN with an interest in the measurement of properties of the Higgs boson, and searches for additional bosons in scenarios beyond the standard model.

- Detector Physics and Fabrication- Exploration of detectors based on silicon sensors, gas based detectors and scintillators.

- QCD and Lattice Gauge Theories- Equation of state in finite temperature QCD and applications to heavy ion collider experiments at RHIC and LHC.

- String Theory, Quantum Gravity and Black holes- Study of gauge gravity duality and its applications, in particular entanglement entropy and reformulation of the conformal bootstrap. The formation of black holes, the study of their entropy and the nature of cosmological singularities.

IN NUMBERS

13 Academic Staff	**2** PhD and **2** Int PhD Conferments
11 PhD and **2** Int PhD Students	**59** Publications

- Non-Commutative Geometry- The study of field theories on a non-commutative spatial surface, to understand the spectrum and the renormalisation properties.

- Quantum Computation- Design of efficient quantum algorithms for linear algebra problems. Dynamics of weak quantum measurement and its applications to quantum error correction.

- Condensed Matter Systems in Low Dimensions- Transport properties of condensed matter systems in low dimensions. Study of topological insulators using a combination of analytical and numerical techniques. Effects of periodic driving on various systems, such as generation of surface states and dynamical localization of electrons.


CENTRE FOR HIGH ENERGY PHYSICS
LATTICE

FACULTY

B Anathanarayan | PhD (Delaware), Professor

Apoorva Patel | PhD (Caltech), Professor

Diptiman Sen | PhD (Princeton), FASc, FNA, FNASc, Professor

Rohini M Godbole | PhD (Stony Brook), FASc, FNA, FNASc, FTWAS, Professor

Aninda Sinha | PhD (Cambridge), Associate Professor

Justin Raj David | PhD (TIFR, Mumbai), Associate Professor

Sachindeo Vaidya | PhD (Syracuse), Associate Professor

Sudhir Kumar Vempati | PhD (Gujarat), Associate Professor

Chethan Krishnan | PhD (Texas), Assistant Professor

Biplob Bhattacherjee | PhD (Calcutta), Assistant Professor

Jyothsna Rani Komaragiri | PhD (TIFR), Assistant Professor

Prasad Satish Hegde | PhD (Stony Brook), Assistant Professor

Somnath Choudhury | PhD (CEA Saclay), Assistant Professor

EMERITUS FACULTY

N Mukunda | PhD (Rochester), FASc, FNA, Professor

J Pasupathy | PhD (Rochester), FASc, Professor

3.6.3 Instrumentation and Applied Physics

FACT FILE

Established: 1996

Phone: +91-80-2293 2269

Fax: +91-80-2360 0135

Email: office@isu.iisc.ernet.in

URL: http://iap.iisc.ac.in/

Chairperson: S. Asokan

Degree Programs Offered: PhD, MSc (Engg) and MTech

Core Research Areas

Instrumentation: Scanning-probe Microscopy, Precision motion control, Water purification, Energy harvesting, Point-of-care diagnostics, Semiconductor devices & circuits, Ion trap mass spectrometry, Fiber optics, Sensors & actuators, Embedded systems.

Applied Physics: Amorphous semiconductors, Phase-change memories, Plasma processes, Surface engineering, Solar cells, Super-resolution microscopy, Fluorescence microscopy, Optical tomography, Optical metrology, Optofluidics, Medical imaging, Flexible electronics.

Current Research

NANOBIOIMAGING

- Research is being pursued in the areas of nanoscale imaging, single molecule imaging, optical microscopy, multiphoton microscopy, point spread function engineering and multi-dimensional image reconstruction. The main thrust is to extend these optical imaging techniques for potential applications in nanobiology, applied biophysics.

NANOMETROLOGY

- Measurement and control of motion and forces at micrometer and nanometer length scales. Developing new measurement techniques, probes, actuation techniques, and advanced control strategies. Relevant ongoing research projects include high-speed atomic force microscopy, multi-axis probing systems for 3D nanometrology, magnetic tweezers with force sensing capability.

FIBER BRAGG GRATING SENSORS

- Novel methodologies have been proposed, employing FBG Sensor- for detection of E. coli bacteria, D-glucose and glycated hemoglobin, for the measurement of the pulse transit time differential from the pulse pressure

IN NUMBERS

9 Academic and **6** Scientific Staff	**7** PhD Conferments
90 PhD, **3** MSc (Engg) and **16** ME/MTech Students	**87** Publications

waveforms obtained at the carotid artery and radial artery, and for the postural stability analysis of human subjects.

PLASMA PROCESSES

- Hard coatings exceeding 30 µm thicknesses have been deposited on industrial tools using PVD techniques. Strain gauges for structural health monitoring of compressor blades in turbo engine have been developed. This would be a useful device for several defense applications. Photocatalysts that can degrade dyes using sunlight have been developed.

FLEXIBLE ELECTRONICS

- Study of devices physics and circuit techniques for disordered semiconductor based semiconductor devices. Techniques and Studies with regards to self-assembly, interplay of mechanics of substrate and electronic properties of the devices and system design have been pursued. Application areas include Water filtration and desalination and energy harvesting.

MEDICAL IMAGING

- Developed new stochastic-filtering based direct recovery of optical contrast from photo-acoustic measurement of pressure, Vibro-acoustography, Diffusing wave spectroscopy to measure the free vibration spectrum of insonified regions in a soft-condensed matter material. Study of the changes that occur when light travels in a turbulent medium and methods of reconstructing the wavefront from the scattered light.

OPTICS AND MICROFLUIDICS INSTRUMENTATION

- Developing Innovative Technologies for realizing affordable, automated, and portable instruments for conducting verity of Medical Diagnostics (Blood tests and Urinalysis), for instantaneous Detection of Adulterants/harmful- analytes in Milk & drinking-Water, and for rapid Synthesis of Metal Nanoparticles.

SENSORS AND ACTUATORS

- Nanotechnology is being utilized for developing various sensors& actuators, and varied applications of these are being demonstrated. Effort has also been made on the realization of piezoelectric materials (both bulk and thin films) based sensors for biomedical and aerospace applications.

MASS SPECTROMETRY

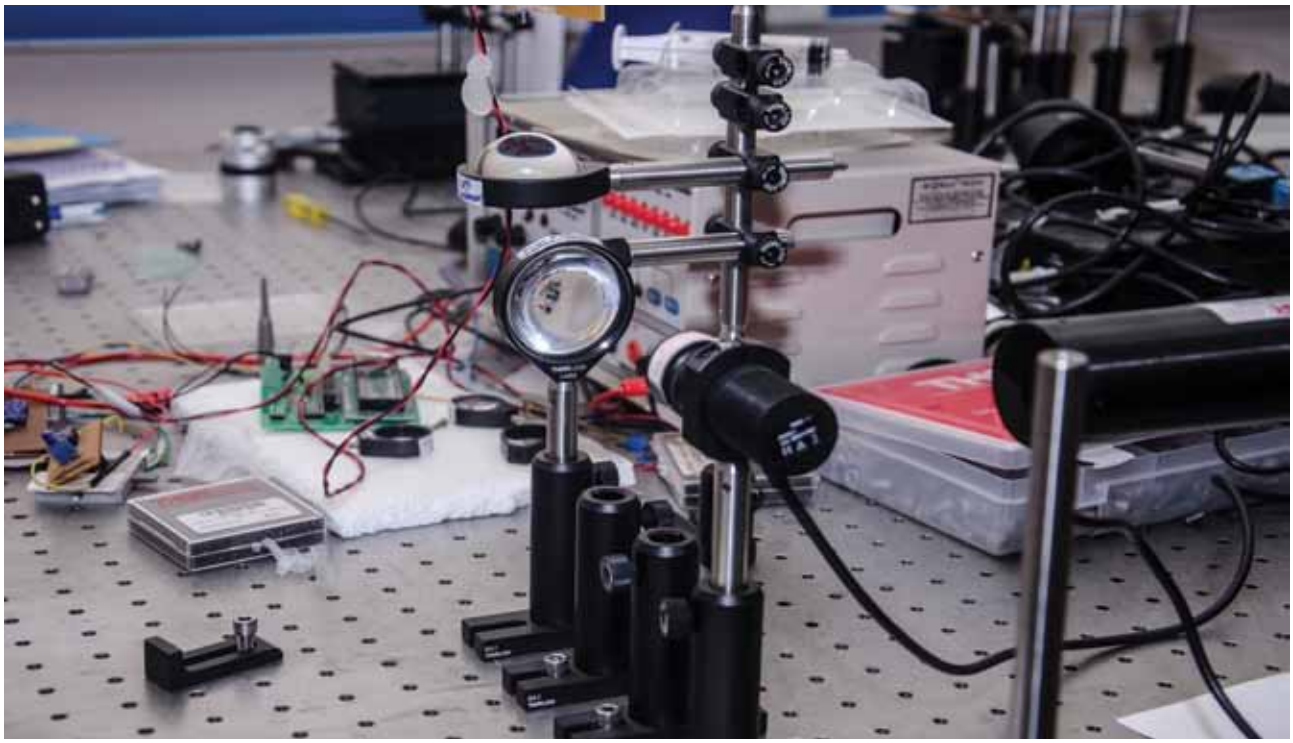
- Design of novel ion trap mass analyzers and low power electronics for realizing portable mass spectrometers. Development of simulation packages for the numerical study of mass analyzers.

EMBEDDED SYSTEMS

- Developing communication protocols of embedded systems, and state machine based application software.

GEOMETRIC METHODS FOR DESIGN

- Three geometries of the rotor of turbo molecular pump, and multistage configurations have been analyzed using Markove chain models.



FACULTY

Asokan S | PhD (IISc), FNASc, Professor

Chandran M | PhD (IISc), Principal Research Scientist

Chatterjee, Vani V | PhD (IISc), Senior Scientific Officer

Sai Siva Gorthi | PhD (EPFL), Assistant Professor

K R Gunasekhar | PhD (IISc), Principal Research Scientist

G R Jayanth | PhD (Ohio State), Assistant Professor

Abha Misra | PhD (IIT Bombay), Assistant Professor

T K Mondal | PhD (IISc), Principal Research Scientist

Partha P Mondal | PhD (IISc), Associate Professor

Konandur Rajanna | PhD (IISc), Professor

S Ramgopal | MSc (Engg) (IISc), Principal Research Scientist

G Mohan Rao | PhD (IISc), Professor

Sanjiv Sambandan | PhD (Waterloo), Assistant Professor

NC Shivaprakash | PhD (Mysore), Chief Research Scientist

Ram Mohan Vasu | PhD (Aston), Professor

ASSOCIATE FACULTY

S Umapathy | PhD (Otago), Professor

PC Mathias | PhD (IISc), Associate Professor

K Rajan | PhD (IISc), Professor

Atanu K Mohanty | PhD (Polytechnic University), Associate Professor

3.6.4 Mathematics

FACT FILE

Established: 1956

Phone: + 9 L -80-2293 2265

Fax: +91-80-2360 0146/0683

Email: office@math.iisc.ernet.in

URL: http://math.iisc.ac.in/

Chairperson: Gadadhar Misra

Degree Programs Offered: PhD and Int. PhD

Core Research Areas

Probability, Applied probability, Stochastic processes, Mathematical finance, Statistical Mechanics; Numerical analysis; Partial differential equations, Nonlinear dynamics and chaos; Combinatorics; Combinatorial topology, Low dimensional geometry and topology; Commutative algebra, Representation theory; Algebraic geometry, Differential geometry, Non-commutative geometry; Functional analysis, Harmonic analysis, Function theory in one and several variables; Number theory.

Current Research

The Department has research groups in Combinatorial Topology; Commutative Algebra and Algebraic Geometry; Complex Analysis in Several Variables, and Complex Geometry; Harmonic Analysis; Low-dimensional Topology; Non-linear Dynamics; Numerical Analysis; Operator Theory; Partial Differential Equations; Representation Theory; Stochastic Systems, Differential Games, and Stochastic Control. It has recently started - in collaboration with interested colleagues across several departments in the Institute - a major new initiative in Mathematical Biology.

ALGEBRAIC AND COMBINATORIAL TOPOLOGY

- Combinatorial manifolds, PL-manifolds, minimal triangulation of manifolds, triangulation of spheres and projective planes with few vertices, pseudo-manifolds with small excess, equivelar polyhedral map.

COMMUTATIVE ALGEBRA AND ALGEBRAIC GEOMETRY

- Study of derivation modules of curves and hyper surfaces, connection with Zariski-Lipman conjecture, monomial curves, complete intersections and set theoretic complete intersections, intersection theory of algebraic varieties, minimal number of generators for ideals and modules.

- Study of certain algebraic surfaces.

IN NUMBERS

21 Academic Staff	**5** PhD and **3** Int PhD Conferments
22 PhD and **13** Int PhD Students	**62** Publications

DIFFERENTIAL EQUATIONS
- Homogenization of partial differential equations, controllability, viscosity solutions.

DIFFERENTIAL GEOMETRY
- Manifolds of positive curvature (Ricci, scalar and isotropic), Einstein manifolds, conformal geometry (Weyl curvature and the Yamabe invariant), Gromov hyperbolic spaces.

FINITE FIELDS AND CODING THEORY
- Classification of permutation polynomials, study of PAPR of families of codes, construction of codes with low PAPR.

FUNCTIONAL ANALYSIS AND OPERATOR THEORY
- Hilbert modules, multivariable operator theory, indefinite inner product spaces.

HARMONIC ANALYSIS
- Analysis on the Heisenberg group and generalizations such as H-type groups, analysis on symmetric spaces of non-compact type and on semi-simple Lie groups, spectral multipliers of Laplacians and sub-Laplacians on these spaces, integral geometry on homogeneous spaces and relations with complex analysis.

LOW DIMENSIONAL TOPOLOGY
- Topology of three-manifolds and smooth four-manifolds, Geometric group theory, Heegaard Floer theory and its relations to geometric topology.

NON LINEAR WAVES, HYPERBOLIC EQUATIONS AND NUMERICAL ANALYSIS
- Physical phenomena associated with a class of nonlinear waves governed by a hyperbolicsystems of quasilinear partial differential equations and hyperbolic conservation laws. Application of ray methods to study successive positions of a curved wave front and a shock front. Relation between kinematical conservation laws and level set theory. Theoretical (i.e., study of approximate equations), numerical (i.e., computation of solutions with discontinuities) and applied (sonic boom, extension of Fermat's principle) problems.

NON LINEAR DYNAMICS
- Dynamical systems, Synchronization, Turing patterns, applications of Lie algebraic methods to nonlinear Hamiltonian systems, fractal dimensional analysis, generalized replicator dynamics.

PROBABILITY AND STOCHASTIC PROCESSES
- Stability and control of stochastic systems, diffusion and related topics, stochastic dynamic games, applications to manufacturing systems, first passage time problems for anomalous diffusion, long memory processes, branching particle systems, stochastic differential equations, queuing theory.

SEVERAL COMPLEX VARIABLES
- Holomorphic mappings, convexity and its applications to function theory, finite-type domains, pluripotential theory, and complex dynamical systems.

TIME SERIES ANALYSIS
- Application of time series analysis techniques to neuroscience esp. brain-machine interface, applications to geophysics.

FACULTY

Arvind Ayyer | PhD (Rutgers), Assistant Professor

Abhishek Banerjee | PhD (Johns Hopkins), Assistant Professor

Gautam Bharali | PhD (Wisconsin), Associate Professor

Tirthankar Bharracharyya | PhD (ISI), Professor

Soumya Das | PhD (HRI, Allahabad), Assistant Professor

Basudeb Datta | PhD (ISI), FASc, FNASc, Professor

Siddartha Gadgil | PhD (Caltech), Professor

MK Ghosh | PhD (TIFR-IISc), FASc, FNASc, Professor

Subhojoy Gupta | PhD (Yale), Assistant Professor

Srikanth Krishnan Iyer | PhD (UC Santa Barbara), Professor

Manjunath Krishnapur | PhD (UC Berkeley), Associate Professor

Gadadhar Misra | PhD (SUNY Stony Brook), FNA, FASc, FNASc, Professor

AK Nandakumaran | PhD (TIFR-IISc), Professor

EK Narayanan | PhD (ISI), Associate Professor

Dilip P Patil | PhD (TIFR Mumbai), Professor

G Rangarajan | PhD (Maryland), FASc, FNASc, Professor

Harish Seshadri | PhD (SUNY, Stony Brook), Associate Professor

Pooja Singla | PhD (IMSc), Assistant Professor

S Thangavelu | PhD (Princeton), FASc, FNA, Professor

Thirupathi, Gudi | PhD (IIT Bombay), Assistant Professor

Kaushal Verma | PhD (Indiana), FASc, Associate Professor

EMERITUS PROFESSORS

Usahdevi Narendra Bhosle | PhD (TIFR Bombay), Professor (Raja Ramanna Fellow)

Aloknath Chakrabarti | PhD (Calcutta), Professor (NASI Honorary Scientist)

Phoolan Prasad | PhD (IISc), Professor (NASI Senior Scientist Platinum Jubilee Fellow)

NMI DISTINGUISHED PROFESSOR

MS Narasimhan | PhD (TIFR BU), FRS, FNA, FASc, FNASc

KB Sinha | PhD (Rochester), FNA, FASc, FTWAS

VS Borkar | PhD (Berkeley), FNA, FASc, FNASc, FNAE, & FIEEE, FTWAS, FAMS

3.6.5 Physics

FACT FILE

Established: 1933
Phone: +91-80-2293 2315
Fax: +91-80-2360 2602
Email: chairman@physics.iisc.ernet.in
URL: http://physics.iisc.ernet.in
Chairperson: V Venkataraman
Degree Programs Offered: PhD, Int. PhD and BSc (Research)

Core Research Areas

Condensed matter physics – theory and experiment, Soft matter and complex systems, Astronomy and astrophysics, Biology-inspired physics, Atomic and optical physics.

Current Research

CONDENSED MATTER PHYSICS

- Significant progress has been made in the area of understanding the behavior of glassy systems. The transformation of flowing liquids into rigid glasses is thought to involve increasingly cooperative relaxation which is not fully understood. Several theoretical perspectives have been devised to explain the glass transition. Key experiments done in the department unambiguously point towards one of the theories of glass formation. This constitutes a crucial step in distinguishing between competing theories of glass formation.

- Furthermore, plasmonics has been receiving significant attention owing to its varied applications and fundamental physics insights. The large concentration of electromagnetic fields near metal nanoparticles upon illumination of light is one of the defining concepts of light matter interactions at the nanoscale. The strength of this so called "near field" can be very large at the junction of two metal nanoparticles. Experimentalists in the department have developed a method for creating structures with nanoparticles and atomically thin materials. This has allowed the realization of a new class of large-area colour-selective plasmonic photodetectors.

- In one dimension, non-interacting particles can undergo a localization-delocalization transition in a quasiperiodic potential. Recently it has been suggested that this transition transforms into a many-body localization (MBL) transition upon the introduction of interactions. It has also been shown that mobility edges can appear in the single particle spectrum for certain types of quasiperiodic potentials. Theorists

IN NUMBERS

29 Academic, **6** Scientific and **3** Technical Staff	**16** PhD and **7** Int PhD Conferments
165 PhD and **57** Int PhD Students	**150** Publications

in the department have investigated the effect of interactions in such systems. They found that MBL does indeed occur in one of the two models that they studied, but the entanglement appears to grow faster than logarithmically with time unlike in other MBL systems.

ASTRONOMY AND ASTROPHYSICS

- Significant progress has been made in understanding the evolution of galaxies and type Ia supernovae. The grand-design two-armed spiral pattern seen in many galaxies is explained by a density wave theory, however its long-term persistence is a serious problem since the group transport would destroy it within a billion years. Astrophysicists in the department have shown that upon including interstellar gas along with stars in the formulation of the theory makes the group transport slower. This allows the pattern to persist longer - for several billion years. Further, the addition of gas is shown to be essential to get a stable density wave for the observed pattern speed for the Milky Way.

BIOPHYSICS

- Microfluidic polymer devices have been designed and fabricated in the department to address key problems in biology and biophysics. In particular, a transparent planar device has been demonstrated for in-situ optimization of cell electroporation. Furthermore, detailed molecular dynamics simulations have been carried out as a function of temperature which find that the pore activation energy matches well with the experiments.

FACULTY

Arnab Rai Choudhuri | PhD (Chicago), FASc, FNASc, FNA, Professor

Chanda J Jog | PhD (New York), FASc, FNASc, FNA, FTWAS, Professor

Chandan Dasgupta | PhD (Pennsylvania), FASc, FNA, FTWAS, Professor

Jayadeep Kumar Basu | PhD (Calcutta), Professor

KSR Koteswara Rao | PhD (IISc), Professor

HR Krishnamurthy | PhD (Cornell), FASc, FNASc, FNA, FTWAS, Professor

K Rajan | PhD (IISc), Professor

Reghu Menon | PhD (IISc), Professor

Rahul Pandit | PhD (Illinois), FASc, FNA, FTWAS, Professor

Sriram Ramaswamy | PhD (Chicago), FASc, FNA, FRS, Professor

Vasant Natarajan | PhD (MIT), Professor

V Venkataraman | PhD (Princeton), Professor

Vijay B Shenoy | PhD (Brown), Professor

PS Anil Kumar | PhD (Pune), Associate Professor

Arindam Ghosh | PhD (IISc), FASc, FNASc, Associate Professor

Banibrata Mukhopadhyay | PhD (Calcutta), Associate Professor

Prabal K Maiti | PhD (IIT Kanpur), Associate Professor

KP Ramesh | PhD (Bangalore), Associate Professor

Subroto Mukerjee | PhD (Princeton), Associate Professor

Anindya Das | PhD (IISc), Assistant Professor

Aveek Bid | PhD (IISc), Assistant Professor

Manish Jain | PhD (Minnesota), Assistant Professor

Prateek Sharma | PhD (Princeton), Assistant Professor

Ramesh Chandra Mallik | PhD (IIT Madras), Assistant Professor

Tarun Deep Saini | PhD (Pune), Assistant Professor

Tanmoy Das | PhD (Northeastern), Assistant Professor

Vibhor Singh | PhD (TIFR), Assistant Professor

Prerna Sharma | PhD (TIFR Bombay), Assistant Professor

Nirupam Roy | PhD (NCRA-TIFR), Assistant Professor

Prasad Vishnu Bhotla | PhD (IISc), Chief Research Scientist

Suja Elizabeth | PhD (IISc), Chief Research Scientist

R Ganesan | PhD (IISc), Principal Research Scientist

K Ramesh | PhD (IISc), Principal Research Scientist

DV Suvisesha Muthu | PhD (IIT Kanpur), Principal Research Scientist

MN Ramanuja | PhD (IISc), Senior Scientific Officer

VC Srinivas | BE (Bangalore), Technical Officer

MV Manjula | MSc (Annamalai), Scientific Assistant

K N Sathya Murthy | MSc (Bangalore), Scientific Assistant

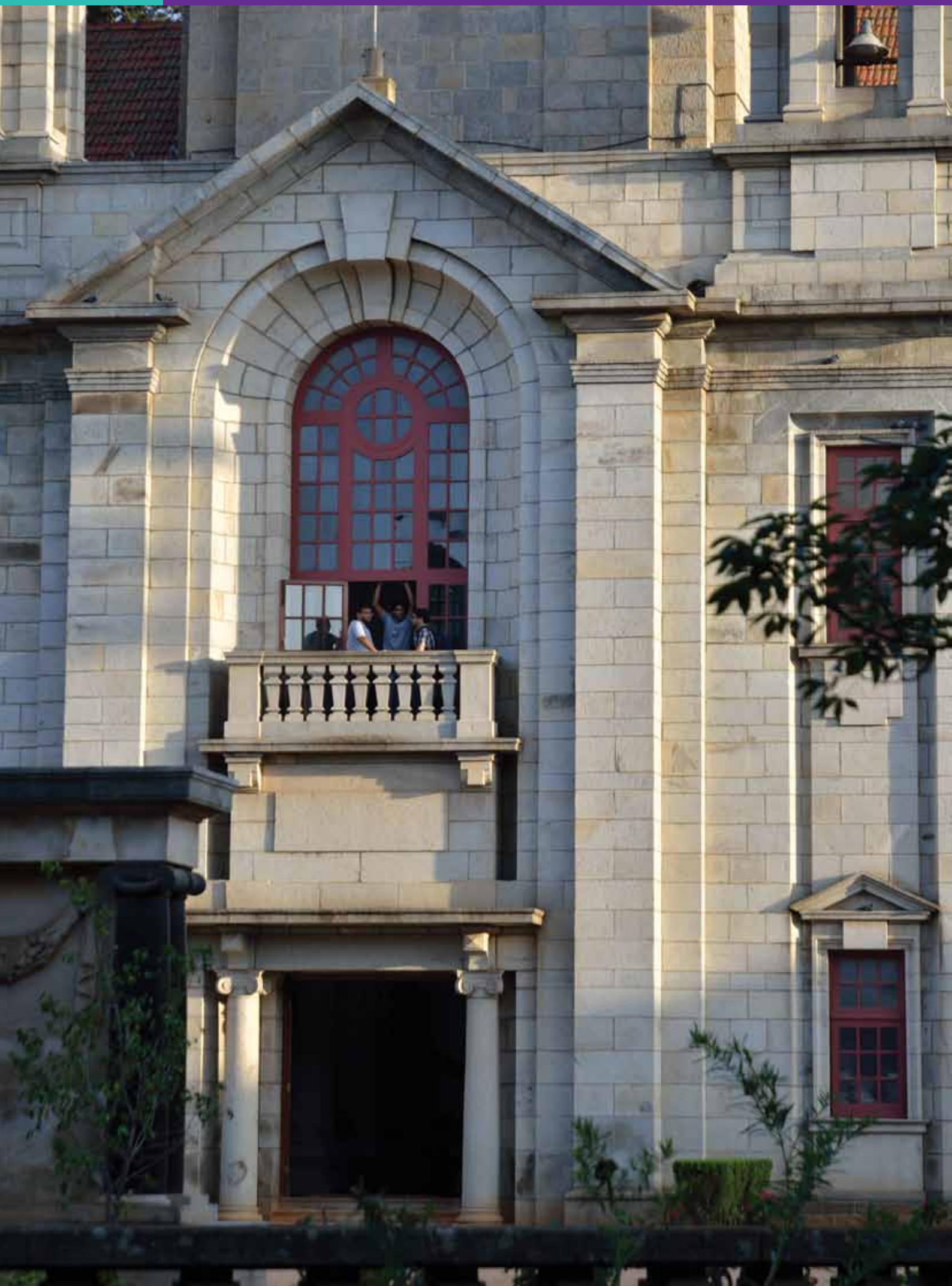
ASSOCIATE FACULTY

Ambarish Ghosh | PhD (Brown), Associate Professor

HONORARY & DISTINGUISHED FACULTY

AK Sood | PhD (IISc), FASc, FNASc, FNA, FTWAS, FRS, Professor

TV Ramakrishnan | PhD (Columbia), FNASc, FASc, FNA, FTWAS, FRS, Foreign Associate, Academie des Science (Paris), Distinguished Associate



3.7 Centres under The Director

3.7.1 JRD Tata Memorial Library

The JRD Tata Memorial Library, at the Indian Institute of Science, is one of the oldest, yet among the most modern science and technology libraries in India. It was started in 1911, just two years after the Institute was established. The collection includes books, journals, reports, theses, Indian Patents and standards. This rich and valuable collection built over nine decades has rare reference materials and back volumes of several important journals. Apart from its print resources, the library has access to a large collection of e-journals, eBooks and databases.

