॥ त्वं ज्ञानमयो विज्ञानमयोऽसि ॥

ANNUAL REPORT 2019-20

INDIAN INSTITUTE OF TECHNOLOGY JODHPUR

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INDIAN INSTITUTE OF TECHNOLOGY JODHPUR

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Message from the Director

IIT Jodhpur is currently in the phase of consolidation. Physical infrastructure has expanded. Provisions for adequate Faculty, Staff and Student accommodations have been made. Now, IIT Jodhpur is enriched by the presence of about 130 Faculty Members. On roll, we have more than 1600 students. In terms of physical capacity there has been substantial enhancement.

R&D activities have shown phenomenal growth. Funding for sponsored projects has shown three-fold increase. Number of Ph.D. students has also doubled. IIT Jodhpur, having strong departmental and inter-disciplinary Ph.D. programs with funding from sponsored research projects, is poised for significant R&D output.

In this year IIT Jodhpur initiated formation of the new School of Management and Entrepreneurship. This school is offering MBA and Ph.D. programs. New curriculum has been designed for B.Tech. programs. Institute is completely prepared for starting new B.Tech. programs in AI & Data Science, Civil and Infrastructure Engineering, Chemical Engineering and Metallurgical and Materials Engineering. We target to admit more than 450 undergraduate students in the new academic year. We expect to have on roll 2400 students by the first semester 2020-2021.

It is now clear that IIT Jodhpur is making progress. It will reach its target of built up area and student strength in the financial year 2020-21. IIT Jodhpur is looking forward to a more productive and distinguished future for itself.

Santanu Chaudhury

IIT Jodhpur

Vision, Mission & Core Values

Vision

The Institute shall

1 Promote technology thought and action, and

2 Prepare needed technical human resources to meet the technology challenges of the nation.

Mission

The Institute shall

1. Create a vibrant technology institute that incubates and promotes learning, research, invention and eventually innovation; and
2. Prepare each primary stakeholder towards their dharma, while continuing to adhere to its core values:
   a) Prepare competent Technology Graduates ready to meet Grand Challenges of India;
   b) Train active functionaries of a process driven professional institute;
   c) Facilitate builders of an internationally competitive academic institute; and
   d) Provide technology innovation as a force to as many industries as possible for economic value creation.

Core Values

The Institute stands for a set of core values, wherein each member of the IIT Jodhpur community shall

1. Uphold highest levels of human integrity and dignity;
2. Not take unfair advantage of any stakeholder of the Institute;
3. Work towards building the most admired technology Institute furthering interests of Students, Industries and Society;
4. Commit to economic development of India through technological thought and action;
5. Be ethical, sincere and open in all transactions; and
6. Be continually responsible for upholding utmost confidentiality of all information and circumstances arising out of any interaction.

The Institute

Organizational Structure

Under the broad umbrella of IIT Council, IIT Jodhpur functions under the guidance of the following statutory bodies:

(1) Board of Governors;

(2) Finance Committee;

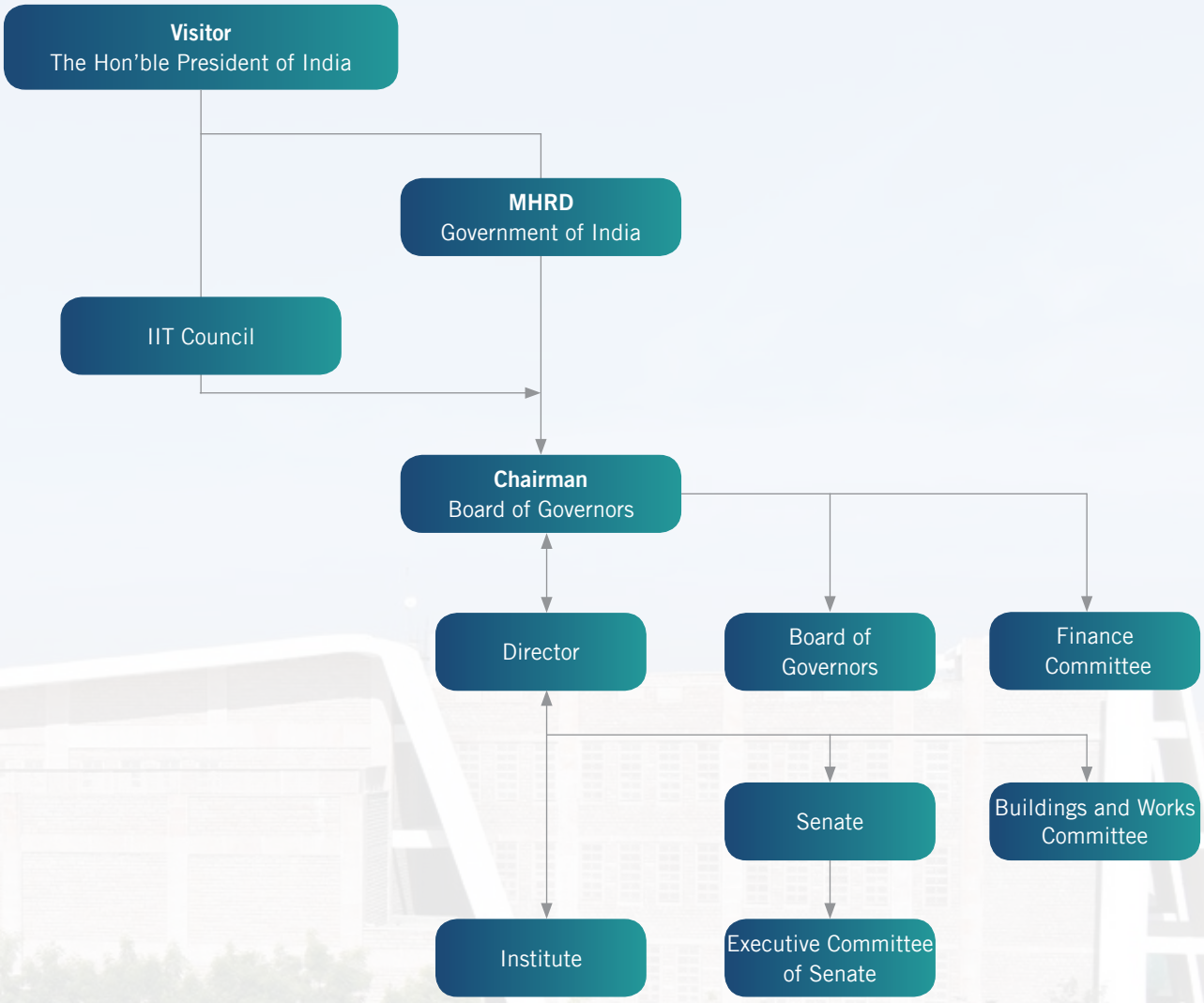
(3) Senate; and

(4) Buildings & Works Committee.

The following organogram represents the broad administrative structure of the Institute, at policy level.

Administrative Structure of IIT Jodhpur

Policy



Member details of these Statutory Bodies are given in the pages to follow.

Board of Governors

Dr. R. Chidambaram
Chairman, BOG
DAE-Homi Bhabha Professor
Former Principal Scientific Adviser to
Government of India
6th Floor, Central Complex
Trombay, Mumbai 400 085
Email: rajachid@gov.in

Professor Santanu Chaudhury
Member (Ex-officio)
Director
Indian Institute of Technology Jodhpur
N. H. 62, Nagaur Road
Karwad
Jodhpur 342 037
Email: director@iitj.ac.in

Professor Akhil Ranjan Garg
Council Nominee
Department of Electrical Engineering
Faculty of Engineering & Technology
Jai Narayan Vyas University
Jodhpur 342 011
Email: agarg@jnvu.edu.in

Additional Secretary (Technical Education)
Council Nominee
Department of Higher Education
Ministry of Human Resource Development
118-C, Shastri Bhawan
New Delhi 110 001
Email: ashe-mhrd@gov.in

Professor Narpat S. Shekhawat
Council Nominee
B131, Prithiviraj Nagar
Near Maharani Park
Pali Road
Jodhpur 342 001
Email: biotechunit@gmail.com

Shri Anil Bhavarlal Jain
Council Nominee
Vice Chairman
MD & CEO,
Jain Irrigation Systems,
Jalgaon 425 002
Email: jisl@lains.com

Professor Sampat Raj Vadera
Senate Nominee on the Board of Governors
Head, Department of Physics
Indian Institute of Technology Jodhpur
N. H. 62, Nagaur Road
Karwad
Jodhpur 342 037
Email: srv@iitj.ac.in

Professor Surajit Ghosh
Senate Nominee on the Board of Governors
Professor, Department of Bioscience & Bioengineering
Indian Institute of Technology Jodhpur
N. H. 62, Nagaur Road, Karwad
Jodhpur 342 037
Email: sghosh@iitj.ac.in
(w.e.f. 24.09.2019)

Secretary, Higher and Technical Education
Member (Nominee of State Government)
Government of Rajasthan
Secretariat Jaipur
Jaipur 302 005
Email: secretaryhte@gmail.com

Sh. P.G. Basak
Secretary to the BoG
Offg. Registrar
Indian Institute of Technology Jodhpur
N. H. 62, Nagaur Road, Karwad
Jodhpur 342 037
Email: registrar@iitj.ac.in
(w.e.f. 16.09.2019)

Finance Committee

Dr. R. Chidambaram
Chairman, FC
DAE-Homi Bhabha Professor
Former Principal Scientific Adviser to
Government of India
6th Floor, Central Complex
Trombay, Mumbai 400 085
Email: rajachid@gov.in

Professor Santanu Chaudhury
Member (Ex-officio)
Director
Indian Institute of Technology Jodhpur
N. H. 62, Nagaur Road
Karwad
Jodhpur 342 037
Email: director@iitj.ac.in

Mr. S. S. Bhandari, CA
Member
Non-Executive Director on the Board Bank of
Baroda
P-7, Tilak Marg, C-Scheme
Jaipur 302 005
Email: bhandariss@hotmail.com

Additional Secretary (Technical Education)
Member
Ministry of Human Resource Development
Shastri Bhawan
New Delhi 110001
Email: ashe-mhrd@gov.in

Sh. Ashoke Guha
Member
CFO (MLCP JV)
Delhi International Airport Pvt. Ltd.
GMR Group
New Delhi 110 037
Email: ashoke_guha@yahoo.co.in
(w.e.f. 22.10.2019)

Joint Secretary and Financial Advisor (JS&FA)
Member
Integrated Finance Division (IFD)
Department of Higher Education
Ministry of Human Resource Development
Shastri Bhavan
New Delhi 110115
Email: jsfa.edu@gov.in

Dr. Gaurav Harit
Member
Associate Professor
Department of Computer Science & Engineering,
Indian Institute of Technology Jodhpur
N. H. 65, Nagaur Road, Karwad
Jodhpur 342 037
Email: gharit@iitj.ac.in
(Tenure upto 21.10.2019)

Mr. G. S. Sood, IDAS
Member
Principal Controller
178, Ellora Enclave
Dayalbagh, Agra 282005
Email: gursaroop@yahoo.co.in
(Tenure upto 21.10.2019)

Sh. P. G. Basak
Secretary to the Finance Committee
Offg. Registrar
Indian Institute of Technology Jodhpur
N. H. 65, Nagaur Road, Karwad
Jodhpur 342 037
Email: registrar@iitj.ac.in
(w.e.f. 16.09.2019)

Senate

As per Institutes of Technology Act, 1961

(a) The Director, Ex-officio, who shall be the Chairman of the Senate
Professor Santanu Chaudhury
Director, IIT Jodhpur
Chairman

(b) Deputy Director, Ex-officio
VACANT

(c) The professors appointed or recognized as such by the Institute for the purpose of imparting instruction in the Institute

1. Professor S. R. Vadera
   Department of Physics
2. Professor M. P. Gupta
   School of Management & Entrepreneurship
3. Professor Surajit Ghosh
   Department of Bioscience & Bioengineering
4. Professor Mayank Vatsa
   Department of Computer Science & Engineering
5. Professor Richa Singh
   Department of Computer Science & Engineering

(d) Three persons, not being employees of the Institute, to be nominated by the Chairman in consultation with the Director, from among educationists of repute, one each from the fields of science, engineering and humanities

1. Professor Sanjeev Misra
   Director, All India Institute of Medical Sciences, Jodhpur
2. Professor H. P. Khincha
   Chairman, Karnataka State Innovation Council, Bangalore
3. Professor Pratap Bhanu Mehta
   President, Centre fir Policy Research, New Delhi
   (Tenure upto 15 March 2020)
4. Professor Purnima Singh
   Department of Humanities & Social Sciences, IIT Delhi
   As per Statutes of the Institute, 2017

(e) Deans

1. Professor
   Surajit Ghosh, Dean (R&D)
2. Heads of the Departments or Schools as may be established by the Institute
   1. Head, Department of Bioscience and Bioengineering
      Dr. Meenu Chhabbra
   2. Head, Department of Chemical Engineering
      Professor Pradeep K. Tewari
   3. Head, Department of Chemistry
      Dr. Ritu Gupta
   4. Head, Department of Computer Science & Engineering
      Dr. Gaurav Harit
   5. Head, Department of Electrical Engineering
      Dr. Anil Kumar Tiwari
   6. Head, Department of Humanities & Social Sciences
      Dr. Ankita Sharma
   7. Head, Department of Mathematics
      Dr. Gaurav Bhatnagar
   8. Head, Department of Mechanical Engineering
      Dr. Prodyut Ranjan Chakraborty
   9. Head, Department of Metallurgical & Materials Engineering
      Professor B. P. Kashyap
   10. Head, Department of Physics
       Professor S. R. Vadera
   11. Head, School of Management & Entrepreneurship
       Professor M. P. Gupta
   12. Head, Centre for Emerging Technologies for Sustainable Development
       Dr. Anand K. Plappally
   13. Head, Centre for Technology Foresight & Policy
       Dr. Deepak M. Fulwani

3. One or more members of academics from each of the Departments and Schools, nominated by the Chairman of the Senate, for a period of one year, subject to a maximum of two persons from any Department or School

    1. Department of Bioscience and Bioengineering
       Dr. Sushmita Jha, Associate Professor
    2. Department of Chemical Engineering
       Dr. Deepak Arora, Associate Professor
    3. Department of Chemistry
       Dr. Rakesh Kumar Sharma, Associate Professor
    4. Department of Computer Science & Engineering
       Professor Richa Singh, Professor
    5. Department of Electrical Engineering
       Dr. Shree Prakash Tiwari, Associate Professor
    6. Department of Humanities & Social Sciences
       Dr. V. Hari Narayanan, Associate Professor
    7. Department of Mathematics
       Dr. Puneet Sharma, Associate Professor
    8. Department of Mechanical Engineering
       Dr. Anand K. Plappally, Associate Professor
    9. Department of Metallurgical & Materials Engineering
       Dr. Appala Naidu Gandi, Assistant Professor
    10. Department of Physics
        Dr. Ashutosh Kumar Alok, Associate Professor

4. Two distinguished persons from the industry, Research & Development, Financial Institutions and any other comparable organizations, nominated by the Chairman of the Senate, for a period of two years

    1. Professor Souvik Bhattacharyya
       Vice Chancellor, BITS Pilani
    2. Dr. Jitendra BalaKrishnan
       CTO-Products, Sterlite Technologies Ltd.

5. Invitees, with no voting rights, whose presence may be sought during discussion on one or more items of agenda

    As and when need arises

6. Upto five student representatives nominated by the Chairman of the Senate, as special invitees, for a period of one year whose participation shall be for the non-evaluation items of the Senate

    1. General Secretary, Students Gymkhana
    2. Secretary, Academics & Career Society
    3. Secretary, Elected Representatives Society

    Invitees

    1. Professor-in-charge (Faculty)
    2. Associate Dean (Academics – UG)
    3. Associate Dean (Academics – PG)
    4. Associate Dean (Students)
    5. Associate Dean (R&D)
    6. Associate Dean (Infrastructure)
    7. Associate Dean (International Relations & Outreach)
    8. Associate Dean (Planning & Resources Generation)

    Secretary to the Senate
    Registrar
    (w.e.f. 16.09.2019)

Buildings and Works Committee

Professor Santanu Chaudhury
Chairman
Director
Indian Institute of Technology Jodhpur
NH 62, Nagaur Road
Karwad, Jodhpur 342037
Email: director@iitj.ac.in

Professor Neeraj Gupta
Member
Department of Architecture, Central University of Rajasthan
NH-8, Bandar Sindri,
District Ajmer-305817
Email: ng@curaj.ac.in, ng2560@yahoo.com

Professor B. Bhattacharjee
Member
Emeritus Professor
Department of Civil Engineering
Indian Institute of Technology Delhi
Hauz Khas, New Delhi – 110 016
Email: bishwa@civil.iitd.ac.in
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Sh. Ramesh Chand Jain
Member
Additional Chief Engineer (Retd.),
KA-1, Bhagat Ki Kothi Extension, Pali Road
Jodhpur 342 003
Email: rameshjain1953@gmail.com
(w.e.f. 22.10.2020)

Dr. B. Ravindra
Member
Associate Dean (Infrastructure)
Indian Institute of Technology Jodhpur
NH 62, Nagaur Road
Karwad, Jodhpur 342037
Email: ravib@iitj.ac.in

Mr. R. K. Govil
Member
Additional Director General (Civil) (Retd), CPWD
26 Ankur Apartments
7 I P Extension
Delhi 110092
Email: govil.rk@gmail.com
(Tenure upto 21.10.2019)

Mrs. Usha Kasana
Member
Chief Architect
Public works Department
Government of Rajasthan
Jacob Road, Jaipur 302021
Email: ushakasana@hotmail.com
(Tenure upto 21.10.2019)

Mr. V. K. Bansal
Member
Chief Engineer Electrical (Retd.), CPWD
721 Sky Lark Apartment
Sector-6, Plot No 35, Dwarka
New Delhi 110075
Email: vkb_cepwd@yahoo.com
(Tenure upto 21.10.2019)

Sh. P.G. Basak
Secretary to the B&WC
Officiating Registrar
Indian Institute of Technology Jodhpur
NH 62, Nagaur Road
Karwad, Jodhpur 342037
Email: registrar@iitj.ac.in
(w.e.f. 16.09.2019)

Key Functionaries

Details of various key functionaries of the Institute are as follow:

Director	
Santanu Chaudhury	
Dean (R&D)	
Surajit Ghosh	
Associate Deans	
Rakesh K. Sharma	Research & Development
Suril V. Shah	Academics (UG Programs)
Somnath Ghosh	Academics (PG Programs)
Samanwita Pal	Students
Deepak Fulwani	Planning & Resource Generation
Kaushal Kumar A. Desai	International Relations & Outreach
B. Ravindra	Infrastructure
Heads of the Departments /Center/School	
Meenu Chhabra	Bioscience & Bioengineering
Ritu Gupta	Chemistry
Gaurav Harit	Computer Science & Engineering
Pradip K. Tewari	Chemical Engineering
Anil K. Tiwari	Electrical Engineering
Ankita Sharma	Humanities & Social Sciences
Gaurav Bhatnagar	Mathematics
Prodyut Ranjan Chakraborty	Mechanical Engineering
Sampat Raj Vadera	Physics
M. P. Gupta	School of Management and Entrepreneurship (Upto 01.01.2020)
Deepak M. Fulwani	Centre for Technology Foresight & Policy
Anand K. Plappally	Centre for Emerging Technologies for Sustainable Development

Professors In-Charge	
B. P. Kashyap	Department of Metallurgical & Materials Engineering
C. Venkatesan	Faculty
S. R. Vadera	Stores & Purchase
Registrar	
P. G. Basak	Advisor (Admin) & Offg. Registrar
Other Functionaries	
Amardeep Sharma	Estate Officer
Amardeep Sharma	Public Relations Officer
Amardeep Sharma	Central Public Information Officer
Ananya Debnath	Nodal Officer, Unnat Bharat Abhiyan
Appala Naidu Gandi	Nodal Officer for OBC, PwD, and Minorities
Atul Kumar	Green Initiatives Officer
Gaurav Bhatnagar	Transparency Officer
Gaurav Bhatnagar	Nodal Officer, National Institutional Ranking Framework (NIRF)
Gaurav Harit	Chief Vigilance Officer
Kshema Prakash	Nodal Officer, All India Survey on Higher Education (AISHE)
Meenu Chhabra	Nodal Officer, Swachh Bharat Abhiyan
Priyanka Singh	Nodal Officer, Vigyan Jyoti Program
Puneet Sharma	Hindi Officer
Rakesh K. Sharma	Nodal Officer, IMRPINT India Program
Ramesh K. Metre	Nodal Officer for SC and ST
Ritu Gupta	Nodal Officer, GIAN Program
S. P. Tiwari	Nodal Officer for EWSs
Sandip Murarka	Nodal Officer, DAAD Scholarships Program
Somnath Ghosh	Nodal Officer, Study in India Program
Sudipto Mukhopadhyay	Nodal Officer, Ishaan Vikas Program
Sudipto Mukhopadhyay	Nodal Officer, Undergraduate Research Initiative (UGRI)

Organization of Academic and Research Activites

The Institute has organized its academic and research activities to be conducted through the following Departments, Centres, Schools and seven Interdisciplinary Programs (IDRPs), whose details are given in the pages to follow:

Departments

1. Bioscience & Bioengineering
2. Chemical Engineering
3. Chemistry
4. Civil & Infrastucture Engineering
5. Computer Science & Engineering
6. Electrical Engineering
7. Humanities & Social Sciences
8. Mathematics
9. Mechanical Engineering
10. Metallurgical & Materials Engineering
11. Physics

Centres

1. Center for Emerging Technologies for Sustainable Development
2. Center for Technology Foresight and Policy

Schools

1. School of Management & Entrepreneurship

Interdisciplinary Programs

1. Digital Humanities
2. IoT & Applications
3. Quantum Information and Computation
4. Robotics and Mobility Systems
5. Science of Intelligence
6. Smart Healthcare
7. Space Technologies

Department of Bioscience & Bioengineering

The Department of Bioscience & Bioengineering aspires to cater to the technological requirements of the country by conducting high-quality, translatable research in cutting edge areas and by training our students to be technological innovators in Biological sciences.

The department currently offers a B.Tech. Program in Bioengineering and post-graduate (M.Tech., M.Tech.-Ph.D. dual degree & Ph.D. programs) in Bioscience & Bioengineering. In these programs, Students are exposed to state-of-the-art research infrastructure, where they undergo hands-on training.

The focus of research efforts of the department is on developing technological solutions in the areas of healthcare, environment and agriculture. The faculty members associated with the Department pursue solutions to complex biological problems in the fields of:

1. Omics approaches in Molecular & Cellular Biology,
2. Bioimaging & Biosensors,
3. Systems & Computational Biology,
4. Biomaterials & Biomechanics,
5. Neuroscience and Neuroengineering, and
6. Drug Design & Development.

The department actively collaborates with other departments of the Institute as well as with other National and International institutions of higher learning to maximize research and teaching outcomes. The department has received research funding from premier funding agencies in India, namely, Ministry of Human Resource Development, Department of Science & Technology, Department of Biotechnology, Board of Research in Nuclear Science, Science & Engineering Board, and DBT/Wellcome Trust India Alliance.

Following are the Faculty Members associated with the department:

Faculty Members & Research Areas

Meenu Chhabra

Head of Department
Biological Science & Bio-Engineering: Renewable Bioenergy Bioremediation

Shankar Manoharan

Molecular Microbiology, Host-Microbe Interaction, Genomics and Metagenomics

Amit Kumar Mishra

Cellular and Molecular Neuroscience, Cell Cycle Regulation and Cancer

Sushmita Jha

Cellular and Molecular Neuroscience, Cell and Molecular Physiology

Priyanka Singh

Cellular and Molecular Biology

Sushmita Paul

Computational Biology and Bioinformatics

The following new faculty members joined the department during this financial year:

Faculty Members & Research Areas

Indranil Banerjee

Tissue Engineering; Regenerative medicine; Biomaterials Theranostic systems; Biomicrofluidic

Raviraj Vankayala

Nanobiotechnology; Biomaterials and Photomedicine

Neha Jain

Molecular Biophysics and Microbiology

Surajiit Ghosh

Chemical Neurobiology, Chemical Biology and Cancer Biology

Pankaj Yadav

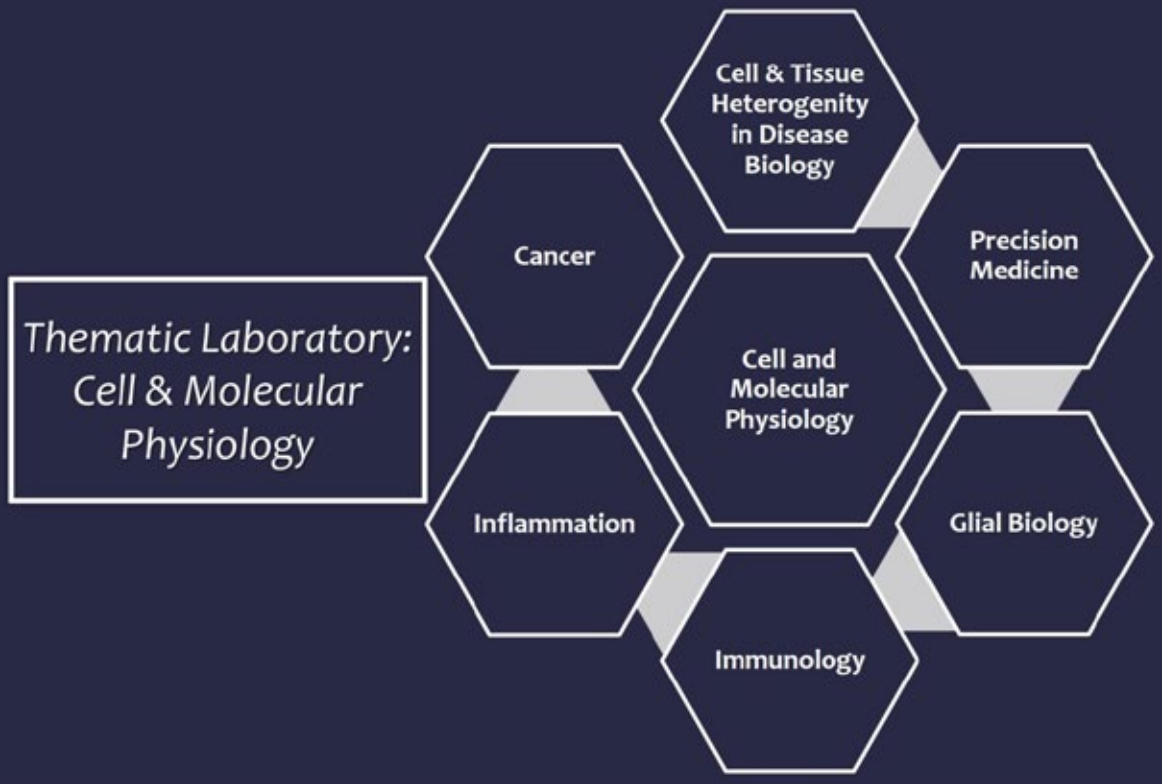
Statistcal Genetics and Big Data Analytics

Sudipta Bhattacharyya

Structural Biology; Enzyme Chemistry and Protein Engineering

The following laboratories are functioning in the Department of Bioscience & Bioengineering.