In 2015, the library added 6266 documents, including 1450 books, 4200 bound volumes and 616 Gift books. Its EBook cataloguing service is being continued. The total holdings of the Library has now increased to about 5,13,438 physical documents which includes materials like technical reports, standards, theses and dissertation. It currently subscribes to over 765 e-only journals at an expenditure of nearly Rs.15 crores. The 'Electronic Theses Repository' contains about 2430 theses.

The Circulation section has registered 756 new members. The total number of transactions carried out in 2015 was 24,079 transactions. Besides this, reshelving, shelf rectification, shifting etc. are carried out in the library regularly.

The library continues to maintain pre-eminence in providing access to a large number of e-resources from the following professional scientific societies:

1. American Chemical Society - All journals and its archive
2. Royal Society of Chemistry - All Journals and its archive
3. American Society for Microbiology - All Journals
4. Society for Industrial and Applied Mathematics (SIAM) - Complete journal collection and archive
5. American Institute of Physics - Journals and archive
6. American Physical Society Journals, including Physical review Online (PROLA) Collection
7. Institute of Physics Publishing - Complete collection including its archive
8. Oxford University Press - Complete Mathematics, Physical and Life Science Collections
9. JSTOR Archive

Some of the Backfile collections to which access is provided on a perpetual access basis include:

1. Elsevier Backfiles in eleven subject categories such as Biochemistry, Organic Chemistry, Inorganic Chemistry, etc.
2. Wiley InterScience backfiles in eight subject categories which include Biochemistry, Polymer Science, Analytical Science, etc.
3. 3 new backfiles have been added to the e-collection- Nature backfiles, American Chemical Society Legacy Archive, Institute of Physics Publishing Journal Archive

LIBRARIAN-IN-CHARGE

N C Shivaprakash | Chief Research Scientist, Instrumentation and Applied Physics

Apart from the above, as a core member of INDEST-AICTTE Consortium of MHRD, access is provided to over 6000 plus electronic journals, several databases and major e-resources including:

1 Association of Computing Machinery Journals
2 IEEE / IEE Journals
3 Elsevier Science Direct
4 Springer Link Journals
5 ASTM Journals and Standards
6 ASCE Journals
7 ASME Journals
8 Emerald full-text

Besides Web of Science, SciFinder Scholar and MathScinet databases were also subscribed in 2015. Also, 27 *Nature Group* journals were continued to be subscribed by the library.

The library has been using LIBSYS, a Library Management Software for acquisition, cataloguing, serials control, and circulation. Online access to Library holdings data is through WEB-OPAC. Users have the facility to browse and search the library database and view the status of a document or their own transactions and make on-line reservations for a document issued out. For its house-keeping, the library has purchased LibSys 7, a web-centric library information management software. And for the optimum use of e-resources subscribed, Sixth Sense Journal search: a federated search engine was procured with the approval of the Journal Purchase Committee. The software was on trial for almost two years.

Presently, the OPAC database has about 1,95,271 books and 2,09,287 records of bound volumes of periodicals. Content page access for books through OPAC is provided to all users of the library. Article indexing service for articles published by the Institute faculty has been initiated.

During this past year, computing facilities in the user area, computer section and operational units were augmented. A new photocopy machine was purchased under buy-back scheme. The library also provides photocopies of documents available in the library under the copyright laws to scientists/ academicians/ students.

In addition, the library continues to provide, e-mail based services like, new additions of books and journals, interactive services like reminders, reservations and overdue intimation and e-mail based reference service. The library web page has been designed to disseminate up-to-date information. The web-page provides comprehensive information on the collections, e-resources, databases, new additions and all the services provided by the library. The page also serves as a portal to access e-resources.

The library procures books by placing order on vendors who offer substantial discount while providing prompt supply. This has resulted in a discount ranging from 25% to 34% across various publishers.

At the national level, a new consortium was formed at the national level merging major Consortiums such as INDEST-AICTE, N-LIST and UGC-INFONET Digital Consortium primarily connected with MHRD Government of India. Known as *e-Shodh Sindhu: Consortium for Higher Education Electronics Resources*, it will be operational in 2016, and through it, the Institute is likely to get few new e-resources. UGC has identified the library as the Document Delivery Centre for the Southern Region and has fixed charges for these services. Initially financial assistance was provided by UGC-INFLIBNET for the purpose. In addition, as a member of Consortium, it provides document delivery to other Consortium members. It is also recognized as the Resource

Center for Mathematics for the South Region by the National Board of Higher Mathematics, Dept. of Atomic Energy, Government of India, and is receiving financial assistance for developing this collection on Mathematics.

The library's other new initiatives include: Painting of the library and new sign boards, installation of fire-fighting and equipment, and extension of working hours until 2:00 am.

3.7.2 Archives and Publications Cell

The Archives Cell was established in 2007 with a mandate to collect, catalogue and preserve all documents, images, and other articles of relevance to the Institute. It became the Archives and Publications Cell (APC) in 2008 with the additional responsibility of coordinating and facilitating the publication activities of the Institute through IISc Press. APC also hosts the DST Centre for Policy Research, devoted to research on policies related to science and technology research in Indian universities and R&D centres.

Archives

Original Institute correspondences and land documents, administrative manuals and bye-laws, schemes of instruction, building committee reports, faculty profiles and speeches of Sir M Visveswaraya have been uploaded to D-Space, the digital archiving platform. Its other outreach activities included: A photo exhibition (with brochure) on APJ Abdul Kalam on Open Day 2016 and a poster display on the achievements of the Alumni of IISc during the 3rd Global Alumni Conference in June 2015. A brochure outlining a brief history of IISc was brought out on the occasion.

APC facilitated archival research by scholars from IIT-Madras, IIM-Kozhikode, King's College (London), the Prime Minister's Office, Prasar Bharati, and departments in IISc. Under the Oral History program, interviews with a several eminent professors of IISc were recorded.

IISc Press

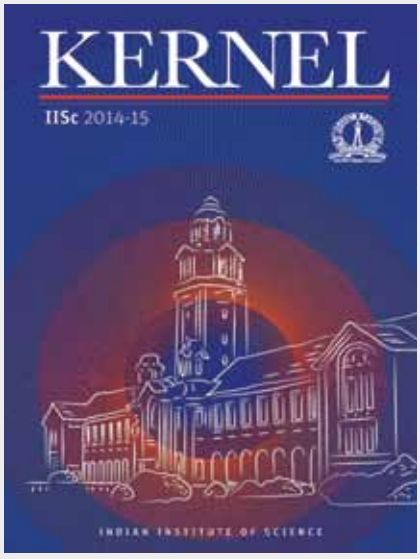
IISc Press coordinated the design, copy-editing and printing of *KERNEL* (the annual magazine of IISc), *Connect* (quarterly magazine of IISc), and four issues of the *Journal of the Indian Institute of Science.* In addition, the following IISc documents were published: Annual Reports (English and Hindi), Annual Accounts (English and Hindi), IISc Profile, Budget Estimates and Revised Estimates, Directory and Planner, Student Information Brochure, Undergraduate Scheme of Instruction, Quarks (a magazine of the undergraduate students), Desk Calendar and Wall Calendar.

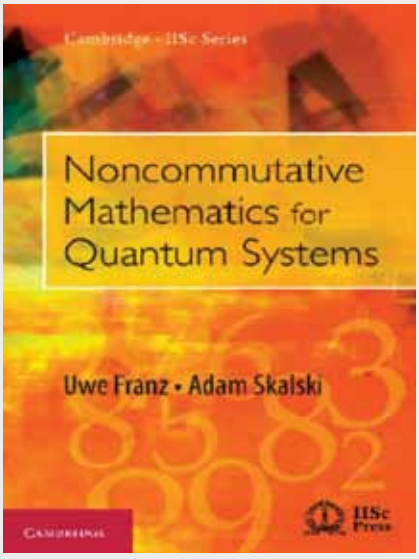
IISc Press, along with the World Scientific, co-published two text books in the IISc Lecture Notes Series: *Game Theory and Mechanism Design* (by Y Narahari), and *Pattern Recognition: An Algorithmic Approach* (by M Narasimha Murthy and Susheela Devi). The IISc–Cambridge Lecture Notes series saw the publication of two books: *Non Commutative Mathematics* by Uwe Franz and Adam Sklaski, and *Continuum Mechanics (in two volumes)* by Chandrashekhar S Jog. IISc Press and TU-Delft co-published an e-book, *Design for Sustainable Well-Being and Empowerment (Selected Papers)*, edited by Monto Mani and Prabhu Kandachar.

A Special Commemorative Centenary Issue of the *Journal Of the Indian Institute of Science* (besides the regular issues) containing notable papers published in the same journal during 1914-1964 brought out in 2015.

CHAIRPERSON

T A Abinandanan | Professor, Materials Engineering





3.7.3 Office of International Relations

The Office of International Relations (OIR) oversees and coordinates all international programmes of the Institute. In particular, it is responsible for the following:

- Admissions of International students to Ph.D and M.Sc (Engg) programs of the Institute.
- To facilitate the Institute's links with International partners.
- To promote academic collaborations and student and faculty exchange programmes with institutions and universities abroad.
- To formulate and help in signing MOUs between IISc and Institutions abroad for collaborative research and student exchange.
- Maintain a data base of international cooperation programmes at IISc, visits of foreign delegations, etc.
- Act as an advisory body to the growing number of foreign students and visitors at the Institute.

During this academic year

- An IISc delegation visited the University of Melbourne and Australian National University from 28th January to 1st February, 2016. It included Anurag Kumar, Director, Rangarajan, Divisional Chairperson Interdisciplinary Research, Usha Vijayraghavan, Chairperson OIR, and Rudra Pratap, Chairperson, CeNSE
- 12 foreign students from USA, Germany, France, Spain and Iran were offered short term courses at IISc.

Many foreign delegations visited the Institute. Some of the delegations who visited our Institute to explore possible collaborations in specific areas of research and student and faculty exchange are listed below:

- Delegation from the Dutch Embassy, led by Diplomatic head Mr. Jasper Wesseling and Mr. Hans De Groene (1st April, 2015).
- Delegation from Israeli, led by His Excellency Mr. Daniel Carmon, Israeli Ambassador (6th April, 2015).
- Delegation from The Army College, led by Captain Sanjay Rihani , Brigadier, with other Army officials from USA, Germany, France (8th May , 2015).
- Delegation from Curtin University, led by Prof. Brett Kirk, Associate Deputy Chancellor (13th May, 2015).
- Delegation from The Islamic Republic of Iran, New Delhi, led by Dr. Aliazam Khosravi, Research Counsellor (15th May, 2015).
- Delegation from Dalhousie University, Canada, led by Prof. Michael Shepherd, Dean of Computer Science, Prof. Carolyn Watters, Provost and VP Academic (11th June, 2015).
- Delegation from Dublin, UK, led by Dr. Patrick Prendergast, President, Trinity College, and Prof. Juliette Hussey, Vice President, Trinity College University (1st July, 2015).
- Delegation from European International collaborations led by Mr. Patrick Nedellee, Director (10th July 2015).

CHAIRPERSON

Usha Vijayraghavan | Professor, Microbiology and Cell Biology

- Delegation from University of Brunei Darussalam, led by Dr. Zulkarmain Hanafi, Vice Chancellor & President (10th July 2015).
- Delegation from University of Calgary-Alberta, Canada, led by Dr. Ruwanpur, Vice Provost International, (13th July, 2015).
- Delegation from McGill University, Canada, led by Prof. Laurette Dube, Scientific Director (14th July, 2015).
- Delegation from Australian Consul General, South India, led by Diplomatic Head (21st July, 2015).
- Delegation from Kazakh Embassy, led by Mr. Rapil Zhoshybayev, First Deputy Minister of Foreign Affairs, (19th August, 2015).
- Delegation from Australian Universities & Education Department and several Australian Vice Chancellors, ProVCs (25th August, 2015).
- Delegation from King's College London (KCL) Prof. Ed Byrne, Principal & President, KCL (7th September, 2015).
- Delegation from Melbourne University, led by Prof. Strugnell, ProVice Chancellor for Graduate and International Research (7th September, 2015).
- Delegation from USA, Brandeis University, International Office, the Head of Study abroad office (8th September, 2015).
- Delegation from France, led by Dr. Katia Mirochnitchenko Pirrero, Director General of OPTITEC, French optics and photonics competitiveness cluster (11th September, 2015).
- Delegation from UK, led by Dr. Bob Ferrier, Director, James Hutton Institute Scotland (21st October, 2015).
- Delegation from American Society for Mechanical Engineers (ASME), led by Mr. Julio Guerrero, President and Dr. Urmila Ghia (27th October, 2015).
- Delegation from Thales group led by Prof. Jean Chazelas, Scientific Director (30th October, 2015).
- Delegation from France, CNRS, led by Prof. Jean Yves Marzin, President, CNRS and Dr. Kaveri Srini (30th October, 2015).
- Delegation from Iran, led by Dr. Seyed Mohammad Reza Khalili and Mr. Mehdi, Iran Embassy (2nd November, 2015).
- Delegation from Sweden, KTH Royal Institute of Technology, led by Prof. Rajeev Thottappillil (5th November, 2015).
- Delegation from University of Technology Sydney, Australia, led by Dr. Jamshed A. Siddiqui, Director - India & Chief Representative - South Asia with Deputy Vice Chancellors (16th November, 2015).
- Delegation from German Academic Exchange Service Administration, led by Ms Heike Mock, Director and Dr. Shikha Sinha, Advisor, International Co-operatio (20th November, 2015).
- Delegation from UK, led by Mr. Dominic McAllister, British Deputy High Commissioner, Karnataka, and Mr. Murtaza Khan, Deputy Head of the UK Science and Innovation Network (26th November, 2015).
- Delegation from University of Technology (TU) Delft, The Netherlands, led by Mr. RR Venkatesha Prasad and Mr. RHJ Fastenau (26th November, 2015).
- Delegation from Purdue University, led by Prof. Dan Jeff Cheryl, VP Advancement (2nd February, 2016).
- Delegation from Brandeis University, International Office (4th February, 2016).
- Delegation from University of Portsmouth, led by Prof. Taraneh, Dean of science (9th February, 2016).

- Delegation from University of Edinburgh, led by its Vice Chancellor, Prof. Sir Timothy O'Shea (18th February, 2016).
- Courtesy Visit by Her Excellency Ms. Yael Hashavit, Consul General, of Israel, Bengaluru (19th, February, 2016).
- Visit by Mr. Frank Rose, Assistant Secretary of State for Arms Control, Verification, and Compliance and Mr. George Mathew, Economic Specialist US Consulate Chennai (22nd February, 2016).
- Delegation from Curtin University, led by Prof. Brett Kirk, Associate Deputy Vice- Chancellor (1st March, 2016).
- Delegation from Germany Hamburg University, led by Prof. Schulze (8th March, 2016).
- Delegation from Japan, led by Prof. Naohito Saito, Director, JPARC (11th March, 2016).
- Delegation from University of Ontario Institute of Technology (UOIT) Canada, led by Prof. Sidhu, Dean, and Prof. Michael, Vice President (Research) (17th March, 2016).
- Delegation from Canada led by Mr. Bogdan Ciobanu, Vice President of the Industrial Research Assistance Program (IRAP) of the National Research Council (17th March, 2016).
- Delegation from Japan, led by Ms. Makita, Director of CEMS Promotion Office at RIKEN, Japan (28th March, 2016).

The Institute has signed Memoranda of Understanding (MOUs) with several Institutions abroad for cooperation in research and exchange of students and faculty, including:

- University of Florida (signed on 28th, June 2015).
- Technical University of Denmark (renewed on 9th July, 2015).
- The Institute for Molecular Science (IMS) (signed on 7th October, 2015).
- The James Hutton Institute, Scotland, UK (signed on 21st October, 2015).
- CNRS, France (signed on 30th October, 2015).
- The Thales Group, France (signed on 30th October, 2015).
- TU Delft, The Netherlands (signed on 26th November, 2015).

3.7.4 Centre for Continuing Education

The Centre for Continuing Education (CCE) has initiated and achieved progress in a wide range of activities by utilizing the resources of faculty and facilities available at the Institute towards the objective of promoting the cause of continuing education. These activities have been carefully structured to meet the requirements of different target groups ranging from high school science teachers to research scientists/engineers.

SUMMARY OF PROGRAMMES

Sl No.	Programme Type	Details	Students/ Participants benefited
1	National Programmes	a) Quality Improvement Programmes (QIP): Degree program (Ph.D./ME/M.Tech)	18
2	Industry Oriented programmes	a) CCE-Proficience: 26 Semester long courses	424
		b) Industry sponsored short term/full term courses: 15	450

DETAILS

1 NATIONAL PROGRAMMES

a) **QIP (leading to award of degrees):** During the current year, under this programme, 6 teachers were admitted for Ph.D and 12 for M.E/M.Tech. Apart from this, 6 persons were given advance admission for Ph.D for during 2015

	Ph.D	ME/MTech
Students admitted	6	12
Degree awarded	2	5
On Roll	20	14

2 INDUSTRY PROGRAMS

a) CCE–Proficience Programme: Under this programme, 26 evening courses were conducted in two semesters, attended by 508 participants; 410 successfully completed the programme. A sum of Rs. 26 lakhs was received, towards application and course fee.

b) Self-supporting Intensive Courses: CCE promotes various refresher/extension programmes to enable the participation of scientists and engineers working in different organizations. During the year, 15 such courses

CHAIRPERSON

G L Sivakumar Babu | Professor, Civil Engineering

were organized for different organizations, with a total participation of 450. Under this programme, a sum of Rs. 40 lakhs has been received as overhead.

c) Curriculum Development Cell: The Curriculum Development Cell (CDC), sponsored by the AICTE, Government of India, has been functioning at the Institute since 1979. The Curriculum Development Cell provides financial assistance for book writing, preparation of laboratory manuals, holding of conference, workshops, seminars, special lectures and panel discussions, for the preparation of monographs and audio-visual aids for teaching etc. Since 1979, the Centre has provided financial assistance for 93 faculty members for book writing; so far, 50 books have been published.

d) Pedagogy Training Programme: Centre for Continuing Education conducts two-day long pedagogy training programmes every year.

3 EXTENSION LECTURE PROGRAMME

The progress, prosperity and material welfare of the country depend on the scientific and technological base of its citizens. With this in mind, the Institute has been organizing Extension Lectures by the faculty of the Institutes in Institutions of higher learning at the technical level and in schools and public/cultural organizations, Doordarshan, All India Radio, etc. These extension lectures are of great help in the transfer of information on the latest scientific developments in this Institute and other organizations in India and abroad. They are intended to popularize science and educate the public about science in a way that brings about a transformation in their basic thinking, a transformation from the traditional attitude to a daring confidence in dealing with the challenges of the modern times using science.

These lectures are arranged not only in Bangalore, but also across the state of Karnataka, and sometimes even in other states. Even though the majority of these are in English, lectures are also arranged in regional languages like Kannada if specific requests are received. Many of these lectures are supported by demonstrations and power point presentations.

4 HOYSALA GUEST HOUSE

CCE runs a guest house, named after the famous Hoysala Dynasty, which ruled over ancient Karnataka. It has 60 self-contained and fully furnished single rooms. These are intended to accommodate the participants of the programmes conducted under CCE. However, subject to availability, accommodation is also made available to participants in seminars, symposia and conferences, and persons visiting the Institute for academic work. This year, 238 faculty from other universities/research laboratories, 619 participants for short term Courses and workshops/ seminars and 62 new students were accommodated at Hoysala Guest House. Revenue of about Rs. 12.20 lakhs was generated by the Institute through Hoysala Guest House.

3.7.5 Centre for Sponsored Schemes & Projects

Most of the research contributions from the Institute come from research and development sponsored by over a hundred agencies, comprising a total of **877** projects with an outlay of **Rs. 1087.48** crores and an annual cash flow of **Rs. 245 crores.** The primary sponsors are the Department of Science and Technology, Aeronautical Research and Development Board, Department of Biotechnology, Indian Space Research Organization, Space Technology Cell, Council of Scientific and Industrial Research, Department of Atomic Energy, Ministry of Information Technology, Office of the Principal Scientific Advisor, European Union, Boeing Company and Ministry of Non-Conventional Energy Source. The International sponsors include Welcome Trust, IBM, Asian Office of Aerospace Research and Development, Indo-French Centre for Promotion of Advanced Research, Korea Institute of Science and Technology, European Union, The Swiss Agency for Development Agency and UK-India Education and Research Initiative.

In the past year, the science departments received a total of **449** projects with a total outlay of **Rs. 420.65 crores.** The Engineering departments received **428** projects with a total outlay of **Rs. 666.83 crores.** There has been a changing trend in recent times in terms of the industrial relevance of the projects. In a few projects, industries are involved from the initial stages, are partially funded, identify technology transfer terms and mutually agree on when the research should mature. The tables below show (1) the Division-wise breakup of projects and the financial outlay and (2) the details of each sponsored scheme

DIVISION	No. of Schemes	Outlay (Rs in Lakhs)
Division of Biological Sciences	214	21527.10
Division of Chemical Sciences	138	13644.70
Division of Electrical Sciences	118	7107.11
Division of Mechanical Sciences	233	26250.45
Division of Physical and Mathematical Sciences	97	6894.72
Division of Interdisciplinary Research	77	33324.38
GRAND TOTAL	**877**	**108748.46**

ADVISOR

R Mohan Das

	Funding Agency	No of Schemes	Total Budget (Lakhs)
1	AERONAUTICAL DEVELOPMENT AGENCY	2	42.91
2	ASIAN TECHNOLOGY PROGRAMME	1	2.29
3	ADVANCED MICRO DEVICES	1	43.95
4	ASIAN OFFICE OF AEROSPACE RESEARCH & DEVELOPMENT	1	27.82
5	INTERNATIONAL ADVANCED RESERCH CENTRE FOR POWDER METALLURGY AND NEW MATERIALS	1	153.00
6	AERONAUTICS RESEARCH & DEVELOPMENT BOARD	16	1523.12
7	ARGHYAM	1	23.06
8	ANNA UNIVERSITY	1	126.73
9	BRITISH COUNCIL	1	1.30
10	BOEING COMPANY	3	555.47
11	CENTRE FOR DEVELOPMENT OF ADVANCED COMPUTING	2	205.18
12	CENTRE FOR INFRASTRUCTURE TRANSPORTATION AND URBAN PLANNING	18	1515.94
13	THE COMMONWEALTH OF LEARNING	1	15.25
14	COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH	32	621.16
15	DEPARTMENT OF ATOMIC ENERGY	27	1219.49
16	DEPARTMENT OF BIOTECHNOLOGY	118	13040.50
17	DEPARTMENT OF ENVIRONMENT	3	102.23
18	DEPARTMENT OF HEAVY INDUSTRY	1	148.37
19	DEFENCE RESEARCH & DEVELOPMENT LAB	2	32.43
20	DEFENCE RESEARCH & DEVELOPMENT ORGANISATION	49	7920.05
21	DEPARTMENT OF SCIENCE & TECHNOLOGY	367	41166.94
22	ELECTRON DEVICE NEWS	1	4.56
23	ECOLE POLYTECHNIQUE DE FEDERAL	1	20.99
24	EUROPEAN COMMISSION	1	127.10
25	EUROPEAN UNION	2	12.93
26	EARTH WATCH INSTITUTE	1	4.50

	Funding Agency	No of Schemes	Total Budget (Lakhs)
27	FREESCALE SEMICONDUCTOR INDIA PVT. LTD.	1	28.50
28	GE INDIA TECHNOLOGY CENTRE	2	27.00
29	THE GRANTHAM FOUNDATION FOR THE PROTECTION OF THE ENVIRONMENT	1	2774.36
30	GOVERNMENT OF KARNATAKA, DEPARTMENT OF SCIENCE	1	850.00
31	GAS TURBINE RESEARCH ESTABLISHMENT	4	504.64
32	HEWLETT PACKARD	1	10.00
33	INTERNATIONAL BUSINESS MACHINE CORPORATION	6	51.59
34	INDIAN COUNCIL OF AGRICULTURAL RESEARCH	2	19.98
35	INDIAN COUNCIL OF MEDICAL RESEARCH	2	38.34
36	INDO-FRENCH CENTRE FOR THE PROMOTION OF ADVANCED RESEARCH(IFCPAR)	18	782.41
37	INDIRA GANDHI CENTRE FOR ATOMIC RESEARCH	1	31.14
38	INDIAN INSTITUTE OF SCIENCE	3	64.21
39	INDIAN NATIONAL CENTRE FOR OCEAN INFORMATION SERVICES	4	286.76
40	INDIAN NATIONAL SCIENCE ACADEMY	1	15.00
41	INTEL TECHNOLOGIES INDIA PVT., LTD.,	1	51.50
42	INSTRUMENTS RESEARCH & DEVELOPMENT ESTT.	1	9.60
43	INSTITUT DE RECHERCHE POUR LE DEVELOPMENT, FRANCE	4	406.90
44	INDIAN SPACE RESEARCH ORGANISATION	8	920.28
45	ISRO-IISc SPACE TECHNOLOGY CELL	50	852.97
46	INTERNATIONAL UNION OF CRYSTALLOGRAPHY	1	2.97
47	INDO-US SCIENCE & TECHNOLOGY FORUM	8	5136.83
48	JOINT ADVANCED TECHNOLOGY PROGRAMME	7	100.52
49	KARNATAKA STATE FOREST ECOLOGY & ENVIRONMENT	1	1.00
50	KOREA INSTITUTE OF SCIENCE & TECHNOLOGY (KIST)	1	17.22
51	LOS ALAMOS NATIONAL LABORATORY	1	103.65
52	LADY TATA MEMORIAL TRUST	1	32.00
53	MINISTRY OF DRINKING WATER AND SANITATION	1	278.58
54	MINISTRY OF ENVIRONMENT & FORESTS	2	70.13
55	MERCK & Co., INC	2	120.59
56	MINISTRY OF EARTH SCIENCES	13	2618.49
57	MINISTRY OF HUMAN RESOURCE DEVELOPMENT	1	69.99
58	MINISTRY OF INFORMATION TECHNOLOGY	25	10492.46

	Funding Agency	No of Schemes	Total Budget (Lakhs)
59	MICROSOFT CORPORATION INDIA (p) LTD.	1	25.66
60	MICRO, SMALL AND MEDIUM ENTERPRISES	1	500.00
61	NATIONAL BRAIN RESEARCH CENTRE	1	88.10
62	NATIONAL INSTITUTES OF HEALTH, USA	1	19.74
63	NAVAL RESEARCH BOARD	4	140.13
64	OFFICE OF THE PRINCIPAL SCIENTIFIC ADVISER	2	815.74
65	ROBERT BOSCH ENGINEERING & BUSINESS SOLUTIONS LIMITED	4	3712.69
66	RENAULT NISSAN TECHNOLOGY & BUSINESS CENTRE INDIA PVT LTD	1	55.30
67	ROLLS ROYCE	1	40.91
68	RUFFORD SMALL GRANTS FOUNDATION	1	4.89
69	RAIL VIKAS NIGAM LIMITED	1	24.00
70	TEXAS INSTRUMENTS PVT LTD	1	31.29
71	TOKYO ELECTRON LIMITED	3	150.52
72	UNIVERSITY GRANTS COMMISSION	6	2216.05
73	UK-INDIA EDUCATION & RESEARCH INITIATIVE	1	8.58
74	UNIVERSITY OF SOUTHERN CALIFORNIA	1	6.65
75	VETENSKAPSRADET	1	4.05
76	THE WELLCOME TRUST,UK	17	5477.32
	Grand Total	**877**	**108748.46**

3.7.6 Office of Development and Alumni Affairs

The Office of Development and Alumni Affairs (ODAA) was established at the Indian Institute of Science in 2015 to build a vibrant Industry-Institute-Alumni ecosystem, and raise funds for various special projects from corporates, philanthropists and alumni.

By working closely with Institute faculty members and the administration, ODAA identifies specific programmes that would benefit most from private funding, including industry-sponsored corporate social responsibility projects at both IISc Bangalore and Challakere campuses, and initiatives for student and faculty professional development. It aims to raise funds for projects under categories such as education, infrastructure, research, student and faculty professional development, and international activities.

ODAA also focuses on developing mechanisms to process gifts, and maintain accountability and compliance standards for funding sources. In addition, ODAA provides support for alumni-related activities and engagement programmes at the Institute.

Corporate Connections

In the past year, the office has been actively reaching out to and connecting with corporates and organizations to build partnerships and raise funds for special projects at IISc. The Institute is particularly interested in partnering with corporates under the provision of Corporate Social Responsibility (CSR). The Government of India has mandated from Financial Year 2014 that companies registered under the Companies Act, 2013, should spend 2% of the profit of the average of last 3 years at the minimum on CSR activities. Several projects are being proposed to these companies under categories identified by the CSR Rules such as "promoting education", "sustainability", "skill development", "women's empowerment", etc.

In this context, the office has interacted with more than 50 companies and organizations and presented several proposals for fundraising under CSR. Several visits were made to companies in Bangalore, Mumbai, Delhi and Hyderabad and discussions have been held.

Detailed proposals for specific projects have been submitted to companies such as Hindustan Aeronautics Limited, Capgemini, Canara Bank, ABB India Limited, Bharat Electronics Limited, Tata Consultancy Services, General Electric, Oil and Natural Gas Corporation, State Bank of India, Tata Trusts, Housing Development Finance Corporation, Housing and Urban Development Corporation, and many more. The ODAA has also been participating in national training programmes, conferences and CSR meetings for capacity building and developing connections.

Several organizations have approved specific projects to be executed at IISc during the last financial year. These are:

- **Hindustan Aeronautics Limited (HAL):** The establishment of a new HAL-IISc Skill Development Centre at the IISc Challakere campus. The new facility will enable the expansion of the ongoing Teachers' Training Programme at the Talent Development Centre. In addition, new facilities for skill development programmes in niche areas such as mechanical, electrical and electronic engineering will also be established.

DIVISIONAL CHAIRPERSON IN-CHARGE

Govindan Rangarajan | Professor, Mathematics

- **Infosys Foundation:** To support the enhancement of infrastructure and broadening research activities at the Centre for Infectious Disease Research (CIDR), IISc. The funding will help IISc in enhancing infrastructure at CIDR and promoting research with translational goals. In addition, the funding will help organize meetings and workshops to train personnel, thereby increasing awareness in the area of infectious diseases.

- **Cisco:** To support PhD fellowships under the Cisco Research Scholarship Program awarded to selected PhD students at the Department of Electrical Communication Engineering, with the objective of encouraging and supporting world class innovative and impact-creating PhD work at IISc in the areas of technologies that enable Internet of Everything ("IoE") and help greater social causes such as water, health and energy.

- **GE India Technology Centre:** To support workshops conducted as part of the National Mathematics Initiative, an annual thematic programme organized by the Department of Mathematics. More than 300 students, scholars, researchers and industry personnel benefit from these workshops and conferences each year.

- **Tata Trusts:** To augment special officers' positions at the Institute.

In addition, ODAA is also actively involved in increased outreach to alumni and corporates through social media (LinkedIn, Facebook & Twitter).

Alumni Engagement

At the Global Alumni Conference in June 2015, ODAA launched a new, exclusive alumni portal to help alumni connect with each other and with the Institute. This multi-faceted, dynamic portal allows alumni to search for and network with other alumni globally, receive latest updates on IISc and alumni news and events, post jobs/internships, share campus stories and photographs, and many more. The portal also allows alumni to contribute to Institute-approved fundraising projects through an online payment gateway. About 3500 users are currently registered on this free portal. ODAA sends both weekly and monthly emails/newsletters from the Institute to all alumni registered on the portal (www.alumni.iisc.ernet.in).

ODAA has also been reaching out to alumni through individual meetings and interactions at alumni meets/events. The office has been working with the IISc Alumni Association (IIScAA) and the IISc Alumni Association of North America (IIScAANA) to channelize funds from alumni and contributors from the US.

In October 2015, an IISc delegation consisting of the Director, the Chairman, Division of Interdisciplinary Research, and the Chairman, Office of International Relations, made a visit to Chicago and the Bay Area in USA. One of the major goals of this visit was to interact with alumni. The Chairman, Division of Interdisciplinary Research, also met with IISc alumni in New York in January 2016.

The Institute has started receiving generous funding from alumni towards several projects. Major contributions were made towards the Advancement of Photonics Technology at IISc (Prof. Ananth Selvarajan & Mrs. Indira Devi), purchase of next-generation sequencing equipment for Biological Sciences, the CSA Research Fund and the ECE Alumni Research Fund for students (1965 ET, ECE Batch).

3.7.7 Office of Intellectual Property and Technology Licensing

The Office of Intellectual Property and Technology Licensing (IPTeL) at the Indian Institute of Science, was set up in 2004, to put in place a system that brings order to the process of protection of inventions, and the utilization of inventions through processes of technology transfer and entrepreneurship. Within the above broad objectives, the specific objectives of the Office IPTeL are as follows:

- Undertake the mining, identification, and location of IP in the various research, consultancy, educational, and all other academic activities of the Institute
- Encourage, create awareness, and facilitate the process(es) of securing and protecting the IP rights of all Institute personnel
- Initiate and pursue all actions and deeds to maintain, prosecute, and keep in vogue the secured IP rights of the Institute
- Pursue all the necessary procedures and actions to facilitate, catalyze, and bring to bear the Transfer of Technologies (ToT), including the commercialization, licensing, and other means of disseminating the technologies developed by the Institute

The major functions of IPTeL

- Identifying innovations and the embedded IP.
- Facilitating the protection of IP including prosecution and maintenance.
- Arranging for the commercial utilisation of the IP through Technology Transfer and Licensing.
- Improving the general awarness about IP and Technology Licensing in IISc.
- Co-ordinating agreements, MOU between IISc and external agencies.

NUMBER OF PATENT APPLICATIONS FILED IN 2015

No. of Indian applications filed	44
No. of Indian applications granted	6
No. of Foreign applications filed	14
No. of Foreign applications granted	1

EXPENSES INCURRED AND REVENUE GENERATED DURING 2015

New Filing Cost + Renewals + other expenditure (office actions, filing responses, hearings etc)	Rs. 2.27 Crores
Revenue Generated	**Rs. 70 lakhs**

CHAIRPERSON

Parameshwar P Iyer | Principal Research Scientist, Management Studies

BASIC PORTFOLIO INDEX (1995 – 2015)

Total patents filed	580
Patents lapsed	62
Patents granted in force	94
Patents under prosecution	424

Some of the current major inventions at IISc, for which IPTeL is pursuing patent prosecution and licensing efforts, are the following:

- Portable Washing Machine for Rural Areas
- Flood-resistant Septic Tank
- Idea-Sustain
- Optical nano sensor for early stage detection of bactocera olea infestation
- Electrical Gradient Augmented Fluid Filtration Apparatus
- Patient Transfer Device
- Electrochemical Test Cell for In Situ X-Ray Diffraction Investigation of Aqueous Batteries

The major licensing efforts of the Institute in the past 10 years are highlighted below:

- Fungal Strains and a Process for Production of Insecticide Thereof
- Taxol and Bactin III
- Energy storage device and a method thereof

3.7.8 Challakere Campus/ Talent Development Center

This second campus of IISc, known as **"Challakere Campus"**, is being set up in 1500 acres of land allotted by the Government of Karnataka in Challakere Taluk of Chitradurga District. It is 220 km from Bangalore and takes about 4 hours to reach the campus by road.

As part of the development of the new campus, the construction of two check dams for harvesting rain water has been completed. These are expected to serve as the major water bodies for vegetation and the fauna. These will also enhance the ground water level in the region, and thus may serve as a step-in-aid for agriculture and allied activities.

The construction of Solar Power Generation and Research Centre and the Centre for Climate Observatory is nearing completion. The Centre for Sustainable Technologies (CST) has commenced its activities under the project "C-BELT", i.e., the Centre for Bio-energy and Low-Carbon Technologies. The proposed project aims at dissemination and capacity building towards adopting and promoting low-C and biomass centric technologies developed by the Centre. Under this project funded by the state, a few training programmes for surrounding villagers as well as to those from a neighboring state have been completed. The project is funded by the Government of Karnataka. The training and exhibition centres for this activity are nearing completion.

The **Talent Development Centre** is vigorously pursuing its novel programme of providing training for High School Science Teachers, supported by the Government of Karnataka. In the past five years nearly 7300 teachers have been trained at the centre and the impact assessment has shown very promising results.

The Ministry of Human Resource Development, Government of India has identified the IISc Challakere Campus as the Centre of Excellence in Science and Mathematics under the scheme *Pandit Madan Mohan Malaviya National Mission on Teachers & Teaching (PMMMNMTT)*. Under this scheme, the training of teachers from many other states as well as training teachers of higher institutions of sciences is being planned and the facilities are being built. A lecture hall to augment the present facility is under construction.

The Institute has also proposed construction of Skill Development Centre and Hostel Blocks. Architectural Plan has since been finalized and the construction will commence shortly. The entire project is being funded by HAL under the CSR Act for which the Institute has entered in to an MoU with HAL. The Skill Development Centre will extend training to many different levels, including some of the engineering disciplines of importance to the manufacturing sector.

CHAIRPERSON OF CHALLEKERE EMPOWERED COMMITTEE

B N Raghunandan | Professor (Retired), Aerospace Engineering

TALENT DEVELOPMENT CENTRE CONVENOR

M S Hegde | CSIR Emeritus Scientist, Solid State and Structural Chemistry Unit

3.7.9 Centre for Scientific and Industrial Consultancy

During the year under review, the Centre for Scientific and Industrial Consultancy (CSIC) has strengthened the faculty-industry interactions in the form of informal discussions and advice to formal projects, involving design, development and transfer of technology. The Centre has strived to enhance, qualitatively and quantitatively, the nature of Institute-industry linkages. The Centre has undertaken major consultancy projects of national significance involving scientific and technological challenges, with the ultimate goal of technology transfer for industrial development.

The range of professional consultancy services offered by the Institute faculty through CSIC includes:

- Systems design/analysis
- Software development
- Product design/development
- Process design/development
- Model investigations
- Advice on R & D
- Transfer of technology
- Evaluation/overview
- Diagnostics

The above services have been utilized by a wide range of clientele, comprising educational and research institutions, health and pharmaceutical industries, Department of space, defence laboratories and organizations, irrigation departments, electricity boards, electronics and telecom industries, and engineering and chemical industries from both the public and the private sector.

During the financial year 2015-16, **186** consultancy project proposals costing **Rs. 1700.44 lakhs** were communicated to the clients. In the above said period, **151** consultancy projects with an outlay of **Rs. 1071.82 lakhs** materialized. Receipts from consultancy projects and consultancy test projects amounted to **Rs. 1051.61 lakhs.**

SUMMARY OF SOME OF THE CONSULTANCY PROJECTS UNDERTAKEN DURING THE PERIOD APRIL 1, 2015 TO MARCH 31, 2016 ARE AS FOLLOWS:

Department	# Projects	Amount (in Lakhs)
Biochemistry	3	25.90
Ecological Sciences	1	1.01
Microbiology Cell Biology	2	4.47
Materials Research Centre	1	8.16

CHAIRPERSON

J M Chandra Kishen | Professor, Civil Engineering

NMR Research Centre	2	5.36
Computer Science and Automation	1	20.22
Electrical Communication Engineering	3	15.67
Electrical Engineering	6	13.1
Electronic Systems Engineering	2	11.08
Aerospace Engineering	12	251.94
Chemical Engineering	2	12.67
Civil Engineering	97	565.33
Mechanical Engineering	7	87.51
Materials Engineering	4	15.61
Instrumentation and Applied Physics	3	2.96
Management Studies	2	2.66

Placement Section

The Placement Section at the CSIC of the Institute continued to serve the purpose of bringing together the potential employers and outgoing students. The Section kept in touch with a large number of industries, national laboratories, R&D Centres and defence establishments, and extended assistance in the entire recruitment process (pre-placement talks, written tests, group discussions and interviews). During the year 2015-16, about 75 organizations conducted campus interviews. A few organizations invited students to their offices for this purpose. 375 students registered for placement, out of which about 250 participated and 158 received satisfactory placement offers through placement office. In addition, some of the students got placement either through the department's effort or based on their own effort and some decided to pursue higher studies. The placement exercise for the year 2015-16 was effective and satisfactory.

3.7.10 Digital Campus and IT Services Office

Digital Campus and IT Services (DIGITS) Office is a unit set up by the Institute to conceive, plan, and create a best-in-class information technology (IT) and networking system, and implement agile IT and networking services for operational excellence in the Institute. The DIGITS office will consolidate and coordinate all digital campus activities and services for better execution of the following initiatives in IISc:

- OPERA (Operational Excellence for Research Advancement)
- CCIT (Committee on Computerisation and Information Technology)
- TINA (Telecom, Internet, and Network Access)
- VISE (Video Security Equipment for IISc)
- MMCR (Multimedia Class Rooms Initiative)
- Video archives and streaming
- IISc webpage development and maintenance
- Campus infrastructure data acquisition and analytics (including the Challakere Campus)
- Provide an interface between vendors and IISc administrative units, addressing short-term and long-term measures

DURING APRIL 2015-MARCH 2016, THE ACTIVITIES OF DIGITS HAVE RESULTED IN THE FOLLOWING OUTCOMES:

The DIGITS office has been created and the folllowing Executive Committee for DIGITS has been formed:

- Prof. Y. Narahari (Chair, DIGITS) (Chair of the Committee)
- Prof. S. Ramakrishnan, Deputy Director (I & P)
- Prof. J. Modak, Deputy Director (A & F)
- Prof. K.V.S. Hari (Chair, OPERA)
- Prof. Joy Kuri (Chair, TINA)
- Prof. Jayant Haritsa (Chair, CSA)
- Mr. V. Rajarajan, Registrar
- Mr. Indumati Srinivasan, Financial Controller
- Ms. Ganesh Gopalakrishnan, Chief Information Technologist, DIGITS

- Software packages which are currently in operation in various admin units have been streamlined; the source files of all the packages have been retrieved and documentation of the software has been undertaken.

- A detailed 550-page report has been prepared describing the workflow of various business processes in most of the Institute's administrative departments.

CHAIRPERSON

Y Narahari | Professor, Computer Science and Automation

CHAIRPERSON, OPERA

K V S Hari | Professor, Electrical Communication Engineering

CHAIRPERSON, TINA

Joy Kuri | Professor, Department of Electronic Systems Engineering

CHIEF INFORMATION TECHNOLOGIST

Ganesh Gopalakrishnan

IT Inititiatives undertaken include:

- Making available online detailed status regarding campus housing
- Navigate App Launched on Google Playstore during Open Day
- Health Centre computerization: appointments, doctor's prescription, pharmacy
- Web-based system for collecting information from Departments/Centres for compiling the IISc Court Report and IISc Annual Report

- Mobile cellular coverage in the campus has been enhanced by installation of four rooftop Base Transceiver Stations by ATC (American Tower Corporation).
- WiFi coverage in the campus has been improved through installation of access points at various locations
- Enhancement of fiber network and network infrastructure (routers and switches and UPS).

Going forward, the plan of action for the forthcoming year includes preparing a detailed RFP (Request-for-Proposals) for a University ERP (Enterprise Resource planning System), identifying the vendors for the same, and initiating the installation of the ERP system. On the networking side, the optic fiber network will be planned and installed. The cellular coverage will be further improved. A Unified Threat Management (UTM) device will be installed for streamling web accesses and Active Directory will be operationalized.

3.7.11 Society for Innovation and Development

The mission of the Society for Innovation and Development (SID) is to enable India's innovations in science and technology by creating a purposeful and effective channel to help and assist industries and business establishments to compete and prosper in the face of global competition, turbulent market conditions and fast moving technologies. SID strives to bring the leading intellectuals of IISc and the fruits of their research and development efforts closer to industries and business establishments in a cordial atmosphere with prosperity of the Nation as the ultimate goal.

PROJECTS SANCTIONED

During the period under review, SID got 21 projects sanctioned covering different departments of the Institute involving the participation from number of faculty.

INDUSTRY R&D CENTRES IN SID/IISC CAMPUS:

- Pratt and Whitney – Aerospace
- Tata Motors – Automotive
- Robert Bosch Centre – Cyberphysical Systems
- Mesha INC – Energy Storage Systems
- Gubbi Labs LLP – Science Media
- i2n Technologies Private Limited - Nanotech
- Panasonic Corporation – Biotechnology

OTHER CENTRES:

- SATF (Spectroscopy Analytical Test Facility)
- CiSTUP
- ESSI (Energy Storage Systems Initiative)
- Centre for Brain Research

MoUs SIGNED DURING 2015-16 WITH COMPANIES/INDUSTRIES

The following organizations have entered into agreements and project proposals have been submitted. Some projects have been funded and others are in the process of finalizing:

- Panasonic Corporation
- Steel Authority of India Limited
- Nucleus Software Exports Limited
- Panasonic Corporation
- Steel Authority of India Limited
- GE India Technology Centre PVT Ltd
- Jinpao Precision CO Ltd
- Alfatkg Co Ltd

Negotiations are underway for finalization of General MoU/Agreement between SID-IISc with the following firms/companies:

- Tata Consultancy Services (Space for R&D Centre)
- Dr. Reddy's Laboratories
- Boeing (Space for R&D Centre)

INTERACTION MEETINGS

SID has regularly been receiving number of enquiries on the modalities to be followed in sponsoring of projects and for establishment of R&D Centres. SID continues to organize interation sessions between the scientists/technologists from industries and faculty of IISc to showcase the capabilities of the institute that would advance growth of applied research. The following are the details:

- A team of senior executives from Philips Corporation visited SID to discuss future collaborations on R&D Projects
- A team of various Flemish Companies visited SID to discuss future collaborations.

CHIEF EXECUTIVE

B Gurumoorthy | Professor, Mechanical Engineering

- A team of senior executives from Tata Steel visited SID to explore possibilities of setting up R&D Centre on Campus
- A team of senior executives from Underwriters visited SID to explore possibilities of setting up R&D Centre on Campus

ENTREPRENEURSHIP AT SID:

1. THE FOLLOWING STARTUPS ARE INCUBATED AT SID

Company	Incubatees	Technology Area	Status
Instrumentation Scientific Technologies Pvt. Ltd.	Mr. Sumeet Yamdagni, alumnus of IISc	Structural Health Monitoring using Fiber Bragg Grating to cater to the needs of the aerospace, civil and risk management sectors	Successfully exited from incubator
Gamma Porite ElectroTech Pvt. Ltd.	Mr. Adhiraj Deshpande, alumnus of IISc	Energy efficient lighting products	The future of the company is being discussed
Pratimesh Labs Pvt. Ltd	Mr. Prakhar Jain	Microfluidics	Developmental phase
Sickle innovation Pvt. Ltd	Mr. Vinay Reddy	Agrotools	Developmental phase
Azooka Life Sciences LLP	Ms.Fatima Benazir	Life Sciences	Developmental phase
Astrome Technologies Pvt. Ltd	Ms. Neha Satak	Satellite based internet services	Developmental phase

1. THE FOLLOWING STARTUPS ARE INCUBATED AT SID

Company	Faculty Promters	Technology Area
Superwave Technology Pvt. Ltd.	Prof. K.P.J Reddy/ Prof. Jagadeesh	Shock Wave Dynamics
Equine Biotech Pvt. Ltd.	Prof. Utpal Tatu	Veterinary Diagnostics
Pathshodh Healthcare Pvt. Ltd	Prof. Navakanta Bhat	Diabetes Diagnostics
Hi Tech Biosynth Pvt. Ltd.	Prof. B. Gopal	Life Sciences

SID has been receiving further new proposals from faculty and prospective incubatees.

3.7.12 Centre for Brain Research

The Pratiksha Trust (set up by Mr. Kris Goplakrishnan, co-founder of Infosys, and Mrs. Sudha Gopalakrishnan) and the Indian Institute of Science have established the Centre for Brain Research (CBR). As part of this collaboration, The Pratiksha Trust will grant a sum of Rs. 225 crore over a period of 10 years towards the establishment and functioning of the Centre. CBR is a unique initiative in the current research environment in India, wherein most of the academic research in carried out through public funding. Creation of such a centre by private funding offers flexibility in hiring and operation, enabling large scale, focused scientific endeavor.

In the next few years, research in CBR would focus on how we can preserve cognitive functions during aging and how can we reduce the burden of dementia through early diagnosis and innovative interventions through better understanding of how the human brain functions.

CBR will help foster focused research programmes and build capacity for inter-disciplinary neuroscience research in the country that would set the stage to contribute in a significant manner to the endeavor of discovering rational therapies for dementia. Neuroscientists, neuro-physicians (psychiatrists and neurologists), engineers and computational scientists would work together addressing common problems with the goal of reducing the burden of dementia and developing innovative neuromorphic computing architectures.

CBR is already organizing lectures at IISc given by renowned experts in the field of brain science. In the past year, it organized several lectures, including:

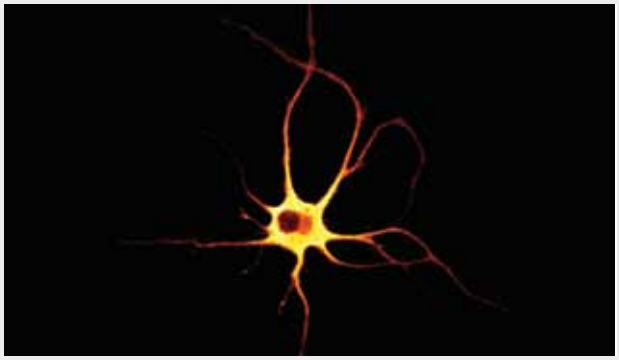
- *Neuromorphic Engineering: Why is it such a hot topic?* by Prof. Andre van Schaik (Research program leader, Biomedical Engineering and Neuroscience, MARCS Institute for Brain, Behaviour and Development, Western Sydney University)

- *Recent progress and future challenges posed by neurological diseases* by Avindra Nath, M.D (Chief, Section of Infections of the Nervous System; Clinical Director, National Institute of Neurological Disorders and Stroke, National Institutes of Health)

- *Neuroscience of Wisdom*, *Resilience and Well Being* by Dilip V. Jeste, M.D (Senior Associate Dean for Healthy Aging and Senior Care; Estelle and Edgar Levi Chair in Aging; Distinguished Professor of Psychiatry and Neurosciences; Director, Sam and Rose Stein Institute for Research on Aging, University of California, San Diego)

CONVENER

Vijayalakshmi Ravindranath | Professor, Centre for Neuroscience

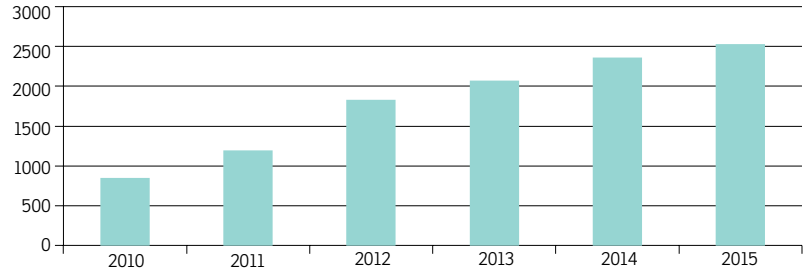


3.7.13 Kishore Vaigyanik Protsahan Yojana

The Kishore Vaigyanik Protsahan Yojana (KVPY) is a programme established in 1999 by the Department of Science and Technology, Government of India to encourage students to take up research career in Basic/ Natural Sciences. The Department of Science and Technology, the nodal agency of the Government has entrusted the overall responsibility for organizing and running the KVPY Program to the Indian Institute of Science, Bangalore and set up a KVPY Management Committee which oversees all the aspects of implementing KVPY program including declaration of results. The National Advisory Committee (NAC) oversees proper implementation of the program and a Core Committee looks after both the day-to-day and academic aspects of the KVPY Program. The aim of the programme is to identify and encourage talented students with an aptitude for research. This programme strives to assist the students to realise their potential and ensure that the best scientific talent is tapped for research and development in the country.

KVPY programme is open to Indian Nationals studying in India. Students enrolled in an undergraduate course in Basic Science subjects such as Chemistry, Physics, Mathematics, Statistics, Biochemistry, Microbiology, Cell Biology, Ecology, Molecular Biology, Botany, Zoology, Physiology, Biotechnology, Neurosciences, Bioinformatics, Marine Biology, Geology, Human Biology, Genetics, Biomedical Sciences, Applied Physics, Geophysics, Materials Science or Environmental Science, in their degree courses leading to B.Sc./B.S./B. Stat./B.Math./Int. M.Sc./Int. M.S., during the academic year in which the fellows awarded are made, are eligible to apply for the KVPY fellowship under various streams – SA, SX and SB. Since 2010 there is more than 196% increase in the number of KVPY Fellowships offered under various categories as depicted in the bar chart.

NUMBER OF KVPY FELLOWSHIPS AWARDED DURING 2010 – 2015



EMPOWERMENT INITIATIVE IN THE KVPY PROGRAM:

i. A certain number of fellowships under the various streams as stated above are available for the students belonging to SC/ST community.

ii. A certain number of fellowships under various streams as stated above are available for the students under the category of Person with Disability (Physically and Visually Challenged).

Application fee: General Category: Rs. 1000; SC/ST & PWD: Rs. 500/-.

Fellowships (Rs.5000-Rs.7000 p.m and a contingency grant equal to 4 months of fellowship per year) are given up to the pre-Ph.D level or for a period of five years whichever is earlier to the selected students.

CONVENER

G Mugesh | Professor, Inorganic and Physical Chemistry

FELLOWSHIP DETAILS

Fellowship Value	Qualifications
SRs. 5000/- p.m.	I to III year B.Sc/B.S/B. Stat/B. Math/Int. M.Sc/Int. M.S
Rs. 7000/- p.m.	I/II year M.Sc, IV/V year B.S/Int. M.Sc/Int. M.S
Contingency Grant	Equivalent to four months of Fellowship per year

KVPY Fellows SA/SB/SX are eligible to attend the Interview/Counselling for admission to the five year Integrated B.S./M.S. Programme conducted by the Indian Institute of Science Education and Research (IISER) Kolkata/Pune/Mohali/Bhopal/Thiruvananthapuram.

KVPY fellows SA/SX/SB are also eligible to apply for 4 - years Bachelor of Science (Research) programme conducted by IISc Bangalore.