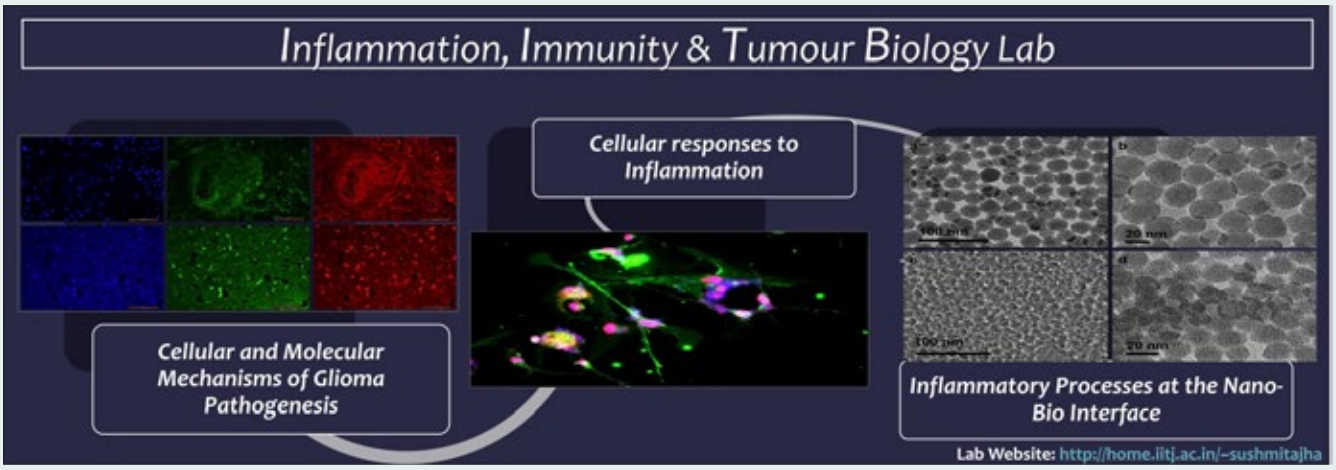
1. Cell & Molecular Physiology Laboratory



Groups under this theme

1. Inflammation, Immunity & Tumor Biology Group

As an institute of national importance, the philosophy remains alignment with research problems relevant to the nation. In this regard it is strategized to work on two leading healthcare issues in India; environmental pollution with nanosilica and cancer (specifically the deadly brain tumours: gliomas). As one seeks to understand the genetic landscape of cancer and inflammation related diseases in the Indian subcontinent, it is believed, an interdisciplinary approach that comes naturally at an IIT would help provide critical insights into complex disease biology. In this regard, the laboratory has established collaborations with colleagues from within the department of bioscience and bioengineering, within the institute (department of computer science, mechanical engineering and humanities & social sciences) and across institutions (AIIMS Jodhpur and ACTREC, Mumbai). This lab is also a part of the interdisciplinary research platform (IDRP) groups in Smart healthcare and Science of Intelligence.

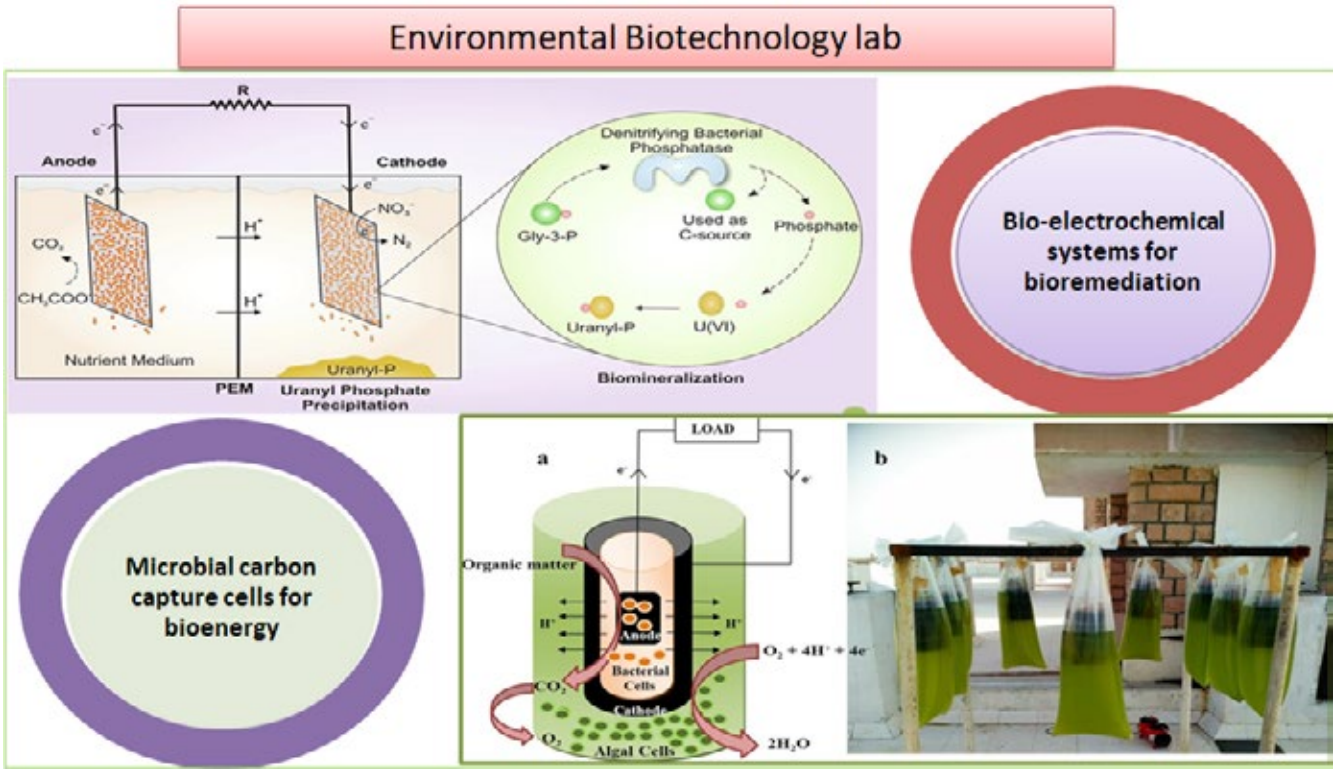


A patent has been filed for the portable hypoxia chamber that has been developed at IITJ. The process of translating this technology with the help of Industry partners is underway. Assistance has been provided to colleagues from Defense Lab Jodhpur in *evaluating wound dressing properties of chitin membranes containing nanosilver* and it has been published in Biomedical Physics & Engineering Express, IOP Science, Volume 4, Number 2, 2018, https://doi.org/10.1088/2057-1976/aaa9ca. Recently funding has been received from the Ministry of Electronics and Information Technology (Meity) for development of an interdisciplinary research platform for dissecting the complex cellular interactions using human tumor derived spheroids, computational biology and artificial intelligence-based approaches.

Key Instrumentation Available

1. Cell culture facility
2. Fluorescence microscope
3. Liquid nitrogen storage system
4. -20°C freezer
5. Gel documentation system
6. -80°C freezer
7. Microplate reader
8. Nanodrop spectrophotometer
9. Realtime PCR
10. Thermal cycler
11. Portable hypoxia chamber
12. Environmental Biotechnology Laboratory

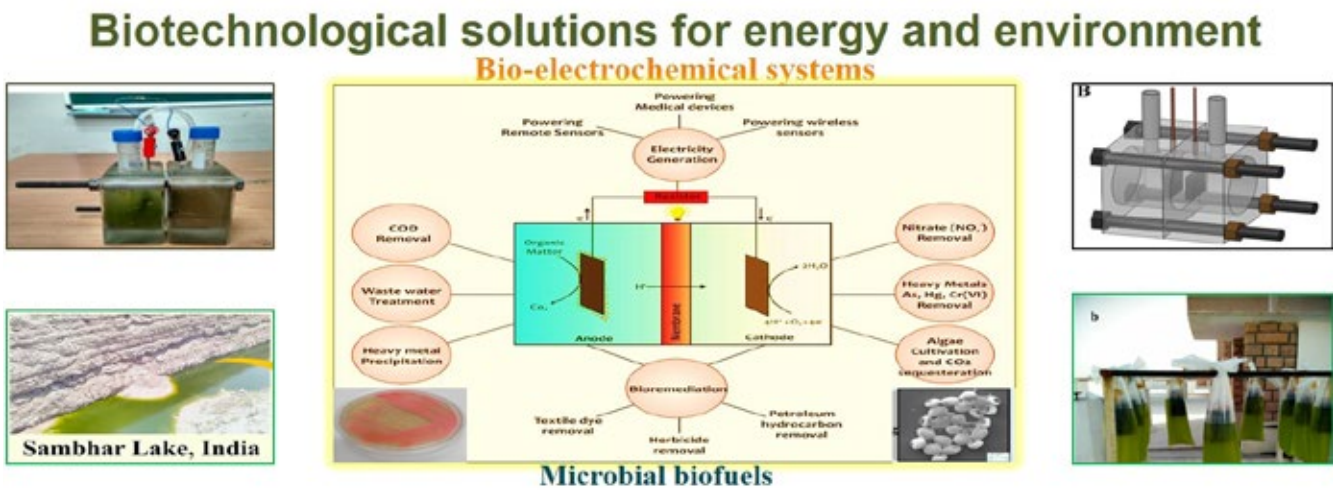
2. Environmental Biotechnology Laboratory



Environmental biotechnology thematic lab at IITJ focusses on applications of microorganisms to curb environmental pollution, provide clean energy, and remediate toxic or hazardous waste. The versatile microbial metabolism enables their utilization for environmental cleanup. Another critical focus is waste to energy conversion systems, in particular, bioelectrochemical systems which combine the versatility of microbial metabolism with electrochemistry. The bioelectrochemical systems can also serve as biosensors for environmental monitoring and assessment.

Groups under this theme

1. Bioenergy & Bioremediation Group

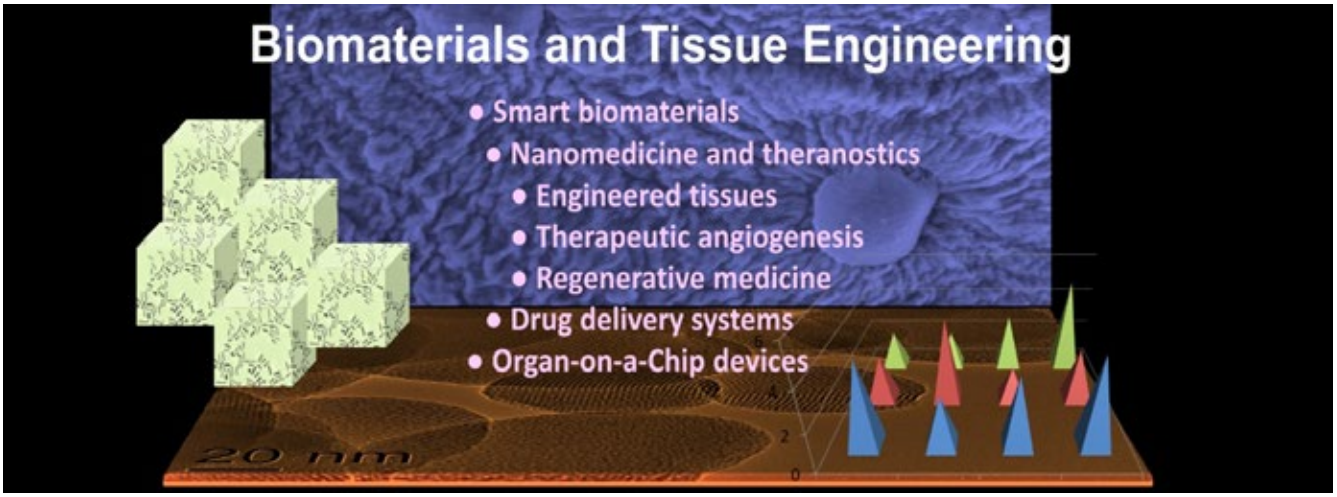


The Environmental Biotechnology Laboratory at IIT Jodhpur carries out researches in the areas of bioenergy and bioremediation. Researchers in the lab investigate on waste to energy conversion processes to develop sustainable biotechnological solutions to water pollution and energy. At present, successful bioremediation processes for nitrate, uranium (VI), saline starch, and chromium (VI) contaminated water has been developed. Besides, low-cost Microbial Carbon Capture cells for power generation and algae cultivation have been developed. Also, researchers in the lab have been successful in isolating novel yeast with characteristics of the potential biodiesel producer.

Key Instrumentation Available

1. Multi-vessel fermenter
2. Photobioreactor
3. Algal growth chamber
4. Electrochemical workstation
5. Two-dimensional gel elecrophoresis system
6. Denaturing gradient gel electrophoresis

3. Biomaterials & Tissue Engineering Laboratory

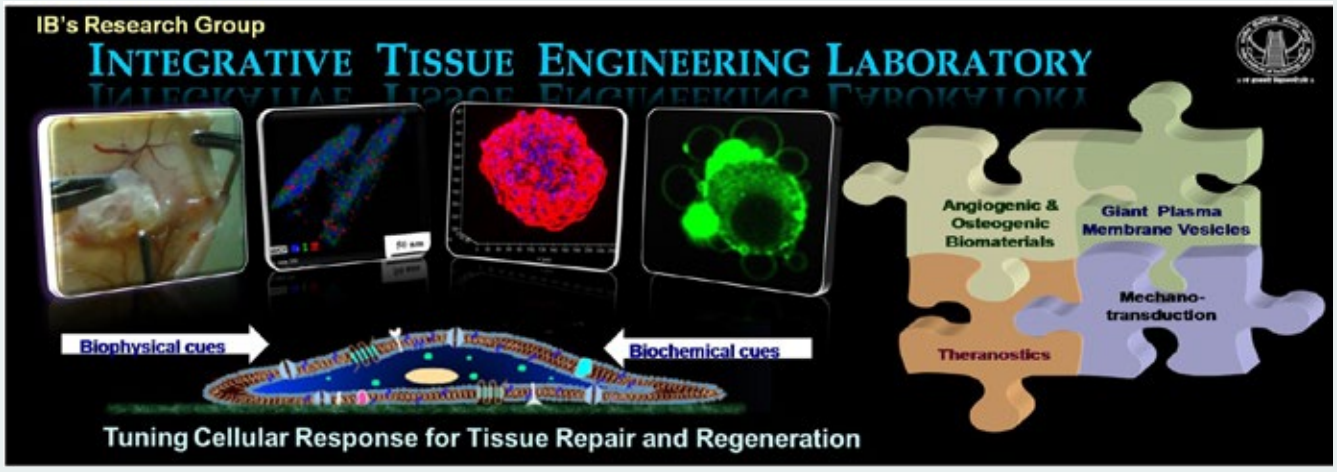


Biomaterials and Tissue Engineering is a transdisciplinary knowledge domain and encompasses sub domains of material science, chemistry, physics, cell and molecular biology, chemical engineering, mechanical engineering, nanotechnology and microfluidics. Rapid evolution of biomaterials and tissue engineering is driven by the growing needs of medical devices, implants, drug delivery vehicles, and engineered tissues. Biomaterials and Tissue engineering has now become an integral component of the translational research in bioengineering. Research under the thematic area of Biomaterials and Tissue Engineering at Department of Bioscience and Bioengineering, IIT Jodhpur is primarily focused on the synthesis and characterization of smart biomaterials and nanomaterials, nanomedicine and nanotheranostics, drug delivery, engineering of tissue graft, organ-on-a chip devices, therapeutic angiogenesis and regenerative medicine.

Groups under this theme

1. Integrative Tissue Engineering Group

The focus of the Integrative Tissue Engineering Laboratory is to decipher the underlying mechanism of tissue repair and regeneration over a length scale of 'micro to nano', and to translate the understanding into bioengineering strategies for tissue engineering and regenerative medicine. Precisely, the lab aims to address three fundamental questions. Firstly, what are the novel clues (universal or cell specific) that contributes significantly to the physiological processes related to tissue repair and regeneration; secondly, how these different cues/factors co-exist, modulate and cooperate in tissue repair and regeneration and finally, up to what certain



In pursuance of the goal, a trans-disciplinary approach has been adopteded that involves strategic amalgamation of the knowledge and techniques of cell biology, regenerative biology, biomaterial science, microfluidics, nanotechnology and tissue engineering. The benefit of such an approach is that it is comprehensive and integrative in nature like any complex physiological process. It is believed that the integrative approach will help us to gain a deep insight and comprehensive understanding of tissue repair and regeneration. Furthermore, such an approach will make tissue engineering an affordable, reproducible and safe health care technology in near future for on-demand production of the so-called spare parts of the human body.

In line with the goal, the following problems are being deduced:

(i) Deciphering the mechanism of angiogenesis and tuning of the biomaterial mediated angiogenic response

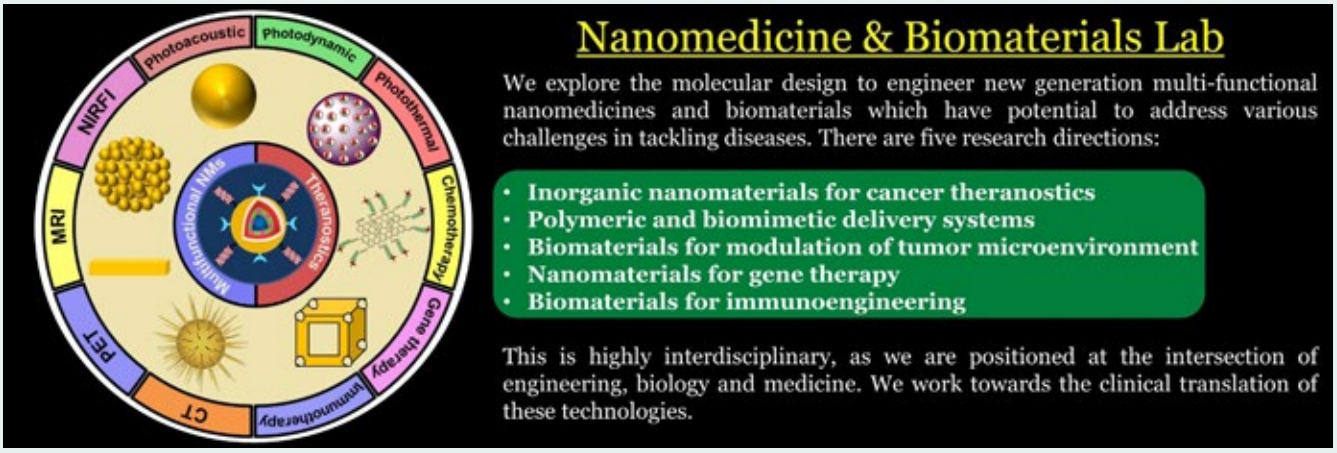
(ii) Mechanistic analysis of osteogenic differentiation and biomaterial induced osteogenesis

(iii) Reconstruction of cell-friendly 3D microarchitecture with reproducible design parameters for bone tissue engineering.

(iv) Synthesis and characterization of cell derived membrane vesicles and understanding of its regenerative potential.

(v) Development of organ-on-chip to probe the cellular cross talk

2. Nanomedicine and Biomaterials Group



Nature performs difficult tasks with perfection ensuring great simplicity and efficiency. Can the nature be mimiced to tailor different materials that can be used to diagnose and treat diverse diseases? Therein lies the focus and the passion behind this research. Here at Nanomedicine and Biomaterials Laboratory, new generation multi-functional nanomedicines and biomaterials which have tremendous potential to address challenges in tackling diseases are developed. The focus areas are on the development of inorganic nanomaterials for cancer theranostics (diagnostics and therapeutics), polymeric and biomimetic delivery systems, biomaterials for modulation of tumor microenvironment, biomaterials for immunoengineering, and nanomaterials for gene therapy. This is highly interdisciplinary, as the research is mainly positioned at the intersection of engineering, biology, and medicine, and a variety of collaborators work together to translate these materials towards clinical use.

4. Chemical Biology Laboratory

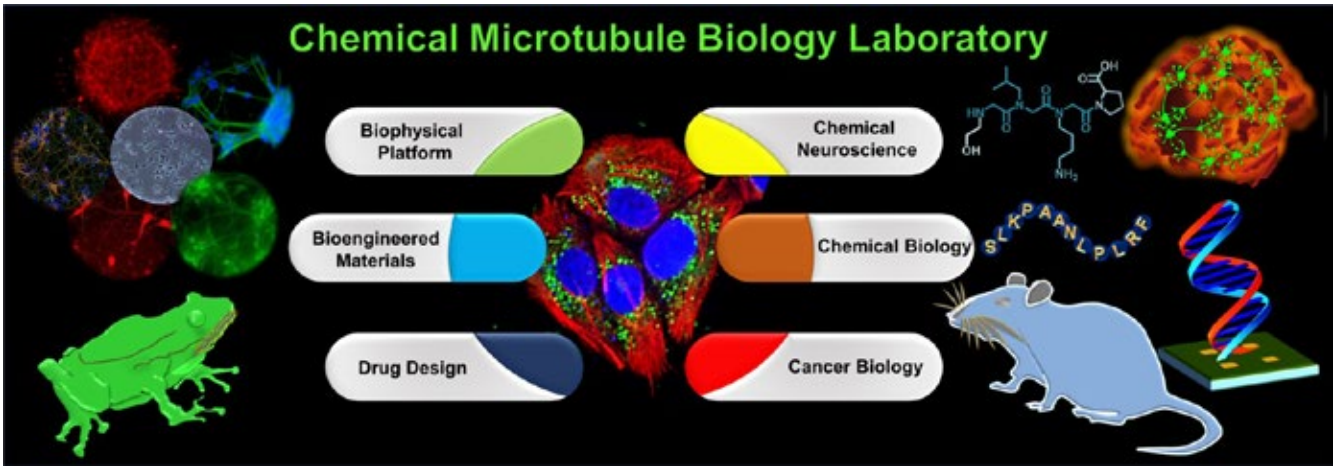
Chemical Biology by definition known as a scientific discipline across the fields of chemistry and biology that includes application of chemical techniques, tools and synthetic compounds for the study and manipulation of biological systems. Chemical Biology research theme has been originated in the 1990s.

Since then Chemical Biology area has been evolved through key discoveries (mammalian RNAi, kinase inhibitors, ribosome structure, activity-based probes, genetic code reprogramming, imatinib becomes a drug, automated carbohydrate synthesis, in situ click chemistry, design of a novel protein fold, origins of amyloidogenesis, personalized medicine, chemical regulators of stem cells, GTP analogues for controlling microtubule dynamics, chemical platforms for understanding microtubule organization and dynamics, chemical regulator for controlling microtubule dynamics etc.) across the multiple disciplines and considered as "molten state" that gradually transformed into the steep trajectory towards a stable but dynamic form of research field. In the last three decades there have been extraordinary development in our understanding of highly complex biological systems through disruptive technological interventions and multidisciplinary efforts.

Groups under this theme

1. Chemical Microtubule Biology Group

This laboratory is focussing on multidisciplinary research problems mostly targeting microtubule and allied key intracellular targets. Microtubule has been an attractive molecular target to understand fundamental biochemistry and for the development of anticancer drugs, given its importance as a key cytoskeleton filament and its crucial role in many biochemical processes. Notably, microtubules as a target for the development of neuro-therapeutics is relatively unexplored. This laboratory focuses on finer role of microtubule in neurodegeneration and cancer, and possible intervention through carefully chosen routes.



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Microtubules perform large number of functions in neurons such as cargo transport, neuronal migration, maintaining polarized structures, to name a few. Microtubule stability is not only critical for neuronal polarization process fundamental to their development and plasticity, but has a role in the development of neurodegenerative diseases. For example, in Alzheimer's disease, microtubule lattice is disrupted due to microtubule-associated tau hyperphosphorylation, which causes microtubule destabilization compromising neuronal architecture. This laboratory has studied the importance of microtubule stabilization in neuro-degenerative disorders especially AD by studying the molecular interactions between some novel ligands with the microtubule lattice. These molecular interactions are crucial and hold translational value as the microtubule stabilization conferred by them halts the progression of neurodegenerative diseases and its associated symptoms. In order to study these molecular interactions, laboratory has developed a facile and low-cost neurosphere based organoid model generated from primary cortical and hippocampal neurons. These neurospheres behave like mini brains with a heterogeneous population of cells consisting of glial cells, neurons, neural stem and progenitor cells bearing a closer resemblance to the human brain. Due to a

rich population of neural progenitor cells (NPCs) and neural stem cells (NSCs), along with AD model or other neurodegenerative disease models, they could be also used to study neural development and differentiation. Moreover, this laboratory has also developed a blood brain barrier (BBB) permeability model in order to study the BBB permeability of the potent ligands that shows interaction with the neuronal microtubules. (ACS Chem. Neurosci. 2015, 2018, 2019, 2020; etc).

Transfection or gene delivery in eukaryotic cells is one of the key tools in biological sciences and though lipofectamine have been traditionally used for this purpose, low transfection efficiency and poor reproducibility have turned scientists to look for more efficient non-viral transfection agents. A peptide Pep1 during its Phase III clinical trial was found to cause amyloidogenicity in brain. This laboratory extracted a non-amyloidogenic short tetra-peptide sequence from this Pep1 and studied its cellular entry and nuclear localization properties. This sequence not only had excellent nuclear localization with an inept ability to interact with the major groove of DNA, it also raised a fundamentally important question regarding the role of spatial position of tryptophan in regulating cell entry. This laboratory successfully reported a new breed as future transfection agents for gene delivery (J Am Chem Soc. 2018; ChemComm 2018, 2019).

Due to the limited regenerative properties of the brain, repairing TBI patients is an immediate challenge. Thus, this laboratory has tried to understand this repair mechanism by exogenously applying a biocompatible neuro-protective hydrogel on the injury region in the brain of the injured mice generated through cryogenic injury model (CIM). In 7 days, the hydrogels reported a total recovery of the injury, with the injury being hardly visible in the cresyl violet stained brain slices and has lower activation of microglia (iba1), an important injury marker. (ACS Chem. Neurosci. 2019, 2020; ACS Biomaterials Science and Engineering, 2020). This laboratory has already provided significant insights into the microtubule dynamics of cancer cells through perturbation of the tubulin dynamics using novel molecular ligands. Many of these perturbations by the ligands resulted in efficient anti-cancer activity either through tubulin polymerization or depolymerization in cellular and animal models with emphasis on their detailed mechanistic pathways of action. This exposes the translational power of these ligands and their interactions calling for future clinical advancement in cancer biology (Mol. Pharmaceutics 2019, Langmuir 2018, Adv Healthcare Mater. 2017, ACS Appl Mater Interfaces, 2016, 2017).

5. Molecular Microbiology & Microbial Genomics Laboratory

Microbial cells living in the human gut outnumber the total human cells in our bodies. Also, one is regularly exposed to several microbes from the environment. It is therefore essential to understand the biology of microbes that may be beneficial to us as well as those, which are potentially harmful. Using molecular methods, an attempt is made to understand the basic functioning of individual microbial cells as well as microbial communities. Microbes shift to a community mode of growth, often under stressed conditions, by forming biofilms. Biofilms can be polymicrobial and are difficult to eliminate as they are resistant to stresses that individual bacteria are sensitive to. A small group of researchers working under this theme use molecular methods and genomics approaches to understand the physiology of individual microbes as well as their communities.