NATIONAL SCIENCE (VIJYOSHI) CAMP:

The aim of the annual National Science (Vijyoshi) Camps is to provide a forum for interactions between bright young students and leading researchers in various branches of science and Mathematics. With boundaries between disciplines fast disappearing, these camps serve as an ideal platform for the young participants to get an exciting global viewpoint of questions relating to Basic Sciences as well as application oriented themes. As in the previous meetings, a comprehensive programme has been designed for the participants. This includes thought provoking lectures followed by a round of discussion at the end of each day's programme. Apart from all this, the previous meetings have ultimately served to motivate and inspire the participants by bringing them together, in what is hoped will be their first step towards a career in research in the Basic Sciences and Mathematics.

3.7.14 Karnataka State Council for Science and Technology

Karnataka State Council for Science and Technology (KSCST) an autonomous S&T organization under Department of Science & Technology, Government of Karnataka established in the year 1975 is one of the first State S&T Councils to be set up in the country.

During the last 40 years of its existence, KSCST has been pro-actively engaging itself to identify, propose and implement S&T based solutions to locale specific needs / problems in the broad areas of Agriculture, Water, Education, Energy, Ecology and Environment, Habitat, Health, Solid and Electronic waste and Infrastructure. In co-operation with the Indian Institute of Science and several other premier R&D institutions, KSCST has been executing many projects and programmes aimed at improving socio-economic conditions of the people of the state.

Over the years, a number of technologies have been translated, from research and demonstration phase to the implementation and operational phase. KSCST provides support to the State Government in formulation of S&T based policies and to both Central and State Governments in scientific surveys, project implementation, evaluation, co-ordination & monitoring, organization of scientific meets and awareness campaigns.

Vision: Application of Science & Technology for the management of resources, improvement of environment, quality of life and socio-economic conditions of the people of Karnataka.

Mission: Co-ordinate R & D activities for generation of knowledge for scientifically based interventions, development and popularization of appropriate technologies for adaptation by the civil society to overcome local-specific problems and, inspire and improve human resources of the S&T sector in the state.

Major Programmes

- Natural Resources Data Management System (NRDMS) - A Repository of Natural Resources and Socio-economic database to support local level development, planning.
- Karnataka State Spatial Data Infrastructure (KSSDI) - Karnataka Geoportal is a web portal to find and access spatial information, metadata and associated geographic services/applications via the Internet..
- Student Project Programme (SPP) - Support to under-graduate and post-graduate engineering students for nurturing innovation and development of new technology.
- Rainwater Harvesting (RWH) - Awareness and technical support for implementation of rooftop Rainwater Harvesting
- Biofuel Programme - Demonstration and dissemination of technology and process for biofuel production and use in rural setup.

SECRETARY

S Subramanian | Professor, Materials Engineering

- State Science and Technology Conference - To discuss, deliberate and generate public opinion on a contemporary theme in S&T.
- National Science Day Celebration - In order to expose, encourage, strengthen scientific temper amongst school children.
- State Awards for Scientists and Engineers - Provide support to state government to recognize and reward eminence in S&T.
- Patent Information Centre - Awareness creation in Intellectual Property Rights and provision of technical support for securing IPR.
- Sir M. Visvesvaraya Geospatial Chair - To promote and encourage R&D in Spatial Data Techniques / Technology.

Ongoing projects (Supported by DST - GoK and GoI)

- Implementation of Virtual Laboratory to improve the quality of education in the backward taluks of Karnataka.
- Digital Geospatial Data Generation and Terrestrial Scanning for 3D reconstruction of heritage site at Hampi.
- Assessing the Status of Kalyanis & Measures for Rejuvenation in different zones of Karnataka State using geospatial technologies.
- Karnataka–Israel Industrial Research & Development Programme (KIRD) to promote industrial research leading to product development.

3.7.15 IISc Alumni Association

The Indian Institute of Science Alumni Association (IIScAA) was formed in 1976 to provide a common platform for the alumni of the Institute to reach out to other alumni across various batches, branches, and interests. The report below summarizes the activities of IIScAA during the financial year 2015-16.

IISC ALUMNI GLOBAL CONFERENCE (JUNE 26 - 28, 2015)

IIScAA organised the third edition of the IISc Alumni Global Conference during June 26-28, 2015 at JN Tata Auditorium, IISc. Dr. VK Aatre was the Conference Chair and Prof. N Balakrishnan was the Conference Co-chair. The conference was inaugurated by Prof. Anurag Kumar, Director, IISc. On this occasion, Prof. CNR Rao was felicitated by Director, IISc, for the "Bharat Ratna" conferred on him by the President of India. IISc and its faculty and alumni wholeheartedly and actively participated in the Conference. The Department-wise reunion gave an opportunity for alumni to connect with the departments and understand current areas of research, its focus and vision. The programme had eminent speakers like Shri. AS Kiran Kumar, Dr. V Bhujanga Rao, Dr. Baldev Raj, Dr. Kota Harinarayana, Dr. Arun Shourie, Dr.VS Arunachalam, Prof. Dilip V Jeste, Prof. Andre Van Schaik, Dr. Madhavi Ganapathiraju, Dr. Michael L Norman, Prof. Ram Akella, Dr. Rajat Moona, Prof. G Padmanaban, Prof. Roddam Narasimha, Prof.S Ranganathan etc. More than 1000 people attended the conference.

Alumni Network Meetings

- Alumni Network Meeting (April 5, 2015): IIScAA organised the alumni networking meeting over breakfast on April 5, 2015 at Choksi Hall, IISc. The main focus of this meet was to inform and interact with the members regarding the upcoming IISc Alumni Global Conference during June 26-28, 2015 at JN Tata Auditorium, IISc.

- Alumni Network Meeting (November 21, 2015): The network meeting was organized on 21st November 2015 by IIScAA. The Director, Chairpersons of Divisions and Departments, Executive Committee Members of Students Council, and ODAA Executive were Special Invitees on this occasion.

- Students' Network Meeting on Founder's Day (March 3, 2016): IIScAA organised a "Students Network Meeting" under the theme *Your key issues are our concern too: Let us find the road map to success.* The meeting was chaired by Prof. Anurag Kumar, Director, IISc.

Honours and Award Functions

Dr. Srinivasan Rajagopalan Award Function & Honouring Senior Gurus (April 9, 2015):

The award winners were:

- Dr. Santanu Mukherjee, Organic Chemistry, IISc and
- Dr. P Govardhan Reddy, Solid State and Structural Chemistry Unit, IISc

PRESIDENT

L N Satapathy | Deputy General Manager, BHEL R&D

The Senior Gurus honoured on the occasion were:

- Prof. R Narasimha, Aerospace Engineering, IISc
- Prof. M. Ranganathan, ISU (Instrumentation), IISc
- Prof. RSN. Rau, High Voltage Engineering, IISc
- Prof. TV Sathyanarayana, Electrical Communication Engineering, IISc

Distinguished Alumnus Awards (August 30, 2015): Prof. Anurag Kumar, Director, IISc, presented the Distinguished Alumnus Awards-2015 to the following awardees. The awards were given to:

- Shri. AS Kiran Kumar (Chairman, ISRO)
- Shri. KSR Charan Reddy (Inspector General of Police, Special Investigation Team, Karnataka Lokayukta, Bengaluru)
- Prof. Vedu Mitter (Principal Consultant / Chief Executive, Changeman, Bengaluru)
- Prof. Sunil Kumar (Dean, Booth School of Business, University of Chicago)
- Subhash Chandra Singhal (Battelle Fellow Emeritus, Pacific Northwest National Laboratory)

Prof. SK Chatterjee Award Function (February 8, 2016): The award went to Prof. Anju Chadha, Dept. of Biotechnology, Indian Institute of Technology, Madras.

Felicitation Functions

- Prof. N. Balakrishnan (July 25, 2015): In view of his retirement
- Felicitation Function for Professor Ajay Kumar Sood (September 10, 2015): For having been elected as a Fellow of the Royal Society
- Felicitation function for Dr. VK Aatre (Padma Vibhushan), Dr. HR Nagendra (Padma Shri) and Prof. Dipankar Chatterji (Padma Shri) (February 26, 2016): For winning Padma awards

Lecture Series

- Prof. M. Vijayan Lecture Series (January 4, 2016): By Prof. Sir Tom Blundell, Department of Biochemistry at Cambridge, titled From Insulin & Diabetes to New Medicines for Cancer and TB: Knowledge Exchange between Academia & Industry.
- IIScAA Science Forum - Popular Lecture Series (March 26, 2016): Prof. HP Khincha, Advisor to the Director, IISc, delivered the 52nd Science Forum Lecture titled Electrical Energy – some future perspectives.

Annual General Body Meeting (August 30, 2015): To elect the new Executive Committee for 2015-17 which took charge from October 17, 2015.

IIScAA Newsletter: The IIScAA Newsletter (Volume 7 and Issue 1) was released on 1st January 2016.

6th IIScAA Sports Meet (January 17, 2016): The 6th IIScAA Sports Meet among IISc Alumni was held on 17th January 2016 at IISc Gymkhana ground.

Floral Tributes to the Founder (March 3, 2016): Dr. LN Satapathy, President, IIScAA, paid the floral tributes to the founder, JN Tata, on the occasion of Founder's Day.

Membership Status: IIScAA has Members as on 31st March, 2016: 9315; Total number of members enrolled during the period 2015-2016: 162

4 Awards/Distinctions

Members of the Faculty have won numerous awards, both national and international, in recognition of their research and development work. Some are listed below:

CROSS OF THE ORDER OF MERIT, GERMANY
Prof. Raghavendra Gadagkar, CES

SHANTI SWARUP BHATNAGAR PRIZE
Prof. B Gopal, MBU

ROYAL SOCIETY OF CHEMISTRY FELLOWSHIPS
Prof. Ashok M Raichur, Mat. Eng.

Academy Fellowships

INDIAN NATIONAL SCIENCE ACADEMY (INSA)
Prof. B Gopal, MBU

INDIAN ACADEMY OF SCIENCES (IASc)
Prof. K N Balaji, MCB
Prof. K R Prasad, OC
Tirthankar Bhattacharyya, MA

INDIAN NATIONAL ACADEMY OF ENGINEERING (INAE)
Dr. L Sunil Chandran, CSA
Dr. Bharadwaj Amrutur, ECE
Prof. Anindya Deb, CPDM

Other Fellowships

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERING
Prof. K V S Hari, ECE

SWARNAJAYANTI FELLOWSHIP
Dr. Satish Patil, SSCU
Dr. Navin Kashyap, ECE
Dr. Saptarshi Basu, ME
Dr. Aninda Sinha, CHEP
Dr. Gautam Bharali, MA

WELLCOME TRUST, DBT INDIA ALLIANCE INTERMEDIARY FELLOWSHIP
Dr. Sandeep Easwarappa, BC
Dr. Sridharan Devarajan, CNS
Dr. Sachin Kotak, MCB
Dr. Aravind Penmatsa, MCB

J C BOSE FELLOWSHIP
Prof. Jayant Haritsa, CSA
Prof. P N Rangarajan, BC
Prof. Manju Bansal, MBU
Prof. N Srinivasan, MBU
Prof. G Mugesh, IPC
Prof. N Jayaraman, OC
Prof. A Chockalingam, ECE
Prof. B Sundar Rajan, ECE
Prof. R Narasimhan, ME
Prof. S K Satheesh, CAOS
Prof. Chanda Jog, PHY

RAMANUJAN FELLOWSHIP (2015-2020)
Dr. Aravind Penmatsa, MCB

RAMALINGASWAMI FELLOWSHIP
Dr. Sachin Kotak, MCB

YOUNG FACULTY RESEARCH FELLOWSHIP
Dr. Gaurab Banerjee, ECE
Dr. Sushobhan Avasthi, CeNSE
Dr. Shankar Selvaraja, CeNSE

AERONAUTICAL SOCIETY OF INDIA FELLOWSHIP
Prof. Ranjan Ganguli, AE

AIAA ASSOCIATE FELLOW
Prof. Gopalakrishnan S, AE

FELLOW OF INDIAN SOCIETY OF EARTHQUAKE TECHNOLOGY
Prof. T G Sitharam, CiE

FELLOW OF THE WORLD ACADEMY OF SCIENCES (FTWAS)
Prof. Chanda Jog, PHY
Prof. Rahul Pandit, PHY

FELLOW OF THE AMERICAN PHYSICAL SOCIETY
Prof. H R Krishnamurthy, PHY

FELLOWSHIP OF THE RADCLIFFE INSTITUTE FOR ADVANCED STUDY, HARVARD UNIVERSITY
Dr. Shivani Agarwal, CSA

FELLOW, ASSOCIATION OF COMPUTING MACHINERY, AWARDED BY ACM
Prof. Jayant Haritsa, CSA

Awards

PROF. RAGHAVENDRA GADAGKAR, CES
- A V Rama Rao, Technology Award 2014, CSIR, IICT
- Prof. N Appaji Rao, Best Mentor Award, 2014, IISCAA

DR. SUPRATIM RAY, CNS
Prof. Priti Shankar, Teaching Award for Assistant Professors for Science

DR. PATRICK D' SILVA, BC
National Biosciences Award-2014

DR. T V RAMACHANDRA, CES
- Diploma-Best Paper Award
- Energy Professional Development Award, AEE, USA

DR. AMIT SINGH, MCB
Senior Innovative Young Biotechnologist Award

PROF. SARASWATHI VISHVESWARA, MBU
Recipient of Platinum Jubilee Senior Scientist Award From The National Academy of Sciences

DR. DIPSHIKHA CHAKRAVORTTY, MCB
- NASI-Reliance Industries Platinum Jubilee Award
- Dae Src Outstanding Investigator Award

PROF. S RAMAKRISHNAN, IPC
Distinguished Alumnus Award, IIT, Bombay

PROF. USHA VIJAYARAGHAVAN, MCB
Indian Science Congress, Platinum Jubilee Award lecture

DR. S MUKHERJEE, OC
Dr. Srinivasan Rajagopalan Award

PROF. UDAY MAITRA, OC
National Award of Chemical Education, C.N.R. Rao Education Foundation

DR. GOVARDHAN P REDDY, SSCU
Dr. Srinivasan Rajagopalan Award of IISCAA

DR. SATISH PATIL, SSCU
Kaushal Kishore Award of The Society of Polymer Science, India

MURALI KRISHNA RAMANATHAN, CSA
Faculty Research Award, Awarded by Google

PROF. R GOVINDARAJAN, SERC
Best Paper Award, International Symposium on Code Generation and Optimization, San Francisco, CA, USA for the the paper titled, *Approximating Flow-Sensitive Pointer Analysis Using Frequent Itemset Mining*

PROF. SHALABH BHATNAGAR, CSA
Dr. RajkumarVarshney Award, Lifetime contributions to Systems Theory, Systems Society of India

DR. UDAY KUMAR REDDY, CSA
Faculty Research Award, Awarded by Google

DR. K J VINOY, ECE
Ulrich L. Rohde Innovative Conference Paper Award in Computational Electromagnetics, Paper entitled *A reduced order model for electromagnetic scattering using multilevel Krylov subspace splitting*, 2015 IEEE International Conference on Computational Electromagnetics

PROF. K V S HARI, ECE
- 2015 IETE - PROF SVC AIYA Memorial Award for Excellence in Telecom Education
- Distinguished Alumnus Award, College of Engineering, Osmania University, Hyderabad

DR. RAJESH SUNDARESAN, ECE
Best Paper Award, 2015 NCC (National Conference on Communications)

DR. G NARAYANAN, EE
Prof. Satish Dhawan Young Engineer Award (Karnata State Council for Science & Technology)

DR. GURUNATH GURRALA, EE
- INAE Young Engineer Award - 2015
- BEST PAPER AWARD, paper entitled *Flexible decision making framework for implementation of power system corrective topology control*, IEEE Industry applications society Annual meeting held in Dallas USA, October 2015

DR. MAYANK SHRIVASTAVA, ESE
2015 IEEE EARLY CAREER AWARD of the IEEE Electron Devices Society

DR. BHARADWAJ AMRUTUR, ECE
IOT Best Paper Award at the 2015 International Conference on VLSI Design And Embedded Systems

DR. PARTHA PRATIM TALUKDAR, CSA
- Google Focused Research Award, 2015 (By Invitation Only)
- Accenture Open Innovation Research Award, 2015 (One of 11 Worldwide)

DR. CHANDAN SRIVASTAVA, MT
NASI-Young Scientist Platinum Jubilee Award

DR. KAUSHIK CHATTERJEE, MT
Prof Priti Shankar Teaching Award

DR. H N CHANAKYA, CST
Amulya-Vimala Reddy Award

DR. S DASAPPA, CST
Best Visual Presentation Award, Performance Evaluation Tool for Simulating Gas Engine, Shanghai

PROF. ROHINI GODBOLE, CHEP
- Stree Shakti Awardee of Aditya Pratishtan, Pune of the year 2015 for achievements in field of Science, April 2015
- Received Devi Award of the New Indian Express Group, August 2015

DR. ABHA MISRA, IAP
Joseph Wang Award

DR. SAI SIVA GORTHI, IAP
- ISOI young scientist/engineer Award
- Young investigators Award in cancer biology

DR. SANJIV S, IAP
- Google Award
- Golden reviewer Award

PROF. GADADHAR MISRA, MA
Mathematician of the year Award 2014 jointly by Ponnala Foundation and the National Institute of Technology, Warangal

DR. BANIBRATA MUKHOPADHYA, PHY
Honorable mention in the gravity research foundation 2015 awards for essays on gravitation

PROF. A G RAMAKRISHNAN, EE
Manthan Award 2015

Prizes / Medals

PROF. VIJAYALAKSHMI RAVINDRANATH, CNS
S.S. Bhatnagar Medal, INSA

PROF. E D JEMMIS, IPC
Goyal Prize in Chemistry, Kurukshetra University

DR. K R PRABHU, OC
CRSI Bronze Medal

PROF. K R PRASAD, OC
Rajib Goyal Prize

DR. ANINDA J BHATTACHARYYA, SSCU
CNR Rao National Prize for Chemical Research

PROF. D D SARMA, SSCU
CNR Rao Prize Lecture in Advanced Materials, MRSI

DR. P S MUKHERJEE, IPC
Chemical Research Society of India Bronze Medal

PROF. V KUMARAN, CE
TWAS PRIZE

PROF. K CHATTOPADHYAY, MT
IIM Platinum Medal

PROF. U RAMAMURTY, MT
Twas Prize

DR. SAPTARSHI BASU, ME
Prof. K N Seetharamu Medal And Prize

PROF. SHALABH BHATNAGAR, CSA
- Prof. Satish Dhawan Young Scientist Prize in Engineering Sciences, Awarded by Govt. of Karnataka
- Rajib Goyal Young Scientist Prize

Others

PROF. C JAYABASKARAN, BC
Astra Chair-2015

DR. T V RAMACHANDRA, CES
Distinguished Scientist, Card, Chennai

PROF. R SUKUMAR, CES
Doctor of Sciences (Honoris Causa), Minnesota, USA

PROF. RAGHAVENDRA GADAGKAR, CES
D.Sc. (Hc), University of Burdwan

PROF. RENEE M BORGES, CES
Elected as Council Member, International Society of Chemical Ecology

PROF. R VARADARAJAN, MBU
Council Member & Treasurer, Indian Academy of Sciences (2016-18)

PROF. V NAGARAJA, MCB
President, JNC, Bangalore

PROF. P KONDAIAH, MRDG
Elected to Indian National Science Academy

PROF. B J CHERAYIL, IPC
Amrutmody Chair Professorship

PROF. K L SEBASTIAN, IPC
Vice President, Indian Academy of Science, Bangalore

DR. P S MUKHERJEE, IPC
Appointed as The Editorial Advisory Board Member of ACS Journal, Inorganic Chemistry

PROF. S RAMAKRISHNAN, IPC
President, Society of Polymer Science-India (SPSI)

HON. PROF. S CHANDRASEKARAN
Chairman, National Organic Symposium Trust

PROF N JAYARAMAN, OC
President, International Carbohydrate Organization

PROF. S BHATTACHARYA, OC
Director, Indian Institute of Cultivation of Science, Kolkata

PROF. D D SARMA, SSCU
- Honorary Professor, S.N. Bose National Centre for Basic Sciences, Kolkata
- Honoris Causa Doctorate Degree From Indian Institute of Engineering Science and Technology, Shibpur, India, 2015
- IIA Bicentiennial Commemorative Public Lecture (2015), Indian Institute of Astrophysics, 2015
- CSIR-National Geophysical Research

PROF. S YASHONATH, SSCU
- Editorial Board Member of Pramana 2015-2018

PROF. T.N. GURU ROW, SSCU
- Regional Co-Chair of International Centre for Diffraction Data (ICDD), USA
- A Three-Year Membership in The American Chemical Society

DR. ARPITA PATRA, CSA
Associate of Indian Academy of Sciences, Bangalore

PROF. CHIRANJIB BHATTACHARYYA, CSA
- University Research Grant, Awarded by Xerox Research
- Co-Chair of Karnataka Jana Ayog (KJA), Government of Karnataka, Task Force on Machine Intelligence for the state of Karnataka

PROF. JAYANT HARITSA, CSA

Commendation Certificate for Software Tools , Awarded by HP

PROF. K GOPINATH, CSA

Expert Committee Member, Mobile Governance, DEITY, New Delhi

DR. BHARADWAJ AMRUTUR, ECE

- Best IoT Paper in 28th International Conference on VlSIDesign And Embedded Systems
- A.K. Chowdhary Best Paper in the 28th International Conference on VlSIDesign And Embedded Systems

DR. SHAYAN SRINIVASA GARANI, ESE

- Lead Guest Editor for IEEE Journal on Selected Areas in Communication
- Lead Principal Investigator for an Indo-US Grant involving three US Universities and IISc

PROF. NAVAKANTA BHAT, ECE

Elected to the Board of Governor of IEEE Electron Devices Society

DR. V R SUPRADEEPA, CENSE

Associate Editorship

DR. SATHISH VADHIYAR, SERC

Outstanding Reviewer Status for Journal of Parallel And Distributed Computing, May 2015

DR. D HARURSAMPATH, AE

- Winner, Best Startup Company, Itma Future Materials Awards, Milano, Italy + Four Finalist Nominations
- By World Textile Information Network (Wtin), UK
- Innovator of The Year
- Best Innovation Mobile Textiles [Automotive, Aerospace & Other Transport]
- Launch of The Year
- Top-3 (Cleantech & Environment) + Special Mention (Product & Technology), University Startup World Cup, Copenhagen, Denmark
- Multinational Team Multifun, Winner, 2015 Unesco-Airbus Fly Your Ideas
- Multinational Team Multifun, Winner, 2015 Dutch Aerospace Award
- Team Lakshya-IISc, Winner, 2015 Best Graduate Entry, AHS International Student Design Competition
- Airbus "Link The Top," Isae Supaero, France; Nus, Singapore & Iisc, India, 2015â€"16

DR. S N OMKAR, AE

- Member of Editorial Board of Journal of Advance Research in Aeronautics And Space Science
- Treasurer, Fourth Asian-Australian Rotorcraft Forum (ARF) 2015
- Best New Entrant Graduate Team Faculty Advisor for Lakshya at 32nd AHS International Student Design Competition 2015
- Member of Board of Studies, Department of Aerospace Engineering, Dayananda Sagar College of Engineering, Bengaluru, 2015
- Evaluator for Books of Science And Technology To Karnataka State Council for Science And Technology (KSCST)

PROF. RANJAN GANGULI, AE

- Senior Member, IEEE
- Faculty Advisor, Best New Entrant Graduate Team in The 32nd American Helicopter Society Student Design Competition on Distributed Logistics in An Urban Setting Using Small Unmanned Aerial Vehicles, Sponsored by Boeing, 2015. (With Dr. S.N. Omkar and Dr. Dinesh Harursampath)

PROF. GOPALAKRISHNAN S, AE

Ulrich L. Rohde Innovative Conference Paper Awards on Computational Electromagnetics for The Paper Entitled "A Reduced Order Model for Electromagnetic Scattering using Multilevel Krylov Subspace Splitting," Presented in 2015 IEEE International Conference on Computational Electromagnetics 2015

DR. ASHISH VERMA, CiE

Nominated Member of Project Team of United Nations Economic Commission for Europe (UNECE)

DR. G MADHAVI LATHA, CiE

Secretary, Technical Committee of Indian Geotechnical Society on Ground Improvement and Reinforcement

PROF. T G SITHARAM, CIE

- Vice President, Indian Society of Earthquake Technology, 2015-2017
- National Executive Committee Member, Indian Geotechnical Society, 2015-2016

- Adjunct Professor, Department of Civil Engineering, Indian School of Mines, Dhanbad
- Honorary Dean, Yoga And Physical Sciences, S-Vyasa University, Bangalore
- Board of Studies Member, Dept.Of Civil Engineering, M S Ramaiah Institute of Technology, Bangalore
- Peer Review Member, Peer Review Process of Departments, Department of Civil Engineering
- Vice President Golden Spiral Innovations And Technolgies Ltd., Bangalore

DR. ALOKE PAUL, MT

Associate Editor, Journal of Electronic Materials, Springer-TMS

DR. KAUSHIK CHATTERJEE, MT

- Associate Editor, Rsc Advances of The Royal Society of Chemistry
- Visiting Lectureship, ASM/IIM

PROF. M K SURAPPA, MT

Honorary Doctorate Degree (D.Litt), Karnataka State Open University

PROF. S RANGANATHAN, MT

Editor, Journal Materials Transactions

DR. SURYASARATHI BOSE, MT

- Young Associate, INAE
- Young Engineer, INAE
- Founder Member, INYAS
- Member, NASI
- Member, Editorial Board, Proceedings of INSA
- International Advisory Member, Materials Research Express (IOP Journal)

PROF. U RAMAMURTY, MAT. ENG.

Quashi Chair Professor, Zhejiang University

PROF. R V RAVIKRISHNA, ME

International Board Member, Institute of Liquid Atomization & Spray Systems

PROF. G S BHAT, CAOS

Chairman, Research Advisory Committee, Incois, Ministry of Earth Sciences, Govt. India.

DR. BINOD SREENIVASAN, CEaS

Elected Member, IUGG Commission on Planetary Sciences

PROF. AMARESH CHAKRABARTI, CPDM

- Visiting Professor, Japan Advanced Institute of Science And Technology, Japan, 2015
- Associate Editor, Design Science Journal (Cambridge University Press), Since 2015
- Advisory Editor, Journal of Design, Business & Society (Intellect), Since 2015
- Advisory Editor, Journal of Integrated Design And Process Science (Ios), Since 2015
- Guest Editor, Spl Issue on Design Science, Journal of Indian Institute of Science, 2015
- One of the Best Papers, 3rd International Conference on Design Creativity (3rd ICDC), Bangalore, India, 2015, and invited to be published in International Journal of Design Creativity and Innovation (IJDCI), Taylor & Francis.
- Review Coordinator, 27th ASME IDETC Intl. Conference on Design Theory and Methodology, Boston, 2015.