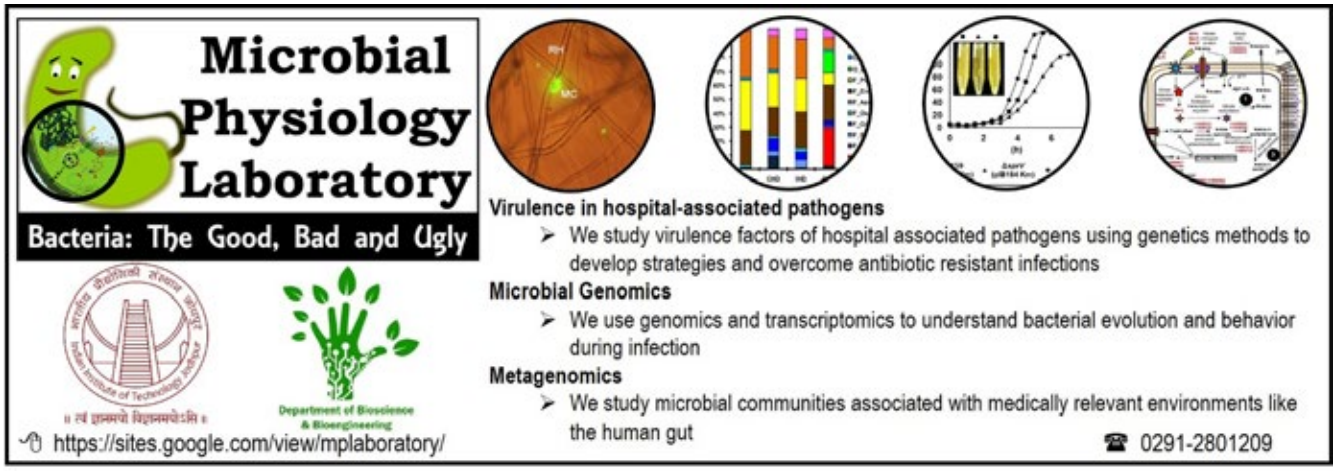
Groups under this theme

1. Microbial Physiology Group

The Microbial Physiology laboratory (MPL) has two major focus areas:

1. Virulence regulation in hospital-associated pathogens
We study how microbes control the production of important factors that are necessary to cause disease in a host.

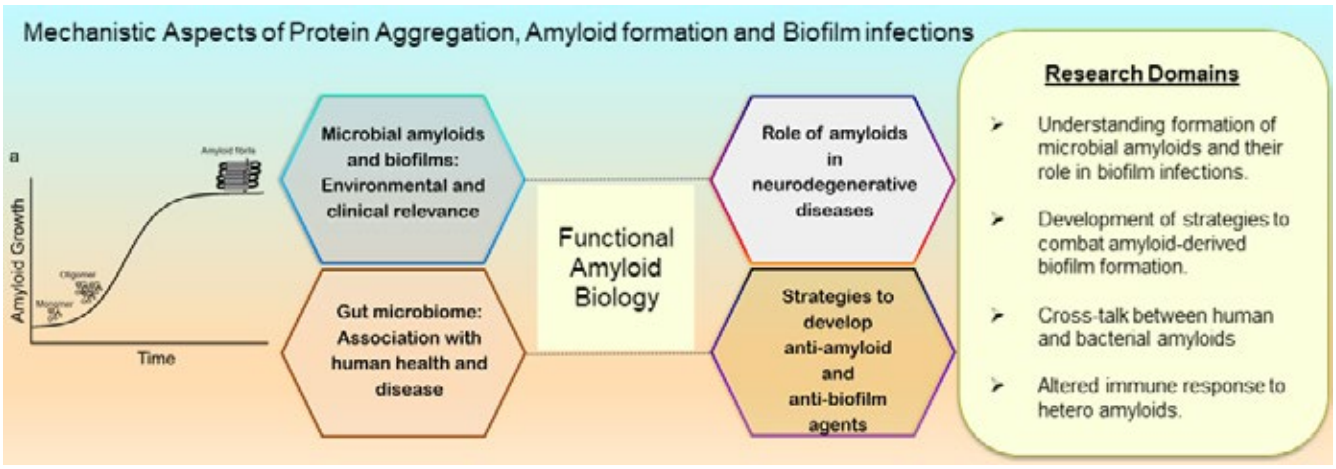
2. Medically relevant microbial communities
We explore the human gut microbiota in the context of health and diseased states to identify patterns that contribute to a better physiological state



2. Biofilms & Amyloid Biology Group

This is an exclusive group with diverse yet overlapping interests. The research in lab revolves around the altered folding of proteins which leads to formation of ordered aggregates called amyloids. This group is interested in understanding how bacterial amyloids contribute to biofilm formation and severe infections in humans. The group uses a combination of biophysical techniques to elucidate the mechanism of formation and inhibition of amyloid-dependent biofilm by bacteria under different environmental conditions. Currently, the experimental plan is limited to in vitro studies however in the future the study will be extended into cell culture and animal-based model. The group is interested, but not limited to the following aspects of bacterial amyloids:

1. Understanding formation of microbial amyloids and their role in biofilm infections.
2. Development of strategies to combat amyloid-derived biofilm formation.



Key Instrumentation Available

1. AKTA protein purification system
2. Probe sonicator
3. Multi-mode plate reader
4. Microvolume fluorometer
5. Electrophoresis systems with blotting apparatus
6. Hybridization oven
7. Microplate reader
8. Laboratory workstation
9. Bacteriological incubators
10. Incubator shakers
11. Refrigerated centrifuge

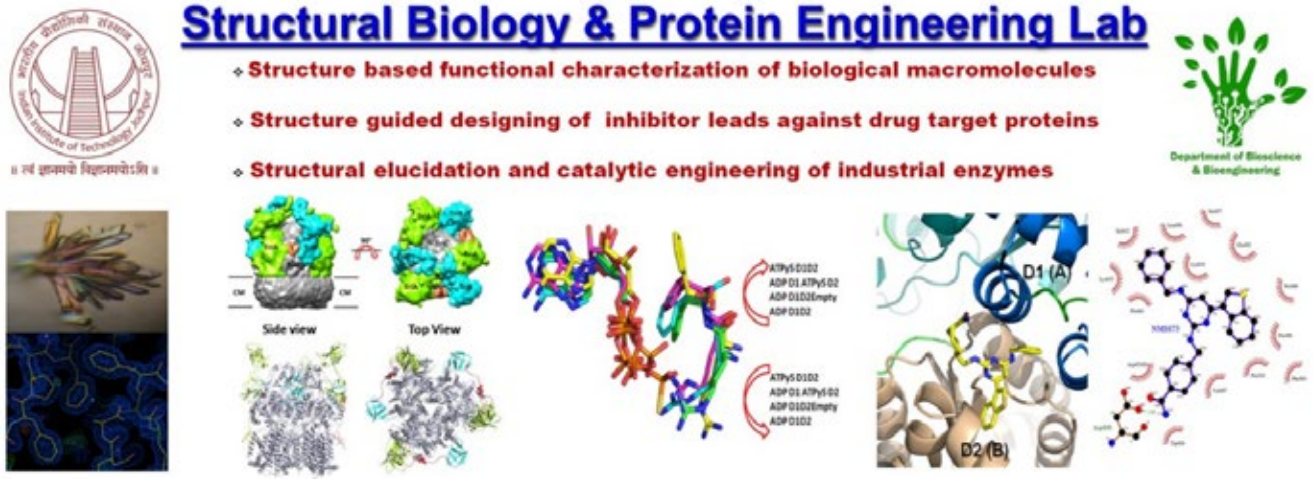
6. Biophysics Laboratory

"Seeing is believing" … according to this famous quote, visual inspection paves the most convincing way to divulge naturally occurring phenomena. In Structural Biology and Protein Engineering lab, we aim to elucidate complex biological phenomena by unraveling the molecular snapshots of the concerned pathways through the atomic resolution structures of the macromolecules involved. For this purpose, we principally use the cutting-edge tools of structural biology (X-ray diffraction crystallography and single particle Cryo-Electron microscopy) to define the structure-function behavior of biological macromolecules.

Groups under this theme

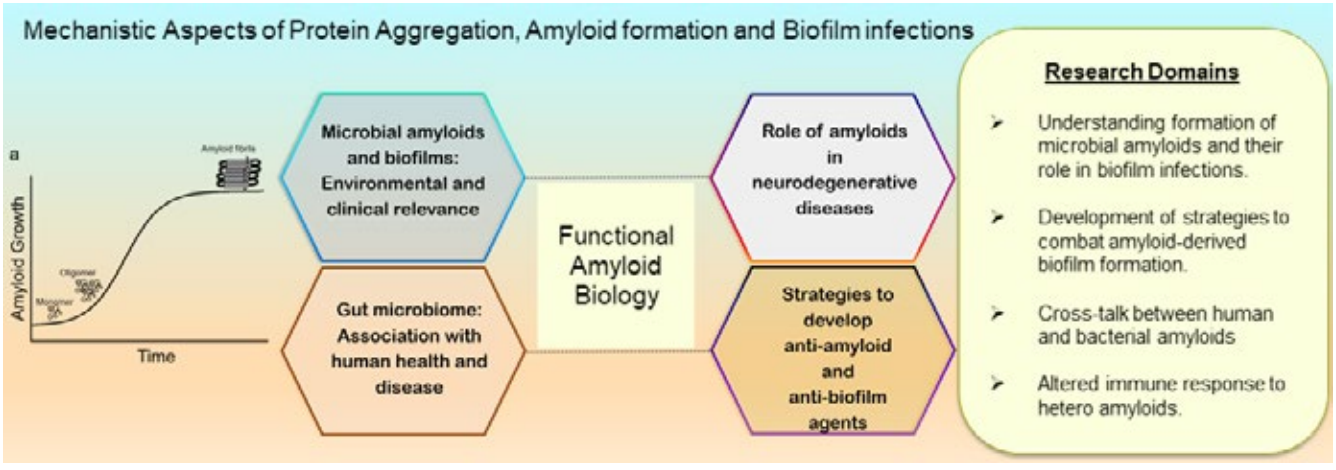
1. Structural Biology & Protein Engineering Group

The main focus is to deduce the molecular mechanism of diseased conditions. Likewise, taking a reductionist's approach we target proteins or protein complexes involved in disease progression and pathogenesis to reveal their molecular mechanism of action. The detailed three-dimensional structural information gained thereof, not only pinpoint the role of the target proteins/protein complexes but also help design structure-based lead inhibitor libraries against these potential drug target candidates. Further kinetic characterization of these potential inhibitor leads against the drug candidate proteins is performed to validate their antagonistic properties in vitro. The structural biology and protein engineering lab also aims industrially important enzymes to customize their structure-function to cater industrial needs. The high-resolution structural information of the industrially important protein(s)/enzymes(s) also enable us to gain significant insights into their structure-function relationships which in turn allow to tailor their function by the state-of-the-art protein engineering and bioinformatic tools.



2. Protein Aggregation & Amyloid Biology Group

The lab is interested in understanding the altered folding of proteins which leads to formation of ordered aggregates called amyloids. Amyloids are highly stable ordered cross-β-sheet aggregates of proteins which are considered as the hallmark of neurodegenerative disorders like Parkinson's and Alzheimer's. We are interested in looking at amyloids that have both functional and disease-associated properties.



The lab utilizes various biophysical, biochemical and microbiological tools to answer some of the fascinating questions pertaining to amyloids fibrils. Understanding two aspects of human amyloids as under are of particular interest to this group:

1. How bacterial amyloids influence the aggregation of human amyloids and contribute to progression of neurodegenerative diseases?
2. Development of unconventional strategies to modulate amyloid formation in humans.

7. Computational Biology & Bioinformatics Laboratory

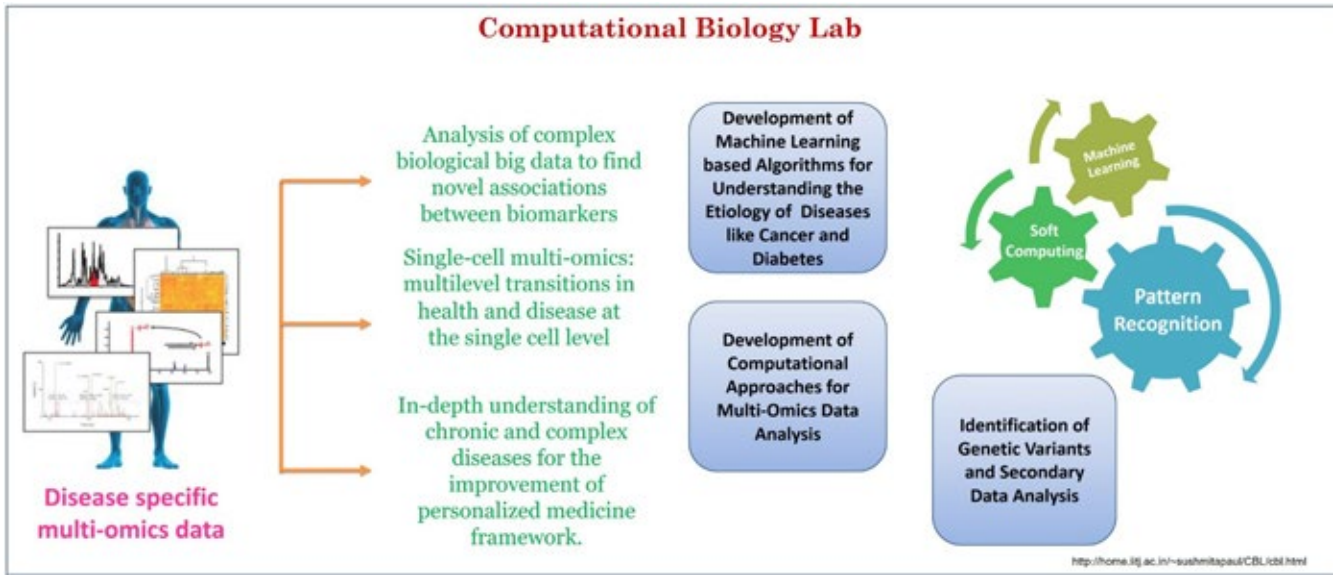
Computational Biology and Bioinformatics is a rapidly developing multidisciplinary field. There has been a great increase in the amount of biomedical data over the past decade. Along with the expanding application of large-scale genomic sequencing, other modalities such as mobile health (mHealth) data and imaging have added to the rise. At the same time, computing power and storage capacity have continued to increase, allowing to now mine and model biological data with unprecedented ability. The research activities include computational modeling of biological processes, computational management of large-scale data sets, database development and data-mining, algorithm development and high-performance computing, as well as statistical and mathematical analyses.

Groups under this theme

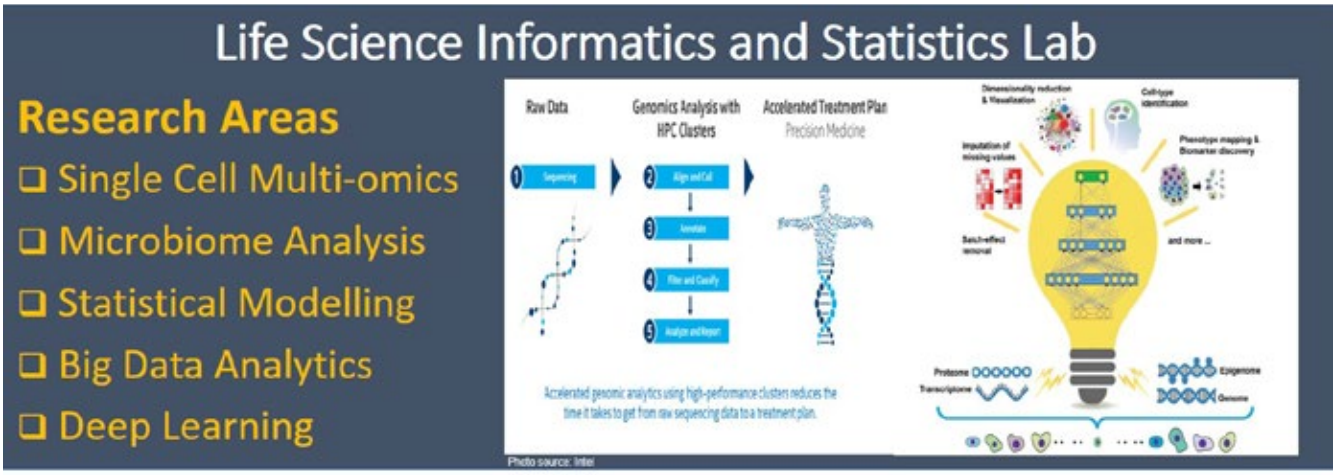
1. Computational Biology Group

Computational Biology Lab (CBL) is established to carry out fundamental and advanced research in the fields of computational biology and bioinformatics. Dr. Sushmita Paul's research group carries out research in multi-omics data analysis, development of pattern recognition algorithms for analysing high dimensional biological data, analysis of genome variation, development and application of bioinformatics tools. The group is actively involved in development of algorithms for identification of miRNA-mRNA modules in various diseases by using multi-omics data. Another important challenge related to multi-omics data analysis is classification of cancer subtype. In this regard, the group has developed an algorithm for effectively classifying the cancer samples into their respective sub-types. The group is also involved in functional annotation of genomic variants in Indian population, sub-grouping of Indian population based on genetic variants. The group is also focusing on development of an AI based framework to predict patient outcome to treatment based on patient biopsy derived tumour spheroid. The group also developed several algorithms/frameworks to identify Type II diabetes genes by judiciously integrating gene expression data and protein-protein interaction network data. The CB Lab also conducted an international workshop on Recent Advances in Biomedical Data Analysis at Olsztyn, Poland, 2017 (http://ijcrs2017.uwm.edu.pl/?page_id=190). In 2019, the lab organized a national level workshop on Computational Biology and Bioinformatics at IIT Jodhpur.

(http://home.iitj.ac.in/~sushmitapaul/Workshop2019/).



2. Life Science Informatics & Statistics Group



Recent advancements in technologies have generated huge amounts of biological and clinical data for researchers. This wealth of data poses challenges that have never before been confronted. At the heart of these is understanding how massive biological data sets are best analyzed to discover new knowledge about the function of living systems in health and disease, and how this knowledge can be harnessed to provide improved, more affordable health care. To this end, sophisticated tools are needed to manage and analyse such a large volume of the data sets. This research group is dedicated to develop advanced statistical and computational methods for drawing statistically valid inference from biological and clinical data. Inter-individual differences by large-scale statistical modelling and integrating multiple layers of OMICS data are studied.

Key Instrumentation Available

1. Servers
2. Workstations
3. Desktops

Software Developed

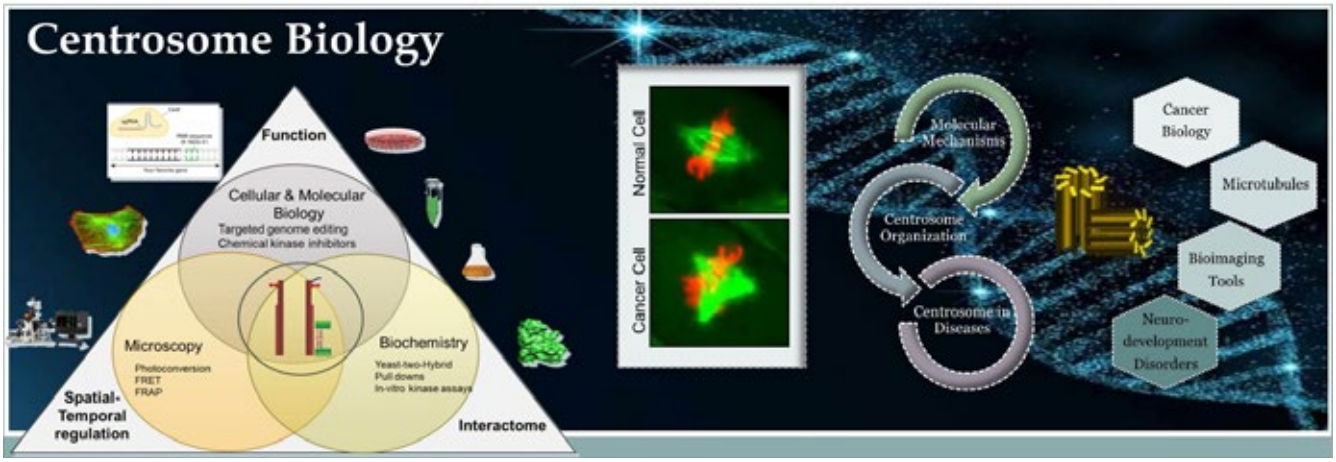
RFCM3 (http://home.iitj.ac.in/~sushmitapaul/CBL/softwares.html)

8. Molecular Motors & Cell Motility Lab

"Almost all aspects of life are engineered at the molecular level, and without understanding molecules we can only have a very sketchy understanding of life itself" (Francis Crick, Nobel Laureate). The mechanical work for the cell is performed by the molecular motors along the cell cytoskeleton. The thematic group is focused on understanding these molecular motors and cell motility in the healthy & diseased states.

Groups under this theme

1. Centrosome Biology Group



Centrosomes are molecular machineries which are involved in a plethora of cell functions like spindle organization, cell migration and cell polarization. Their number, position, organization & functioning is precisely regulated in a cell. Any defect in centrosome structure or number could lead to several human diseases like cancer, neurodevelopmental disorders and ciliopathies. The Centrosome Biology group is utilizing a combination of cellular, molecular and biochemical approaches, in order to understand the molecular details of centrosome organization in mammalian cells.

Key Instrumentation Available

1. Cell culture facility
2. Biosafety cabinet
3. Inverted light microscope
4. -20 °C freezer
5. Nanodrop spectrophotometer
6. -80 °C freezer
7. Gradient thermal cycler
8. Bacteriological incubator
9. Electrophoresis systems
10. Refrigerated centrifuge

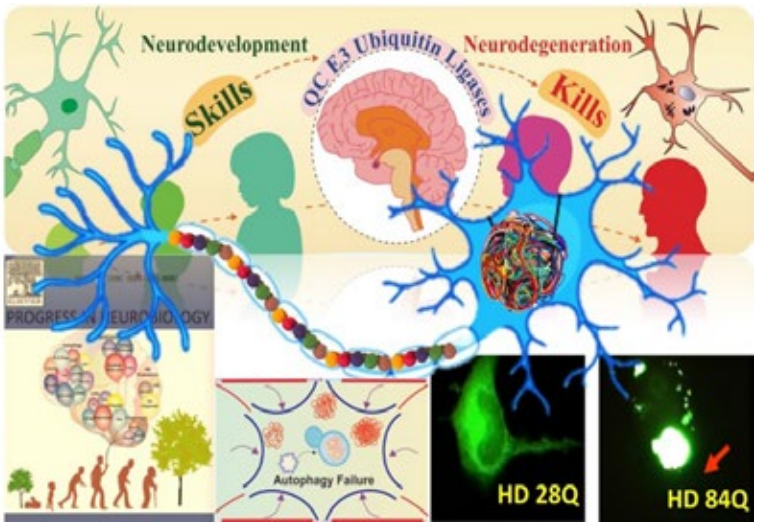
9. Neuroscience & Neuroengineering Laboratory

Detailed observation and scientific study of Neuroscience defines the structure and function of the nervous system. Major objective of the current thematic lab is to find the answers of hidden challenges linked with the new reports that can directly contribute and enhance our current understanding of how the nervous system works. It is also critical to understand the molecular defects, repair and restore the neural systems. Neuroengineering research targets those complex interface problems of living neural tissues and engineering techniques of non-living constructs.

Groups under this theme

1. Cellular & Molecular Neurobiology Unit

Tight control of numerous cellular pathways is a vast and responsible task. To facilitate the research, various latest biochemical techniques that enable to explore functional aspects of E3 Ubiquitin Ligases biology in a comprehensive way are being combined. Current efforts strive for identification, assessment, and characterization of E3 Ubiquitin Ligases substrates linked with the pathogenesis of neurodegenerative diseases, neurodevelopmental disorders, and cancer. The overall goal of our Research group on Cellular and Molecular Neurobiology is to understand how confidential network of cellular quality control mechanism (Autophagy and Ubiquitin Proteasome System linked with neurodegeneration and imperfect ageing, and how mutations that disrupt these processes impact disease development.



Key Instrumentation Available

1. Cell culture facility
2. Floid cell imaging station
3. Inverted microscope
4. Gel dryer
5. Gel documentation system
6. -80 °C freezer
7. Single tube multi-mode reader
8. Nanodrop spectrophotometer
9. Realtime PCR
10. Thermal cycler
11. Electrophoresis systems
12. Automated cell counter
13. Sonicator
14. Gene pulser system
15. Cryotome

Department of Chemical Engineering

Department of Chemical Engineering came into operational existence during this financial year and is preparing to offer under-graduate (B.Tech.) and post-graduate (M.Tech., M.Tech.-Ph.D. and Ph.D.) programs in Chemical Engineering. Through the academic programs, the department is making conscious effort to establish itself as a leading institute in the new genre of chemical engineering education. The program involves core chemical engineering courses, emerging areas and specialisations such as process engineering intelligence, molecular engineering and sustainability.

In addition, B.Tech. (Chemical Engineering) students have unique opportunity and flexibility for:

(i) Minor in (a) Management; (b) Entrepreneurship; (c) Data Science;

(ii) Five (5) year B.Tech.+M.Tech./MBA;

(iii) One (1) year Engineering Innovation opportunity.

Department is keen on collaboration with industry and academia world-wide. At present, Chemical Engineering Department is sharing its expertise with Department of Drinking Water and Sanitation (DDWS), Ministry of Jal Shakti; Defence Research and Development Organisation (DRDO), Ministry of Defence; International Atomic Energy Agency (IAEA) etc. Department has signed MoU with the industries for providing consultancy serivices. Department is also actively involved in Scientific Social Responsibility (SSR) and other societal initiatives.

The following Faculty Members have associated with the Department during this year:

Faculty Members & Research Areas

Pradip K. Tewari

Head of Department
Water Technologies; Membrane Technology; Desalination; Nanocomposite Membrane Technology; Heat Transfer and Two-Phase Flow, Nuclear Chemical Engineering.

Deepak Arora

Adhesion in electronic packaging and manufacture of high-density interconnects; Polymer rheology; Polymer crystallization; Dielectrics for electronic packaging; Structure-process-property relationships for polymers and their composites

Somnath Ghosh

Colloidal dynamics, Functional colloids and their self-assembly, Nano-particles for targeted drug delivery, Microfluidics based particle synthesis and their applications, Microfluidic based medical devices, Electro-wetting, Superhydrophobicity.

Professor Devang Khakhar, Former Director, Indian Institute of Technology Bombay, is associated with the Department as Scholar-in-Residence.

Department of Chemistry

Chemistry at IIT Jodhpur is where Chemistry sees Technology. At IIT Jodhpur, Chemistry embraces a distinctive locus in science and technology collaboration. The department is making technological contribution to new materials for energy solutions, catalysis and water. Fundamental understanding of chemical dynamics, biological phenomena, Nuclear Magnetic Resonance and Quantum Chemistry are growing in prominence. The vision of the Department of Chemistry is to strive to be acknowledged for excellence in teaching, research, and outreach.

The following Faculty Members are associated with the department:

Faculty Members & Research Areas

Ritu Gupta

Head of Department
Nanomaterials & Nanodevices for Water, Energy and Healthcare

Rakesh Kumar Sharma

Catalysis for Energy and Stereocontrol, Feedstock Chemistry, Fuel and Lubricants, Energy Storage and Water Treatment Technology

Ananya Debnath

Theoretical and Computational Chemistry

Ramesh K. Metre

Main-group organometallic chemistry, Coordination polymers, Inorganic-organic hybrid materials and Metal phosphonate and phosphate chemistry

Atul Kumar

Quantum Information Processing

Samanwita Pal

Solution and solid-state NMR and NQR spectroscopy

Manikandan Paranjothy

Theoretical and Computational Chemistry, Chemical Reaction Dynamics

Sandip Murarka

Organic Synthesis, Development of Novel Synthetic Methods, Transition Metal Catalyzed Synthetic Transformations, C-H Functionalization Reactions, Asymmetric Catalysis

Nirmal Kumar Rana

Asymmetric Catalysis and Natural Product Synthesis

The following new faculty members joined the department during this financial year:

Faculty Members & Research Areas

Dibyendu Kumar Sasmal
Biophysical Chemistry and Electrophysiology

Subrata Chakraborty
Organometallics, Homogeneous Catalysis

Rohan D. Erande
Synthesis of Natural Products & Medicinally Active Compounds, Method development Lewis Acid Catalysis

The following laboratories are functioning in the Department of Chemistry:

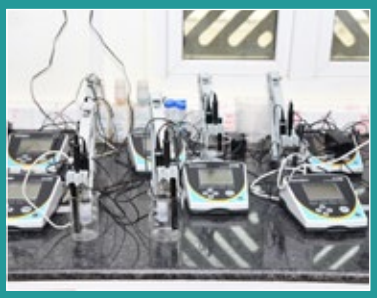
Teaching Laboratories

The UG and PG level chemistry courses are taught practically to students during the two-hour long sessions on alternate weeks. They are designed to complement and reinforce course material presented in lectures. Students are provided with a laboratory manual at the beginning of the semester. After completing a pre-lab assignment, students under the supervision of their teaching assistant complete the experiment and prepare a report, which is submitted for grading at the end of the lab period. PG students work individually or with a partner. UG students work in a group of 3-4 students. One can expect to see many different types of experiments including titrations, organic reactions, synthesis of nylon, electrochemical reactions, study of color in complexes, fluorescence and functional groups identification using spectrometers, to name a few. The focus is on developing hands-on-skills required for solving various scientific problems.