PROF. ANINDYA DEB, CPDM

Elected as SAE (Society of Automotive Engineers) Fellow

PROF. N H RAVINDRANATH, CST

- Nominated to the (IPBES) Inter-Governmental Platform for Bio-Diversity and Eco-System Services of UN
- Nominated to the Scientific Advisory Panel of UNEP

PROF. ROHINI GODBOLE, CHEP

Invited to give Sir C.V. Raman Lecture of the Department of Atomic Energy, organized by the Indian Physics Association, February 2015

DR. ABHA MISRA, IAP

Member of National Science Academy, India (NASI)

DR. ARVIND AYYER, MA

Elected Associate of the Indian Academy of Sciences for 2014-17

DR. PRERNA SHARMA, PHY

Forbes India 30 under 30

PROF. E D JEMMIS, IPC

Editorial Advisory Board, J. Chemical Sciences

Awards given by Institute

The institute also provides some meritorious awards for the academician in recognition of their research and development work. Some are listed below:

ALUMNI AWARD FOR EXCELLENCE IN RESEARCH FOR THE YEAR 2016

Science

- Prof. Chanda J Jog, Dept. of Physics
- Prof. Rajan R Dighe, Dept. of Molecular Reproduction, Development & Genetics

Engineering

- Prof. Debasish Ghose, Dept. of Aerospace Engineering
- Prof. K Gopakumar, Dept. of Electronics System Engineering

PROF. RUSTUM CHOKSI AWARD FOR EXCELLENCE IN RESEARCH FOR THE YEAR 2015

Engineering

- Prof. Rudra Pratap, Centre for Nanoscience & Engineering
- Prof. R Govindarajan, Supercomputer Education & Research Centre

PROF. PRITI SHANKAR TEACHING AWARD FOR ASSISTANT PROFESSORS FOR THE YEAR 2015

Science

Dr. Supratim Ray, Centre for Neurosciences

Engineering

Dr. Kaushik Chatterjee, Dept. of Materials Engineering

5 Undergraduate Programme

BACHELOR OF SCIENCE (RESEARCH) AND MASTER OF SCIENCE PROGRAMMES

DEAN	: **UMESH VARSHNEY** | Professor, Microbiology and Cell Biology
ASSOCIATE DEAN:	**BALAJI JAGIRDAR** | Professor, Inorganic and Physical Chemistry
ASSOCIATE DEAN:	**PS ANIL KUMAR** | Associate Professor, Physics

Preamble

The undergraduate programme in science at IISc began in 2011. The first batch of students who completed their programme with a Four-year Bachelor of Science (Research) degree graduated in 2015. Some of the students from this batch continued for a fifth year at the institute to pursue a Master of Science programme. In the Master's programme, the students continue to take classroom courses and a major laboratory project course in the discipline of their major. This year, the UG programme will see the students of 2011 batch graduating with a Master of Science degree and the remaining students (of either 2011 or 2012 batch) with Four-Year Bachelor of Science (Research) degree. As in the past, the UG students continue to bag competitive fellowships such as SN Bose, DAAD fellowships, etc. Students have also been pursuing summer projects in several top institutes in India and abroad. Some students have also been taking up summer internships in industries. Within a short span of five years since the UG programme was started at the institute, it has gained immense popularity and is the most sought-after programme of a large section of the bright, young and energetic minds of the country.

Career paths of outgoing students

Of the first batch of graduating Master's students (batch 2011) and Bachelor's students (batch 2011), several have secured admission for Ph.D. programmes in some of the top ranking universities of the world. A total of 33 graduating Bachelor's students (batch 2012) have secured admission to Ph.D./Master's programmes. To name a few, universities and institutes in which these students secured admission include, Caltech, MIT, University of California(Berkeley), Yale University, Harvard University, Cornell University, University of Chicago, University of Illinois(Urbana-Champaign), University of Wisconsin, University of Oxford, Max-Planck Institute (Dresden), IIMs and others. This is a testimony of the world-wide reputation that the UG programme has gained within this short span of time. A total of 53 students from 2012 batch opted to continue for a fifth year to pursue a Master of Science degree at the institute.

Current batches of students

The current batches of students are as follows: year 2012 (53 students continuing for their Masters), 2013 (109 students), 2014 (107 students), and 2015 (110 students). There has been an overwhelming response in the recently held first round of counseling session for admission for the academic year 2016-17. It is expected to attract roughly 120 new students into the UG programme. Thus, the campus boasts of a vibrant environment with nearly 500 bright and the best young and energetic minds of the country.

Co-curricular activities

Students are also involved in several co-curricular activities in addition to their academics. These include, the national science, technology, and cultural festival, PRAVEGA, UG magazine QUARKS which brings out the literary talents, SAMANWAY, the industry outreach initiative of the institute in which UG students played a key role in organization, RANGMANCH and RHYTHMICA which bring out the dramatic and the dance talents. Students continue to excel and have brought laurels to the institute by winning gold medals in several national level competitions.

6 Students

6.1 ADMISSIONS AND ON ROLL

During the year, 1005 students (451 for research, 47 for Integrated PhD, 394 for course programmes and 113 under graduate programme) joined the Institute taking the number "On Roll" to 4071 (2537 students in research, 295 in Int. PhD, 735 in post graduate and 504 in under graduate course programme).

6.2 SC/ST STUDENTS

51 students belonging to SC/ST in research, 84 in the course programme and 28 in the under graduate programme joined the Institute in the current year and, in all 274 research students, 44 Int. PhD and 149 course students, 111 under graduate students were "On Roll" during the year.

Admissions:

RESEARCH: Out of 846 applicants, 575 were called for an interview; 56 were offered admission and 44 joined.

INTEGRATED PhD: Since 2013, admission is through JAM (Joint Admission Test for M.Sc), 56 of them were short-listed and called for an interview, 9 were offered admission and 7 joined.

Courses:

ME/MTech/MMgt/MDes: Out of 1510 applicants, 257 were offered admission and 84 joined.
B S: Out of 1405 applicants, 169 were offered admission and 28 joined.

6.3 SCHOLARSHIPS / FELLOWSHIPS

The students participating in research and course programmes are granted scholarships at the Institute ranging from ₹ 12,000/- to ₹ 36,000/- depending on the programme. Those students who are granted fellowships by agencies like UGC/CSIR and other bodies are not eligible for scholarships awarded by the Institute.

6.4 STUDENTS ASSISTANCE PROGRAMME

Needy students have offered their services in selected Institute activities and have secured additional finances under the "earn-while-you-learn" scheme.

Students Aid Fund: This is a co-operative scheme (every student subscribes ₹ 100/- per annum) to assist needy and deserving students through loans, to meet tuition fees, study tour expenses, cost of books, thesis expenses and maintenance at the Institute.

During the period 2015-16, 262 students availed themselves of the loan to the extent of ₹ 75,10,000/-.

6.5 STUDENTS COUNCIL

The Students Council (an elected body from among the student community) provides an effective channel of communication between the Director, faculty and students. Through dialogue and discussion on various student matters, problems relating to the students are resolved by initiating appropriate action. The Students' Council is also responsible for certain welfare measures initiated by the student community. The publication of 'SCAMPUS', a campus magazine and News Letter of the students is one of its main activities.

6.6 HOSTELS

The Students' Hostel consists of 11 gents and 4 ladies hostel blocks. Students, research associates and short term workers totaling 2,945 (2,179 Gents and 766 Ladies) are provided accommodation in the Hostel Blocks.

Four Dining halls (Two Vegetarian and Two Composite) provide a variety of food items in clean and hygienic conditions for all the boarders.

The Hostel and Dining halls are managed by the Council of Wardens headed by the Chairman and team.

6.7 AWARD OF MEDALS

The Institute awards medals every year in recognition of the best thesis (both at the Doctoral and Master's levels) in various fields and for excellence in course programmes and projects.

The following tables give the names of the medal and the recipient for the current year:

Sl No.	Name of Medal	Awardee	Dept/Centre
	FOR THE BEST PhD THESIS		
1.	Prof. Chintakindi V Joga Rao medal	Dr. Chintoo S Kumar	AE
2.	Prof. B K Subba Rao Medal	Dr. Anirban Bhattacharya	ME
3.	Prof. K P Abraham Medal	Dr. R Lakshmi Narayan	MT
4.	Alumni Medal	Dr. P Balamurugan	CS
5.	The Seshagiri Kaikini Medal	Dr. Ranjitha Prasad	EC
6.	Prof. D J Badkas Medal	Dr. Saurav Pramanik	EE
7.	Prof. N S Govinda Rao Medal	Dr. J Indu	CE
8.	MAA Communications Medal	Dr. Prasand S Onkar	PD
9.	Prof. Giri Memorial Medal	Dr. Kumar Somyajit	BC
10.	Mrs. C V Hanumantha Rao Medal	Dr. Ankana Tiwari	MD
11.	The Shamrao Kaikini Medal	Dr. Anusha Krishnan	ES
12.	The M Sreenivasaya Medal	Dr. Sahana Holla	MC

13.	Prof. B H Iyer Medal	Dr. Rahul Kumar Rathour	MB
14.	Dr. J C Ghosh Medal (Physical Chemistry)	Dr. Bharathi Konkena	IP
15.	Prof. S Soundararajan (Inorganic Chemistry)	Dr. Amit Ashok Vernekar	IP
16.	The Guha Research Medal	Dr. Sougata Datta	OC
17.	The Toulouse Medal	Dr. Ritesh Dubey	SS
18.	The Martin Forster Medal	Dr. Biplab Basak	MA
19.	Prof. Anil Kumar Memorial Medal (Experimental Physics)	Dr. Subhamoy Ghatak	PH
20.	Kumari L A Meera Memorial Medal (Theoretical Physics)	Dr. Kirtimaan Ajaykant Mohan	PH
21.	Sir Vithal N Chandavarkar Memorial Medal	Dr. Jaya Prakash Naidu	SE
22.	The Sudborough Medal	Dr. Satish Laxman Sindhe	MR
23.	Dr. Srinivasa Rao Krishnamurthy Medal	Dr. G Srividya Varma	IN
24.	Amulya and Vimala Reddy Medal	Dr. Durgamadhab Mahapatra	ST
25.	Tag Corporation Medal	Dr. Ram Krishna Ghosh	ED

FOR THE BEST INTEGRATED PhD STUDENT (MS LEVEL)

26.	Dr. R K Maller Memorial Medal	Ms. Priyanka Biswas	Biological Scs.
27.	Dr. A Nagaraja Rao Medal	Mr. Sagar Ghorai	Chemical Scs.
28.	Prof. P L Bhatnagar Medal	Mr. Hassain M	Mathematical Scs.
29.	Kumari L A Meera Memorial Medal	Mr. Thathagata Paul	Physical Scs.

FOR THE BEST MSc (Engg) THESIS

30.	The Institute Medal	Mr. M S Vaidyanathan	CH
31.	M N S Swamy Medal	Mr. Chandan G	CS
32.	Prof. F M Mowdawalla Medal	Mr. Pramod R T	EC
33.	The Hay Medal	Ms. Lakshmi S	EE
34.	Subramaniam Rajalakshmi Medal	Mr. Avinash S Ramakanth	SE
35.	The Institute Medal	Ms. Thushara Venugopal	AS

FOR THE BEST INTEGRATED ME/MTech/MDes/MMgt STUDENT

36.	Mrs. Sabita Chaudhuri Memorial Medal	Mr. Velayutham T	AE
37.	Prof. N R Kuloor Memorial Medal	Mr. Sayani Majumdar	CH
38.	Prof. N S Lakshmana Rao Medal	Mr. Subramanian S	CE
39.	The Computer Society of India (Bangalore Chapter) Medal	Mr. Suman Kumar Datta	CS
40.	The K K Malik Medal	Ms. Arunima Banerjee	MT
41.	S V Sastry Memorial Medal	Mr. Birla Mayur Bhushan	ME
42.	The Alumni Medal	Mr. Saugata Datta	EC/ED
43.	Prof. I S N Murthy Medal	Mr. Shubhanshu Shekhar	EE
44.	The N R Khambhati Memorial Medal	Mr. Pradeep Bansal	EE
45.	The N R Khambhati Memorial Medal	Mr. Rupam Pal	EE
46.	Prof. S V C Aiya Medal	Ms. Kavitha R	EC

47.	Motorola Medal	Ms. Neel Choudhury	SERC
48.	The CEDT Design Medal	Mr. Rajib Lochan Swain	ED
49.	Prof. K N Krishnaswamy Medal	Mr. Rishav Mallick	CEaS
50.	The Institute Medal	Mr. Kulkarni Aniket Anand	PD
51.	Prof. B G Raghavendra Memorial Medal	Mr. Gaurav Khanna	MG

FOR THE BEST BACHELOR OF SCIENCE (RESEARCH – AFTER 4 YEARS OF STUDY)

52.	The Institute Medal	Mr. Himani Anand Galagali	Biology
53.	The Institute Medal	Mr. Aritra Sil	Chemistry
54.	The Institute Medal	Mr. Kamalnath K	Materials
55.	The Institute Medal	Mr. Vignesh A N	Mathematics
56.	The Institute Medal	Mr. Aditya Hebbar	Physics

6.8 AWARDS & DISTINCTIONS

Fellowships

DR. MINI JOSE DEEPAK, CNS
RAMALINGASWAMI RE-ENTRY FELLOWSHIP

REDDY PEERA KOMMADDI, CNS
RAMALINGASWAMI RE-ENTRY FELLOWSHIP FROM DEPARTMENT OF BIOTECHNOLOGY

MALAVIKA SAMAK, CSA
GOOGLE PHD FELLOWSHIP

ASHUTOSH PANDEY, DCCC
DEEPANKAR PACHERIA, DCCC
ANAND N, DCCC
JALIHAL CHETANKUMAR ADAPPA, DCCC
DIXIT VISHAL VIJAY, DCCC
FARHA, DCCC
Grantham fellowship

ANUPAMBERA, IPC
RAMAN-CHARPAK FELLOWSHIP FOR 2015

ANINDITGA DAS, MBU
BRISTOL -MYERS SQUIBB FELLOWSHIP

SAI RAMA KRISHNA MEKA, MT
FELLOWSHIP-UNIV OF TORONTO

SUMIT BAHL, MT
ORAU FELLOWSHIP

Best Paper Awards

SINDHU PADAKANDLA, CSA
SHELL INDIA BEST STUDENT PAPER AWARD (FIRST PRIZE)

NEHA SHARAN, ESE
BEST PAPER AWARD

CHETHAN KUMAR, ESE
BEST PAPER AWARD

A KATTY, ME
S CHAKRAVARTHY, ME
FINALIST FOR BEST PAPER AWARD

A ROYCHOWDHURY, ME
K D PATIL, ME
A NANDY, ME
BEST PAPER AWARD

SAFMAN P, DARSHAN S, KATTI A N, ME
BEST Application PAPER AWARD

KSHITIJA JOSHI, MS
BEST PAPER AWARD IN THE CONFERENCE

Y RAGHUPATHY, MT
BEST PAPER

Best Poster Awards

PRIYANKA JAYAL, BC
BEST POSTER AWARD

DEEPTHI R, BC
BEST POSTER PRESENTATION AWARD

RUPA KUMARI, BC
BEST POSTER PRESENTATION AWARD

GOWRI BALACHANDER, BSSE
BEST POSTER AWARD AT THE ALTERNATIVES TO ANIMAL TESTING MEETING HELD AT IIT BOMBAY.

RISHAV MALLICK, CEaS
BEST STUDENT POSTER AWARD

SOUVIK MANDAL, CES
STUDENT POSTER AWARD

ANINDITA BRAHMA, CES
STUDENT POSTER AWARD

BIJYALAXMIATHOKPAM, IPC
BEST POSTER PRIZE

SARMISTHA GUHA, MCB
BEST POSTER AWARD

ARKA LAHIRI, MT
BEST POSTER AWARD

PRITI XAVIER, MT
BEST POSTER AWARD

SHITAL PAWAR, MT
BEST POSTER AWARD

MADHANGI M, MRDG
BEST POSTER AWARD

Best Oral Presentation Awards

MONICA PANDEY, BC
2ND BEST ORAL PRESENTATION AWARD IN CARCINOGENESIS

K P KRISHNARAJ, CES
BEST STUDENT PRESENTATION

TITASH SEN, MCB
BEST PRESENTATION

DEVI LAL, MT
POSTER PRESENTATION

SHALAKA SHINDE, MT
ORAL PRESENTATION

AMIT A VERNEKAR, IPC
BVS2015 ORAL PRESENTATION PRIZE (FIRST PRIZE)

Best Researchers/Thesis Awards

INDU J, CIE
PROF. U. C. KOTHYARI BEST PHD THESIS AWARD FROM INDIAN SOCIETY OF HYDRAULICS

DILIP MATHEW THOMAS, CSA
BEST THESIS AWARD

MONIKA DHOK, CSA
IDRBT DOCTORAL COLLOQUIUM (THIRD PRIZE)

ROHITH D VALLAM, CSA
HONOURABLE MENTION FOR BEST DOCTORAL DISSERTATION (XEROX)

ABHIJIT KULKARNI, EE
POSOCO POWER SYSTEM AWARD

ALOK RANJAN VERMA, EE
POSOCO POWER SYSTEM AWARD

MOHAMMAD HASSAN HEDAYATI, EE
POSOCO POWER SYSTEM AWARDSAN HEDAYATI

PALLAVI BHARADWAJ, EE
POSOCO POWER SYSTEM AWARD

Travel Awards

ANANYA S RAO, CAOS
AMERICAN GEOPHYSICAL UNION'S BERKNER TRAVEL FELLOWSHIP FOR ATTENDING THE 2015 AGU FALL MEETING IN SA

PRASANNA K NAIDU, CEAS
TRAVEL GRANT AWARD

RITIKA KAUSHAL, CEaS
TRAVEL GRANT AWARD

YOGARAJ BANERJEET, NAYELA ZEBA, RITIKA KAUSHAL, ANUPAM BANERJEE, GAUTHAM S B, CEaS
TRAVEL GRANT AWARD

K. RAJA, IPC
STUDENT TRAVEL AWARD BY THE SOCIETY OF BIOLOGICAL INORGANIC CHEMISTRY (SBIC)

DRISYA V, MCB
TRAVEL GRANT FOR ORAL PRESENTATION

TITASH SEN, MCB
TRAVEL GRANT AND SUPPORT

RAJI NAIR, MRDG
DBT TRAVEL AWARD

SAI RAMA KRISHNA MEKA, MT
STUDENT TRAVEL AWARD

ANSHU SHUKLA, SERC
RAVIKANT DINDOKAR, SERC
ABHILASH SHARMA, SERC
IEEE HIPC TRAVEL AWARDS CHEMICAL SOCIETY

Award and Medals

DEEPESH NAGARAJAN, BC
BRISTOL MEYERS SQUIB SCIENCE AWARD

KUMAR SOMYAJIT, BC
K.V.GIRI MEDAL

DEEPASH KOTHIWAL
DR. A.S. PERUMAL AWARD

SOUVIK MANDAL, CES
EUROPEAN COMMISSION EURAXESS SCIENCE COMMUNICATION AWARD

SIVA RAM KRISHNA PERALA, CES
SHAH-SCHULMAN AWARD OF IICHE FOR 2015

AMARNATH HEGDE, CIE
IGS PROF G A LEONARDS AWARD FROM INDIAN GEOTECHNICAL SOCIETY

ARJUN SIL, CIE
SARDAR RESHAM SINGH AWARD 2015 FROM INDIAN GEOTECHNICAL SOCIETY

SHIVAPUJI A M, CST
BEST VISUAL PRESENTATION AWARD 2015

VEERENDRA KALYNA JAGANNADH, IAP
IEEE BANGALORE SECTION PATENT AWARD

VEERENDRA KALYNA JAGANNADH, IAP
IEEE BANGALORE SECTION PUBLICATION AWARD 2014

AMIT A VERNEKAR, IPC
GANDHIAN YOUNG TECHNOLOGICAL INNOVATION (GYTI) AWARD FOR THE YEAR 2015

KEERTIMAN SYAL, MBU
RANBAXY AWARD

SOUMITRA GHOSH, MCB
BIO-ASIA INNOVATION AWARD (FIRST PRIZE)

Others

NAYELA ZEBA, CEaS
STUDENT AMBASSADOR

NIKITA AMBASANA, ECE
STUDENT SOFTWARE DEMONSTRATION PRIZE

ANWESHA MUKHERJEE, IAP
GANDHIAN YOUNG TECHNOLOGICAL INNOVATION APPRECIATION

VEERENDRA KALYNA JAGANNADH, IAP
AWARDED FULL SCHOLARSHIP

MANISHA SINHA, MBU
SHELL INDIA COMPUTATIONAL TALENT PRIZE FOR THE YEAR 2015

SAROJ JAWKAR, MRDG
3RD BEST PLATFORM PRESENTATION

M S BHASKAR, MT
P K DASGUPTA PRIZE

P JAGTAP, MT
EDITORS CHOICE

LOKESH, NMRC
JHARANA RANI SAMAL

UPASANA DAS, PHYSICS
SELECTED FOR THE LINDAU NOBEL LAUREATE MEETING

6.9 PLACEMENT

The Placement Section at the CSIC of the Institute continued to serve the purpose of bringing together the potential employers and outgoing students. The Section kept in touch with a large number of industries, National Laboratories, R&D Centres and Defence Establishments, and extended assistance in the entire recruitment process (pre-placement talks, written tests, group discussions and interviews).

During the year 2015-16, about 75 organizations conducted campus interviews. A few organizations invited students to their offices for this purpose. 375 students registered for placement, out of whom 250 participated and 158 received satisfactory placement offers. Some of the students obtained placements on their own and some decided to pursue higher studies. The placement exercise for the year 2015-16 was effective and satisfactory.

6.10 EXTERNAL REGISTRATION PROGRAMME

Students on roll under the External Registration Programme

Sl No.	Sponsors	No. onroll
	EDUCATIONAL INSTITUTIONS	
1	BMS College	1
2	Hemvati Nandan Bahuguna Garhwal University	1
3	Hindustan University	1
5	M S Ramaiah Institute of Technology	3
6	National Institute of Technology (Tiruchirappalli)	1
7	Siddaganga Institute of Technology	2
8	Visveswaraya College of Engineering	1
	TOTAL:	**10**
	R & D LABS / ORGANISATIONS	
1	3M India Limited	1
2	ABB Corporate Research Centre	3
3	Accenture Technology Labs	1
4	ADA	5
5	ADE	3
6	Agere Systems	1
7	Analog Devices India Pvt Ltd	2
8	Ashok Leyland	1
9	Atomic Mineral Directorate for Exploration and Research	1
10	BARC Mumbai	2
11	Bangalore Integrated Systems Solutions Pvt Ltd	1
12	BHEL (Corporate R and D Division)	1
13	Blss Research	1
14	C-DAC	2
15	Council of Scientific & industrial Research	2
16	Crompton Greaves Ltd	2
17	CSTEP	4

18	DAE	1
19	Defence Electronics Research Lab	1
20	Defense Research and Development Laboratory	1
21	DMRL	3
22	DRDO	17
23	Faurecia Emission Control Technologies	1
24	Gas Turbine Research Establishment	4
25	GE India Technology	10
26	General Motors India Pvt Ltd	3
27	Global Technology Ltd	1
28	HAL	2
29	Hewlett Packard Labs	2
30	Honeywell Solutions Pvt Ltd, Blore	7
31	HP Indian Software Operations	1
32	IBM India Pvt. Ltd.	2
33	IGCAR, Kalpakam	2
34	Infosys Ltd	2
35	Institute for Robotics and intelligent Systems	1
36	I-AIM Foundation of Revitalization of Local Health Traditions	1
37	ISRO	38
38	Kirloskar Copeland Limited	1
39	Laboratory for Electro Optics Systems	1
40	LRDE	3
41	TVS Motors Company Ltd Hosur, Tamil Nadu	1
42	Microwave Tube Research and Development Centre	3
43	Nagarjuna Fertilizers and Chemicals Ltd	1
44	National Aerospace Laboratories	19
45	Naval Science and Technological Laboratory	1
46	NI Systems India Pvt Ltd	1
47	Nokia India Pvt Ltd	1
48	Robert Bosch Engineering and Business Solutions Ltd	3
49	Salarmiria Arena	1
50	Schneider Electric India Pvt Ltd	1
51	Siemens Information Systems Ltd	1
52	Steer Engg Pvt Ltd	1
53	Tata Consultancy services limited	1
54	Tata Motors	2
55	Tata Steel	1
57	Texas Instruments India Pvt Ltd	5
58	Vittal Mallya Scientific Research Foundation	1
59	WEBFIL Ltd (Digital Systems Division)	1
60	Wipro Technologies Ltd	3
61	Xerox Research	1
	TOTAL:	**187**
	GRAND TOTAL:	**197**

6.11 RESEARCH CONFERMENTS PhD, M Sc (Engg)

6.11.1 Doctor of Philosophy (PhD)

Biochemistry

1. **Ms Astha Nautiyal:** Understanding the mechanism of homologous recombination in Mycobacterium tuberculosis: Exploring RecA as an antibacterial target and characterization of Holliday junction resolvases

2. **Mr Chaitanya Dende:** Adjunct therapy with curcumin for the treatment of malaria: Studies in a murine model

3. **Mr Gaurav Kumar:** Japanese Encephalitis Virus infection in Human Amniotic, Chorionic and Endothelial cell lines

4. **Mr Ghodke Indrajeet Laxman:** The role of Saccharomyces cerevisiae MRX complex and Sae2 in maintenance of genome stability

5. **Mr Harshavardhana Y:** Biochemical and functional characterization of Mycobacterium tuberculosis nucleoid-associated proteins H-NS and mIHF

6. **Mr Iyappan R:** Arabidopsis serine/threonine/tyrosine protein kinase: Implications in growth and lipid metabolism.