1. Organic and Inorganic Chemistry laboratory

The core objective of this laboratory of IIT Jodhpur is to train students in scientific methods that would solve real problems at the frontier of our understanding of the matter. This is a multi-use laboratory and provides a number of resources to assist undergraduate, graduate and Ph.D. students in planning their professional careers after completing their academic program at IIT Jodhpur.

This laboratory maintains a broad spectrum of state-of-the-art instrumentation including basic laboratory set up (for Organic, Inorganic, Organometallic and Material Synthesis), Nitrogen Gas Facility, Ice Making Machine, Hot Air and Vacuum Oven, Fume Hood pH- Conductivity Meters, Rotary Evaporator, Vacuum Pumps, Centrifuges, Chiller, Microbalances, Orbital Shaker, Melting point, Hot Plates and Stirrers etc.



2. Analytical and Physical Chemistry laboratory

This lab is newly set up in the academic year 2018-2019, the lab procured equipment such as UV-visible spectrometers, FTIR Spectrometers, Fluorescence Spectrometer, Electrochemical Workstation, Contact Angle Meter, Polarimeter for carrying out state of the experiments in Analytical and Physical Chemistry. This laboratory can accommodate 40 students together for carrying out group experiments.



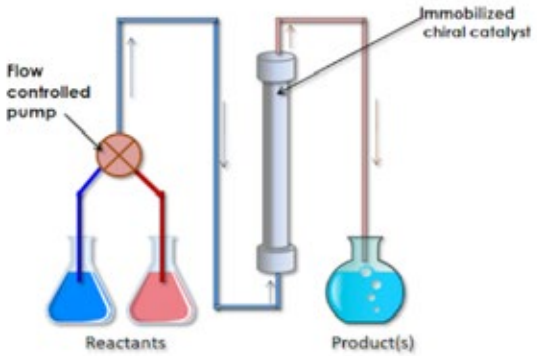



Research Laboratories

The Department of Chemistry has set up 7 thematic research laboratories for advanced experimental research activities for PhD scholars, project staff and Post-Doctoral Researchers. The details of the research, experimental facilities etc. can be found under the webpages of individual faculty users of the laboratory.

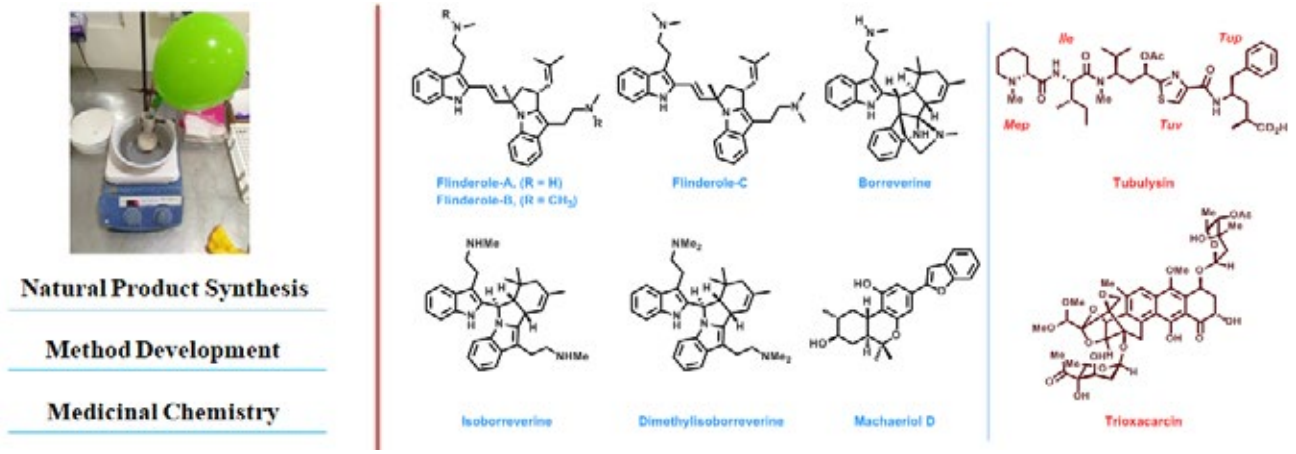
1. Asymmetric Synthesis and Continuous Flow Chemistry

There are two research groups working in this laboratory. One group aims to design and synthesize new organocatalysts and apply them in developing novel asymmetric methodologies mainly emphasizing on domino/cascade/sequential reactions for creating multiple stereocenters within a molecule. Additional targets are the exploration of dual organo-metal catalysis and biocatalysis. Our other aim is to develop new methodologies using continuous-flow systems using immobilized chiral catalysts for the production of fine chemicals, chiral drug molecules/intermediates with industrial implementation. We are also focused to utilize our methodologies as key steps for the synthesis of architecturally interesting and biologically active molecules.



Continuous-flow system

The other research group mainly focuses on the total synthesis of biologically important Natural Product. We are highly interested in method development like metal catalysis, organocatalysis, Lewis acid catalysis and cascades of reactions to resolve the complexity of targeted natural products in access to achieve their total synthesis in efficient and step- and atom-economical way. An aiming to target potent drug molecules with new mechanisms of action, we are exploring the field of medicinal chemistry by collaboration with bio-laboratories and pharmaceutical companies towards drug discovery and development in India.



2. C–H functionalization and Photoredox Catalysis Laboratory

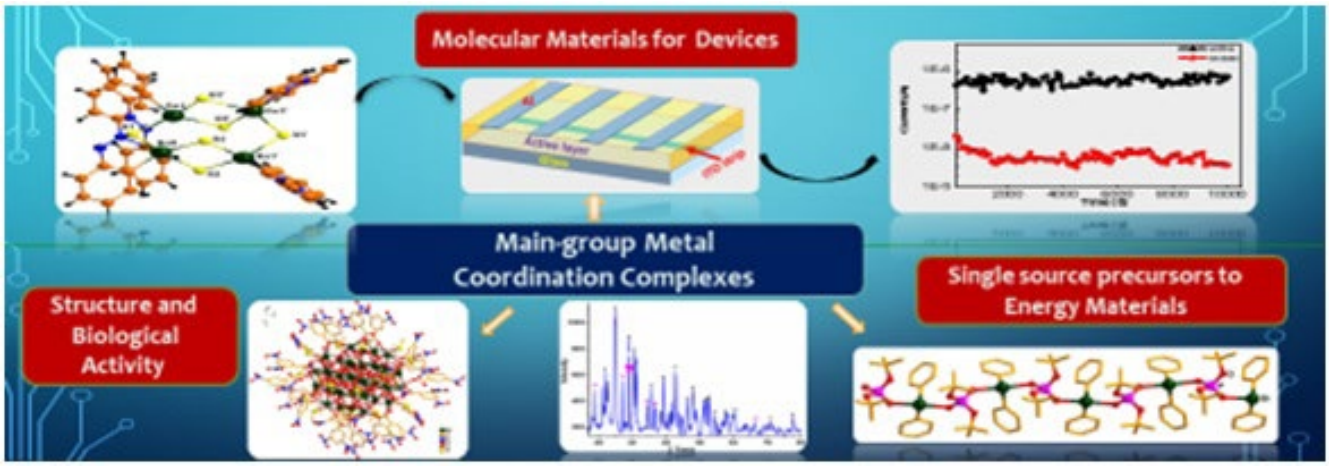
C-H Functionalizations and Photoredox Catalysis are arguably the most exciting, powerful and rapidly emerging fields in synthetic organic chemistry. The laboratory is focused on utilizing these powerful strategies for the development of atom-economic, efficient and functional group tolerant methods.

The research group working in this laboratory is dedicated to develop novel sustainable synthetic methods towards molecules of medicinal importance. To this endeavor the group has embarked on developing a diverse array of transition metal catalyzed and metal-free synthetic transformations. The research group is actively engaged in the direct chemoselective C-H functionalization leading to the formation of carbon-carbon and carbon-heteroatom bonds allowing access to untapped regions of chemical space. Direct C-H functionalization does not only render the synthetic sequence of useful molecular entities more economical and straightforward but also provide a powerful alternative to the conventional de novo strategies. On the other hand, photoredox catalysis, another cutting-edge tool which allows photosensitizers to convert visible light into chemical energy and promote single electron transfer-based organic transformations is an another heavily investigated area in Murarka research group. The group has recently unfolded a visible light induced and organophotoredox catalyzed efficient and robust radical cascade cyclization strategy towards the synthesis of biologically important alkyl substituted chroman-4-one scaffolds. This research group envisage that such

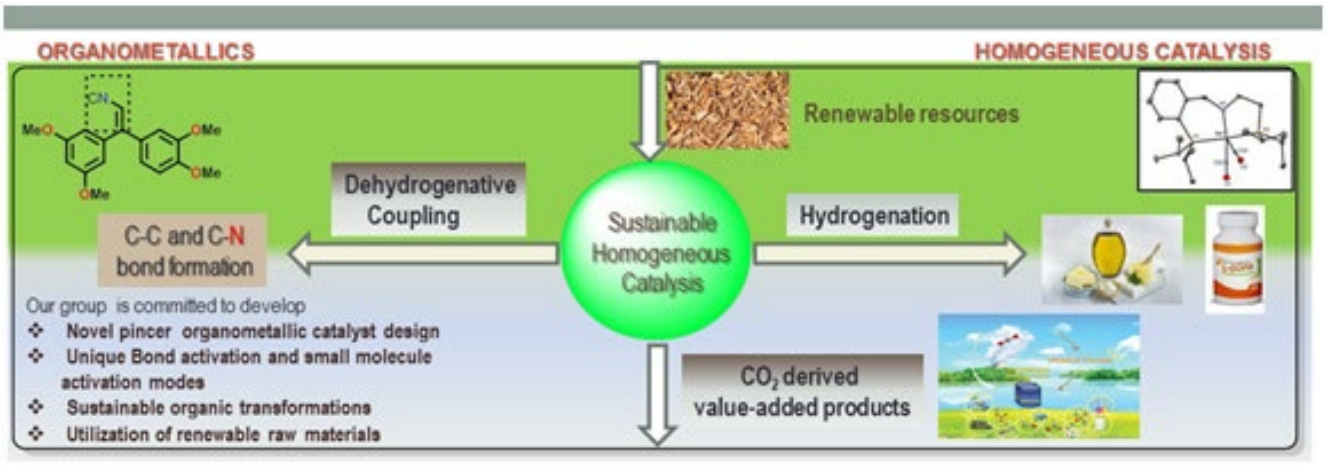
novel chemical tools should potentially unlock unique reaction pathways and facilitate rapid diversification of pharmaceutical molecules to an exciting range of closely related bioactive analogs and thereby enabling development of new chemical entities (NCEs).

3. Transition Metal and Organometalics Research Laboratory

The organometallic chemistry laboratory focuses on developing novel transition metal and main-group element based organometallic complexes, study and characterize their properties, understanding unique behavior and potential applications in material chemistry and sustainable homogeneous catalysis. There are two research groups working in this laboratory.



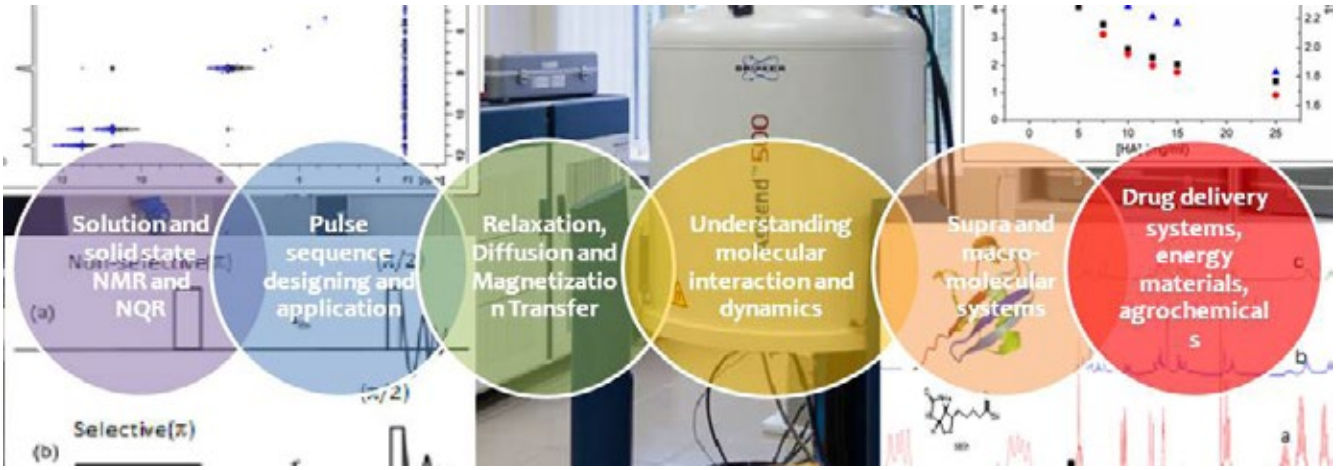
One group is interested to develop and study Main-group organometallic complexes, with focus on applications into materials chemistry. In an effort to gain better understanding of structure and properties of the Main-group Organometallic Complexes, design involving intramolecular coordination approach will be probed. The new complexes with their unique structures will be explored as a potential candidate for Single source precursors to Energy materials. The group also focuses on use of Photoactive and Electroactive ligands to construct the main-group organometallic molecular assemblies for the applications in area of sensors and molecular electronics.



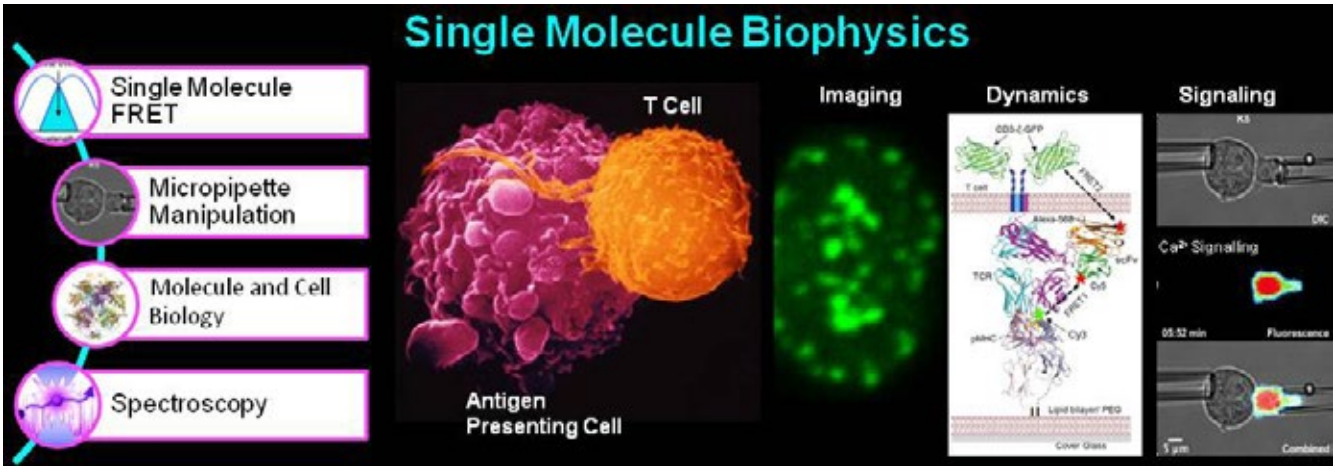
The other group is committed to develop and study Organometallic Catalysis, which shape and guide the processes of the Industry. In an effort to gain better understanding of the transition metal complexes, design of new pincer ligand based organometallic complexes, study their reactivity towards inert C-H, N-H, H-H bonds and exploration on activation modes of small molecules like N2, H2, CO2 and CO etc with the pincer complexes will be probed. The group also focuses on applications of organometallics in homogeneous catalysis using renewable resources targeting catalytically challenging sustainable transformations via (transfer) hydrogenation, dehydrogenation, hydrosilylation, hydroamination etc including in-depth kinetic and mechanistic investigation.

4. Spectroscopy & Biophysics Laboratory

The laboratory is focused on elucidating structure, function, dynamics and interactions of chemical entities ranging from small to complex biological macromolecules at the condensed phase as well as single-molecule level using state-of-the-art spectroscopy and biophysics techniques. Progressive uptake of challenging biophysical projects and solving them with cutting-edge spectroscopic and biophysics techniques are the main theme of this lab.



This laboratory has two research groups working on different aspects. One research group focuses to decipher dynamics and interaction of small molecules both in solution and solid state by employing NMR methods based on relaxation, molecular diffusion, chemical exchange and magnetization transfer. The group is involved in design, modification and implementation of NMR pulse sequences to unveil molecular interaction relevant in the field of materials, medicine and environment to name a few. The group is currently investing time in analysing various drug delivery systems ranging from supramolecular to polymeric to metal oxide nanomaterials in terms of drug encapsulation, release mechanism and stability. The group is actively involved in humic substance extraction and design of HS based biosensors for environmental pollution remediation processes. Additionally, this research group is also interested in NMR metabolomics and solid state NQR. The group further uses various spectroscopic techniques to shed light in the cross-disciplinary areas of renewable energy sources, biomacromolecules and biomaterials. The lab is continuously expanding its research areas for a better understanding of macromolecular systems.



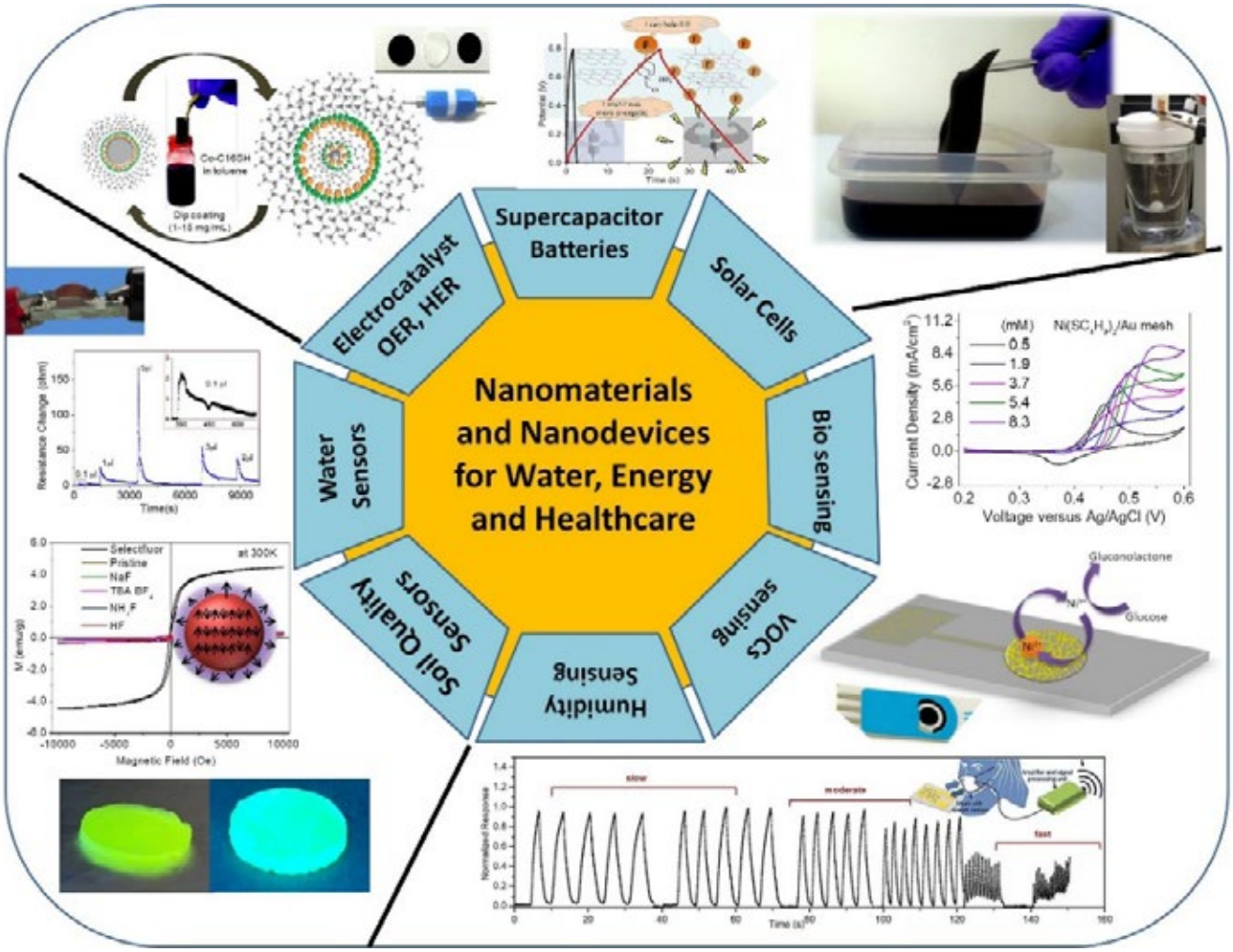
The other research group works to unravel complex sub-cellular functions and dynamics at single-molecule level combining multidisciplinary research areas in molecular/cellular biology, physical chemistry, time-resolved fluorescence spectroscopy, and fluorescence microscopy. The research group is focused to understand various complex cellular signalings (immunological synapse), immunological interaction (TCR-pMHC), ligand-receptor interaction dynamics, immunotherapy against muscular dystrophy (DMD) and conformation dynamics of ion channels like protein (NMDA receptor) molecules. This research group is going to develop a micropipette manipulation system (biomembrane force probe) to measure ligand-receptor interaction

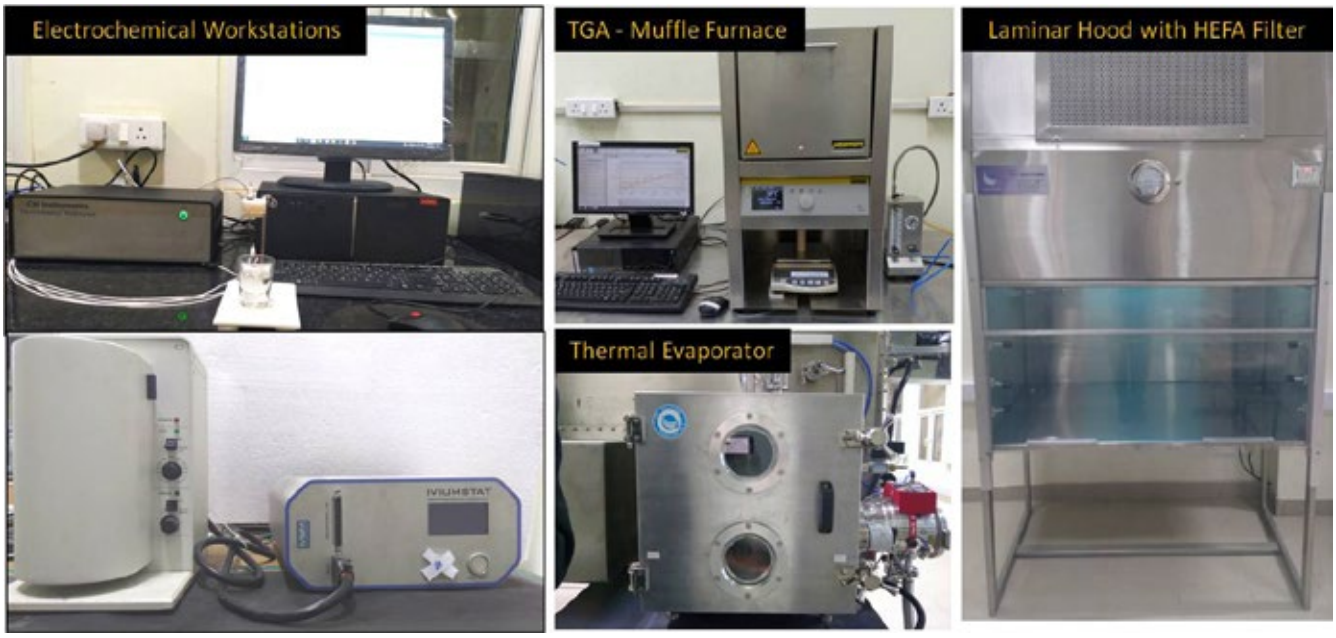
forces at pico-Newton scale. The lab will build customized TIRF and confocal microscopy systems and combine highly interdisciplinary research areas in chemistry, life science, physics and computer science. In addition, the research group is also focused on understanding biological water dynamics using femtosecond upconversion spectroscopy and fluorescence correlation spectroscopy (FCS).

5. Advanced Functional Materials Laboratory

Advanced Functional Materials and Interfaces is an interdisciplinary field with chemistry playing a central role. Chemistry Department has a broad range of interests across the fields of materials and interfaces. Amongst these are materials exhibiting interesting optical, electronic, magnetic, catalytic and mechanical properties. The discovery, understanding and development of these materials is central to providing solutions in areas ranging from energy, healthcare, electronics, and catalysis. The research includes development of new synthetic techniques enabling the preparation of a range of well-defined nanoparticles, 2-D nanosheets and heirarcical complex nanostructures. We focus on developing materials amenable to patterning and printing over large areas for scalable nanomanufacturing.

The research group associated with this laboratory works on developing large scale methods for synthesis of nanomaterials and translating them into devices for application in Energy, Water and Healthcare. The present interest includes application of nanomaterials in areas related to water treatment, energy storage devices, photoelectrochemical devices, environmental gas sensors and healthcare devices.