7. **Ms Jinu Mathew Valayil:** Structure elucidation and biological evaluation of a novel steroidal saponin, cholestanol glucoside isolated from Saraca asoca endophytic fungus, Lasiodiplodia theobromae

8. **Mr Kumar Somyajit:** Role of mammalian RAD51 paralogs in genome maintenance and tumor suppression

9. **Ms Madhuja Samaddar:** Understanding in vivo significance of allosteric regulation in mtHsp70s: Revealing its implications in Parkinson's disease progression

10. **Ms Nishana M:** Mechanism and Regulation of Physiological and Pathological Roles of RAG Complex: Implications in Lymphoid Malignancies and Immunosuppression

11. **Mr Prasenjit Prasad Saha:** Uncovering the role of Mitochondrial Iron-sulfur (Fe-S) Cluster Biogenesis in Human Health and Disease

12. **Mr Prashant Purushottam Damke:** Biochemical and Genetic Dissection of Anti-Recombinase Activity of Helicobactor pylori MutS2

13. **Mr Praveen A:** Large-Scale Structural Analysis of Protein-Ligand Interactions: Exploring New Paradigms in Anti-Tubercular Drug Discovery

Centre for Ecological Sciences

1. **Ms Paromita Saha:** Queen succession in the primitively eusocial wasp Ropalidia marginata

2. **Mr Rittik Deb:** Mate choice, mate sampling and baffling behaviour in the tree cricket Oecanthus henryi

3. **Mr Saikat Chakraborty:** Molecular ecology of the primitively eusocial wasp Ropalidia marginata: relatedness, queen succession and population genetics

4. **Ms Sneha Vijayakumar:** Understanding patterns of bird species distributions in the Western Ghats

Micro Biology & Cellbiology

1. **Mr Aluri Srinivas:** Physiological Role of folate dehydrogenase in One Carbon Metabolism of Escherichia coli

2. **Mr Challa Krishna Reddy:** Genetic and molecular analysis for the maintenance of leaf shape, size and flatness in Arabidopsis thaliana

3. **Mr Deepak Anand:** Regulation of the Principal Cell Division Protein FtsZ of Escherichia coli by Antisense RNA and FtsH Protease

4. **Ms Jani Riddhi Atul:** Understanding the Snare Dynamics During Melanosome Biogenesis

5. **Ms Karambelkar Shweta Narendra Bharati:** Understanding phage Mu mom regulation and function

6. **Ms Mamatha B N:** Proteomic-based identification of serum biomarkers: Role of secreted MCSF and CRP in glioma pathogenesis

7. **Mr Nanda Kishore R:** Enterovirus non-structural protein 3A interaction with Sec12, an upstream component of the COPII secretory pathway and implications for viral replication

8. **Ms Preeti Garai:** Carbon starvation genes mediate the cross-talk between metabolism and pathogenesis of Salmonella Typhimurium

9. **Mr K Premananda:** Map-based cloning and characterization of TARANI, a global regulator of Arabidopsis development

10. **Mr Ravindra Naick M:** Functional Insights into PRR-Driven SHH Signaling: Implications for Host-Microbial Interactions

11. **Mr Shetty Sunil S Kumar:** Initiation of protein synthesis: Role of the three consecutive GC base pairs in the anticodon stem of initiator tRNAs

12. **Ms S Shwetha:** Host-pathogen interactions in Hepatitis C Virus Infection: Deciphering the role of host proteins and microRNAs

13. **Mr Vijay Krishna Nagampalli:** Design and application of Temperature sensitive mutants in essential factors of RNA splicing and RNA interference pathway in Schizosaccharomyces pombe

Molecular Biophysics Unit

1. **Ms Anusmita Sahoo:** Protein Structural and Stability Insights Derived from Saturation Mutagenesis

2. **Ms Chetana Baliga B:** Rational elicitation of cold sensitive phenotyes

3. **Mr Debanjan Dasgupta:** Plasticity of Intrinsic Excitability in Fast Spiking Interneurons of the Dentate Gyrus & its Implications for Neuronal Network Dynamics

4. **Ms Kalagiri Rajasree:** Structural studies on the intracellular steps that govern the Staphylococcus aureus quorum sensing system

5. **Mr Kancherla Aswani Kumar:** Solution structures and dynamics of conotoxins and Small MutS Related domain from Helicobacter pylori MutS2

6. **Mr Kirtimaan Syal:** (p)ppGpp and Stress response: Decoding the key pathways by Small molecule analogues, Biophysical methods and Mass spectrometry

7. **Mr Kumar P:** Molecular Characterization of Bacillus subtilis Oxidoreductases involved in the Bacilysin synthesis

8. **Mr Sannula Kesavardana:** Protein Engineering and Stabilization of HIV-1 Envelope Glycoprotein

9. **Ms Swagata Ghatak:** Ischemic Concentrations of Lactate increase TREK1 Channel Activity and Expression

10. **Mr V Vamsee Aditya Mallajosyula:** Design of Influenza immunogens by hemagglutinin(HA) protein minimization

11. **Ms Yamuna Kalyani M:** Structural studies on the role of hinge involved in domain swapping in Salmonella typhimurium stationary phase survival protein (SurE) and Sesbania mosaic virus coat protein.

Molecular Reproduction, Development and Genetics

1. **Ms Arunita Chatterjee:** Novel regulators of Drosophila melanogaster immune system

2. **Mr Kairam Konda Subash:** Genetic and molecular characterization of Drosophila melanogaster mutants with compromised motor and reproductive functions

3. **Ms Neha Dhar:** Unraveling the Mechanism of Luteinizing Hormone Receptor Activation: Hinge region as a key player

4. **Ms Patil Shilpa Shantinath:** Mechanistic Insights into the Role of IGFBP-2 in Glioblastoma

5. **Ms Ruchi Jain:** Spatio-temporal Regulatin of GPCR mediated MAPK Transactivation in Living Cells

6. **Ms Ruchi Surendrakumar Agrawal:** Systemic Profiling of Two Component Signaling Networks in Mycobacterium tuberculosis

7. **Ms Sudeshna Tripathy:** Elucidation of 17β-estradiol (E2) role in the regulation of corpus luteum function in mammals: Analysis of IGFBP5 expression during E2-mediated actions

8. **Ms Sunita Chopra:** Context Dependent Effects of the Transforming Growth Factor-beta Signaling and Role Played by WNT4 in the Activation of Fibroblasts

9. **Mr Vishnu Janardan:** Biochemical and functional studies on the evolutionarily conserved MPPED1/MPPED2 protein family

Inorganic and Physical Chemistry

1. **Ms Anindita Das:** Nanoparticle Mediated Suppression of Protein Aggregation

2. **Mr Joydeb Mandal:** Controlling Conformation of Macromolecules by Immiscibility Driven Self-segregation

3. **Mr Koushik Acharyya:** Organic Imine Cages: Self-sorting and Application

4. **Mr Pagidi Sudhakar:** Rational Design and Facile Synthesis of Boryl Anilines: Intriguing Aggregation Induced Emission and External Stimuli Responsive Properties

5. **Mr Sanjoy Mukherjee:** Investigations of Structure-Property Relationships in NPI and BODIPY Based Luminescent Materials

6. **Mr Samya Banerjee:** Studies on Oxovanadium (IV) Complexes for Photocytotoxicity and Cellular Imaging

7. **Mr Shubhadip Chakraborty:** Gas Phase Infrared Spectroscopy of Large Aromatic Molecules: Identification of Fermi Resonances in the C-H Stretching Region

8. **Mr Surender Kumar:** Electrochemical Investigations Related to High Energy Li-O2 and Li-ion Rechargeable Batteries

9. **Mr Tirupathirao Penki:** High Capacity Porous Electrode Materials for Li-ion Batteries

10. **Ms Uttara Basu:** Insights into the Chemistry of Iron Complexes as imaging and Photocytotoxic Agent

11. **Mr Vernekar Amit Ashok:** Bioinspired Materials: Antioxidant and Phosphotriesterase Nanozymes

Materials Research Centre

1. **Mr Ahin Roy:** Investigation of Structural and Electronic Aspects of Ultrathin Metal Nanowires

2. **Ms Chandorkar Yashoda Prakash:** Multi-functional, Anti-inflammatory and Tuneable Polysters –A Novel Polymer Platform for Tissue Engineering and Drug Delivery Applications

3. **Mr Daramalla Venkateswarlu:** Titanium Niobium complex oxide (TiNb2O7) thin films for micro battery applications

4. **Mr Ivan Jebakumar D S:** Solution-Processed Optoelectronic Devices Based on Colloidal Semiconductor Nanostructures for Photodetection

5. **Mr Kota Moses:** Investigations of Borocarbonitrides and Nanocarbons

6. **Mr Piyush Jaiswal:** Thin films and Nanostructures of carbonaceous and substituted metal oxides synthesized from metal complexes through MOCVD and related processes

7. **Ms M Shruthi:** Epitaxial Nonpolar III-nitrides by Plasma-Assisted Molecular Beam Epitaxy

8. **Mr Subhajit Kundu:** Mechanistic Understanding of Growth and Directed Assembly of Nanomaterials

9. **Mr B Sunil Kumar:** Developmental strategies to address prosthetic infection and magneto-responsive biomaterials for orthopaedic applications

10. **Mr VLV Narayanachari K:** Stress and Microstructural Evolution During the Growth of Transition Metal Oxide Thin Films by PVD

Organic Chemistry

1. **Ms Abirami Lakshminarayanan:** Studies of Poly(propyl Ether Imine) (PETIM) Dendrimers as Synthetic siRNA Delivery Vectors with Relevance to Hepatitis C Virus Inhibition

2. **Mr Chandra Bhushan Tripathi:** Lewis Base and Hydrogen-Bonding Catalysis by Thioureas: from Chemoselective Alcohol Oxidation to Asymmetric Iodofunctionalizations of Alkenes and Dienes

3. **Mr Chinta Nagaraju:** Construction of Complex Polycyclic Systems Using Gold Catalyzed Intramolecular Diyne/Enyne/Hydroalkoxylation Reactions

4. **Mr Devi Prasan Ojha:** Palladium Catalysed Refunctionalization of Olefins: Novel Strategies for the Construction of C-C, C-Hetero Bonds and Homogeneous Hydrogenation

5. **Ms Lakshmi Aparna Nallapati:** Design and Synthesis of Peptidomimics Constrained in Helical and Sheet Conformations Using a Novel Covalent Surrogate for the Peptide Main Chain Hydrogen Bond

6. **Mr Madhu Sudan Manna:** Controlling Stereochemistry at the Quaternary Center Using Bifunctional (Thio)urea Catalysis

7. **Mr Omkar Revu:** Total Synthesis of Bio-active Macrolide Natural Products and Sulfinamide Based Ligands in Asymmetric Catalysis

8. **Mr Somnath Mukherjee:** Crystal Structures as Mechanistic Probes: Anomeric effects, Antiaromaticity, Molecular Inclusion and Other Studies

9. **Mr Varun B V:** Novel strategies for the synthesis of organo-sulfur compounds under metal-free reaction conditions

Solid State & Structural Chemistry

1. **Mr Abhijit Hazarika:** Photophysical Properties of Manganese Doped Semiconductor Nanocrystals

2. **Mr Joydeep Dhar:** Understanding the Effect of Selenium on Structure-Property Relationship in π- Conjugated Functional Materials

3. **Mr Karothu Durga Prasad:** Exploration of 1,9-Pyrazoloanthrones as a Copious Reserve for Multifarious Chemical and Biological Applications

4. **Mr Lokesh N:** Pushing the Limits of NMR Sensitivity and Chiral Analysis: Design of New NMR Methods and Bio-molecular Tools

5. **Mr Manish Kumar Mishra:** Probing Mechanical Properties of Molecular Crystals with Nanoindentation: Applications to Crystal Engineering

6. **Mr Pavan M S:** Unravelling the Nature of Halogen and Chalcogen Intermolecular Interactions by Charge Density Analysis

7. **Ms Ramanpreet Kaur:** Structure-function control in organic co-crystals/salts via studies on polymorphism, phase transitions and stoichiometric variants

8. **Ms Rikhia Ghosh:** Structure and dynamics of macromolecular solvation in aqueous binary mixtures: Form Polymers to proteins

9. **Mr Ritesh Dubey:** Crystal Engineering: From Molecule to Crystal Structure Landscape

10. **Ms Rumpa Pal:** Addressing subtle physicochemical features exhibited by molecular

crystals via Experimental and Theoretical Charge Density Analysis

11. **Mr Saurav Bhattacharya:** Syntheses, Structural Transformations, Magnetism, Ferroelectricity and Proton Conduction of Metal-Organic Framework (MOF) Compounds

12. **Mr Sayantan Mazumdar:** Harvesting Solar Photon Using TiO2-CdS Nanostructured Semiconductor Assemblies

13. **Mr Shiv Kumar:** Fluoranthene-Based Materials for Non-Doped Blue Organic Light-Emitting Diodes

14. **Mr Shivanand Pudakalakatti:** Novel NMR Methods for Fast data acquisition: Application to Metabolomics

15. **Mr Somnath Pal:** Investigation of Dielectric and Magnetic Properties of Some Selected Transition Metal Oxide Systems

16. **Mr Soham Mukherjee:** Local structure-property relationship in some selected Solid State Materials

17. **Mr Sundar Rajan A:** Studies on Alkaline Iron Electrodes for Nickel-Iron Accumulators

18. **Ms Vaishakhi Mohanta:** Study on Self-Assembly of Fullerenes and Biopolymers

19. **Mr V M L Durga Prasad Goli:** Studies on Frustrated Spin Chains and Quasi – One – Dimensional Conjugated Carbon Systems

Computer Science & Automation

1. **Mr Ananda Vardhan Kommaraju:** Designing Energy-Aware Optimization Techniques through Program behavior Analysis

2. **Mr Balamurugan P:** Efficient Algorithms for Structured Output Learning

3. **Mr Nithin Shivashankar:** Morse-Smale Complexes: Computation and Applications

4. **Mr Pankaj Dayama Satyanarayan:** Incentive Strategies and Algorithms for Networks, Crowds, and Markets

5. **Mr Rohit D. Vallam:** Game- theoretic Analysis of Strategic Behaviour in Neworks Crowds and Classrooms

6. **Mr Soumyadev Maity:** Efficient Key Management, and Intrusion Detection Protocols for Enhancing Security in Mobile Ad Hoc Networks

7. **Mr Subramanya Bharadwaj B V:** Variants and Generalization of some Classical Problems in Combinatorial Geometry

8. **Mr Sumesh Divakaran:** A Refinement-Based Methodology for Verifying Abstract Data Type Implementations

9. **Mr Srijith P K:** Gaussian Processes for Learning Problems with Related outputs

Electrical Communication Engineering

1. **Mr Abhay Sharma:** Finding a Subset of Non-defective Items from a Large Population: Fundamental Limits and Efficient Algorithms

2. **Mr Amit Kumar Datta:** Transceiver Design Based on the Minimum-Error-Probability Framework for Wireless Communications Systems

3. **Mr Arijit Ghosh:** Dynamics, Fluctuations and Rheological Applications of Magnetic Nanopropellers

4. **Mr Arpan Chattopadhyay:** Sequential Decision Algorithms for Impromptu (or"As-You-Go") Deployment of Wireless Sensor Networks

5. **Mr Ashok Kumar M:** Minimization problems based on a parametric family of relative entropies

6. **Mr Dinesh Dileep Gaurav:** Algorithms for Homogeneous Quadratic Minimization and Applications in Wireless Networks

7. **Mr Kaushik Ghosal:** Power Scaling Mechanism for Low Power Wireless Receivers

8. **Mr Krishnamurthy R:** Physical Layer Impairments Aware Transparent Wavelength Routed and Flexible-Grid Optical Networks

9. **Mr Lakshmi Narasimhan T:** Efficient Transceiver Techniques for Massive MIMO and Large-scale GSM-MIMO Systems

10. **Mr Manikandan R R:** Lower Power and Low Spur Frequency Synthesizer Circuit Techniques for Energy Efficient Wireless Transmitters

11. **Ms Meena D:** Optical WDM Systems for Multipoint Distribution of Hybrid Signals in Phased Array Radar applications

12. **Ms Pushpa P V:** Design and Development of Customer Contest-Aware Mobile Commerce Services

13. **Ms Ranjitha Prasad:** Sparse Bayesian Learning for Joint Channel Estimation and Data Detection in OFDM Systems

14. **Mr Ranga Prasad N:** On the Sum-Rate Capacity of Gaussian X Channels

15. **Mr.Sainath Bitragunta:** Optimal Amplify-and-forward relaying for Cooperative Communications and Underlay Cognitive Radio

16. **Mr Sanjay Vishwakarma:** Transmitter Optimization in MISO and Relay Wiretap Channels For Physical Layer Security

17. **Mr Sooraj K Ambat:** Fusion of Sparse Reconstruction Algorithms in Compressed Sensing

18. **Ms Sujatha M N:** Analysis of Printed Periodic Structures and Their Applications in Antennas and Absorbers

19. **Mr Thejas:** Exploration of Displacement Detection Mechanisms in MEMS Sensors

20. **Mr Vikas Kumar Dewangan:** Role of Power Control in Enhancing the Performance of Opportunistic Selection Schemes

21. **Mr K R Viveka:** Design and Characterization of SRAMs for Ultra Dynamic Voltage Scalable (U-DVS) Systems

Electrical Engineering

1. **Mr Anoop K R:** Dynamic Headpose Classification and Video Retargeting with Human Attention

2. **Ms Anusuya Bhatacharyya:** Discharge Plasma based NOx abatement in Engine Exhaust assisted by Industry Wastes: A parametric evaluation with diesel fuels and corona electrodes

3. **Mr Arun Karuppaswamy B:** Design and Performance Evaluation of Sub-Systems of Grid Connected Inverters

4. **Mr Jyothi N S:** Thermal and Electrical Degradation Resin impregnated Paper Insulation for High Voltage Transformer Bushings

5. **Mr Mandlik Manoj Kisan:** Moisture Aided Degradation of oil Impregnated Paper Insulation in Power Transformers

6. **Mr Pavankumar Hari V S S:** Space-Vector-Based Pulse Width Modulation Strategies to Reduce Pulsating Tarque in Induction Motor Drives

7. **Mr Prathosh A P:** Temporal Processing for Event- based Speech Analysis with Focus on stop Consonants

8. **Mr Ravi R Shenoy:** Spectral and Temporal Zero-Crossings-Based Signal Analysis

Electronic Systems Engineering

1. **Mr Anto K Davis:** Antiresonance and Noise Suppression Techniques for Digital Power Distribution Networks

2. **Mr Joglekar Ashish Vasant:** Cost Effective Multi-role Active EMI Filters for Switched Mode Converters

3. **Mr Lalit Patnaik:** Investigations on Dynamics and Control of a Rimless Wheel based 2D Dynamics Walker using pulsed Torque Actuation

4. **Mr Saurabh Aggarwal:** Content Distribution in Social Groups

5. **Mr R Sudharshan Kaarthik:** Multilevel Dodecagonal Space Vector Structures and Modulations Schemes with Hybrid Topologies for V Variables Speed AC Drives

Centre Nano Science and Engineering

1. **Ms Greeshma T:** Electric stimuli as instructive cues to guide cellular differentiation on electrically conductive biomaterial substrates in vitro

2. **Mr Krishna Bharadwaj B:** Controlling defects in CVD grown grapheme Device application perspective

3. **Mr Santanu Talukder:** Study and Control of Electromigration Driven Material Transport for Applications in Nanofabrication and Patterning

Management Studies

1. **Ms Amrutha A A:** A Class of Mathematical Models For Low Carbon Electricity Planning

2. **Mr Gangatharan C:** Knowledge Integration Mechanisms, Organizational Capabilities, And Factors of Knowledfge-Worker Productivity: A Selective Study of Indian Software Firms

3. **Ms Meenu Mary Margaret:** Family Business Conflicts: Impact on Family Climate, Psychological Stress and Business Performance

4. **Mr Soumya Roy:** Bayesian Accelerated Life Testing of Series Systems

5. **Mr Sudhakar T:** ICT Interventions for Rural Empowerment An Empirical Study

Super Computer Education Research Centre

1. **Ms Jyothi P:** An Integrated systems biology approach to study drug resistance in mycobacteria

2. **Ms Kavyashree M:** Structure and Dynamics Studies on SAICAR Synthetase from Pyrococcus Horikoshii OT3

3. **Ms Neeta Trivedi:** Robust, Energy-efficient Distributed Inference in Wireless Sensor Networks With Applications to Multitarget Tracking

High Energy Physics

1. **Mr Arpan Bhattacharyya:** Lessons for gravity from entanglement

2. **Ms Manisha Thakurathi:** Topological Phases, Majorana Modes, Dynamics and Transport in One-dimensional Systems

3. **Mr Shouvik Datta:** Higher spins, entanglement entropy and holography

Instrumentation and Applied Physics

1. **Mr Eswaramoorthy K V:** Studies on Non-Invasive Monitoring of Blood Glucose, Urea and Potassium using Reverse Iontophoresis

2. **Ms Prarthana V D:** Study of Electromechanical and Optoelectronic Behavior of Carbon Nanostructures

3. **Mr Sharath U:** Fiber Bragg Grating Based Sensing Devices for Novel Applications in Bio Medical and Engineering Fields

4. **Ms Shilpa Dilipkumar:** Multidimensional Multi color Image Reconstruction Techniques for Fluorescence Microscopy

5. **Mr Siva Kumar Reddy C:** Mechanical Behavior Study of Microporous assemblies of Carbon Nanotube and Graphene

6. **Ms Sridevi S:** Nanomaterials Coated Etched Fiber Bragg Grating Sensors for Sensitive Detection of Biomolecules, Gas, Strain and Temperature

7. **Mr Yellareswara Rao Kosuri:** Sputter Deposited Thin Film Cathodes from Powder Target for Micro Battery Applications

Mathematics

1. **Mr Bidyut Sanki:** Shortest Length Geodesics on Closed Hyperbolic Surfaces

2. **Mr Biplab Basak:** Minimal crystallizations of 3 - and 4 - manifolds

3. **Mr Pranav Haridas:** The Green's function, the Bergman kernel and quadrature domains in Cn

4. **Ms Pratiti Bhadra:** A new coarse grained molecular mechanics for proteins dynamics and its applications on dynamics functions correlation

5. **Mr Rajeev Gupta:** The Carathéodory-Fejér Interpolation Problems and the Von- Neumann Inequality

6. **Ms Ratna Pal:** Dynamical properties of families of holomorphic mappings

7. **Ms Richa Mudgal:** Inferences on structure and function of proteins from sequence data: Development of methods and applications

8. **Mr Sayan Bagchi:** Weighted norm inequalities for weyal multipliers and Hermite pseudo-multipliers

9. **Ms Senthil Raani K S:** Lp-Asymptotics of Fourier transform of fractal measures

10. Ms Soma Ghosh: A multiscale modeling study of iron homeostasis in Mycobacterium tuberculosis

11. **Mr Sumanta Mukherjee:** Multi-scale odeling of HLA diversity and its effect on cytotoxic immune responses in influenza H1N1 infection

12. **Mr Tulasi Ram Reddy A:** On Critical Points of Random Polynomials and Spectrum of Certain Products of Random Matrices

13. **Mr Turaga Venkata Hanumanta Prathamesh:** Mechanising Knot Theory

Physics

1. **Mr Arnab Roy:** Planar Hall effect: Detection of Ultra-Low Magnetic Fields and a Study of Stochasticity in Magnetization Reversal

2. **Ms Bhagyashree K S:** Electron Paramagnetic Resonance and Magnetic Studies of Certain Doped Rare Earth Manganites

3. **Mr Gokhale Shreyas Shashank:** Dynamics of glass-forming liquids and shear-induced grain growth in dense colloidal suspensions

4. **Mr Harsh Soni:** Flocks, Flow and Fluctuations in Inanimate Matter: Simulations and Theory

5. **Mr Kalangi Siddeswara Vasu:** Nanodevices of Graphene, Carbon Nanotubes and Flow behavior of Graphene Oxide Gel

6. **Mr Nitin Kumar:** Driven Granular and Soft-Matter: Fluctuation Relations, Flocking and Oscillatory Sedimentation

7. **Ms Ruchika Yadav:** Growth and studies of phase transitions in multifunctional perovskite materials

8. **Mr Samyaday Chaudhury:** Study of evolved stellar populations in the Magellanic Clouds

9. **Ms Sarika C K:** Thin Film Instabilities Mediated Self-assembly of Polymer Grafted Nanoparticles

10. **Mr Saquib Shamim:** Electrical transport in Si:P and Ge:P ∂-doped systems

11. **Ms Shwetha G Bhat:** Electrical Spin Injection and Detection Using Oxide Magnetic Material Fe304

12. **Mr Sumesh Nicholas:** Aromatic Interactions, Conformational Flexibility and Intermolecular Sheet Formation in Peptides: An X-ray Crystallographic Study

13. **Ms Upasana Das:** Establishing super-and sub-Chandrasekhar limiting mass white Dwarfs to explain peculiar type la supernovae

14. **Mr R Venkata Sudheer Kumar:** Solid State NMR – Development of Methods and Applications to the Study of Materials

15. **Ms Vidya K:** Impact of disorder, magnetism and proximity-induced superconductivity on conductance fluctuations in graphene

16. **Mr Vikram:** Shear Induced Transitions in Mixed Surfactant Systems and Anisotropic Colloids

Aerospace Engineering

1. **Mr Allamaprabhu C Yaravintelimath:** Turbulence Modeling for Predicting Flow Separation in Rocket Nozzles
2. **Mr Ashwin Dhabale:** Impact Angle Constrained Guidance Using Cubic Splines
3. **Mr Harikumar K:** Design and Flight Test of Integrated guidance and Control of a Fixed Wing Autonomous Micro Air Vehicle
4. **Mr Janardhanraj S:** Investigations on Supersonic flow in Miniature Shock Tubes
5. **Mr Mohammed Ibrahim S**: Expermental Investigation of High Speed Aerothermodnamics Over Large Angle Blunt Cone Forebodies Entering Martian Atmosphere
6. **Mr Patadiya Dharmeshkumar Makanlal:** Modelling, Simulation, and Statistical Studies of Primary Fragmentation of Coal Particles Subjected to Detonation Wave
7. **Mr Patwardhan Saurabh Sudhir:** Effect of favorable pressure gradient on turbulence in boundary layers
8. **Mr Rajarshi Bardhan:** Differential Games based Guidance Laws for Aerospace Applications
9. **Mr Salil Kanj Jalan:** Mechanical Characterization of Carbon Nanotubes and Nanocomposites
10. **Mr Saroj Kumar:** An Integrated Estimation-Guidance Approach for Seeker-less Interceptors
11. **Mr Shashi Ranjan Kumar:** Sliding Mode Control based Guidance Strategies with Terminal Constraints
12. **Ms Sri Vallabha Deevi:** Large Eddy Simulation of Multiphase Flows
13. **Ms Sudha U P V:** Flutter Identification and Aeroelastic Stability during Wake Penetration
14. **Mr Titas Bera:** Application of Randomized Algorithms in Path Planning and Control of a Micro Air Vehicle
15. **Ms Vinita Chellappan:** Spectral Methods for different classes of Partial Differential Equations
16. **Mr Vijay Kumar R L:** Some Experimental and Numerical Studies on Evaluation of Adhesive Bond Integrity of Composite Lap Shear Joints
17. **Mr Visakh V:** Experimental and theoretical studies of liquid drop impact on solid surfaces comprising smooth and texture portions
18. **Mr Vivek T R:** Ultrasonic Guided Wave based Models, Devices and Methods for Integrated Structural Health Monitoring

Civil Engineering

1. **Mr Aditya Parihar:** Seismic Site Classification and Response Studies of Shallow Bedrock Sites
2. **Mr Amarnath Hegde:** Ground Improvement using 3D-cellular confinement systems Experimental and Numerical Studies
3. **Mr Anoop Krishnan N M:** Computational studies on the mechanics of nanotubes and nanocomposites
4. **Mr Bidroha Basu:** A New Mathematical Framework for Regional Frequency Analysis of Floods
5. **Ms Deepthi Mary Dilip:** Stochastic modelling of flexible pavement performance
6. **Mr Y K Guruprasad:** Repair and Retrofit Strategies for Structural Concrete Against Thermo mechanical Loadings
7. **Ms Latha M S:** Studies on characteristics of stabilized soil compacts for structural applications
8. **Mr Manash Chakraborty:** Finite Element Limit Analysis for solving different axisymmetric stability problems in geomechanics: formulations and solutions

9. **Mr Manoj M:** Analysis and modelling of activity-travel behaviour of non-workers from an Indian city

10. **Mr Mahantesh M Hanamasagar:** Fracture Behaviour Including Size Effect of Cement Stabilized Rammed Earth

11. **Ms Pervaiz Fathima Khatoon M:** Studies on the Modeling of Fatigue Crack Growth and Damage in Concrete: A Thermodynamic Approach

12. **Mr Rahul T M:** Non Motorized Transport Planning for an Indian City

13. **Mr P Raghuveer Rao:** Factors influencing contaminant transport in vadose zone of near surface radioactive waste disposal facility

14. **Mr Raviraj H Mulangi:** Performance Evaluation of Public Bus Transport Operations in Karnataka by using Non-Parametric and Multivariate Analysis

15. **Ms Resmi Sebastian:** Elastic wave propagation and evaluation of low strain dynamic properties in jointed rocks

16. **Ms Sonali Pattanayak:** A HYdroclimatological Change Detection and Attribution Study over India using CMIP5 Models

17. **Mr Suryawanshi Anup Arvind:** Uncertainty quantification in flow and flow induced structural response