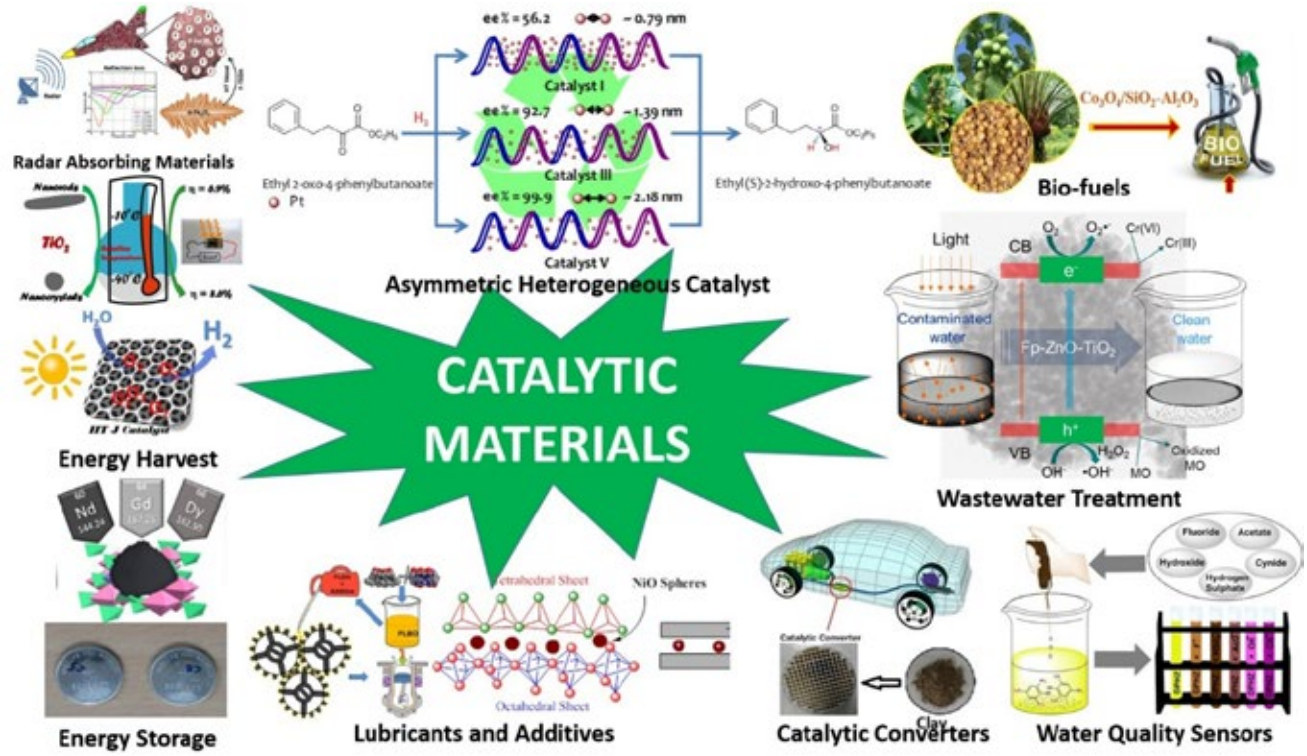




6. Energy and Environmental Catalysis Research Laboratory

This laboratory focuses on multidisciplinary research for the development of energy and environmental catalysis that includes chemists, materials scientists, and environmentalists working towards the improvement of human health and life quality.

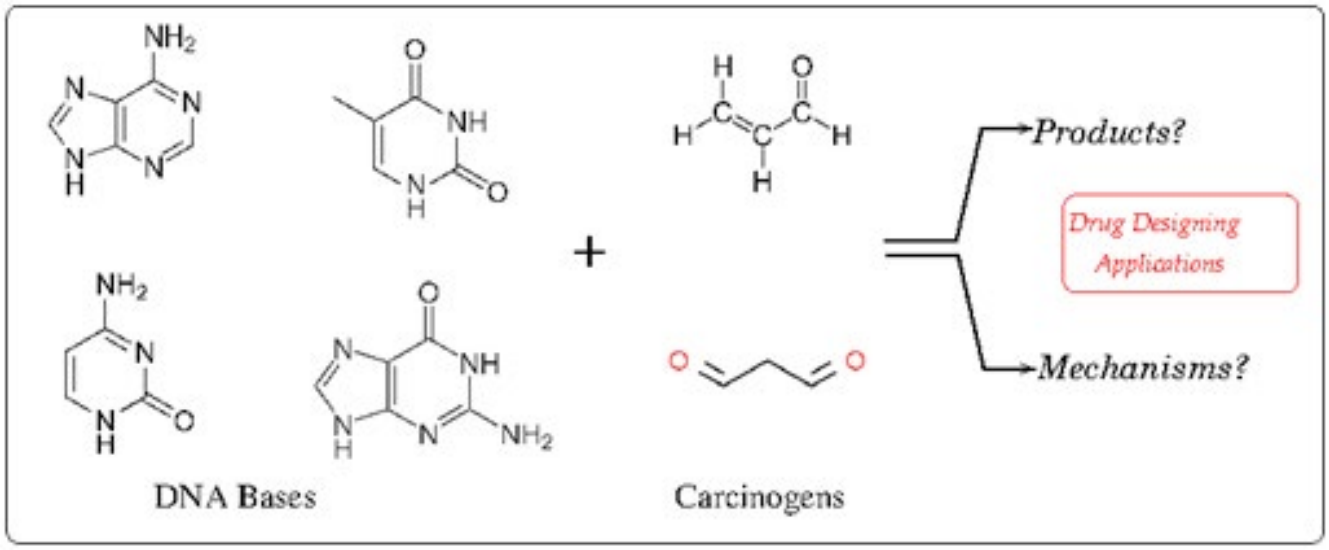
The research group associated with this laboratory focuses on sustainable materials for catalysis. It includes a diverse group of chemists and material scientists specializing in catalysis, feed-stock chemistry, energy harvesting and storage, environmental remediation and fuels. The main goal is to understand fundamental chemical processes and also to develop highly efficient materials inspired by nature. The researchers develop simple, reproducible and scalable methods for sustainable science. The research undertaken in the group is intended to have far lasting implications to utilize and design materials for applications that are required by a booming technology minding the effect on the environment. The group nurture philosophy of collaboration expedites new discoveries and innovations. Researchers are actively engaged with, international universities, inter-institutional, numerous government agencies and industries to harvest the benefits of our research work for end-users.



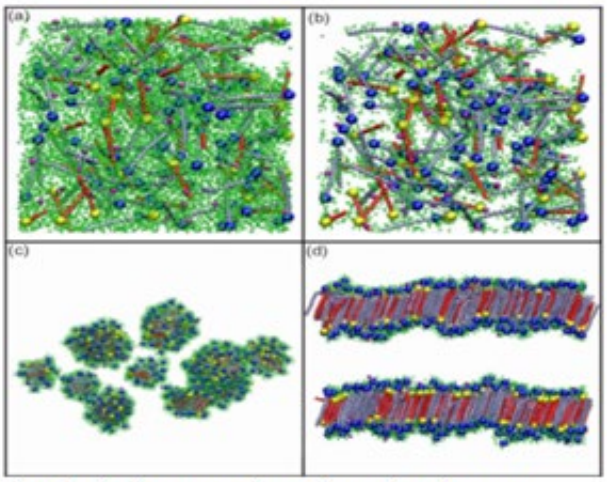
7. Computational Chemistry Laboratory

This laboratory is focused on studying the structure and dynamics associated with important chemical processes. Modern computational techniques including electronic structure theory and molecular dynamics simulations are used to understand complex chemical phenomena. Computing facilities are available in the Computer Centre to perform these calculations. There are three groups associated with this laboratory.

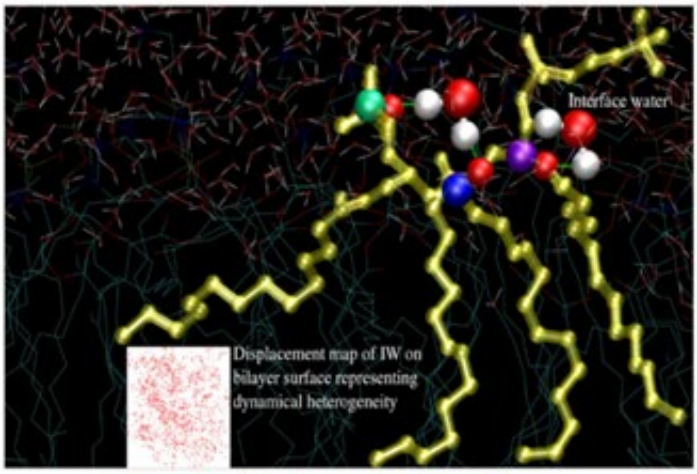
Gas Phase Reaction Dynamics: This work is about studying complex organic reactions in the gas phase to investigate mechanisms and energy flow pathways using state-of-the-art direct dynamics techniques wherein classical Newton's equations are integrated on-the-fly using quantum mechanical potential energies and gradients. The research group associated with studies in this area is interested in looking into the dynamics of chemical reactions using the principles of classical and quantum mechanics. Understanding a chemical reaction from a static picture – the potential energy surface – is insufficient in completely describing the process. One needs to look at the dynamics i.e., the time-dependent nuclear motion at the atomic level. Classical trajectory simulations with potentials and gradients computed on-the-fly using electronic structure theory packages, a methodology known as direct dynamics, is used in most of our simulations. The group is interested in studying organic reaction mechanisms and pathways, modelling gas phase experiments and studying the associated dynamics. Research work is going on to understand mechanisms of covalent adduct formation between DNA base pairs with few select carcinogens and chemistry of negatively charged arenes.



Computational Molecular Biophysics: The research aims at understanding principles of complex biophysical processes using principles of Statistical Mechanics and Quantum Chemistry. High end supercomputers located at computer centres are used to simulate the systems. The research group associated with studying this area of study broadly envisages on understanding principles of soft condensed matter using multi-scale modeling. Dynamical processes involving soft matter have a broad range of coupled time-scales where small changes in molecular level weak interactions lead to large effect on system's macroscopic properties. Using multi-scale modeling the research group is exploring the structure function relationships at different time and length scales important for different biological and non-biological soft matter systems. In particular, the group focuses on water dynamics at the hydration layers, self-assembly of surfactants, protein-membrane-water systems, their interactions with other bio-molecules and polymer dynamics related to chemical and activated processes. The group develops and uses modeling tools ranging from molecular simulations to study the structure and dynamics of proteins, lipids, water at the micro and meso-scale as well as the analytical theory at the macro-scale to investigate different processes involving biological chain and macromolecules.



Study of phase transformations of surfactants



Dynamics of water near soft interfaces

Quantum Information and Computation: The group is interested in foundations of quantum mechanics and quantum information processing. The research aims at analysing and characterizing multiqubit entanglement and nonlocality in pure as well as mixed states. In addition, the group is also interested in communication protocols, quantum cryptography and quantum games.

Department of Civil & Infrastructure Engineering

The Department of Civil and Infrastructural Engineering came into existence in this Financial Year 2019-20. The department has a unique vision of creating the next generation of engineers who will address societal needs from an individual to a community level. B.Tech., M.Tech., M.Tech.-Ph.D. and Ph.D. programs in Civil and Infrastructure Engineering are proposed to be started from the Academic Year 2020-21. Through these undergraduate and postgraduate programs, the department is making a stride to reimagine the course structure incorporating and integrating the elements of conventional civil engineering with advanced transformative technologies such as Artificial Intelligence (AI), Cyber-Physical Systems (CPS), Digital Twins (DT), and automated management and information system.

Two Faculty Members joined the department till 31 March 2020.

Faculty Members & Research Areas

Debanjan Guha Roy

Rock mechanics, reservoir geomechanics, engineering geology

Deepika Bhattu

Emission sources, characterization and secondary aerosol formation potential; Real-time aerosol measurements using mass spectrometry techniques; Source apportionment techniques; Physical, chemical and hygroscopic properties of atmospheric aerosols and cloud condensation nuclei (CCN) activity

Prof. T. K. Datta, Emeritus Professor, Department of Civil Engineering, Indian Institute of Technology Delhi, is associated with the department as Adjunct Faculty Member.

Department of Computer Science & Engineering

Computer Science and Engineering, today, plays a major role in transforming every aspect of human life - in addressing social challenges and catalyzing the ongoing wave of the industrial revolution. The department is driven by its commitment to excel in next generation technology development and research. Our mission is to perform cutting edge research on problems of importance and value, educate students and prepare them to contribute to multi-disciplinary projects, for solving problems of national interest, and strengthen industry-academia collaborations.

The Department offers B.Tech., M.Tech., M.Tech.-Ph.D., and Ph.D. Programs in Computer Science & Engineering. The department also offers M.Tech. and M.Tech.-Ph.D. in Artificial Intelligence. The B.Tech. program aims to equip its students with skills to undertake careers that involve identifying and engineering solutions for real-world problems, through innovating upon their core competence in computer science. The curriculum gives due importance to the foundational aspects of computer science, as well as aspires to inculcate in students the foresight and expertise to address transdisciplinary technological questions. The students who have graduated from the department are either placed in reputed industries or are pursuing higher studies in reputed universities within the country and abroad. The M.Tech. programs establish a balance between the traditional and emerging areas of the discipline by offering the students a combined knowledge of theory and practice. The program is designed to extend the undergraduate computing skills with up-to-date and in-depth expertise in specialized areas of computer science discipline and provide them with opportunities and an environment to pursue research.

This year, the department has hired eight regular faculty members and two young faculty associates, making the total faculty strength 14, and is continuously looking for new faculty in all areas of Computer Science and Engineering. The research areas of the faculty span from theoretical computer science to systems, intelligent software architectures, internet of things, cyber-physical systems, and artificial intelligence. The M.Tech.- Ph.D. and Ph.D. programs offer students opportunities to solve impactful and challenging problems in all these areas with the goal of producing state-of-the art research and solving socially and locally relevant problems.

The research activities of the department are supported by agencies such as the Department of Science and Technology, Ministry of Electronics and Information Technology, and Ministry of Home Affairs. The department works closely with industry leaders like Microsoft, IBM, Intel, and TCS, and academic and research collaborators like IIT Delhi, IIT Kanpur, IIT Bombay, and AIIMS Jodhpur. The faculty members have several international collaborations with universities like University of Texas A&M at Kingsville and University of Notre Dame. The department is steadily striving towards excellence in both academics, research and service to the community with active participation from faculty, staff and students.

Following are the Faculty Members associated with the department:

Faculty Member & Research Areas

Gaurav Harit
Head of Department
Image and Video Analysis

Santanu Chaudhury
Computer Vision, Multimedia Systems, Computational Intelligence

Chiranjoy Chattopadhyay
Computer Vision

Sumit Kalra
Software Architecture, Cloud Computing, Data Analytics

The following Faculty Members and Young Faculty Associates joined the department during the financial year 2019-20:

Faculty Member & Research Areas

Anand Mishra

Computer Vision; Deep Learning; Knowledge Graph; Multimodal Machine Learning

Mayank Vatsa

Computer Vision, Machine Learning, Deep Learning, Biometrics, Trusted AI

Debasis Das

Vehicular Ad-Hoc Networks (VANETs), Internet of Vehicles (IoV), Vehicular Cloud Computing (VCC), Network Security, Machine Learning, Blockchain, Social Networking and Wireless Body Area Networks (WBAN)

Richa Singh

Machine Learning; Pattern Recognition; Biometrics; Forensics; Trusted AI

Deepak Mishra

Machine Learning, Medical Image Analysis, Biomedical Circuits and Systems, Polarization Imaging

Suman Kundu

Social Network Analysis; Granular Computing; Network Data Science; Fuzzy Sets; Rough Sets; Distributed Algorithms

Yashaswi Verma

Applied Machine Learning and Computer Vision

Young Faculty Associate & Research Areas

Debarati Bhunia Chakraborty

Computer Vision; Machine Learning; Soft Computing; Image Processing; Deep Learning; IoT

Ravi Bhandari

Mobile and Pervasive Systems; Intelligent Transportation Systems

Romi Banerjee

Embodied Cognitive Architectures; Artificial General Intelligence; Computing with Words; Natural Language Understanding

The department also has a Scholar-in-Residence, Padma Shri Professor Sankar K. Pal, who is the National Science Chair, Distinguished Scientist and Former Director of the Indian Statistical Institute, Kolkata. Prof. Pal works in the area of fuzzy neural networks, soft computing, and machine intelligence and is the recipient of the Shanti Swaroop Bhatnagar Award.

The following laboratories are functioning in the Department of Computer Science & Engineering:

1. Language Technology and Knowledge Management Lab

Research in this lab is broadly focussed on information extraction, information access, and knowledge management. Thanks to the internet technology and social media, there is an enormous amount of data such as images, text, videos, speech, etc available around us. However, most of these data are unstructured and not directly useful to us. In this lab, we aim to harvest knowledge from these unstructured data and use multimodal context in indexing, retrieval, transcription, question-answering, translation, and summarization. In this regard, since language provides an excellent interface between AI systems and humans, understanding language is one of the major focuses as well. The lab focuses on the following themes:

- Knowledge harvesting from the multimodal data
- Knowledge-aware Computer Vision
- Language understanding-driven Document Image Analysis
- E-governance through Social Network

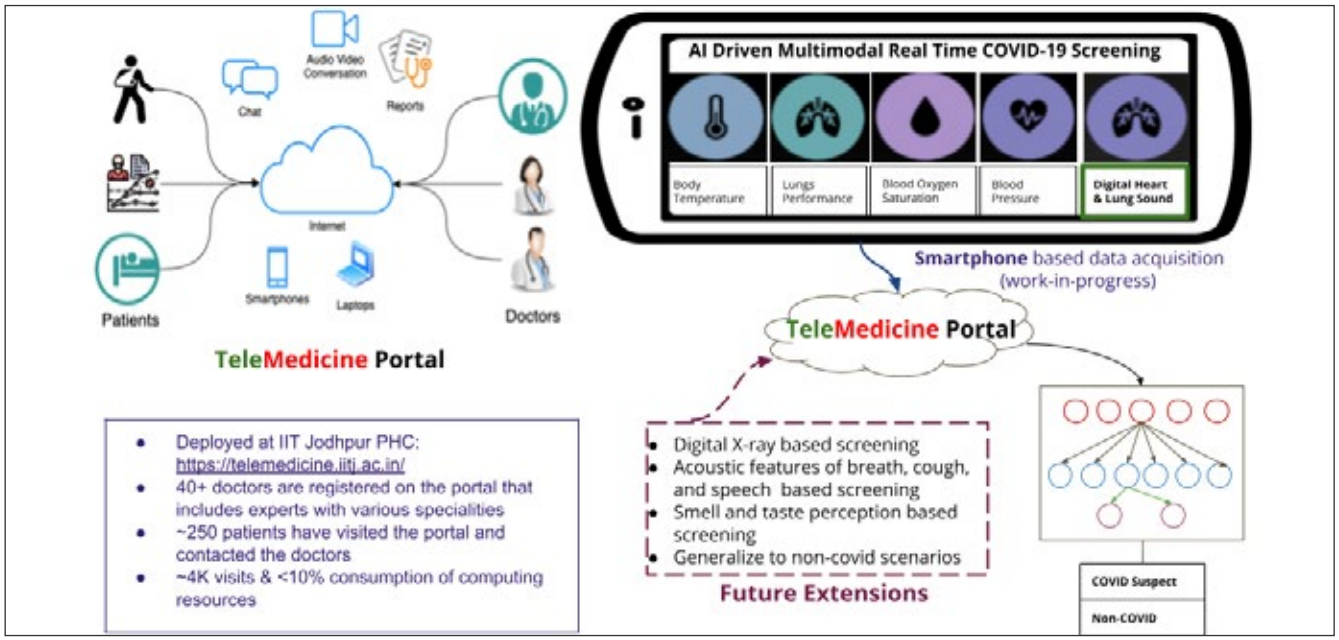
2. AI and Cognitive Computing Lab

This lab focuses on learning techniques that use constantly changing data, do reasoning to make sense of data, and evolve self-correction mechanisms. These technologies are integrated with smart decision support systems that make use of large volumes of data and sophisticated algorithms for better analysis, thus helping in understanding and simulating reasoning and human behaviors. The computing infrastructure comprises the Nvidia DGX-2 System, the world's most powerful AI System for the most complex AI challenges. The availability of the state-of-the-art computing resources drives the research and development of the next generation of AI Systems, which will transform computers from tools into problem solving partners and enable AI systems to explain their actions and to acquire and understand and reason with common sense knowledge. The goal is to immerse AI in various fields and devices related to Healthcare, Agriculture, Public Safety, Social good, and IOT.

3. Software Innovation Lab

The lab research focus areas are Software Architecture to design and develop modern scalable software solutions in the various domains. The current sub-themes in the lab are:

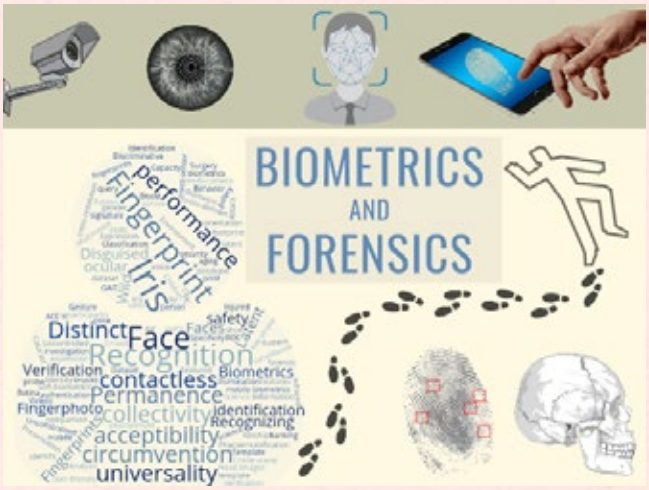
1. Telemedicine Solutions: It includes development of advanced data architecture and provides innovative solutions for Healthcare Data Management using on-premise or cloud services. It also focuses on integrating telecommunication with existing clinical processes to make them more efficient and reliable.
2. Industrial IoT Solutions: Industrial IoT requires processing a huge amount of data and analyse it for predictive maintenance. Designing such a real time system to manage unreliable sensor data is one of the focus areas of the lab.



4. Image Analysis and Biometrics Lab

The Image Analysis and Biometrics Lab focuses on designing accurate and trustable biometrics and image forensics systems. We work on multiple biometric modalities including face, fingerprint, iris, and multimodal. The lab focuses on a wide range of challenging real-world scenarios such as recognition/analysis in varying spectra (VIS/NIR), varying resolutions, and matching across different domains. Beyond biometrics, the lab also focuses on developing algorithms for core machine learning challenges such as learning with small sample size data and online learning. While solving problems with direct applicability to real-world scenarios, the lab also focuses on making machine learning algorithms adversarially robust and developing dependable and trusted solutions across different domains and applications.

Lab website: http://iab-rubric.org/index.htm



Department of Electrical Engineering

The Department of Electrical Engineering primarily focuses on imparting quality education and preparing students to face the future technological challenges. The vision of the Department is to enhance the research environment and to innovate in pedagogy to address the challenges of socio-economic and human resource development. The Department is committed to engage in high quality research by Faculty Members and Students, and in the pursuit of excellence in teaching.

The Department offers B.Tech. in Electrical Engineering and started two state-of-the-art M.Tech. programs in Sensors and Internet of Things (SIoT) and Cyber Physical Systems (CPS) in the AY 2019-20. The Department also started three new M.Tech.- Ph.D. dual degree programs in Communication and Signal Processing (CSP), Sensors and Internet of Things (SIoT) and Cyber Physical Systems (CPS). In addition, as well as Ph.D. program with a broad range of specialization covering detailed aspects of Microelectronics, Signal Processing, Communication, Microwave & Photonics, Power systems, Control systems etc. Department faculty members are also engaged in challenging interdisciplinary research in collaboration with faculty members across various departments through the Institute's Interdisciplinary Research Platforms (IDRPs).

Active collaborations are on-going with organizations like UC Berkeley, Carleton University, TIMA laboratory (Grenoble, France), Technion-Israel Institute of Technology, Norweigian University of Science and Technology (Gjovik, Norway), Higher Institute of Applied Sciences and Technology of Sousse (Tunisia), IISc Bangalore, IIT Delhi, IIT Kanpur, IIT Mandi, IIT Bombay, IIITM Kerala, IIT Madras, IIST Thiruvananthapuram, Society for Applied Microwave Electronics Engineering and Research, Indian Space Research Organization, Freescale Semiconductors, Global Foundries, AIIMS Jodhpur, Defence Research and Development Organization. In the year 2019-20, a total of 14 faculty members joined the department, taking the total number of faculty members associated with the department to 25.

New Programs Started during 2019-2020:

- M. Tech. and M. Tech.-Ph.D. in Cyber Physical Systems
- M. Tech. and M. Tech.-Ph.D. in Sensors and Internet of Things
- M. Tech.-Ph.D. in Communication and Signal Processing

The following Faculty Members are associated with the department:

Faculty Members & Research Areas

Anil Kumar Tiwari

Head of Department
Electrical Engineering: Image Processing, Video Processing, and Signal Processing application in Bio-Medical

Mahesh Kumar

Group III-V quantum structures by MBE, Growth of thin films and nanostructures, Group III-nitride alloys for LEDs, HEMTs and photovoltaic applications, Inorganic-Inorganic hybrid structures with special attention to band gap engineering, Si and wide band gap semiconductors for MEMS, Micro and Nano device fabrications

Abdul Gafoor Shaik

Protection of various components of Power System, Protection of Distribution Network with DG penetration, Power Quality assessment and mitigation in Distribution Networks with Renewable Energy Source penetration

Sandeep Kumar Yadav

Signal Processing, Condition Monitoring, Image Processing, Data Compression, Blind Source Separation, Artificial Neural Network

Aashish Mathur

Power Line Communications, Free Space Optical Communications, Visible Light Communications

Shree Prakash Tiwari

Microelectronics & VLSI Technology, Microfabrication, Organic Electronics, Device Physics and Characterization, New Device Structures

Arpit Khandelwal

Group III-V Optoelectronic Devices, Fiber Optics and Integrated Optics Sensors, Non-Linear Photonics, Silicon Photonics and Optical Communication

Rajlaxmi Chouhan

Image processing, Noise-aided image processing using Stochastic Resonance, Image enhancement, Digital watermarking, Image quality assessment

Arun Kumar Singh

Communication Theory, Wireless and Mobile Communications, Satellite based Navigation Systems, Spread Spectrum Systems

Soumava Mukherjee

Microwave Communication

Deepakkumar M. Fulwani

Control and state estimation of uncertain systems, Power system, Control issues in wind energy conversion system

The following Faculty Members and Young Faculty Associates joined the department during the financial year 2019-20:

Name & Research Areas

Amandeep Kaur

Analog and Mixed-Signal Circuit Design, Data Converters (ADC, DAC), High-speed circuits, CMOS image sensors

Kamaljit Rangra

MEMS, Transducers and Actuators

Amit Bhardwaj

Human Haptics, Computer Haptics, Haptics for Teleoperation and Applications of Machine Learning

Manish Narwaria

Multimedia signal processing

Anoop Jain

Cooperative Control; Multi-Agent Systems; Formation Control; Nonlinear Control; Event-Triggered Control, Cyber-Physical Systems

Niladri Sekhar Tripathy

Dynamics and Control, Mechatronics and Cyber Physical Systems

Arani Ali Khan

Microwave Circuits

Nitin Bhatia

Fiber Optics and Photonics

Harshit Agarwal

Industry standard compact modeling; Analog and RF modeling, Energy efficient next generation transistors, emerging memories

Rajendra Nagar

Computer Vision; Image Processing; Computer Graphics; 3D Shape Analysis; Geometry Processing

Himanshu Kumar

Image and Video Processing, Computer Vision, Computational Imaging, Deep Learning

Saakshi Dhanekar

Nano-sensors for societal applications, device development, gas- and bio-sensors, MEMS, silicon based devices

Jai Narayan Tripathi

VLSI Circuits and Systems, Signal Integrity, Power Integrity, Design of Experiments, Metaheuristic Optimization Techniques

Young Faculty Associate & Research Areas

Dushyant Sharma

Automatic load frequency control; renewable energy systems; distributed control in power systems; microgrids; active power control of interconnected power systems

The department has following Adjunct Faculty Members:

1. **Akshay Kumar Rathore**
   Associate Professor, Electrical and Computer Engineering
   Concordia University, Montreal, Canada
2. **Tapan Mishra**
   Senior Advisor to Secretary, DOS/ Chairman, Indian Space Research Organisation
   Former Director, Space Application Center, Ahmedabad, ISRO
3. **Ajoy Kumar Ray**
   Professor, Electronics & Electrical Communication Engineering
   Indian Institute of Technology Kharagpur
4. **Hari Mohan Gupta**
   Formerly Professor (HAG), Department of Electrical Engineering,
   Indian Institute of Technology Delhi
5. **Rajesh Kumar Sharma**
   Former Director, Solid State Physics Laboratory, Delhi

The following laboratories are functioning in the Department of Electrical Engineering:

1. CPS Modelling Laboratory

The CPS modelling laboratory is designed to study the interaction of physical and cyber components by means of modelling for better understanding of the overall system. Modelling of a CPS can be performed using appropriate tools and softwares. Various simulators such as helicopter simulators are also available in this laboratory which helps in understanding the model of various cyber physical systems and their application in real life. The lab is equipped with modern modelling softwares and tools such as COMSOL Multiphysics modelling software, MATLAB, State flow.

2. Control & Computing Laboratory

This lab provides students with real life experience of the control system theory by providing exposure to system modelling, Digital and analog data acquisition systems, controller design and electro-mechanical interfacing. This laboratory is also equipped with softwares and tools needed for performing experiments on processor architecture, real time scheduling algorithms and embedded processors. The embedded processors that are available in this laboratory come equipped with reach peripherals like GPIOs, Timers, Analog inputs, I2C Bus, USART, RTC etc. The students learn how to program these using C and assembly programming languages. The knowledge of assembly programming language helps students to understand the working of low level drivers whereas they learn the Hardware Abstraction Layer (HAL) for accessing different peripherals through high level languages like C.

The lab also includes equipment and simulation kits useful for realizing the various DSP techniques into hardware. The lab aims to provide the experience of developing various DSP algorithms and then, porting them to the hardware for real time applications. Thus, this bridges the necessary gap of DSP Theory and development of hardware aware DSP algorithms. The experiments in the DSP lab ranges from basic implementation of sampling, filtering, Fourier transform to complex real-life applications such as noise cancellation, audio processing etc.

3. Electronics Laboratory

The Electronics Lab is based on hands-on experimentation, and exposes students to the basic building blocks of electronic circuitry and measurement procedures. The lab includes experiments on PN diodes, zener regulators, transistor switches and amplifiers, digital logic design using gate level ICs, and microcontroller-based design. The lab allows the students to engage in creative design thinking and implement small projects such as rectifiers, audio amplifiers, automatic light controller, digital counters and finite state machines. In the process, the students also learn the use of Function Generator, Power Supply and Digital Storage Oscilloscope available in the lab.

The Electronics Lab is used for academic activities for the following courses along with B.Tech. Projects across the Institute:

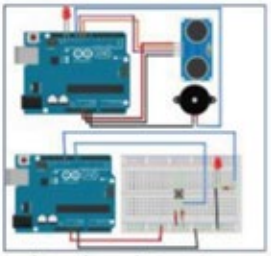
- Introduction to Electrical Engineering
- Digital Logic & Design

Facilities available in the laboratory:

- Arbitrary Function Generator (Tektronics (AFG3021B - 25MHz)
- Digital storage oscilloscope (Agilent & DSO1022A - 200MHz)
- Digital Multimetre 61/2 Digit (Agilent 34410A)
- Programmable DC Power Supply (Scientific PSD9005 -30V/1A, 5V/5A)
- Universal IC Tester (VPL-UICT)
- Soldering Iron Station (Xytronics LF-2000)
- Arduino Uno Microcontroller and Sensors


Demonstration on familiarization with lab equipment


Viewing Fast Fourier Transform on the DSO


Arduino-based Experiments


Typical Apparatus for Circuit Analysis


Arbitrary Function Generator


Digital Multimeter


Digital Storage Oscilloscope


LCR Meter


DC Power Supply

4. Energy conversion & Systems Laboratory

The Energy Conversion & Systems Lab is dedicated for research and academic activities in the areas of power engineering and electrical machines. Power engineering, also called power systems engineering, is a subfield of electrical engineering that deals with the generation, transmission, distribution, and utilization of electric power, and the electrical apparatus connected to such systems.

Facilities available in the laboratory:

- DC machines
- Induction machines
- Synchronous machines
- Transformers
- Synchronization panel
- Directional over current relay
- Differential relays
- Continuous Variable Auto Transformer
- Transformers Rheostat, Ammeters, Voltmeters, Wattmeters, Multimeters, resistive and inductive loads inductive loads

5. Electronic Circuit Simulation & VLSI Systems Laboratory

Electronic Circuit Simulation & VLSI Systems Lab was developed to support the fabless design activities. It hosts various design and simulation tools related to VLSI design and TCAD simulations with the aim of designing low power systems for future IoT applications. Following are the summary of resources. Many of the VLSI Design tools are supported through SMDP-C2SD project from the Ministry of Information Technology, Govt. of India, in addition to the tools supported by the Institute.

- VLSI Design and Circuit Simulation: Various VLSI Design Tools and FPGA kits (with 5 Workstations) obtained under SMDP-C2SD project. 11 Workstations are hosted as a part of Electronic Circuits Simulations and Systems Laboratory
- Device Simulation: Synopsys ISE-TCAD tools for simulation of conventional as well as novel devices.

This lab is used for research as well as conducting lab experiments related to VLSI design to our M.Tech. students, specifically M.Tech. in Sensors and IoT.

6. Image Processing & Computer Vision Laboratory

The Image Processing and Computer Vision Lab of the Department of Electrical Engineering currently focuses on research in the areas of computer vision, image processing, machine learning and multimedia signal analysis.

Research Areas:

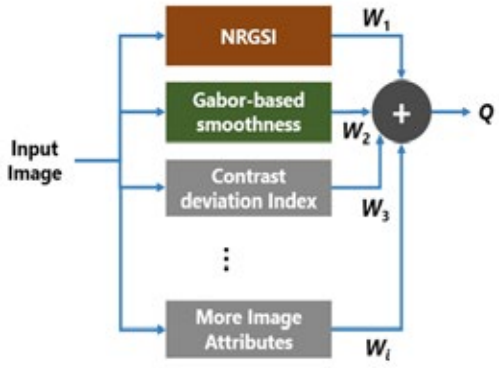
- Video and Image Coding
- Development of low-cost devices for health monitoring
- Digital Watermarking
- Image enhancement and restoration
- No-reference Image quality assessment
- Noise-aided image processing

Image Processing & Computer Vision Lab

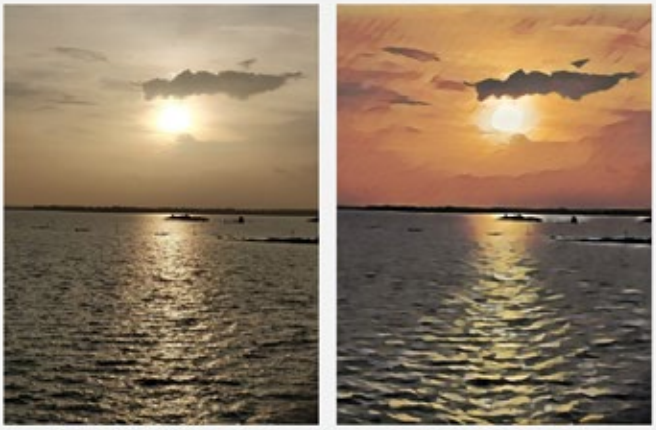
Research Facilities

- RGB-D Motion Sensor
- Dell Precision Tower
- GPU GTX1080ti
- Dell Precisi on 5820 Tower XCTO
- Nikon Camera D5600 with 18-55 mm lens and accessories
- HP 280 G4 MT
- Acer 4K Display
- Netgear Network Attached Storage

No-reference Image Quality Assessment



	$NRGSI$	S_G	C_{dev}
TID	0.759	0.724	0.797
LIVE	0.962	0.943	0.966
CSIQ	0.859	0.786	0.878
Average	**0.860**	**0.818**	**0.880**



Quantifying glossiness

Students
Vineet Kumar (M.Tech., 2017)
P. Shabari Nath (PhD Student)
Harshkooshal Gandhi (BTech)

Advisor
Rajlaxmi Chouhan

7. Internet of Things (IoT) Laboratory

Internet of Things (IoT) uses physical objects embedded with sensors, readout electronics, networking, communication, enabling intelligent data exchange or storage between these devices. Within the last decade, various commercial IoT products are available in the market. These are widely used in applications like smart health care and monitoring, autonomous vehicles, smart home, smart city applications and others. IoT lab encourages interdisciplinary research where different departments share the common platform.

This laboratory is used for research as well as conducting lab experiments related to Sensors & IoT lab for M.Tech. students in Sensors and IoT.

8. Microelectronics Laboratory

Microelectronics lab was developed to support the fabrication of discrete devices. It is mainly a research laboratory focusing on low cost devices and sensors for various applications. Currently, various devices such as Organic Field-Effect Transistors and Gas Sensors are routinely fabricated and characterized. Following is the summary of facilities of this laboratory.

Research Areas:

- Organic and Flexible Electronics: OFETs, Circuits, and Sensors:

  To reduce the detrimental impact of E-waste on the earth, electronic products need to be developed which leave minimum footprints on earth at the end of their lifespan. This technology offers advantages over inorganic electronics with the possibility of development of systems on unconventional substrates that can even be of biodegradable nature. Details of this work can be found on the page of FLAME Research Group.

- Thin-Film Device and Sensor Development:

  Sensors based on various materials including oxide metal semiconductors, and 2D materials such as MoS2 are being fabricated for various applications using gases and pollutants. Eventual aim is to develop integrated sensors which can be enabled for IoT applications. Other Sensors such as biosensors, and MEMS based sensors are also being explored.

- New Material and Devices:

  Bandgap engineering and surface studies of semiconductors, AlGaN/GaN HEMTs, Compact Modelling and Simulation.

Facilities available in the laboratory:

- Device Fabrication: Mask Aligner, Thermal Evaporation System, E-beam Evaporation System, Chemical Vapour Deposition System, RF Sputtering, Atomic layer deposition, Mask Aligner, Fume hoods
- Characterization: Keithely 4200 SCS, Probe station, Gas Sensing Characterization Setup, Hall Effect Measurement, Profilometer.

- Sensor and Transducer Design and Simulation Tools
    - o CoventorWare® Integrated software suite for designing and simulating MEMS sensors and actuators. A versatile FEM and BEM based tool set, has material properties database, creates or imports a 2-D layout and can build 3D models in conjunction with process flow information. Important modules consist of (i) Designer - Material Properties Editor, Process Editor, Layout Editor, Foundry Design Kits (ii) Analyzer Meshing, MemElectro, MemMech, CoSolve, Parametric Simulations, Visualization (iii) Advanced Solvers and Reduced Order Modelling.
- Mentor Graphics HEP Software: Tanner MEMS design (layout editor) and IC Design suite consist of Tanner L-Edit, S-Edit, T-spice, Eldo and Nitro SoC etc.

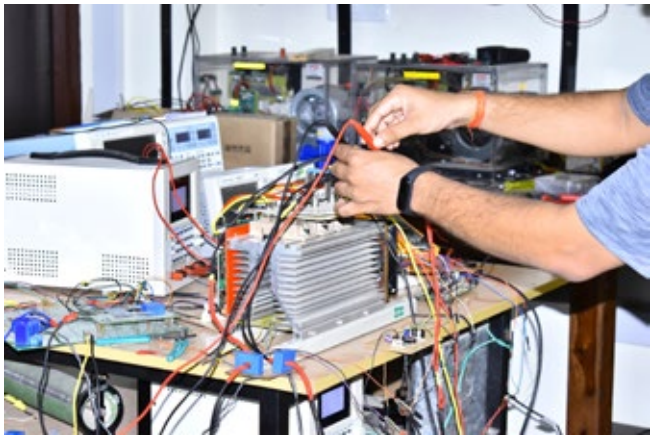
This lab was developed to support the fabrication of discrete devices and mainly focusing on low cost devices and sensors for various applications. Currently, various devices such as Organic Field-Effect Transistors and Gas Sensors are routinely fabricated and characterized. Main research areas of this lab are organic/flexible electronics, micro/nano electronics, and new semiconductor devices. Natural protein such as gelatin and other Eco-friendly materials are integrated in the process technology to add biodegradability to the devices. Bio-mimetic applications are also being explored. Recently, the devices with gelatin dielectric were demonstrated as real time human Breath Rate Analyzer. In 2020, the laboratory contributed many top rated journal articles and conference papers.

9. Microgrid & Real-time Simulator Laboratory

The microgrid and real time simulator laboratory carries out research in the areas of Electric vehicles, DC microgrid and the control issues in Power Converters. For the purpose of micro-grid research, this laboratory has been equipped with a real time simulator. It also has a test bench for the purpose of micro-grid research. The microgrid test bench has the ability to test power sharing schemes and complex control algorithms. For the purpose of research on electric vehicles the laboratory has resources to research controllers for Electric Two wheelers and Three Wheelers.

The laboratory also has some other resources like Yokogawa WT3000 power analyzer, Semikron power boost converters, Hameg programmable LCR bridge, Xytronic LF2000 High-power soldering station, Chroma DC Electronic load, DC Programmable power supply and Opal-RT Real-time Simulator.

At present the laboratory is hosting two projects one is funded by SERB on development of system to mitigate second order harmonic in hybrid Microgrid. The second project is funded by DHI and some industries on development of controllers for electric two wheelers/three wheelers. In 2020, the laboratory contributed 07 top rated Journal articles and many conference papers.



10. Power Electronics & Drives Laboratory

The Power Electronics & Drives Laboratory is utilized for undergraduate studies and research in the area of power electronics-based power conversion systems, control systems and electrical drives. The laboratory offers facilities for UG and PG students, faculties, project staffs and researchers to conduct research in the areas of power converters and AC/DC micro-grid. The laboratory is equipped with state-of-art test and measurement instruments, converters, power supplies and programming boards.

Major equipment available in this lab are:

1. High Precision Power Analyzer –YOKOGAWA WT3000.
2. DSO- Tektronix 200MHz (DPO 2024) and 1GHz (DPO 4104B).
3. Function Generator-Tektronix AFG 3021B.
4. Power Supply: 0-32V, 3A; 0-32, 10A.
5. Three-phase inverter drive.
6. Three-phase inverter stacks.
7. DC-DC converters.
8. Differential currents probes.
9. Isolation Transformers.
10. FPGA training kits.

This lab is dedicated to the study of power electronics and electrical drives. Research and teaching activities are carried out in the following areas:

- Study the performance of various power electronic converter
- Triggering circuit for SCR firing
- Study the operation of single-phase and three-phase converters
- Study of AC voltage regulators
- Study of zero voltage switching
- Study of zero current switching
- Performance of DSP based 3-ph Induction Motor drive using SCR
- Performance of DSP based 3-ph Induction Motor drive using IGBT

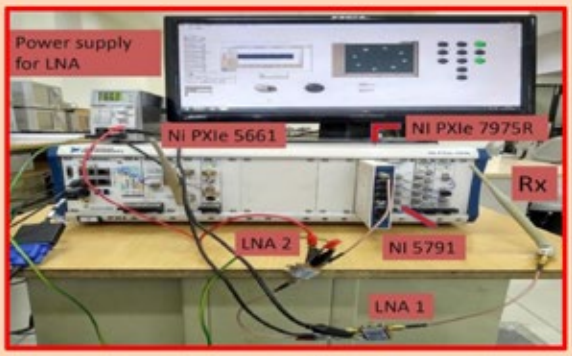
11. Signal Processing Laboratory

The Signal Processing Laboratory facilitates research in the areas centered around Signal Processing, Condition Monitoring, Image Processing, Data Compression, Blind Source Separation and Artificial Neural Network. The current research themes are:

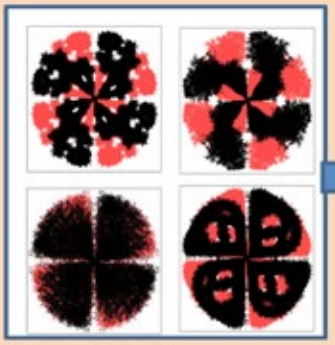
- Automatic Modulation Classification
- Modelling of Complex Networks
- Automatic Fault Diagnosis in distribution Networks

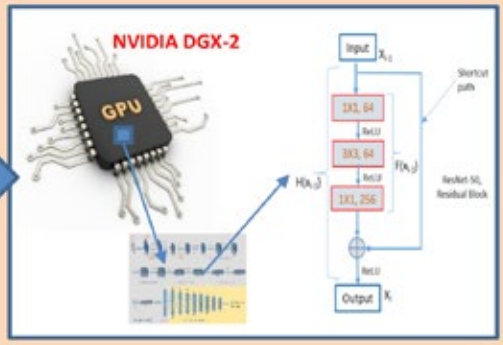
The laboratory is equipped with modern test and measuring instruments. This enables UG and PG students, faculties, project staff and researchers to work efficiently in the fields of signal processing, neural network, image and speech processing, etc. Major equipment available in this lab are:

- NI PXI-5652 Signal Generator.
- NI PXI-5611 RF Up-Converter.
- NI PXIe-5450 Arbitrary Waveform Generator.
- NI PXIe-5601 RF Down-Converter.
- NI PXIe-5622 Digitizer.
- NI PXIe-5791 Adapter Module.
- NI PXIe-7975 FPGA.
- NI 8880 Controller.
- USRP 2920.



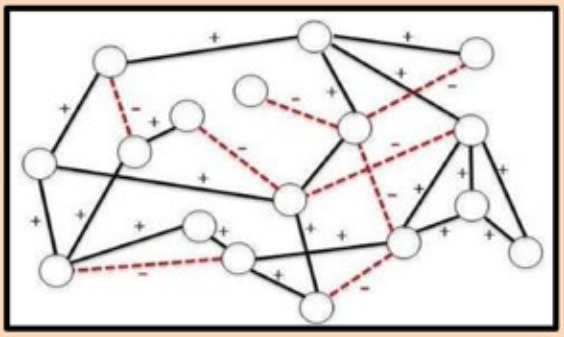
Blind Signal Modulation Identifier detects the type of modulation in unknown RF signal without any prior information of signal parameters. Clustering and regression analysis of the extracted constellation signature is used for recognition of different order of linear digital modulation schemes viz. ASK, PSK, FSK, and QAM in fading environment.

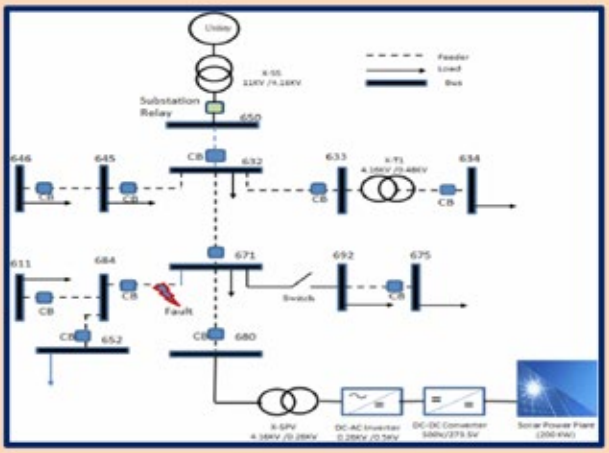




Modulation scheme in unknown RF signal is identified by mapping it into image domain, and applying supervised deep learning algorithms.

Modelling of complex networks facilitates to dig deep in the processes and dynamics that shape the real-world networks. Recently, Signed graphs (or networks) have been extensively studied due to its generalized nature. The research focuses on designing mathematical models and structural controllability of signed graphs.





Fast fault detection, classification and location in distribution network is a challenging task in the presence of renewable energy sources. Research work focuses on the application of signal processing and machine learning techniques to achieve the task.

12. Smart Grid Laboratory

This lab is dedicated to the study of distributed generations and their integration to the electrical grid. Research work is carried out in the following areas:

- Integration of solar PV and Wind energy systems into the electrical grid
- Control of distributed generation
- Integration of distributed FACTS devices
- Power quality issues in the integration of distributed generation

Facilities:

- Solar power generating Experimental Equipment Model: KTE 7000SG
- Wind power plant Model no. EWG 1

13. Wireless and Microwave Laboratory

This lab is dedicated to the study of all aspects of testing and characterization of wireless communication signal. In addition, the lab also also consists of facilities dedicated to microwave active and passive devices. The research activities conducted in the lab are as follows:

- Design and characterization of Microwave antenna and passive circuits (filters, couplers, crossover etc.)
- Design and characterization of Microwave active circuits (LNA, PA etc.)

The lab is also conducted for teaching activities which are as follows:

- Contemporary Communication System Laboratory
- Communications Engineering Lab.
- RFIC laboratory

Facilities:

- ENA Series Network Analyzer (300KHz-20GHz).
- ENA Series Network Analyzer (100KHz-4.5GHz).
- Power Meter.
- Triple Output DC Power Supply.
- Function Waveform Generator (300MHz).
- EXA Signal Analyzer (9KHz-3.6GHz).
- EXA Signal Analyzer (9KHz-26.5GHz).
- MXG Analog Signal Generator (100KHz-3GHz).
- MXG Analog Signal Generator (100KHz-20GHz).
- ME1000 RF Training Kit (Tx-Rx).
- ME1300 Antenna Training Kit (Tx-Rx).
- ME1100 Digital RF Communication Kit.
- VSA89600 Software 1 set for 15 users).
- Digital Phosphor Oscilloscope (200MHz).
- Oscilloscope (200MHz).
- Single Channel Arbitrary/Function Generator (25MHz).
- NI PXIe-1075 Chassis: NI PXIe-8108 Controller, NI PXIe-5652, NI PXIe-5601, NI PXIe-5622, NI PXIe-5450, NI PXIe-5611, NI PXI-5600, NI PXI-5610, NI PXI-5441, NI PXIe-5641R, NI PXI-5691, NI PXI-5652, NI Developer suit for Lab-view DS1 2011, NI Modulation Tool kit 4.3, NI Modulation Tool kit 4.1, NI Modulation Tool kit 4.2.1, NI Spectral Measurement 2.5.1.
- Logic Analyzer TLA6404.

With the rapid technological improvements in hand-held devices such as tablets and mobile phones, the requirement of faster access of wireless resources is ever increasing. The Microwave & millimeter-wave research group mainly focuses on design and characterization of active and passive components for modern transceivers. Currently, a broad study of microwave/ millimeter-wave circuits and systems based on substrate integrated coaxial line (SICL) technology is conducted by this group to explore the self-packaged, low-group delay, low-loss and wideband transmission properties of SICL.

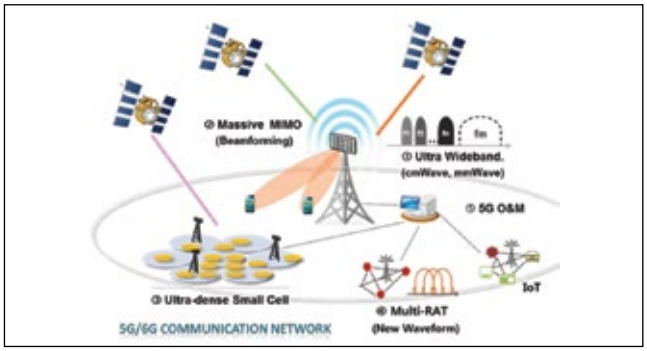
14. Wireless Communications and Navigation Laboratory

The Wireless Communications and Navigation Lab's research spans several aspects of wireless communications and communication signal processing, with the aim to provide for theoretical breakthroughs as well as practical solutions to problems pertaining to futuristic communication networks. In particular, the focus is on the information theoretic performance analysis of wireless communication systems including multiuser communication networks, cooperative communication networks, MIMO communication systems, and algorithmic solutions to satellite based navigation receiver design.Our research is highly conducive to multi-disciplinary collaboration; it builds on a diverse set of theoretical breakthroughs in information theory, communication theory, large deviation theory, matrix theory, linear algebra, and coding theory.

Facilities available in the laboratory:

- Computing Facility- In addition to high performance computation facility of the institute the lab has several workstations for system simulation studies.
- Testbed Facility -2x2 Multiple Input Multiple Output Transceiver Setup, NI USRP units, GNSS Satellite Signal Acquisition Setup, NavIC Software Signal Simulator and Receiver, IoT Network Setup
- Equipment -Data Acquisition Unit, Logic Analyzer

The work includes design and development of baseband signal processing algorithms for signal acquisition, code and carrier tracking, control lock detection, accumulated delta range computation and data demodulation for NavIC System. The scope of the proposed work also includes development of algorithms, for multipath mitigation, anti-jamming and anti-spoofing, that ensure proper functioning of NavIC receiver even in the indoor and urban environments with relatively high interference levels. Satellite signals are captured and recorded, further to be used for receiver development and other academic purposes. And in our laboratory an active work going in wireless sensor networking with RF energy harvesting and IoT development. A research on wireless sensor networking going on with introduction of supercapacitor in contrast to ideal battery. Modelling of the imperfection in such systems, particularly in context of RF energy harvesting has been done recently. Further, the development of IoT networking with generic protocol stack is going on with availability of various IoT modules in the lab. Integration of various sensors with IoT modules, testing, data acquisition etc., have been key recent activities.



Department of Humanities & Social Sciences

The Department of Humanities and Social Sciences operates from spaces that give us an opportunity to act as an interface between empirical and experiential knowledge systems. Playing a significant role in the academic curriculum of the young engineers, we offer both core and elective courses at the Bachelors, Masters, and Doctoral levels. The ability to provide tools and skills for specific aims notwithstanding, the essence of Humanities and Social Sciences involves the sensitizing of individuals. Acting as facilitators, thus, we engage in meaningful interactions with students and help them witness, study, and understand the interplay among technology, society, and humanity. With students from a spectrum of backgrounds, the Department provides an enriching platform where technical education can be complemented with human and social understanding. This task assumes even more significance in an educational context where the brightest young minds of India come together.

The following are the faculty members associated with the department:

Name & Research Areas

Ankita Sharma

Head of Department
Psychology: Gerontology, Clinical and Positive Psychology

Mayurakshi Chaudhury

Sociology/Sociocultural Anthropology: Gender Studies; Postcolonial South Asia; International and Transnational Migrations, Qualitative Research

K. J. George

Philosophy: Applied Ethics, Ethics of Technology, Bioethics

Vidya Sarveswaran

English: Literature and Environment (Ecocriticism), Film and Literature, Literatures of the Global South, Regional Literatures in Translation, American Literature

V. Hari Narayanan

Philosophy: Cognitive Studies, Evolutionary Theory, Analytic Philosophy and Mindfulness

The following Faculty Members and Young Faculty Associates joined the department during this financial year:

Name & Research Areas

Farhat Naz

Natural Resource Management; Water Governance; Disaster Risk Reduction; Climate Change Adaptation; Resilience; Poverty Reduction; Agroforestry; Gender; Social Exclusion; Caste; Governance Studies; Intersectionality; Diaspora Studies

Parichay Patra

Film Studies: Transnational Cinema, Film History and Historiography, Film Aesthetics

Kaamya Sharma

Cultural Studies, Visual and Material Culture, Popular Culture, South Asia

Prasenjeet Tribhuvan

Anthropology of Material Objects, STS studies in Sociology, Political Ecology, Tourism and Youth Subcultures

Young Faculty Associate & Research Areas

Mithu Rani Kuiti

Green Supply Chain Management, Reliability Theory

The following academicians are engaged with the Department as Adjunct Faculty Members:

Arjun Ghosh (2019-2020)

Associate Professor
Digital Humanities and Performance Studies
IIT Delhi

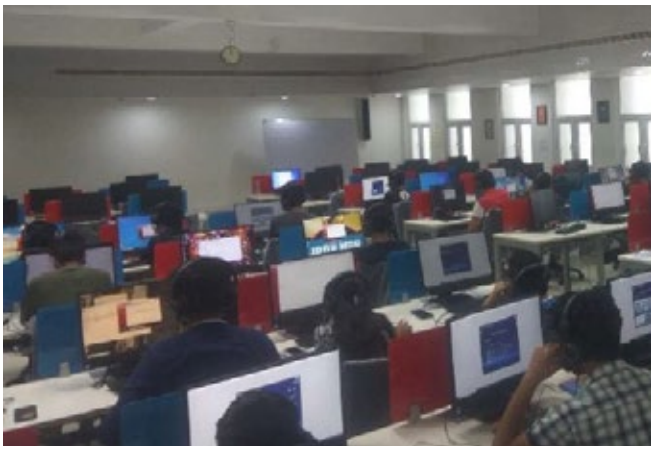
Mr. Prasenjit Kundu (2019-2020)

CEO, SkillSoincs India Pvt. Ltd.