18. **Mr Ujjwal Saha:** Impacts of Climate on IDF Relationships for Design of Urban Strom water Systems

Chemical Engineering

1. **Mr Pranesh Padmanabhan:** Systems – Level Modelling of Hepatitis C Virus Infection and Treatment Response

Centre for Atmospheric & Oceanic Sciences

1. **Mr Dixit Vishal Vijay Vaishali:** Structure and dynamics of the Intertropical convergence zones

Centre for Earth Science

1. **Mr George Paul Mathews:** Evolutionary aspects of Archean Kolli-Massif, Southern India: An archive of crustalprocesses

2. **Mr Ishwar Kumar C:** Mesoproterozoic suturing of archean crustal blocks in Western Peninsular INDIA: New insights on India Madagascar correlations

3. **Ms Janwari Shazia Ab. Rashid:** Tectonic Evolution of Central Madurai Block, Southern India and Potential Heat Sources for High-temperature Metamorphism

4. **Mr Vinod Oommen Samuel:** The crustal evolution of Nilgiri Block, southern India: A Study on Archean tectonics and crustal Growth

Centre for Product Design & Management

1. **Mr Haorongbam Bisheshwar:** Predication of the Behaviors of hollow/form-filled axially loaded steel/composite hat sections fo advanced vehicle crash safely design

2. **Mr Lakshmanan P:** Studies on Glass Fiber-Reinforced Composites for CAE-Driven Design of Impact Safety Countermeasures

3. **Mr Manoj Kumar Mahala:** Advanced Numerical Approaches for Analysis of Vechicle Ride Comfort, Wheel Bearings and Streeing Control

4. **Ms Nandhini Devi N:** A Feasibility Framework and Its Implementation for Selection as an Engineering Design Paradigm

5. **Mr Reddi Sarath:** A Geometric Approach for Discrete and Statistical Reach Analysis for a DHM with Mutable Supports

Centre for Sustainable Technology

1. **Mr Anand M Shivapuji:** In-cylinder experimental and modeling studies on producer gasFuelled operation of spark ignited gas engines

2. **Mr Durga Madhab Mahapatra:** Algal bioprocess development for sustainable wastewater treatment and biofuel production

3. **Mr Jagmohan Sharma:** Vulnerability of Forests to Climatic and Non-Climatic Stressors: A Multi-Scale Assessment for Indian Forests

4. **Mr P Lakshmikanthan:** Evaluation of the Engineering Properties of Municipal Solid waste for Landfill Design

5. **Mr Ullas S N:** Studies on Utilisation of iron Ore tailings as fine aggregate in mortar and concrete

Materials Engineering

1. **Mr Ajay Kumar Kalyani:** Electric Field Driven Structural Transformations in BaTiO3 and lead zirconate titanate (PZT) based Piezoceramics

2. **Mr Badari Narayana Rao:** Influence of electric field on the global and local structure in ferroelectric ceramic Na1/2Bi1/2TiO3 and its solid solutions with BaTiO3 and K1/2Bi1/2TiO3

3. **Ms Dhanalakshmi P:** Synthesis and phase transformation studies of AL45Mn55 ferromagnetic Heusler alloy

4. **Ms Divyasree C Prabhakaran:** Bioremediation of Chromium: Mechanisms and Biosensing Applications

5. **Mr Dulal Chandra Jana:** Dense and Porous Silicon Carbide Ceramics Processed through Aqueous gelcasting and Studies of Densification Kinetics

6. **Ms Lalitha K V:** Correlation Between Structure, Microstructure and Enhanced Piezoresponse around the Morphotropic Phase Boundary of Bismuth Scandate –Lead Titanate Piezoceramic

7. **Mr Midhun Ben Thomas:** Therapeutic Applications of Biodegradable Chitosan Based Polyelectrolyte Nanocapsules

8. **Mr Olu Emmanuel Femi:** Microstructure Design and Interfacial Effects on Thermoelectric Properties of Bi-Sb-Te System

9. **Mr Rama Krushna Sabat:** Evolution of microstructure and texture during severe plastic deformation of a Magnesium-Cerium alloy

10. **Mr E Rajasegaran:** Biodegradable Polyelectrolyte Multilayered Nanocapsules as Carrier for Liver Targeted Gene Delivery in ice and Magnetic Field Enhanced Anticancer Drug Delivery against Drug Resistant Cancers

11. **Mr Rajesh K:** Grain Boundary Sliding in Bicrystals: Experiments and Atomistic Simulations

12. **Ms Soumya S Bhat:** First-Principles Studies of Point Defects and phase transformations in materials

13. **Ms Sreeranjini P:** Hyaluronic Acid based Biodegradable Polyelectrolyte Nanocapsules and modified Protein Nanoparticles for Targeted Delivery of Anticancer Agents

14. **Ms Sukla Mondol:** Improving high temperature strength of 2219 Al alloy by minor alloying additions

15. **Mr Surendra Kumar M:** In Improvement of high temperature strength of Al and Co alloy by L12 type coherent precipitates

16. **Mr Venkatesh N:** Nanoparticles for Bio-Imaging: Magnetic Resonance Imaging and Fluorescence Imaging

Mechanical Engineering

1. **Mr Ajay Kumar:** In-Situ Polymer Derived Nano Particle Metal Matrix Composites Developed by Friction Stir Processing

2. **Mr Amrit Bikram Sahu:** Quantitative Laser-based diagnostics and Modelling of Syngas-Air Counterflow Diffusion Flames

3. **Mr Anirban Bhattacharya:** Effect of Convection and Shrinkage on Solidification and Microstructure Formation

4. **Ms Anju R Babu:** Role of Microstructure in the Mechanics of Soft Matter

5. **Mr Ankur Miglani:** Insights Into Instabilities In Burning And Acoustically Levitated Nanofluid Droplets

6. **Mr Anubhav Sinha:** Experimental and Numerical Studies on Spray in Crossflow

7. **Ms Arti Yadav:** Nano Porous Alumina based Composite Coating for Tribological Applications

8. **Ms Diptimayee Samataray:** Effect of Semi-Solid Processing on Micro structural Evaluation and Mechanical Behaviour of Austenitic Stainless Steel

9. **Mr Gaurav Kumar Sharma:** Heterogeneous Object Modelling: Representation, Construction and Process Planning

10. **Mr Kiran Akella:** Studies for the Design of Layered Ceramic Armour Inspired by Seashells

11. **Mr Krishna S:** Laser-based Diagnostics and Numerical Simulations of Syngas Combustion in a Trapped Vortex Combustor

12. **Mr Kundanati Lakshminath:** Mechanics of Insect Based Materials

13. **Mr Naresh Nadammal:** Development of microstructure, texture and residual stresses during friction stir processing of aluminium alloys

14. **Mr Prapanch Nair:** Modeling Free Surface Flows and Fluid Structure Interactions using Smoothed Particle Hydrodynamics

15. **Mr Prashant Pendyala:** Generation, Characterization and Control of Nanoscale Surface Roughness

16. **Ramnath Babu T J:** A Discretized Approach to Modeling Growth with Application to A Shape-matching Inverse Problem in Leaf-growth

17. **Ms Rizuwana Parween:** Modeling of the Haltere – A Natural Micro-scale Vibratory Gyroscope

18. **Mr R Santhosh:** Transition and Acoustic Response of Vortex Breakdown Modes in Unconfined Coaxial Swirling Flow and Flame

19. **Mr Shyam Sunder:** Dynamics of Bubbles and Drops in the Presence of an Electric Field

20. **Mr Vamsy Godhi:** Dynamics of Cricket Song Towards Nature-inspired MEMS speakers

6.11.2 Research Conferments: Master of Science (Engineering)

Computer Science & Automation

1. **Mr Abhishek Dubey:** Multimodal Deep Learning for Multi-label Classification and Ranking Problems

2. **Mr Mohammed Afraz:** P3: An Effective Technique for Partitioned Path Profiling

3. **Mr Patil Tejas Bharath:** Matching Domain Model with Source Code using Relationships

4. **Mr Ravi Teja Mullapudi:** PolyMage: Automatic Optimization for Image Processing Pipelines

5. **Mr Saneem Ahmed C G:** Bayes Optimal Feature Selection for Supervised Learning

6. **Ms Saranya N:** Efficient Schemes for Partitioning Based Scheduling of Real-Time Tasks in Multicore Architecture

7. **Mr Sri Varun P:** Deterministic Dynamic Race Detection Across Program Versions

8. **Mr Vineet Nair:** Expanders in arithmetic circuit lower bound: Towards a separation between ROABPs and multilinear depth 3 circuits

ELECTRICAL COMMUNICATION ENGINEERING

1. **Ms Ananya S N:** On the Best-m Feedback Scheme inb OFDM Systems with Correlated Subchannels

2. **Mr Sahasranand K R:** Robust Nonparametric Sequential Distributed Spectrum Sensing under EMI and Fading

Electrical Engineering

1. **Mr AshishKumar:** Hall-Effect Current Sensors for Power Electronic Application: Design And Performance Validation

2. **Mr Gokul Deepak:** Motion estimation from moments of projectiuon data for dynamic CT

3. **Ms Harini Kishan:** On Maximizing the Performance of the Bilateral Filter for Image Denoising

4. **Mr Menon Sreeram V:** Savitzky-Golay Filters and Application to Image and Signal Denoising

5. **Mr Shiva Kumar Balibani:** Small Signal Stability Analysis of a Power System with a Grid Connected Wind Powered Permanent Magnet Synchronous Generator (PMSG)

6. **Mr Sudarshan N:** Super-Resolution Reconstruction in Biomedical applications – A Finite Rate of Innovation Approach

7. **Mr Rakesh P R:** PWMTechniques for Split-Phase Induction Motor Drive

Electronic Systems Engineering

1. **Mr Bijaya Adhikari:** Architecture and Design of Wide Band Spectrum Sensing Receiver for Cognitive Radio Systems

2. **Ms Namratha Nayak:** A Study of Experience Mapping based Predictive controller as applied to Switching Converters

3. **Mr Nithin Raveendran:** A Modified Sum-Product Algorithm Over Graphs With Short Cycles

4. **Ms Mukta Dinesh:** High Performance Hybrid Drive for Induction Motor Using Transient Angle Estimation and Control

Aerospace Engineering

1. **Mr Adul Sankar:** Characteristics of liquid jets discharging from rectangular, elliptical, square and triangular orifices

2. **Mr K Nagashetty:** Experimental Investigations of Hypersonic Waverider

3. **Mr Sai Krishna Venkeswaram:** Atomization characteristics of camelina-and jatropha-derived drop-in aviation biofuels

4. **Mr Sourabh Kotnala:** Lattice Boltzmann Relaxation Scheme for Compressible Flows

5. **Ms Ruchi Thakur:** Experimental Analysis of Shock Standoff Distance over Spherical Bodies in Hypersonic Flows

6. **Mr Srinath L:** Experimental investigations of leading edge bluntness in Shock Boundary Layer Interactions at Hypersonic speeds

Civil Engineering

1. **Ms Karuna K:** Structural Safety Analysis With Alternative Uncertainty Models

Chemical Engineering

1. **Ms Sharmila S:** Studies on Fabrication and Characterisation of TiO2 based Dye-sensitised Solar Cells

2. **Mr Tarun Sharma:** Swelling and Dye Adsorption Characteristics of Superabsorbent Polymers

3. **Mr Uday Shankar K:** Computational study of Stokesian suspensions using Particle Mesh Ewald summation

Mechanical Engineering

1. **Mr Jagadish Pratap Singh:** Non-dimensional Kinetoelastic Maps for Nonlinear Behavior of Compliant Suspensions

2. **Mr Vishal Vijayl Bagade:** Type and Dimensional Synthesis of Spring .Mechanisms for Circuits Breakers

3. **Mr Sanadi Dilip Sunil:** Dynamics of Hollow Cone Spray in an Unconfined, Isothermal, Co-Annular Swirling Jet Environment

Centre for Atmospheric & Oceanic Sciences

1. **Mr HemantKhatri:** Mesoscale Turbulence on the Ocean Surface from Satellite Altimetry

2. **Mr Umasankar Das:** Formation and maintenance of the southern Bay of Bengal cold pool

Centre for Product Design & Management

1. **Mr Bhaskar R:** Finite Element Modeling of Knee Joint to Study Tibio-Femoral contact Mechanics

Centre for Nano Science and Engineering

1. **Ms Ritu Das:** A Comparative study of the structural magnetic and electric properties of Bi 1-x LaxFe03(x=0.0, 0.10,0.20) thins films via pulsed laser deposition for future memory device applications.

Super Computer Education Research Centre

1. **Ms Nitisha Jain:** Performance Specific 1/O Scheduling Framework for Cloud Storage

2. **Mr Prakash Murali:** Metascheduling of HPC Jobs in Day-Ahead Electricity Markets

3. **Mr Prashant Kumar Sharma:** Optimal Location of Distributed Generation to Reduce Loss in Radial Distribution Networks

4. **Mr Sovan Biswas:** Motion based Event Analysis

5. **Mr Tanuj Kumar Agarwal:** Cache Coherence State Based Replacement Policies

Instrumentation and Applied Physics

1. **Mr Piyush Kumar Pandey:** Development of High Precision Out-of-Plane Motion Measurement Systems Based on Optical Beam Deflection

7 Events

7.1 INSTITUTE LECTURES

The Institute has organized the following Centenary, Memorial, Endowment, Institute lectures during the year:

CENTENARY LECTURES

Professor Thomas Kailath, Professor of Engineering Emeritus, Stanford University, California, USA, 15th December 2015.

DST CENTENARY LECTURES

Professor William A.Goddard, III, California Institute of Technology, USA , 7th December 2015.

SRI M CT M CHIDAMBARAM CHETTYAR MEMORIAL LECTURE

Dr. Sam Pitroda, Chairman of India's National Knowledge Commission, and CEO of World-tel Limited and founder and CEO of C-SAM, Inc., 21st Oct. 2015.

SIR VITHAL N CHANDAVARKAR MEMORIAL LECTURE

Dr. Raghuram Rajan, Governor, Reserve Bank of India, 27th February 2015.

M J THIRUMALACHAR AND M J NARASIMHAN ENDOWMENT LECTURE

DR. SHANKAR BALASUBRAMANIAN, FRS FMedSci, Herchel Smith Professor Of Medicinal Chemistry Fellow of Trinity College, Department of Chemistry, University of Cambridge, UK, 18th June 2015.

CNR RAO ENDOWMENT LECTURE

Professor K. Vijay Raghavan, Secretary, DBT, Govt. of India, Distinguished Professor & Former Director of The National Centre for Biological Sciences (NCBS), 15th February 2016.

AMULYA & VIMALA REDDY AWARD LECTURE

Prof T G Sitharam, Department of Civil Engineering, IISc., and Dr.H N Chanakya, Centre for Sustainable Technology, IISc., 9th June 2015.

INSTITUTE COLLOQUIUM

- The Mysterious Magnetic Personality of our sun, Prof. Arnab Rai Choudhuri, Department of Physics, IISc, 20th Jan 2015.
- Improving Programmability, Portability and Performance in Heterogeneous Accelerator-Based Architectures, Prof. R Govindarajan, SERC, IISc, 29th Jan 2015.
- The tiger-lily talks: Codes for the making of a rice flowering stem, Prof. Usha Vijayraghavan, MCB, IISc, 24th Feb 2015.
- Finding patterns in sequential data: the frequent episodes approach in temporal data mining, Prof. PS Sastry, EE, IISc, 4th March 2015.

- A Structural Chemistry for Boron: Boranes, Boron, Metal Borides, Boron-Fullerenes and nanotubes, Prof Eluvathingal D Jemmis – Dept, of IPC (Chemical Sciences), 12th Nov 2015.

- Fiber Bragg Gratings: Sensors which can sense most anything, Prof. S Asokan, IAP, IISc, 28th Oct 2015.

- Viruses and Humans: Living in symbiosis and pathogenesis –research from dirt to discoveries, Professor C Durga Rao, Department of Microbiology & Cell Biology (Biological Sciences), 20th January 2016.

- Realizing the Power of MIMO Signal Processing, Professor KVS Hari, ECE, IISc (Electrical Sciences), 16th February 2016.

- Turning Science into Technology: Narratives of Some Exhilarating Experiences, Professor Rudra Pratap- Chairperson, Centre for Nano Science and Engineering (Chemical Sciences), 16th March 2016.

- Wave Propagation in Nanomaterials and Structures, Prof. S Gopalakrishnan, AE, IISc, 6th April 2016.

7.2 CONFERENCES / SEMINARS / SYMPOSIA / WORKSHOPS

A number of conferences, workshops, seminars and symposia are regularly organized at the Institute. A large number of scientists, engineers, educationists take advantage of these. The programmes conducted during the year were:

DIVISION OF BIOLOGICAL SCIENCES

- International workshop entitled "The Art of Scientific Observation", 2-4 July 2015, University of Freiburg, Germany (CES)

- Ecology in Space and Time: An Interdisciplinary Conference on Forest Ecology and Climate Change, 8-10 April 2015 (CES)

- Workshop on molecular phylogenetics, 3-7 August 2015 (CES)

- Student Conference on Conservation Science, 8-11 September 2015 (CES)

- Modern Finance and Macroeconomics: A Multidisciplinary approach, 22 December 2015 and 2 January 2016 (CES)

- Conference on Climate Change and Mitigation, 30th December 2015 (CES)

- Internet based Course – Environment Management, August-December 2015 (CES)

- Workshop on Mangroves, World Mangroves day, 5 August 2015 (CES)

- Free & Open Source Geospatial Technologies (FOSS4G) for Urban Environment Applications (mapping, inventorying & monitoring), 21st - 24th August 2015 (CES)

- Biodiversity Awareness Workshop using Open Source Geospatial (FOSS4G) Tools, 20th August 2015

- International Mangrove Day, 26thJuly 2015 (CES)

- Workshop Mega-Regional Development and Environmental Change in India and China, 12th -13th May 2015 (CES)

- Workshop – Conservation of Western Ghats Ecology, Regional (Organised by Kuamradhara Parisara Samrakshana Samithi, Puttur jointly with Energy & Wetlands Research Group, CES, IISc and Vrikshalaksha Andholan, Sagar), Kumaradhara river basin, 9th May 2015 (CES)

- Workshop on Free & Open Source Geospatial Technologies (FOSS4G) for Urban Environment Applications (mapping, inventorying & monitoring), 1st - 5th April 2015 (CES)

- Workshop on Urban environment issues, 27-28 February 2015 (CES)

- Workshop on Status of water in Varada river basin. Regional, Organised by Vrikshalaksha Andolan,

Sagar jointly with District science Centre and Energy & Wetlands Research Group, CES, IISc, 2 January 2015 (CES)

- Co-organizer of summer school on Computational Approaches to Memory and Plasticity (Held at NCBS, Bangalore), 27 June–12 July 2015 (MBU)
- From molecules to organisms, Dec. 11-14, 2015 (MCB)
- Mammaglobin-A: A Breast Cancer Associated Antigen, Wednesday, 2nd September 2015. MRDG Seminar Hall, First Floor, Biological Science Building (MRDG)
- "Neurodegenerative Diseases: Pathogenesis to Therapy", November 16-18, 2015 (CNS)
- The Neurology of Vision Disorders and the Lysosome: of wrong signals and stuck traffic!, January 1st 2015 (CNS)
- Mapping Neural Circuits in the Whole Mouse Brain, January 7, 2015 (CNS)
- Cortical processing of complex sensory scenes, January 9, 2015 (CNS)
- Network Models of Brain Function in Health and Disease, January 13, 2015 (CNS)
- Biological Basis of Variability in Dopamine Availability on Frontostriatal Brain Function in Adolescence, January 29, 2015 (CNS)
- Neuronal Nucleus Formation in the Developing Central Nervous System, February 9, 2015 (CNS)
- Allosteric modulation of pentameric ligand gated ion channel function in mediating synaptic plasticity, February 10, 2015 (CNS)
- Continuous Updating of Visuospatial Memory in Superior Colliculus during Slow Eye Movements, February 12, 2015 (CNS)
- Molecular dissection of excitatory synapses in physiology and pathology, February 16, 2015 (CNS)
- GAAIN – A Global Data Sharing Network for Alzheimer's Disease Research, 5th June 2015 (CNS)
- Olfactory bulb coding of odors, mixtures and sniffs is a linear sum of odor time profiles, June 18, 2015 (CNS)
- Neuroscience of Wisdom, Resilience and Well Being, June 24, 2015 (CNS)
- Cortical bases of auditory figure-ground segregation, June 25, 2015 (CNS)
- Recent progress and future challenges posed by neurological diseases, July 7, 2015 (CNS)
- Notch Signaling in Neuronal Cell Cycle Control and Astrocyte-Neuron Interactions, August 5, 2015 (CNS)
- Sixth Sense: Understanding proprioception using the fly model, August 24, 2015 (CNS)
- Neuromorphic Engineering: Why is it such a hot topic?, September 23, 2015 (CNS)
- Molecular approaches to block or modify neurodegeneration in Machado-Joseph disease, November 3, 2015 (CNS)
- Neuropeptide Y enhances autophagy in the hypothalamus: a mechanism to delay aging?, November 3, 2015 (CNS)
- How Events Shape Attention and Memory Over Time, November 27, 2015 (CNS)
- The Longitudinal Study of Aging in India (LASI): Early Results and New Initiative on Dementia, December 21, 2015 (CNS)
- Synaptic tagging mechanism and the role of Synaptotagmin 3 on learning and memory, December 21, 2015 (CNS)
- Is Modularity Dead? Distributed Neural Networks In Language, December 29, 2015 (CNS)

Division of Chemical Sciences

- International Symposium on Advances in Chemical Sciences (ISACS-18) sponsored by the Royal Society of Chemistry – London: November 19-21, 2015 at IISc, Bangalore (IPC)

- ISACS 18 International Conference, Challenges in Organic Materials and Supramolecular Chemistry, November 19-21, (Jointly with Royal Society of Chemistry, IPC and JNCASR) OC)

- Recent Advances in NMR Spectroscopy, July 16-17, 2015 (NRC)

- NMR Spectroscopy: From Molecules to Human Behavior, November 20 (NRC)

Division of Electrical Sciences

- EECS-2015, A symposium of presentations by Final Year Ph.D. students of the Division (CSA, ECE, EE, ESE) (February 13-14, 2015)

- Prof. I G Sarma Memorial Lecture, January 2014 (CSA) by Turing Laureate Professor Silvio Micali from the Massachusetts Institute of Technology

- Thematic Year on Game Theory and Mechanism Design under the aegis of NMI (National Mathematics Initiative) (Arnab Bhattacharyya, Y. Narahari, and Rajesh Sundaresan) (CSA and ECE)

- NMI International Workshop on Advances in Reinforcement Learning, Chennai (ShalabhBhatnagar, Organizer), March 23 - 28, 2015 (CSA)

- VMCAI 2015, Mumbai (Deepak D'Souza, Co-Chair, Organizing Committee), January 12-14, 2015 (CSA)

- Formal Methods Update Meeting (Deepak D'Souza, Organizer), July 16-17, 2015 (CSA)

- International Parallel and Distributed Processing Symposium – IPDPS - 2015 (R Govindarajan, Organizer), May 25-29, 2015 (CSA)

- 35th IARCS Annual Conference on Foundations of Software Technology and Theoretical Computer Science(AdityaKanade and Deepak D'Souza-Organizers), December 15-19, 2015 (CSA)

- ACM SIGPLAN Programming Languages Mentoring Workshop (PLMW) 2015; colocated with POPL 2015 (Co-organized by Aditya Kanade with Derek Dreyer, RuzicaPiskac, Alan Schmitt, Ross Tate) (CSA)

- IMPECS-POPL Workshop on Emerging Research and Development Trends in Programming Languages (WEPL), 18th January 2015 (CSA)

- Indo-US/NMI Symposium on Learning, Algorithms and Complexity (Organized by ShivaniAgarwal), January 5-9, 2015 (CSA)

- Wireless VITAE 2015, Hyderabad, Dec. 2015 (ECE)

- 2015 Joint Telematics Group/IEEE Information Theory Society Summer School on Signal Processing, Communications and Networks, July 2015 (ECE)

- JTG / IEEE Information Theory Society Summer School 2015, July 2015 (ECE)

- One Day Workshop on Modelling, Analysis, and Control of Stochastic Systems, July 2015 (ECE)

- JTG-IISc Summer School on Information Theory, July 2015 (ECE)

- 2015 IEEE International Conference on Information Theory (ISIT 2015), June 2015 (ECE)

- Microsoft Research-IISc Summer School on Machine Learning, June 2015 (ECE)

- International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt 2015), Workshops, May 2015 (ECE)

- 2015 Information Theory Workshop (ITW 2015), April 2015 (ECE)

- 28th Conference on VLSI Design, Bangalore, India, Jan. 2015 (ECE)

- IEEE International Symposium on Signal Processing and Information Technology (ISSPIT-2015) Abu Dhabi, Dec. 2015 (EE)

- Advanced Optimization and Applications, NIT Raipur, Aug. 2015 (EE)

- Biodesign Course, St. Johns Medical College, Bangalore, Feb. 2015 (EE)

- Brainstorming on Language Science and Technology Centre, IIT Guwahati, Dec. 2015 (EE)

- International Conference on Pattern Recognition and Multimedia Signal Processing (ICPRMSP), Chidambaram, Tamil Nadu, Jan. 2015 (EE)
- DICTA 2015, Adelaide, Australia, Nov. 2015 (EE)
- Recent Developments in Industrial Applications of FPGA, Nitte, Bangalore, Sep. 2015 (EE)
- 3rd ISNPEDADM–2015 International Conference, Reunion Island (Indian Ocean)France., Oct. 2015 (EE)
- 7th Intl Conference on Applied Energy (ICAE-2015), Abu-Dhabi, UAE, Mar. 2015 (EE)
- 9th International conference on electrical & electronics insulating materials & systems, INSULEC-2015, Mumbai, Jan. 2015 (EE)
- Ist Intl. Conference on Power, Circuit and Information Technologies (ICPCIT-2015), Bangalore, Apr. 2015 (EE)
- ICONIP2015, Istanbul, Turkey, Nov. 2015 (EE)
- 8th Asia-Pacific International Conference on Lightning held at Nagoya, Japan, Jun. 2015 (EE)
- IEEE PES Innovative Smart Grid Technologies Conference (ISGT)Asia -2015, Bangkok, Thailand, Nov. 2015 (EE)
- National Conference on Power System Protection, CPRI, Bangalore, Feb. 2015 (EE)
- Indo-French workshop on Emerging Trends in Electron Device Modelling (SantanuMahapatra, Organizer), 30 March -- 1 April, 2015 (ESE)
- Workshop on Design Essentials, Bangalore (Organizer: MayankShrivastava), Jan 2015 (ESE)
- 28th Conference on VLSI Design, Bangalore, India, Jan. 2015 (ECE)
- Frontiers in Optics/Laser Science, special event hosted by the Optical Society of America Photonic Detection Technical Group (ShayanSrinivasa, co-organizer), 19 Oct 2015 (ESE)