The following laboratories are functioning in the Department of Humanities & Social Sciences:

1. Multimedia Language Laboratory

The Language Lab located within the Central Library at IIT-Jodhpur is designed to provide students with an interactive learning environment for practical training in English. The lab actively engages students in exercises through its collaboration with SANAKO, a company that produces specialized software to enhance language learning for non-native English speakers. ELT instructors in the lab assist students in developing effective communication skills based on the LSRW model (Listening, Speaking, Reading and Writing) through specific activities such as speed reading, in-depth reading, declamation, practice for better grammar, listening comprehension, round table discussion, speech practice with phonetics, intonation, voice modulation, pronunciation, and exercises to improve writing emails, official letters, reports, and essays. The lab also supplements classroom learning by enabling students to practice independently and in groups with the use of state-of-the-art, multimedia equipment. The spatial layout and software facilities of the lab are designed to maximize immersive language learning. Through the lab, the institute's students and staff from disciplines ranging across the engineering, sciences, humanities and social sciences have access to the best digital tools and hands-on training towards developing fluency and mastery of English.

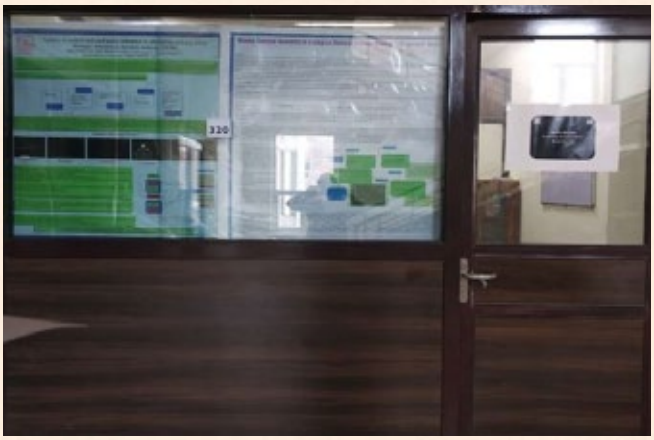


Multimedia Language Lab class in session

2. Psychology Laboratory

The Psychology laboratory is part of a research facility in the Department of Humanities and Social Sciences in Indian Institute of Technology Jodhpur. This is a Positive-Cognitive Psychology lab focusing on 'OPTIMAL HUMAN FUNCTIONING'. We work towards understanding, intervening and promoting wellbeing and excellence of human beings. Currently, work in the lab is focusing on Decision-making, Social Cognition, and Wisdom. The work revolves around three themes: 1) Cognitive Functioning and Psychological Tendencies, 2) Skills, ability and well-being management in personal, educational and organization context, 3) Performance assessment, management and enhancement.

The Psychology Lab provides an understanding of the functioning of brain and mind and their interrelationship with behavior. Some of the concepts of Psychology which can provide input for students as engineers are perception (biases and illusions involved), decision making (algorithmic and heuristic thinking, associated cognitive errors and biases; as students are learning (style and strategies), memory (mnemonic strategies and distortions); as individuals are identifying strength, emotional intelligence, social cognition, etc. The laboratory is equipped with tools and software like EEG Neurofeedback System, E-prime, Speech recognition software, Wisconsin Card Sorting Test, IOWA Gambling Task, Stroop Test, SPM, NEOPI-R, Emotional Intelligence Questionnaire, and Social Responsiveness Scale etc.



Department of Mathematics

Mathematics, being the basis of many disciplines, is a subject that evolves with time and creates new theories to solve real-world challenging problems. The department has been taking a leading role in developing new methods to model such situations that can be used in diverse areas of computer science, engineering, and basic sciences. We are excited to offer high-quality programs at postgraduate level for students who wish to apply math to science or engineering such as a two-year M.Sc. program in Mathematics, a four-year M.Sc.-M.Tech. program in Mathematics-Data and Computational Sciences, a two-year M.Tech. program in Data and Computational Sciences. We also offer an M.Tech.-Ph.D. dual degree program in Data and Computational Sciences and a Ph.D. Program with specialization in different areas of Mathematics to those who wish to earn a deeper understanding of pure and applied Mathematics. The department has faculty with research interests in the areas of Algebra, Mathematical Physics, Fluid Dynamics, Scientific Computation, Lie Groups and its Applications, Numerical Analysis, Partial Differential Equations, Topological Dynamics, Low Dimensional Chaos, Dynamical Systems, Renormalization in Low-dimensional dynamics, Wavelet Analysis, Fractional Transform Theory, Image Processing, Financial Risk Analysis, Categorical Data Analysis, Reliability Theory and Applied Probability.

The following faculty members are associated with the department:

Name & Research Areas

Gaurav Bhatnagar

Head of Department
Wavelet Analysis, Fractional Transform Theory, Multimedia Security, Image Processing, Information Fusion

Vivek Vijay

Financial Risk Analysis, Categorical Data Analysis, Regression

Kirankumar R. Hiremath

Theoretical, mathematical and computational aspects of wave-matter interactions

V. V. M. S. Chandramouli

Dynamical Systems, Renormalization in Low-Dim Dynamics

Puneet Sharma

Topological Dynamics, Low Dimensional Chaos

The following Faculty Members and Young Faculty Associates joined the department during this year:

Name & Research Areas

Abhishek Sarkar
Elliptic partial differential equations

Nil Kamal Hazra
Reliability Theory, Applied Probability

Dilpreet Kaur
Algebra (Group Theory)

Sukhendu Ghosh
Hydrodynamic Instability; Differential Equations; Lie Groups Applications; Dynamical Systems

Moumita Mandal
Numerical Functional Analysis

Vandana Sharma
Reaction-Diffusion Systems, Parabolic Partial Differential Equations, and Mathematical Biology

Professor I. K. Rana, Department of Mathematics, IIT Bombay, is associated with the department as Adjunct Faculty Member.

Department of Mechanical Engineering

The Department of Mechanical Engineering at IIT Jodhpur is devoted to impart quality engineering education and pursuit the excellence in research. It is dedicated to prepare students to face the emerging challenges of forthcoming decades. The vision of the Department is to attain synchronous evolution of pedagogical pursuit and research initiatives to nurture young minds finding technological solutions for emerging engineering challenges. The department offers B. Tech. M. Tech. and Ph.D. in Mechanical Engineering within three broader domains of Thermofluids, Design and Smart Manufacturing. Looking at the diaspora of current and futuristic technology demand, the following four specializations are envisioned to be nurtured and expanded by the Department, namely (i) Micro-Nano Engineering (ii) Energy Engineering, (iii) Design Engineering, and (iv) Smart Manufacturing. The students also have the opportunity to work with interdisciplinary specializations in emerging areas like Artificial Intelligence (AI), Internet of things (IoT), Smart Healthcare, and Cyber-Physical Systems (CPS). The flexible curriculum structure of the Department also allows and encourages undergraduate students to pursue a management or entrepreneurial career.

At IIT Jodhpur, mechanical engineers are educated in a way not only to adapt but to define direct change. This is reflected in the portfolio of the current activities of the department. Faculty members are involved in a wide range of projects in the areas of energy conversion and power systems, heat transfer and fluid mechanics, mechanics of solid, mechanical vibrations, robotics, autonomous unmanned vehicles, design optimization, acoustics and noise control, control systems, rotor dynamics, nano-materials, biomechanics, bio-inspired thermofluids, fluid-structure interaction, conventional/nonconventional manufacturing, and multi-scale manufacturing to name a few. Additionally, efforts are being made to introduce advanced concepts like smart manufacturing, Industry 4.0, Smart scientific computing techniques, high-performance computing, applications of artificial intelligence, machine learning algorithms, sensors, and IoT as a part of solving interdisciplinary problems requiring mechanical engineering knowhow. Keeping a balance between theory and hands-on experience, the department intends to provide its students with a solid foundation in core as well as emerging areas of mechanical engineering by inspiring critical thinking and nurturing problem-solving skills. Technology Tracks include the following.

1. Smart Manufacturing and Industry 4.0
2. Multi-scale Manufacturing
3. Processing of Novel Materials
4. Fluid Thermal System Design
5. Multiphase Flows
6. Microfluidics
7. Energy and Sustainability
8. Solid Mechanics and Design
9. Vibration and Acoustics
10. Robotics and Mobility Systems
11. Aerodynamics
12. MEMS

The following Faculty Members are associated with the department:

Name & Research Areas

Prodyut R. Chakraborty

Head of Department
Heat and mass transfer, Latent heat-based storage device for high temperature applications, Alloy solidification process, Active and passive solar cooling systems, Electronic cooling

Hardik B. Kothadia

Multiphase Flow, Boiling and Condensation, Heat Transfer, Fluid Mechanics, Gasification

Anand Krishnan Plappally

Water, Water Management and Characterization of Engineered Materials

Kaushalkumar A. Desai

Modeling of Manufacturing Processes, CAD/CAM, CNC Machining, Error compensation

Barun Pratiher

Dynamics of Machines and Structures, Flexible Robots, MEMS, Rotor Dynamics, Nonlinear Oscillations

Rahul Chibber

Welding and joining, Manufacturing and materials processing, Mechanical behaviour of materials

B. Ravindra

Design, Dynamics, Vibration and Control

Suril V. Shah

Robotics, Multibody Dynamics and Control

C. Venkatesan

Helicopter Dynamics and Aeroelasticity, Design of Autonomous Mini Helicopters, and Smart Structure Analysis

Sudipto Mukhopadhyay

Energy Technology, Combustion Technology, Computational Fluid Dynamics, Turbulent flows, Sprays

The following Faculty Members and Young Faculty Associates joined the department during this year:

Name & Research Areas

Amrita Puri

Active noise control; Active vibration control; Experimental modal analysis; Acoustics

Jaiveer Singh

Microstructure-mechanical property correlation; Deformation and fracture mechanisms; Metal forming processes; Additive manufacturing; Thermo-mechanical processing of materials; Design and development of alloys; Mechanical behavior of materials

Ankur Gupta

Microsystems Fabrication

Nipun Arora

Flapping wing aerodynamics; Fluid-structure interaction; CFD with Lattice Boltzmann method; Turbulence and moving boundary simulations; High performance computing; Electrorheological Fluids

Arun Kumar, R.

Experimental Aerodynamics - Confined Jets, Shock Wave Reflection and Transitions, Ejector Flows

Shobhana Singh

Thermal energy systems: Thermal energy storage, Solar dryers, Heat pumps, Heat exchangers; Heat and mass transfer analysis; Dynamic and multiphysics modeling; Computational fluid dynamic modeling; System and design optimization; Renewable energy integration; Electrochemical carbon capture

Atul Kumar Sharma

Solid Mechanics; Continuum Mechanics; Computational Solid Mechanics; Mechanics of Soft Active Materials; Wave Propagation in Soft Active Composite Materials; Topology Optimization

Shrutidhara Sarma

Thin film nanocomposite temperature sensors, nanocomposite materials, flexible sensors

Chandan Pandey

Welding, Heat treatment, Nuclear grade material, Mechanical behavior of materials, Material processing

Professor Ashok Joshi, Department of Aerospace Engineering, IIT Bombay, is associated with the department as Adjunct Faculty Member.

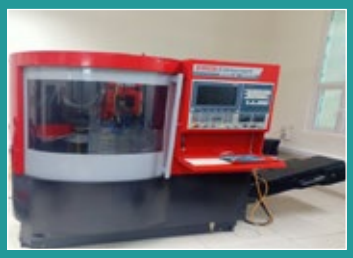
The following laboratories are functioning in the Department of mechanical Engineering:

1. Advanced Manufacturing

The advanced manufacturing laboratory houses CNC Machine Tools, 3-D Printers and manufacturing simulation software to support academic and research activities in the domain of CNC Machine Tools, CAD/CAM, New product development and Smart Manufacturing. The laboratory supports the academic activities of the department in the above-mentioned areas. The research groups associated with the laboratory has developed physics-based process models for machining operations using computational tools and validated the same using experimental facilities available in-house. The laboratory also facilitates the development of prototypes for various applications ranging from mechanical, automotive, aerospace and healthcare industries using 3-D printing technology. Considering recent impetus to Industry 4.0, the laboratory is expanding to develop indigenous technological solutions to implement smart manufacturing for various processes.

The Advanced Manufacturing Laboratory is equipped with the following facilities:

1. CNC Machine Tools and Smart Manufacturing
2. 3-axis CNC Vertical Machining Center
3. On-Machine Probing System
4. Table mounted Dynamometer
5. 3-D Printer
6. Polyjet 3-D Printer
7. Fused Deposition Modeling 3-D Printer (2 Nos.)
8. Computer-Aided Designing and Analysis
9. ANSYS
10. DEFORM - 3D
11. SolidWorks
12. Creo
13. AutoCAST



2. Central Workshop

The central workshop is the central facility of Institute, consisting of various workshops such as Welding shop, Carpentry shop, Fitting shop, Sheet metal shop, Foundry and Heat treatment shop and Machine shop. Undergraduate Students get hands-on experience in the above sections by doing the job work and carrying out projects as part of their coursework and also students utilize the facilities for fabrication purpose of their academic projects. It also supports the R&D projects of the institute handled by various faculty members and PhD and M.Tech. thesis work of research scholars by providing them assistance in the fabrication of their research set-ups. The following machines and equipment are available in the Central Workshop:

1. Welding Fume Extraction Down Draft Table
2. Multi-process Welding Equipment
3. Portable Single Phase MIG/MAG
4. AC/DC Welding Equipment
5. MIG/MAG Welding Equipment
6. Treadle-operated Shearing Machine
7. Hand-operated Folding Machine
8. Kaizen Muffle Furnace
9. Hand-operated Jeeny or Burying Machine
10. Motorized Circle Cutting Machine
11. Hand-operated Circle Cutting Machine
12. Hydraulic Shearing Machine
13. Portable Heating Plant
14. Portable Hardening plant
15. Forging Heating Plant
16. Aluminum Melting Plant
17. Fitting Table
18. Mould Making Facility, and
19. Tool Grinder

3. Industrial Engineering Laboratory

The industrial engineering lab in the department of mechanical engineering consists of several experimental set up covering different domains of the subject. Experiments in the curriculum are designed for better understanding of Value engineering and value analysis. Students are given real-time exposure of quality control with experimental data used to prepare control charts, such as X, R, σ, C, P and nP. The laboratory has the following experiment kits to perform several laboratory activities:

- Finger dexterity test.
- Tweezer dexterity test.
- Grooved keyhole pegboard
- Purdue pegboard.

The experiments and activities of Industrial engineering lab are closely aligned with the theoretical teaching, so as to give necessary hands-on exposure to students.

4. Metrology Laboratory

The Metrology Laboratory facilitates the academic and research activities associated with the understanding of various measuring and inspection activities for manufactured components. The laboratory encompasses a set of classical measuring and gauging instruments, computer-controlled measuring machines and associated software to determine appropriate dimensional and geometric tolerances for the components. The laboratory facilitates the conduct of well-designed experiments to familiarize students with working of measuring tools, equipment and quality control procedures.

The Metrology Laboratory is equipped with the following facilities:

- Tool Maker Microscope
- Profile Projector
- Autocollimator
- Optical Interferometer
- CNC Form and Roughness Measuring Machine
- Coordinate Measuring Machine
- MCOSMOS

5. Dynamics of Machine Laboratory

Kinematics and Dynamics Laboratory has been designed to primarily focus on mechanism and dynamic analysis of the mechanical system in helping the students to understand the behaviour of the various mechanisms and forces acting on them. This lab is well equipped with various mechanisms and machines such as Motorised Gyroscope Apparatus, Static and Dynamic, Balancing Apparatus, Universal Governor Apparatus, Coriolis Component of Acceleration Apparatus, Epicyclic Gear Train Apparatus, Cam Analysis Machine Apparatus, Universal Vibration Apparatus, Stroboscope, and Tachometer.

6. Helicopter Laboratory

Helicopter Laboratory mainly focuses on the development of hover capable aerial vehicles with autonomous capabilities. At present, hover capable configurations of vehicles available are quadrotors and conventional mini-helicopters. The major area of research focus is on the development of indigenous autopilot system consisting of microcontrollers, sensors, actuators and wireless communication, data processing, control, navigation algorithms. In addition, several test rigs have been developed for the characterization of brushless motors, and for testing the control algorithm for stabilization of quadrotors. Development of mathematical formulation for various maneuvers in auto mode, and implementation and flight testing of the vehicle in an outdoor environment are other key areas of research undertaken in this laboratory. The software architecture and source code for all tasks are fully developed in this lab. Further, the lab also aims at the design and development of mechanical hardware of multi-rotors and helicopters.

At present the equipment available in the Helicopter Lab of the institute are:

- Quadrotor Platforms
- Conventional Mini-helicopters
- Control Rigs for Multirotors
- Setup for Motor Characteristic Estimation
- Oscilloscope
- Variable Voltage and Current DC Supply Unit
- Soldiering Station
- NI PXI System
- Atmel and Arm microcontroller development boards
- Lord MicroStrain IMU
- MEMS sensors such as accelerometer, gyroscope, magnetometer, barometer
- GPS receivers and sonar

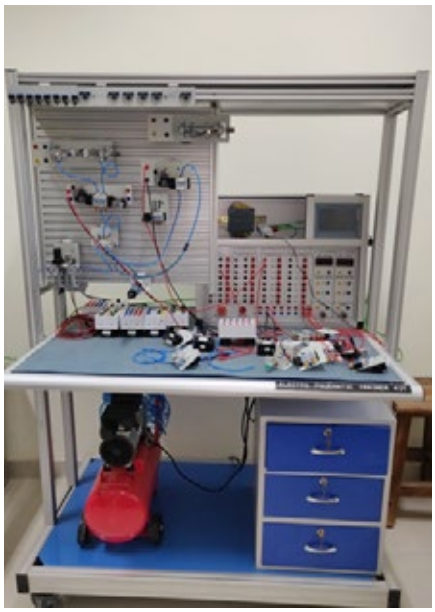
7. Mechatronics laboratory

Mechatronics and IoT lab at IIT Jodhpur is established to impart state of the Art interfacing of mechanical systems with sensors, actuators and microcontrollers. The projects include microcontroller and internet of things (IoT) based design of consumer appliances, healthcare and transportation and automotive domain.

The UG laboratory equipment and projects include:

- Dissection and assembly of consumer appliances
- Creating the Internet of things-based applications using microcontrollers
- Prototype solar tracker using microcontrollers
- Programmable logic controller (PLC) and Pneumatic circuits

- Programmable logic controller for material handling system (conveyor belt)
- Quanser CUBE servo control design with QUARC real-time interface
- Hardware in the loop (HIL) simulations and rapid prototyping with dSPACE
- Applications of computer vision and deep learning in mechatronics
- Sensors and Internet of things
- Software packages such as MATLAB, OpenCV, ADAMS, ANSYS, SOLIDWORKS, Pro-E



8. Robotics Laboratory

- The Robotics Laboratory is a part of Mechanical Engineering Department at Indian Institute of Technology at Jodhpur.
- Robotics laboratory is integral part of M.Tech. in Advanced Manufacturing and Design offered by the department where students get exposed to kinematic, dynamics, motion planning, programming, and control of robots.
- The laboratory focuses on research problems and innovative projects that extend the state of the art in robotics. The laboratory's research work is in the areas of Space Robots, Motion Planning, Vision based Control, Robot Mechanism Design and Computational Dynamics. The laboratory is equipped with diverse robot platforms and advanced sensors.

9. Vibration Laboratory

Vibration and Control laboratory has been established with the objective of measuring the vibration characteristics and subsequent control for vibrating the machine or structures. This lab offers various experimental techniques and principles to study vibration analysis and control strategies. This lab is well equipped with various testing, measuring, and monitoring equipment for conducting the experiments and demonstrations for teaching and research purposes.

10. Fluid Mechanics and Turbomachinery Laboratory

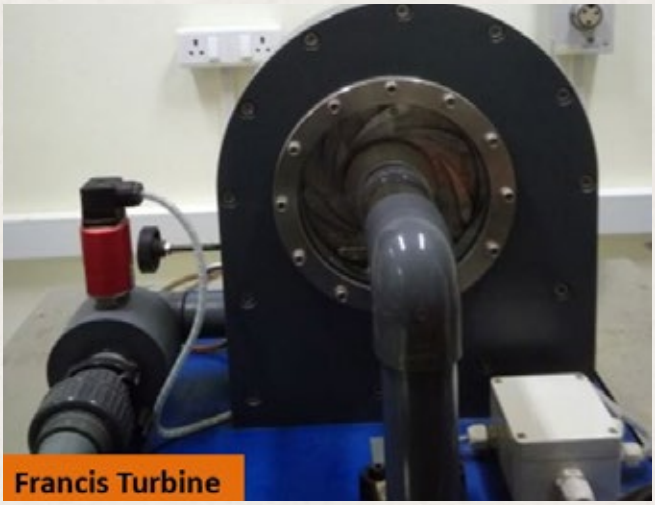
Fluid mechanics lab aims to provide hands-on exposure to students on various experimental flow measurement techniques. Students are introduced with the experimental flow prediction of a wide range of practical problems such as frictional flow through pipes, prediction of various aerodynamic coefficients over subsonic airfoils, wake flows, jet flows, turbulent flows in pipe etc. The laboratory also aims to provide a practical feel on the different fluid dynamic concepts involved in the measurement of various flow field parameters like velocity, pressure, flow rate etc.

The various facilities available at the institute Fluid Mechanics lab are as follows:

- Subsonic Wind Tunnel
- Pipe Friction Apparatus
- Reynolds Apparatus
- PIV simulator
- Various Flow Measurement devices

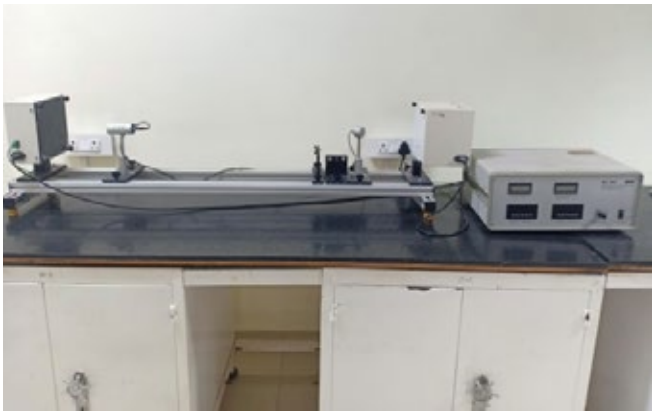
The turbomachines lab introduces students with various hydraulic turbomachines and their operational characteristics. The lab consists of test rigs for various hydraulic turbines and centrifugal pump. The miniature turbomachine units are mounted on a test bench with closed water circuit. A transparent cover provides a direct view of the turbomachine in operation and thus clearly illustrates the interaction of guide apparatus, water flow and runner. The test rigs are equipped with a volume flow meter, pressure sensors at the inlet and outlet pipes, tachometer and brake drum dynamometer which can be used to measure the input power, runner speed and torque and are shown using electronic display boards. Characteristics curves and performance curves for various hydraulic machines at various speeds can thus be evaluated. The various facilities available at the institute Turbomachines lab are as follows:

- Pelton Turbine (Impulse hydraulic turbine)
- Francis Turbine (Reaction hydraulic turbine)
- Centrifugal Pump



11. Heat Transfer Laboratory

The objectives of Heat Transfer Lab is to provide the practical knowledge with regard to the determination of the rate of heat exchange in various modes of heat transfer and to provide practical exposer to various temperature measurement instruments and its working principle. In the Heat Transfer Lab, students can expect to measure the temperature of objects using different temperature measurement instruments, measure the heat transfer properties of various metals, understand basic laws of radiation heat transfer, compare the performance of different convection processes. Students can expect to gain knowledge of heat transfer in solar thermal applications.


12. Energy Conversion Laboratory

Energy Conversion Lab aimed to improve the thermal performance of energy transfer processes. Knowledge of thermal performance of equipment helps to enhance efficiency from power-producing devices like thermal power plants, nuclear power plant, automobile engines as well as refrigeration devices. Knowledge of heat transfer is the key to this goal.

In recent times, research in this field has become more toward industrial applications and includes fields that are at the borderline of Physics. As manufacturing has become miniaturized, the study of heat transfer at the micro and nanoscale has become extremely important. The miniaturization of components provides enormous increment in the heat dissipation capacity of devices in engineering applications. The quest for enhanced heat removal leads researchers to two-phase flow and specialized surface modifications to enhance the heat transfer without leading to a pressure penalty. The intimate relation of the field with energy production has led to significant research in solar while also exploring the use of waste heat for industrial process implementation.

In the Energy Conversion Lab, students can expect to work on the industrial and most contemporary problems in each of these fields.

13. Automotive Propulsion

The increasing demand for vehicles worldwide is driving research for efficient and low emission automotive propulsion solutions. This lab aims to train today's engineers to basic and emerging technologies in automobiles. The lab is equipped with:

- Fuel quality measurement: Flashpoint apparatus, Bomb calorimeter,
- IC Engine rigs: Multicylinder petrol engine, Multicylinder diesel engine
- Emission analyzer: AVL CDS 450
- In-cylinder diagnostics: Kistler box
- Cut section models: 2-S Engine, 4-S engine
- Combustion physics: Cantera, ANSYS FORTE, FLUENT
- IC Engine simulation: Lotus Engine Simulation
- EV simulation: AmeSIM

14. Refrigeration and Air Conditioning Laboratory

In the refrigeration and air conditioning lab, students assess various kinds of refrigeration systems such as vapour compression, vapour absorption, vortex tube, etc and evaluate their performance. They study the characteristics of heating and ventilation and analyze psychrometric processes. The cut section models of hermetically sealed rotary and reciprocating compressors are available to provide a thorough knowledge of various components, their purpose and maintenance. The disassembled window air-conditioner and a domestic refrigerator are also present to impart a practical understanding of their working principles. The lab is equipped with the following facilities:

1. Vapour compression test rig
2. Vapour absorption test rig
3. Vortex tube cooling apparatus
4. Ventilation and air distribution setup
5. Cut sections of rotary and reciprocating compressors
6. Disassembled window air conditioner and domestic refrigerator
7. Psychrometer
8. Steam jet injection test rig

Department of Metallurgical & Materials Engineering

The Department of Metallurgical and Materials Engineering at IIT Jodhpurhas started in January 2017 with a vision of imparting high-quality education in the areas of Materials Engineering to address continuously evolving demands of new materials in the fast-evolving sectors such as, energy, aerospace, defence, healthcare, transport, etc. The department is currently offering degree programs namely, B.Tech., M.Tech., and Ph.D. in Materials Engineering which are designed through a unique combination of foundational courses, core courses and electives from the following four thematic areas or streams

- Structural Materials
- Functional Materials
- Computational Materials Engineering
- Process Metallurgy

The Faculty Members in the department have expertise in diverse areas of Materials Engineering. They are actively involved in conducting translational research in the fundamental and applied areas of Materials Engineering. The department frequently organizes invited lectures and workshops to share research findings, train students on the state of the art experimental and computational techniques to promote the development of skill sets. The Department welcomes bright people who aspire to utilize the power of ambitious research and teaching to shape a better future.