Division of Mechanical Sciences

- Workshop on Recent Advances in Blast Mitigation-2015 (RABM-2015), Angsana Resort, Bangalore, 16-19 August 2015 (AE)
- 4th Asian-Australian Rotorcraft Forum, 16-18 November 2015 (AE)
- Brainstorming Meeting on Radar Meteorology, 25-26 September 2015 (DCCC)
- CTCZ -Subgroup meeting - Hydrology and Land surface, 17-18 July, 2015 (CAOS)
- CTCZ -Subgroup meeting - Large Scale Component, 7-8 August, 2015 (CAOS)
- National Climate Science Conference, 2-3 July 2015 (DCC)
- GdR Dynamo 2015, 1-12 June 2015, ICTS Bangalore (CEaS)
- Geochronology: Challenges and Possibilities, Feb 2-7 2015, IISc Bangalore (CEaS)
- Workshop on Remote Sensing for Water & Agriculture: Current & Future Possibilities, 17 November 2015 (CiE & ICWR)
- Airport Development Conference (AIRDEV-2015), 4 to 6 November 2015 (CiE & CiSTUP)
- Seminar on Smart Mobility – Bengaluru and Amsterdam, 25th March 2015 (CiE & CiSTUP)
- Brainstorming Session for a pilot project on "Comprehensive Solution for Accident data Collection, management, interpretation and accident prediction, 18th Feb. 2015 (CiE & CiSTUP)
- One Day Training Programme on Transportation Software TRANSYT, ARCADY, PICADY, OSCADY, 13th Feb. 2015 (CiE & CiSTUP)
- Workshop on Geothermal Energy- Issues and Challenges, 6th January 2015 (DCCC)
- Seminar on Solar Variability and Climate Change, 7th January 2015 (DCCC)

- Meeting on Lonak glacier lake in Sikkim , , 19th-20th February 2015 (DCCC)
- Training on Glacier, Climate Change and Remote Sensing, , 8th-19th June 2015 (DCCC)
- National Climate Science Conference, 2-3 July 2015 (DCCC)
- one-day workshop in collaboration with NIAS on Is Power generation by Solar cheaper than from Coal, 8th August 2015 (DCCC)
- 7th Climate Change Quiz Program, , 23rd September 2015 (DCCC)
- Workshop on Radar Meteorology, , 25th-26th September 2015 (DCCC)
- Project Appraisal Monitoring Committee (PAMC) of MoES, , 8th and 9th October 2015 (DCCC)
- Eight Jeremy Grantham Lecture on Climate Change, , 9th-12th November 2015 (DCCC)
- Indo-UK workshop on "Water Security", April 13-14, 2015 (ICWAR)
- Workshop on Integrated Computational Materials Engineering , 28-29 Dec 2015 (MT)
- Workshop on Interface Related Mechanical Behavior of Materials - II , 27-28 Nov 2015 (MT)
- NRC-M Workshop on Texture of Materials , 15-19 Feb 2015 (MT)
- 28th Annual Students' Symposium , 22-23 Jan 2015 (MT)

Division of Physical and Mathematical Sciences

- Recent Trends in Astro-Particle and Particle Physics, 11-12 October 2015 (CHEP)
- Discussion Meeting on Quantum Information Processing, 29-30 June 2015 (CHEP)
- CHEP In-House Symposium, 23-24 January, 2015 (CHEP)
- Symposium on Learning, Algorithms and Complexity, Jan. 05 – 09, 2015 (NMI / Math)
- Workshop on Machine Learning and Complex Networks, Feb. 28 - Mar. 07, 2015 (NMI / Math)
- Workshop on Advances in Reinforcement learning, March 23-28, 2015 (NMI / Math)
- Workshop on Non-convex Optimization for Machine Learning, June 10-19, 2015 (NMI / Math)
- Workshop on Static and Dynamic Mechanism Design, Aug. 01 - 04, 2015 (NMI / Math)
- Workshop on Networks and Games, Dec. 07- 09, 2015 (MA)
- Conference on Mathematical and Computational Sciences, Jan. 22-24, 2015 (MA)
- Conference on current Development in Analysis and its applications, Math, Mar. 14-15, 2015 (MA)
- National seminar on Analysis, May 28-29, 2015 (MA)
- International conference on Mathematical Sciences on Homogenization and Unfolding Method , Math, July 13-15, 2015 (MA)
- Colloquium on certain Convergences: Multi-scale, Method of Unfolding and Homogenization, Math, July 31, 2015 (MA)
- Workshop on Calculus of Variations to Optimal Control, Math, Nov. 06, 2015 (MA)
- Lectures on probability and stochastic processes – X, Math, Dec. 13 – 16, 2015 (MA)
- Workshop on Probability and Representation Theory, Math, Mar. 6-7,2015 (MA)
- International conference on " Recent Developments in the Finite Element Analysis for Variational Inequalities", Aug. 10-14, 2015(MA)
- International Workshop on Physics of Semiconductor Devices (IWPSD 2015), December 7-10, 2015 (MRC / PHY)

- Indian Statistical Physics Community Meeting 2015, February 13 – 15 2015 (PHY)

- 3rd Neighbourhood Astronomy Meeting, October 10, 2015 (PHY)

- Indo-Dutch meeting on Emerging Phenomena at low dimensions with new materials, December 15, 2015 (PHY)

Division of Interdisciplinary Research

- International" Workshop on Recent Advances in Photonics 2015 (WRAP 2015)", 16-17 Dec. 2015 (CeNSE, RBCCPS and ECE)

- Free and open source geospatial technologies(FOSS4G) for urban environment application, 01 – 05 April 2015 (CiSTUP)

- Future proof design of transportation systems optimization of KSRTC schedules under uncertain demands, 30 April 2015 (CiSTUP)

- International workshop on Mega regional and environmental changes in India and China, 12 – 15 May 2015 (CiSTUP)

- Workshop on innovative transit financing and sustainable transport planning, 28 - 29 May 2015 (CiSTUP)

- International Conference of Airport Development,: 04 – 06 November 2015 (CiSTUP/CiE)

- International Conference on Solid Waste Management-ICONSWM 2015, 24 – 27 November 2015 (CiSTUP)

- Workshop on Business Analytics, Department of Management Studies, IISc along with Information Excellence Group (IEG) Bangalore, 28th February 2015 (MS)

- Panel Discussion on The Union Budget 2015-16, Department of Management Studies, IISc, 13th March 2015 (MS)

- Workshop on Growth Issues for Start-ups in India, Administrative Staff College of India (ASCI), Hyderabad along with Department of Management Studies, IISc, 9th December 2015 in ASCI, Hyderabad (MS)

- Power Market Leadership course on"Indian Electricity Markets" , Department of Management Studies, IISc along with Power Exchange India Limited (PXIL), Mumbai, October 28-30, 2015 (MS)

- The 15th Consortium of Students in Management Research-COSMAR 2015 Conference, Department of Management Studies, IISc, 24th -25th November 2015 (MS)

- The A&A of IoT: a tutorial on Arduino and Android, July 17th 2015 (RBCCPS)

- Leveraging use-cases to validate IoT opportunities: India and its unique landscape, December 4-5, 2015 (RBCCPS)

- IEEE WRAP: 2015, December 16-17, 2015 (RBCCPS)

- Symposium on Cell and Tissue Mechanics, Jan. 8-9, 2016, (BSSE)

- An Indo-French workshop on "Remote Sensing for Water and Agriculture: Current and Future Possibilities", November 17, 2015 (ICWaR)

- Indo-UK workshop on "Water Security", April 13-14, 2015 (ICWaR)

- Two INUP Familiarization Workshops and Six INUP Hands-on Training Workshops held (CeNSE)

- Training Workshop held for technical staff members of Analog Devices (CeNSE)

- IEEE Nanotechnology Workshop (sponsored by the Joint Student Chapter, IEEE Nanotehnology and Sensors Council), Oct. 16&17, 2015 (CeNSE)

- National Seminar was organized during the Decennial Celebration of the Centre for Contemporary studies during 24-26 January 2015 on "Methodological Aspects of Knowledge Production in Pre-modern India (CCS)

- Discussion Meeting on New Knowledge was organized on 3 October 2015 (CCS)

8 Other Institute Units

8.1 CENTRE FOR CAMPUS MANAGEMENT AND DEVELOPMENT – BUILDINGS

Works completed during the year (value higher than ₹ 10.00 lakh each)

Sl No.	Description of Works	Cost (₹ in lakhs)	Area in Sq. Mtrs.
NEW			
1	Construction of new second floor for CSA & Electrical Engineering	298.00	2751.00
2	Construction of shopping complex and tea Kisok	304.18	2067.00
ADDITIONS AND ALTERATIONS			
3	Renovation and addition to old Aerospace Department building to accommodate Administrative Officers	_	653.00
4	The work of Painting and vitrified tile flooring work at CSA building	_	_
5	Renovation of toilets in Gymkhana, IISc	_	_
6	Construction of toilets and upgrading of kitchen flooring at Kabini Canteen	_	_

Works-in-Progress during the year

Sl No.	Description of Works	Cost (₹ in lakhs)	Area in Sq. Mtrs.
NEW			
1	Construction of laboratories, classrooms, conference hall and office space in Material Engineering Department	465.60	2265.00
2	Construction of dining facility and parking at Main Guest House	43.26	300.90
3	Construction of New Block for Electronics and Communication Engineering Department	643.93	3206.00
4	Construction of new Hydraulics building for Civil Engineering Department	791.09	4875.00
5	Construction of second floor to Department of Electronic Systems Engineering (ESE) Building	258.17	1705.00

6	Construction & renovation of centre for Neuroscience in old TIFR Building, IISc	626.64	2692.00
7	Additional constructions for Divecha Centre for Climatge Change at CAOS premises	368.77	1840.00
8	Acoustic treatment and connected Civil and Electrical works at Raja Ramanna Auditorium in Gymkhana Campus	66.24	_
9	Establishment of 0.5 MLD domestic STP	294.00	_
10	Renovation and improvement to "E" Block Hostel	162.61	_
11	Modification of 'C' Mess including adding new patio and annexe	275.57	
12	Conversion of class rooms, renovation of students Laboratory and other renovation works to Management Studies building at IISc	106.08	_
13	Providing new sanitary line from NNE Quarters/New 8 storeyed quarters under construction upto the proposed STP behind swimming Pool	51.75	_
14	Providing chain link fencing to all round runway at Aerospace department	23.49	_
15	Proposed construction of new Animal facilities building to CAF department	589.55	3794.00
16	Proposed extension to second floor of Aerospace Engineering department building, IISc	328.08	1400.00
17	Formation of hockey ground & improvements to foot ball ground in Gymkhana, IISc	50.58	_
18	Proposed Development and alumni affairs and International Cell Department	51.95	_
19	Repairs and Painting to Gymkhana Building	30.10	_
20	Supply, erection, testing and commissioning of one transformer bay with 66/11 KV 12.5 MVA transformer by extending the existing 66 KV switch yard adding two Nos. of 11 KV VCB panels to existing 11 KV switchgear and SCADA system including all civil works.	297.90	_
21	Electrical renovation works at Civil Engineering Department	18.96	_

8.2 OFFICIAL LANGUAGE UNIT

Chairperson: **Govind S Gupta**

Hindi Workshop

The Institute regularly organizes Hindi Workshops on various aspects of the use of Hindi in Central Government Offices and conversation sessions for the benefit of the Institute staff. Staff from different sections/units of the Institute take part in these workshops and are utilizing the same in their offices. Dr. Radhakrishnan, System Administrator, Indian Institute of Science conducted workshop from 22-6.2015 to 24.06.2016 on "Conversational Hindi" and Dr. Shankar Prasad. Deputy General Manager (Official Language), Retd., Hindustan Aeronautical Limited, Bangalore conducted a workshop on 08.12.2015 for the Assistant Registrars on "Quarterly progress Report, Official Language Policy".

Darshini Magazine

Published Hindi Quarterly Magazine "Darshini" regularly. For the year 201-16, April-June 2015, July-September 2015, October-December 2015 and January-March 2016 issues had been published.

Hindi Lecture Series

- Dr. Abishek Srivastava, C-DAC, Bangalore delivered a Hindi Technical Lecture on "Swayam Anukoolan Network" on 27 May 2015.

- Prof. Satyam Suwas, Department of Materials Engineering, Indian Institute of Science, Bangalore, delivered a Hindi Technical Lecture on "Materials Research for applications in vehicles and Aircrafts" on 18 March 2016

- Ms. Kavitha Krishnamurty Subramaniam, Playback Singer, delivered a Hindi Technical lecture on "Mere Sangeet ka Safar" on 30 March 2016.

TOLIC Competitions

Many participants from various Central Government offices participated in different competitions conducted by TOLIC office, Bangalore. Institute organized Vividha Competition for the Hindi Officers and Hindi staff on October 05, 2015 under the auspicious of TOLIC. For the first time TOLIC celebrated the World Hindi Day on 11.01.2016. Members of the Hindi Samiti of the Indian Institute of Science, Bangalore participated actively in the celebration which was highly appreciated by all the members.

Translation

- Translation of Institute Annual Report into Hindi

- Translation of Annual Accounts into Hindi

- Translation of other administrative manuals, forms and day-to-day correspondence

- Translation of Hindi materials from KVPY, IISc, Bangalore

8.3 SC/ST CELL

Liaison Officer I/c: **Puttabasavaiah**

The Governing Council of the Institute has decided to follow Government of India directives/orders regarding reservations, concessions, relaxation, etc., in favour of Scheduled Castes and Scheduled Tribes.

The SC/ST Cell monitors "Registers of Roster" pertaining to direct recruitments and promotions maintained for both teaching and non-teaching staff. The Cell strictly ensures the Institute's adherence to Government of India directives/orders regarding reservations, concessions, relaxation etc., for Scheduled Castes and Scheduled Tribes.

The Cell furnishes statistical information regarding the representation of SCs & STs in the service of the Institute to the Ministry of Human Resource Development, the University Grants Commission and the National Commission for Scheduled Castes and Scheduled Tribes as and when called for.

The Cell also looks after the implementation of welfare measures such as the reimbursement of tuition and other fees, etc. for SC/ST staff wards.

8.4 COUNSELLING AND SUPPORT CENTRE

Chairperson: **N C Shivaprakash**

The Centre for Counselling & Support (CCS) provides professional support to employees in various kinds of distress, especially those related to debts, alcoholism, absenteeism, family, health & personal matters. The Centre extends educational support to the children of the employees of the Institute through Guidance programmes. The Centre also runs training programmes for family members of the staff who are assessed to be in need of them. A small library for school-going children is also maintained.

Also, the Centre raises awareness amongst the Institute community about social problems through (i) arranging lectures, film shows, (ii) disseminating information through pamphlets. Posters, (iii) house to house visits by social workers.

During the year the Centre conducted the following programmes:

- Yoga, Pranayama, Mudra & Meditation and Clapping and Laughter Therapy classes for Faculty / Students / Employees and their dependents.

- Drawing and painting classes for employees and their dependents.

- Organized interaction with Students (Student support network committee, Students Council) for Counselling.

- Organized Lectures / Seminars by eminent personalities on various topics to help employees, their families & children.

- Organized Tailoring & Embroidery courses for the employees and their dependents.

- Organized interaction with Departments for Counselling

WOMEN'S CELL

The Women's Cell was established in the year 2004 under Centre for Counseling and Support with the objective of addressing matters relating to women in the Institute. This Committee was reconstituted by the Director and Ms. Indumati Srinivasan, Financial Controller of the Institute is the present Chairperson and Dr. V Thilagam is the Convener of the committee.

As the women employees are generally prone to depressions, due to circumstances, it was decided to engage services of a counselor (Psychologist) to counsel them.

To facilitate the Committee to prepare an agenda, several meetings were organized with each category of women, viz., faculty, students and administrative staff to understand the needs of each group.

SEXUAL HARASSMENT COMPLAINTS COMMITTEE

The Hon'ble Supreme Court has laid down certain guidelines and norms to be observed in institutions to ensure the prevention of sexual harassment of women in the work place. Sexual harassment of any kind constitutes an action unbecoming of an employee of the Institute and therefore constitutes misconduct in employment and will attract appropriate disciplinary action. Any complaint of sexual harassment would be examined by a complaints committee for redressal of the complaints. The committee would broadly be as follows:-

- Redressal of complaints of women employees on sexual harassment while on duty and recommend suitable action wherever necessary

- Suggest steps to ensure that there is no hostile environment towards women at work place

- Counselling the staff concerned

- Any other work as entrusted to the Committee regarding welfare of women employees at the Institute.

The sexual harassment complaints committee was constituted during 2003 and functioning under the Centre for Counseling and Support. During this year the committee received four (4) complaints and all of them were dealt with appropriately. Also fifteen workshop on awareness programme against sexual harassment were conducted during this year, which include two Administration and Training for SHCC members

8.5 PUBLIC INFORMATION OFFICE

Right to Information Act, 2005: The Institute adopted the Right to Information Act, 2005 in the year 2006. The Institute has disseminated certain information through its website, which is accessible to the public. During the year, the public have made 140 requests seeking information and prompt action has been taken and the applicants have been informed accordingly.

9 Campus Facilities

9.1 HEALTH CENTRE

The Health Centre extends primary health care to the staff, their family members, pensioners and their spouses, family pensioners and students. The Centre offers round-the-clock out-patient and in-patient treatment. A Clinical Laboratory, ECG, Digital X-ray and Ultrasonography are available. Specialist care in General Medicine, Gynaecology, ENT, Dermatology, Dentistry, Ophthalmology, Psychiatry and Physiotherapy are also available. It has a Pharmacy which stores most medicines and an operation theatre to cater to minor surgeries.

For cases requiring hospitalization for major illness, patients are referred to outside recognized hospitals for admission and treatment. All the permanent employees and their family members, and retired employees and their spouses and also family pensioners are covered by the Group Mediclaim Insurance Policy under the Contributory Health Service Scheme (CHSS).

The Health Centre provides OPD consultation for students residing in the campus.

The Health Centre has experienced doctors and area doctors to cater to the needs of employees residing in the campus and outside.

Ayurvedic Health care is provided in an alternative system of medicine by recognized Ayurvedic Practitioners. Emergency care is given at the Health Center round-the-clock and an ambulance service is available.

The Health Centre has an fully equipped Ambulance to transfer critically ill patients round the clock.

9.2 RECREATION

9.2.1 Gymkhana

The spacious and well designed Gymkhana is the nodal centre for sports and cultural activities of the students and faculty. It offers facilities for many outdoor and indoor games and has a well equipped gymnasium and a swimming pool. In addition, the Gymkhana houses the Nature club, Dance club, Dramatic club, Literary, Fine Arts and Photographic club and a well-equipped modern music room. The Ranade Library in Gymkhana offers light reading material in English and in many Indian languages. Other features include periodic coaching classes in games and athletics such as Basketball, Tennis, Swimming, Kung Fu, Archery, Athletics, Aerobics and Dance. The Football/Hockey and Tennis grounds are fitted with floodlights. The Raja Ramanna Student's Activity Centre (SAC) is open for cultural activities.

The Gymkhana conducted a number of sports and games competitions during the year in connection with Founder's Day, Independence Day, Republic Day and Gandhi Jayanthi. The indoor and outdoor game clubs held annual tournaments throughout the year. The Institute's Cricket team, Football team, Hockey team, Billiards team, Lawn Tennis team and Volleyball team participated in Club Tournaments, League matches and Inter Collegiate Tournaments. The Gymkhana has also conducted Inter Departmental / Open matches for the students, faculty, staff, spouses and their children.

9.2.2 Faculty Club

The Faculty Club is a place for recreational, social and cultural activities.

Some of the salient activities of the club are: Indoor Games (Billiards/Snooker, Carrom, Table Tennis and Chess); Outdoor Games (Tennis); Fine Arts; Library & Reading Room (subscribes to dailies, weeklies and popular magazines); T V Lounge; Ladies Section; Snack Parlour and Pastry Shop and a Mini Gym. Classical music concerts are organized regularly on the campus.

During the year dining and gym facilities were improved. Science learning activity for school kids is arranged through science club.

9.2.3 Tata Memorial Club

This Club provides the space and facilities for various games and cultural activities for the supporting staff of the Institute.

In addition to organizing outdoor and indoor games, its activities cover swimming coaching, computer training, Abacus class, creative camps, dance training, musical instrument training. Yoga / Meditation classes, and Sloka classes for members, students & their dependents. Tuition classes are conducted with the support of student volunteers for needy dependents children. The club also can borrow Engineering and Medicine text books for needy children of the Institute community. The mini multi gym facility is open to the Institute community. The club also maintains a Library. A Regular Blood Donation camp is organized on Independence and Republic day in co-ordination with the Students Council / Lions club (Aishwarya).

The Tata Memorial science quiz was organized on National Science Day. The club organised Badminton / Carrom / Table Tennis tournaments for students, faculty and staff. The club also organised the Karnataka Rajayotsava in co-ordination with the Kannada Sangha.

9.3 AUDITORIA

9.3.1 National Science Seminar Complex

The magnificent National Science Seminar Complex situated in the IISc Campus is the first of its kind in India. The complex is open for seminars, symposia and conferences organized by recognized scientific societies, educational institutions and professional bodies. The total built up area measures around 5750 sq. metres.

This fully air conditioned complex houses the JN Tata Auditorium with a seating capacity of 750 and 3 mini auditoria to seat 120, 90 and 60 people respectively. Interactive concourses at the basement and ground level with excellent light and sound facilities are part of the seminar complex. The business centre at the complex has facilities for photo copying, FAX, STD/ISD phone booths and secretarial assistance.

9.3.2 Prof. Satish Dhawan Auditorium

Located on the first floor of the Centre for Scientific and Industrial Consultancy, this medium sized auditorium has a seating capacity of 265. It has fixed seats and a dais suitable for conferences and chamber music. It is fully air-conditioned and is adequately equipped with sound, lighting and projection equipment.

9.3.3 Rustum Choksi Hall

Located close to the entrance of the Institute, with a seating capacity of 120, the interior of the hall and its surroundings provide the right environment for intellectual inquiry and cultural activities.

9.3.4. Faculty and Reception Hall

The Faculty Hall with a seating capacity of 275 is located in the east wing, on the first floor of the tower building. The Reception Hall is in the west wing. These are used for formal events.

9.4 AMENITIES

The following amenities located in different parts of the campus make day-to-day life smoother and more comfortable. In fact, these facilities have made IISc a totally self contained campus.

- Travel Agencies (Domestic & International Travel)
- Photo copying and DTP Centres
- Stationery/Book Shops
- Pharmacy

- Laundries/Dry cleaners
- Tailoring Shops
- Restaurant
- Tea Parlour
- Juice Shop
- Provision and General Stores
- Vegetable Shop
- Bakery & Pastry Shop
- Hair Dressing Saloons
- Baby Care Centre
- Ladies Boutique
- STD Booth
- Cycle Shop
- Canteen Facility
- Cable Facility
- Nandini Milk Parlour
- Regal Star Electronics/Electrical Repair Shop

COMMUNICATIONS

There is a Post Office (Science Institute, Bangalore – 560 012), Telecom Centre and STD booths. The Institute is connected by the Centrex Exchange from M/s BSNL with 1200 extensions. In addition, there are nearly 250 direct lines to different departments and centres.

Centralized electronic franking takes care of outward postage and is supported by a centralized FAX facility. The Transport section maintains a fleet of service vehicles through approved travel agencies.

Banks: The Canara Bank and the State Bank of India have fully computerized branches with many facilities including foreign exchange transactions and ATM machines.

10 Finance

The Ministry of Human Resource Development provides Non-Plan and Plan Grants to the Institute for meeting Recurring expenditure & for creation of Capital assets, respectively. The Institute also receives funds from other Government agencies like DST/DBT/CSIR etc, for Extra Mural Research. The UGC/DST also release grants for research in emerging areas & for expansion of Infrastructure under Centre for Advanced Study/ FIST Programmes, respectively.

The total receipts covering all major areas for the year 2015-16 was ₹ 96,069.84 lakhs and the payments for various activities of the Institute was ₹ 84,604.09 lakhs.

The details of Receipts and Payments for the year 2015-16 are as follows

₹ in lakhs

Sl No.	Particulars	Receipts	Payments
1	Non-Plan Grant - Recurring	26,909.00	27,747.34*
2	Plan Grants	12,000.00	14,133.71
3	Developmental Projects	12,854.46	8,807.77
4	Sponsored Research Schemes	36,158.60	25,789.91
5	Scientific & Industrial Consultancy	1,287.03	1,112.75
6	Continuing Education Programme	231.27	230.20
7	Sponsored Scholarships (CSIR/UGC/AICTE etc)	1,913.75	2,066.68
8	Academic/Other Income	1,633.76	1,633.76*
9	Interest earnings/Project Overheads	3,081.97	3,081.97
	Total	**96,069.84**	**84,604.09**

	Salaries & Allowances	22,809.34
	Research Associateship	516.57
	Working Expenses	6,055.19
	Total	**29,381.10***

11 Endowed Chairs

Endowed Chairs for Faculty

A number of Endowed Chairs have been instituted in recent years to recognize the outstanding contribution of Institute faculty members.

Year	Name	Department
2012–15	Prof. P S Sastry	EE
2015-18	Prof. K Gopakumar	ESE
AMRUT MODY		
2015-18	Prof. Binny J Cherayil	IPC
ASTRA		
2012-15	Prof. Sandhya S Visweswariah	MRDG
2015-18	Prof. C Jayabaskaran	BC
KSIIDC		
2012–15	Prof. Chanda J Jog	PHY
2015-18	Prof. B Ananthanarayan	CHEP
	Prof. Vasant Natarajan	PHY
PROF. SATISH DHAWAN		
2012–15	Prof. KPJ Reddy	AE
2015-18	Prof. Ranjan Ganguli	AE
TATACHEM		
2012–15	Prof. P Vijay Kumar	EC
2015-18	Prof. N Surya Prakash	NMRC
RAMAKRISHNA RAO		
2014-17	Prof. Srinivasan Raghavan	CeNSE

Endowed Visiting Chairs

A number of Endowed Visiting Chairs have been instituted to facilitate the visits of celebrated researchers from all over the world.

Year	Name	Department
BRAHM PRAKASH		
2015	Prof. Tamas Ungar	Eotvos University, Budapest, Hungary
2015-16	Prof. Kannan M Krishnan	University of Washington, Seattle, USA
2016	Prof. Jiang-Zhong Jiang	Zhejiang University, Hangzhou, PR China,
2016	Prof. Tamas Ungar	Eotyos University, Budapest, Hungary
2016	Prof. David P Field	Washington State University, Pullman, USA
PROF. SATISH DHAWAN		
2015	Prof. Tribrikram Kundu	University of Arizona, Tucson, AZ
2016	Prof. P. Guruswamy	Ames Research Center, California, USA
SUNDARARAJAN		
2015	Prof. Uma Das Gupta	Kolkata
PRATT & WHITNEY		
2015-16	Prof. Ravi N Banavar	IIT Bombay
DST-IISc CENTENARY CHAIR		
2015	Prof. Ramesh Narayan	Harvard University, USA
2015	Prof. Jainendra K Jain	Pennsylvania State University, USA
2015	Prof. William A Goddard	Caltech, California, USA
SMT. RUKMINI – SHRI GOPALAKRISHNACHAR DISTINGUISHED CHAIR PROFESSORSHIP OF IISc		
2015	Prof. Michael L Norman	University of California, San Diego, USA
K VAIDYANATHAN DISTINGUISHED VISITING CHAIR		
2015-2020	Prof. Shihab Shamma	University of Maryland, USA
INFOSYS VISITING CHAIR		
2016-2020	Prof. Jainendra K Jain	Pennsylvania State University, USA
	Prof. Susanne C Brenner	Louisiana State University, USA
	Prof. Aneesh V Manohar	University of California, USA

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