Following are the details of the faculty members associated with the Department:

Name & Research Areas

Bhagwati P. Kashyap

Head of Department
Thermo-mechanical treatment and Super-plasticity, Grain boundary phenomena, Creep and low temperature deformation, Microstructure - flow property correlations, and Light metals and alloy development

Abir Bhattachayya

Mechanical Behavior of Materials, Fatigue of Bearing Steels, High-strain rate Deformation of Materials, Indentation Response of Materials

Appala Naidu Gandi
First Principles Calculations, Phase Filed Modelling

Ravi, K. R.
Computational Thermodynamics for Alloy Design, Solidification Studies on light alloys, Biodegradable magnesium alloys, Self-cleaning coating

The following laboratories are functioning in the Department of Metallurgical & Materials Engineering:

Materials and Mechanics Laboratory

Materials and Mechanics Laboratory is a teaching and research facility in the department of Metallurgical and Materials Engineering consisting of various facilities for material testing, heat treatment, melting, mechanics and metallography etc. This lab provides facilities to test samples of different types of materials to find out their mechanical properties like modulus of elasticity, tensile and compressive strengths, stress-strain curve, bending properties, hardness etc. It also supports the R&D projects of the institute handled by various Faculty Members, Ph.D. thesis work and M.Tech. thesis work of research scholars.

The lab has following testing equipment:

1. Universal Testing Machine (Up to 50 kN)
2. Micro-hardness Tester
3. Spin Coater
4. Metallurgical Microscopes with Software
5. Stereo-zoom Microscope
6. Density balance
7. Muffle furnaces
8. Oven
9. Induction Melting Furnace
10. Hot Mounting Press
11. Precision Diamond Cutting Machine
12. Bend-saw Cutting Machine
13. High Speed Grinder
14. Polishing Machines
15. Spin Coater
16. Jominy End-Quench Test
17. Notch-Broaching Machine
18. Charpy Impact Test for Plastics
19. Beam deflection unit
20. Polarimeter

Department of Physics

A visible research in fundamental Physics along with its applications is the major theme of Physics department at IIT Jodhpur. The faculty members carry out research in the field of Astrophysics, Condensed Matter Physics & Material Science, Particle Physics, Experimental and Theoretical Quantum Optics, Quantum Information and Foundations of Quantum Mechanics. The research facilities available in the department include SQUID magnetometer, Physics Property Measurement Systems (PPMS), Raman Spectrometer and Scanning Tunnelling Microscope (STM).

Following are the faculty members associated with the department:

Name & Research Areas

Sampat Raj Vadera

Head of Department
Solid State Physics, Materials Science, Nanoscience and Nanotechnology, Stealth Materials, Stealth Technology

Satyajit Sahu

Information Processing in Biological Systems

Ambesh Dixit

Semiconductors, multifunctional ferroics & materials for energy-fabrication & characterization, Photovoltaic materials & devices ab initio DFT study and device simulations

Subhashish Banerjee

Open Quantum Systems; Quantum Information; Non-Equilibrium Statistical Mechanics; Quantum Optics

Ashutosh Kumar Alok

Particle Physics and Cosmology

Somnath Ghosh

Light in disordered and complex systems, Mid-IR photonics and unconventional devices

Durgamadhab Mishra

Magnetic thin films and nanoparticles, Permanent Magnets, Synchrotron and Neutron Scattering and X-ray imaging

V. Narayanan

Optics and Solar Field Design, Plasmonics, Laser Produced Plasmas (LPP), Pulsed Laser Deposition (PLD), Plasma Diagnostics (Interferometry & Optical Emission Spectroscopy (OES)), Laser Matter Interaction and Laser Cluster Interaction

Monika Sinha

Astrophysics, Astroparticle physics

The following new Faculty Members have joined the department during the financial year 2019-20.

Name & Research Areas

Amitava Mitra

Magnetism & Application of Magnetic Materials, Electromagnetic Techniques for Non-destructive Evaluation of Damage for Engineering Components, Research Planning & Project Management

Reetanjali Moharana

Astroparticle Physics, High energy Cosmic rays, Gamma rays and Neutrinos

B.M. Krishna Mariserla

Light-Matter interactions, Ultrafast Spectroscopy, Terahertz Spectroscopy, and Higher harmonic generation

Santosh Mogurampelly

Multiscale Modeling of Soft Matter Physics and Materials Science

Prabhat Kumar Jaiswal

Non-equilibrium Statistical Physics and Computational Physics

Shahab Ahmad

Condensed Matter Physics, Nanomaterials, Optoelectronics, Energy Storage Devices, Solar Cells, Photo-detectors, Light Emitting Diodes

Ram Prakash

Plasma Science & Technology: Low temperature plasma applications

The department also has a Scholar-in-Residence, *Professor K. L. Chopra*, Advisor, Thin Film Laboratory, IIT Delhi.

The following laboratories are functional in the Department of Physics:

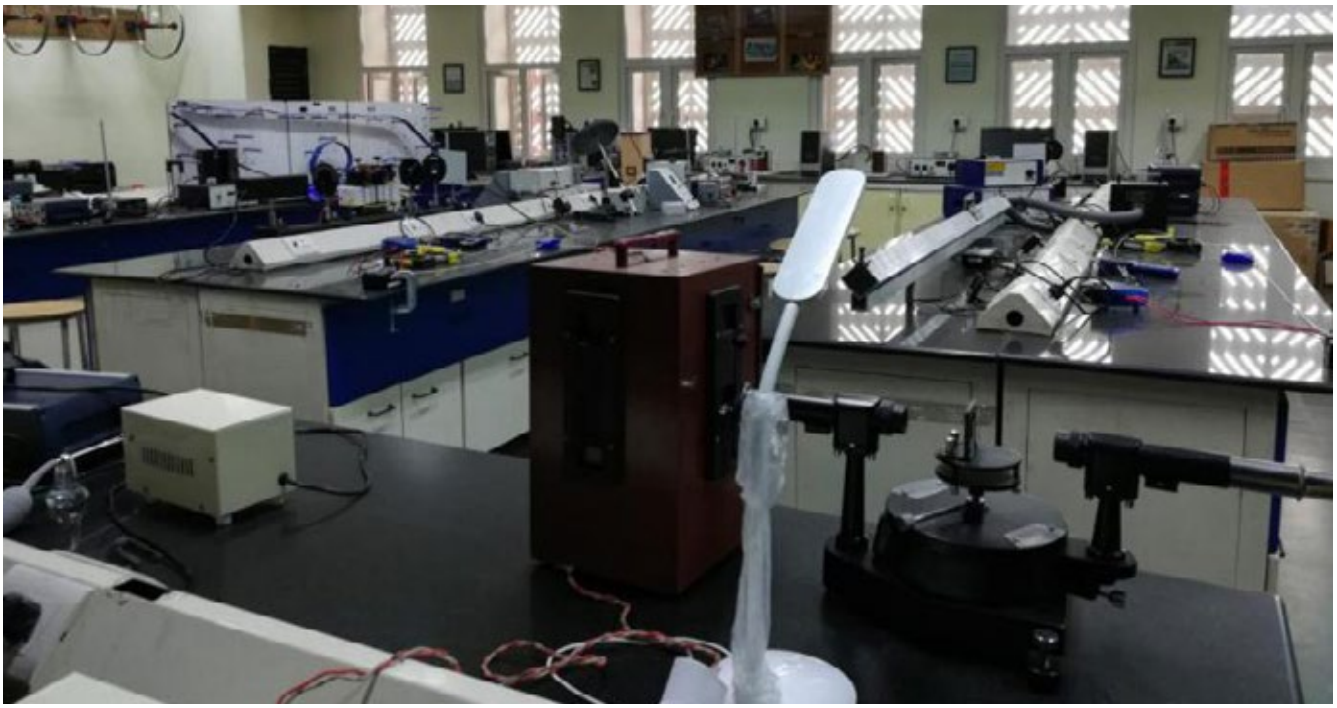
Experiential learning is an integral part of the various programs offered by physics department at IIT Jodhpur. The students grasp the theoretical concepts much better and quickly through the hands-on experience. Therefore, the department of Physics has established following laboratories for UG and PG students to enhance their comprehension of concepts taught in lectures as well as impart skills for their future professional growth.

In order to facilitate globally competitive cutting edge research and breakthrough technologies it is imperative to develop an atmosphere wherein the students and faculty members have free access to research facilities not only within the department but across all the departments oft he institute. Therefore, the department has set up four focussed research groups which carry out fundamental and applied research in the areas of (i) Quantum Physics, (ii) High Energy and Astrophysics, (iii) Optics and Photonics and (iv) Condensed Matter and Plasma Physics. These research groups are supported by the Thematic Research Laboratories catering to the need of the Faculty members, PhD students and Research staffs. The details of Laboratories (Teaching / Research lab, Thematic Research lab) and Research Groups of the Department are given below.

A. Teaching Labs

1. Basic Physics Lab

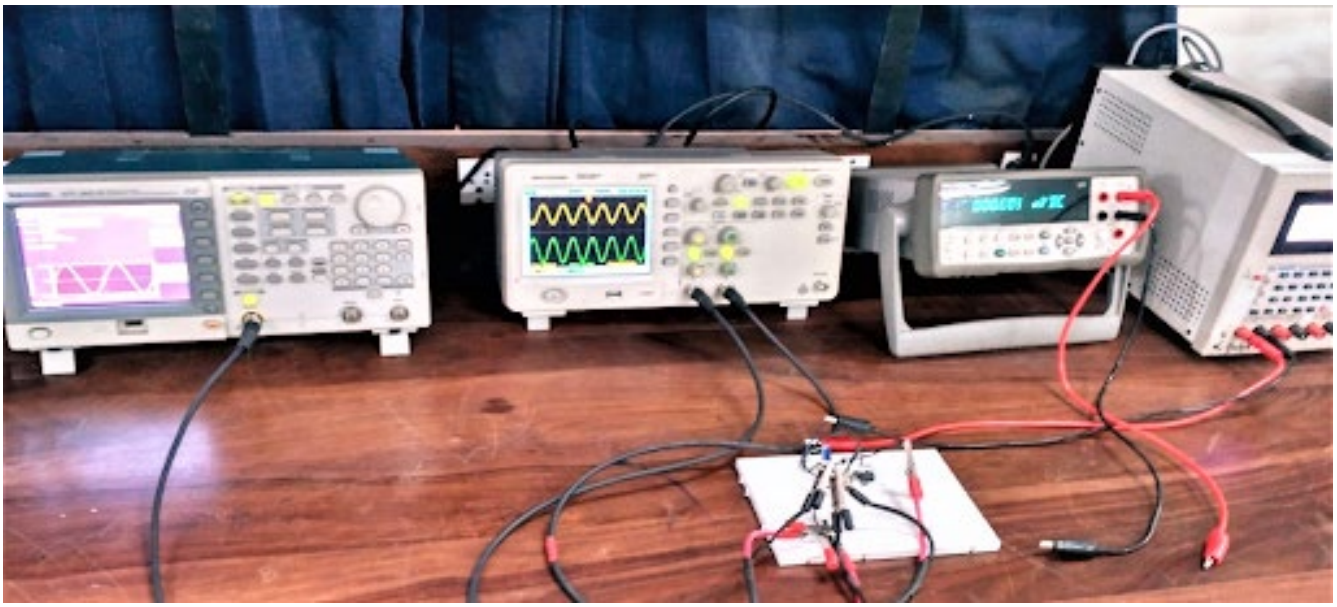
Typical experiments in the lab covers Electromagnetism (Hall effect, B-H curve tracing), Optics (Newton's Rings, Refractive index of prism, Diffraction of light, Faraday effect), Mechanics (Stationary waves in strings, Flywheels) and Electrodynamics (e/m-ratio with Helmholtz's coil, Basic current balance).



Basic Physics Lab

2. Electronics Lab

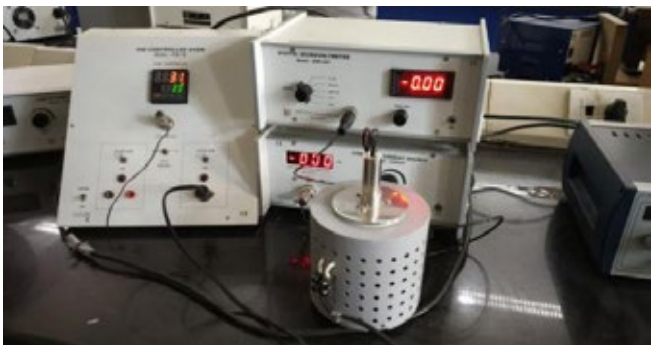
It is equipped with instruments that can be used to perform experiments related to transistors, Op-AMP, Digital circuits, etc.



Electronics Lab

3. Condensed Matter Physics Lab

The lab is equipped with four probe set up for temperature dependent conductivity measurement, band gap measurement of semiconductors, Hall apparatus etc. to measure the functional properties viz. electronic, magnetic, optical and thermal properties of materials.



Four probe set up

Hysteresis loop tracer

4. Atomic and Nuclear Physics Lab

This lab has various experiments such as Compton Scattering, Frank-Hertz Experiment, Photoelectric effect, Alpha particle spectrometer, Radiation counters etc. covering fundamental aspects of nuclear and atomic physics.

Millikan Oil drop

Photoelectric effect apparatus

5. Optics and Laser Lab

The experiments in the lab provide the conceptual understanding of geometrical & wave optics, and Lasers. It has several Intereferometers (Michelson. Fabry Perot, Mach Zehnder), optical fibers, laser diodes, Goniometers, prisms, polarizers to cater to the experiments.

6. Computational Physics Lab

The laboratory is equipped with several state-of-the-art workstations with multiple operating system environments. A number of computational and simulation programs including MATLAB® and Mathematica® are pre-installed. The standard flow of activities in this laboratory is to formulate/model the real-world and multi-Physics phenomena; develop algorithm; write code; execute the job on a computer; visualize and analyse obtained data; and finally, correlate/verify the results with the observed phenomena.

B. Research Laboratories

1. Thin Films and Device Lab

The lab is equipped with various thin film fabrication instruments including in-house developed low-cost solution processing techniques such as spin coater, dip coater, and hydrothermal cells together with more advanced and sophisticated DC and RF magnetron sputtering system for single and multilayer thin film depositions, and thermal chemical vapor deposition system to fabricate thin-film nanostructures in different geometries. The synthesis laboratory provides the opportunity to develop materials ranging from bulk thin films to 2D and 1D nanostructured thin-film structures on various substrates for different applications such as energy, water, health, and environment.

2. Multiscale Characterization Lab

This lab houses several state-of-the art characterization facilities viz. Scanning Tunneling Microscope, Physical Property Measurement System, SQUID Magnetometer, Multferroic measurement systems, etc. The department has also access to a wide range of other analytical equipment available at the Centre for Advanced Scientific Equipment (CASE) being managed at the institute level.

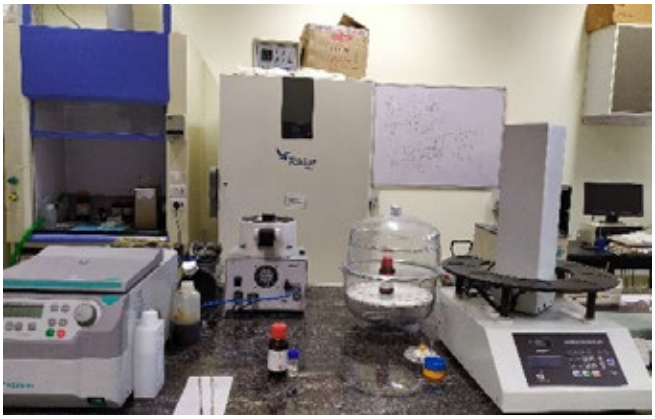
(1) Low temperature Scanning Tunnelling Microscope

(2) Electrical Transport Measurement system

Characterization of electronic properties of fabricated devices

3. Functional Materials Processing Lab

The lab is equipped with several advanced equipment such as High Energy Ball Milling, Pressure Machine, Plasma Etcher, a wide range of Furnaces, Glove Box, etc. The facilities will be further augmented with a number of state-of-the-art high-end process equipment for device fabrication.

Furnaces and Material Processing Units

4. Functional Materials Design Lab

This lab is developing into a state-of-the-art facility with dedicated instrumentation for the synthesis of new functional materials for high efficiency photovoltaic devices and batteries, single-molecule electronics devices. Moreover, novel ferromagnetic and ferroelectric materials, high-performance thermoelectric materials, and stealth materials for enhanced military capability are also being synthesized in this lab.


Synthesis and Functionalization of Quantum Dots

5. Nonlinear Photonics and Laser Lab

Nonlinear optical effects in the materials due to high-intensity laser pulses drive the research towards a deep understanding of light-matter interactions and development of novel photonic and nano electronics devices. In this lab fast dynamics using high intense and ultrafast lasers with broad spectral range, including UV-VIS, IR and THz will be carried out. Moreover, control and propagation of electromagnetic wave in disordered optical media, photonic devices and optical fibers are explored by computational and experimental techniques.

6. Quantum Optics and Quantum Information Lab

Along with various aspects of Quantum Physics efficient generation of entangled photons using short-pulsed laser and its characterization will be realized in this lab. Development of Single Photon Source and its characterization shall be performed. Optically generation of non-classical states shall be applied for carrying out challenging modern-day experiments in Quantum Physics.

7. Computational Physics Lab

The Computational Physics laboratory is being developed with several state-of-the-art HPC workstations. A number of computational and simulation programs including LAMMPS, GROMACS, QUANTUM-ESPRESSO, VMD, MATLAB®, and Mathematica® will be made available to the users of Computational Physic Laboratory. The recommended workflow of research activities in this laboratory includes: ideate the research problem, develop model/algorithm, write a code/script, execute the job on a workstation, analyse and visualize computer generated data; and finally, test/produce/analyse the computational results.

School of Management & Entrepreneurship

The School of Management & Entrepreneurship started in the Financial Year 2019-20. One Young Faculty Associate joined the School and faculty recruitments are underway. It is proposed to start offering a Tech MBA program and a Ph.D. program from the next Academic Session.

Prof. M. P. Gupta

Department of Management Studies, IIT Delhi, associated with the School during the financial year. He has been instrumental in setting up and operationalizing the School.

Center for Emerging Technologies for Sustainable Development

The Center for Emerging Technologies for Sustainable Development (CETSD) came into existence on 14 January 2020. This Center is headed by Dr. Anand Krishnan Plappally, Associate professor, department of Mechanical Engineering. The Center works towards attainment of sustainability development goals using the emerging technologies. The different functions of the center revolve in attaining its vision and mission. These are:

Vision

- To be a partner in tapping the potential of emerging technologies for creating a sustainable and prosperous future India.

Mission

- To help societies to understand interconnected sustainability challenges
- Provide a platform for non-governmental and governmental collaborators to work together to apply emerging technologies for finding solutions.
- Create a knowledge bank on Sustainable Development Goals (SDGs), with latest knowledge of the direction and status of leading technological developments.
- Research and develop models of technological impact and effective delivery of SDGs, take up appropriate disruptive emerging technology pilot projects with private and public institutions, and develop achievable solutions to the social, environmental and economic challenges facing the society.

Activities

Collaborations

1. MOU was signed between IITJ and NIRD&PR, Hyderabad
2. MOA was signed between IITJ and KVIC, Government of India.

Major Projects

1. Sirohi – The Aspiration District of Sirohi is close to Jodhpur. The development of Sirohi using the technologies created and developed by IIT Jodhpur and its collaborators in region is the aim. The project aims at the solving the problems faced by Sirohi District in areas of Health, Water, Air, Food and Governance. The collaborators include IGIB Delhi, AIIMS Jodhpur, DMRC Jodhpur, CAZRI and its KVKs, CEERI Pilani, Sarvepalli Radhakrishnan Rajasthan Ayurved University, ICAR-ATARI, Agriculture University, Mandore.
2. UBA- RCI- IIT Jodhpur is one of the regional coordinating institutes of the MHRD flagship program of Unnat Bharat Abhiyan. The Abhiyan is coordinater by IIT Delhi. Presently IIT Jodhpur is mentoring 41 institutions in 11 districts across Rajasthan.

Scientific Social Responsibility Projects

1. Project of Kitchen Garden Development for Social Justice and Empowerment Department, Jodhpur block in its Dr. B R Ambedkar Hostels across Jodhpur district was proposed on 31 March 2020 and successfully performed during the lockdown period. The kitchen garden is now in its production phase showcasing optimal vegetable and fruit productivity.
2. Installation of Ultra filtration for Re-use and Recycle of waste water at Jheepasni Village, Pradhyamic Vidyalaya is completed as of Oct 27 2020. This was performed in guidance of Prof Pradip Tewari, Head, Department of Chemical Engineering.

ETSD Seminar Series

The emerging technologies and sustainable development seminars are flagship programs of CETSD. It chooses the latest themes of discussion keeping in mind the latest emerging technologies and its application for attaining sustainable solution for engineering the problems of human society in the absence of technology. Till date Seminars were conducted on topics

1. Series 1: COVID-19 Pandemic Disaster: Water, Agriculture and Environment
2. Series 2: Industrial Development and Operational processes
3. Series 3: Emerging Engineering Horizons- Indian Defense Sector

Financial Support

The Institute has allocated Rs. 5 Lakhs for its working.

Affiliated Faculty and Staff Members

The CETSD has the following faculty members and staff members affiliated with the centre. More than 5 projects have been written for funding to various agencies in the last 8 months of its existence.

Mentor

Prof. Santanu Chaudhury, Director

Through Aspirational District Projects – Sirohi Model

Affiliated Faculty Members

Pradip Tewari

1. Richa Singh
2. Deepak Mishra
3. Farhat Naz
4. Anand Plappally
5. Amandeep Kaur
6. Sumit Kalra
7. Ram Prakash
8. Sushmita Jha
9. Sushmita Paul
10. Kaamya Sharma
11. Deepakkumar M. Fulwani

Affiliated Staff Members

1. Rimpesh Katiyar

Through UBA Projects

Affiliated Faculty Members

1. Ananya Debnath, UBA PI
2. Mahesh Kumar
3. Vivek Vijay
4. Ram Prakash
5. K J George
6. Arun Kumar Singh
7. Sumit Kalra
8. Sandeep Yadav
9. Anand Plappally
10. Jaiveer Singh

Affiliated Staff Members

1. Shashank Chaudhary
2. Vivek Verma
3. Hanwant Rathore
4. Nirmal Gehot
5. Poonam Chand Sankhla
6. Dheerendra Yadav
7. Narendra Singh
8. Rimpesh Katiyar

Center for Technology Foresight and Policy

The Center for Technology Foresight and Policy (CTFP) came into existence on 14 Januray 2020. This Center is headed by Dr. Deepak M. Fulwani, Associate Professor, Department of Electrical Engineering.

Under this Center a webinar was organized for the Faculty Members of the Institute on “Leading the Way with Foresight”, delivered by Mr. Sylvian Rochon, Futurist, Serial entrepreneur, Writer and author from Canada on 17 August 2020.

Inter Disciplinary Research Platforms

Digital Humanities (DH)

Digital Humanities at IIT Jodhpur is part of a platform for interdisciplinary research at the Indian Institute of Technology Jodhpur, created to meet the modern day technological challenges and towards a significant boost in impactful research in campus. DH @ IITJ is premised on project-oriented knowledge production on the practical application of methods and involves interdisciplinary collaboration workflows. Our endeavor at IIT Jodhpur is, in an active sense, to focus on and contribute to a composite of approaches (ideas and methods), rather than different approaches, that lay emphasis on preserving, reconstructing, transmitting, and interpreting human record historically and contemporaneously. In other words, we posit the field of DH at IIT Jodhpur on principles of interdisciplinary rather than multidisciplinary principles. This, in major ways, attends to epistemological questions on knowledge production about generating digital data from material objects, and rethinking of existing processes of knowledge production. Our research emphases include, but are not limited to Digital Culture, Digital Heritage, Digital Economy, Multimodal Data Analysis, and Digital Epistemologies and Methods.

The following Faculty Members from different departments are associated with this IDRP:

Department of Humanities & Social Sciences

1. Mayurakshi Chaudhuri, Coordinator
2. Kaamya Sharma
3. Parichay Patra
4. Prasenjeet A. Tribhuvan
5. Vidya Sarveswaran

Department of Computer Science & Engineering

6. Chiranjoy Chattopadhyay
7. Debasis Das
8. Santanu Chaudhury
9. Suman Kundu

Department of Mathematics

10. Gaurav Bhatnagar

From outside IIT Jodhpur

1. Arjun Ghosh (IIT Delhi)
2. Dibyadyuti Roy (IIM Indore)
3. Nirmala Menon (IIT Indore)

The following activities were organized under this IDRP during the FY 2019-20:

1. *Curriculum Development Workshop for Digital Humanities* at IIT Jodhpur was organized during 27-29 September 2019, which hosted discussions with experts in the field namely:
   - Professor Santanu Chaudhury
     Director, IIT Jodhpur
   - Dr. Dibyadyuti Roy
     Chair, Communication Area and Assistant Professor, Indian Institute of Management (IIM) Indore, and Co-Founder of Digital Humanities Alliance of India (DHAI) now DHARTI (Digital Humanities Alliance for Research and Teaching Innovations);
   - Dr. Bhabatosh Chanda
     Professor, Indian Statistical Institute, Kolkata; and

- Dr. Jawhar Sircar

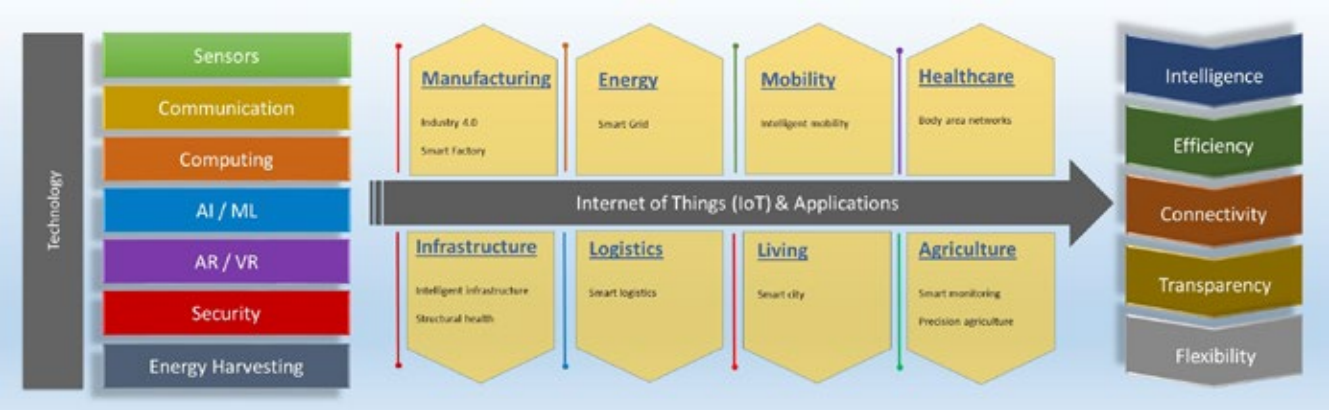
  Chair, BOG, Centre for Studies in Social Sciences, Kolkata, Retired IAS Officer, Former Secretary of the Ministry of Culture (GoI), Ex-CEO, Prasar Bharati (Akashvani & Doordarshan).

2. International Workshop on Big Data in Culture, Design and Heritage, and the Fifth IEEE International Conference on Multimedia Big Data was organized by IIT Jodhpur at National University of Singapore, Singapore during 11 - 13 September 2019.
3. On behalf of the Digital Humanities (IDRP) Research Group, Drs. Kaamya Sharma and Chiranjoy Chattopadhyay presented a research-in-progress poster titled *CRAFT: Collaborative Rejuvenation of Art, Furniture, and Textile* at the first International Heritage Symposium and Exhibition 2020 held at the National Museum, New Delhi, during 15-16 January, 2020. This project is part of a larger GoI project on Jodhpur City Knowledge and Innovation Cluster and aims to develop a facility that will function as an interactive, working space for academics, craft producers making a variety of craft objects, and industrial collaborators for design innovation.
4. The following guest lectures were organized as a part of the Guest Lecture Series in Digital Humanities at IIT Jodhpur:

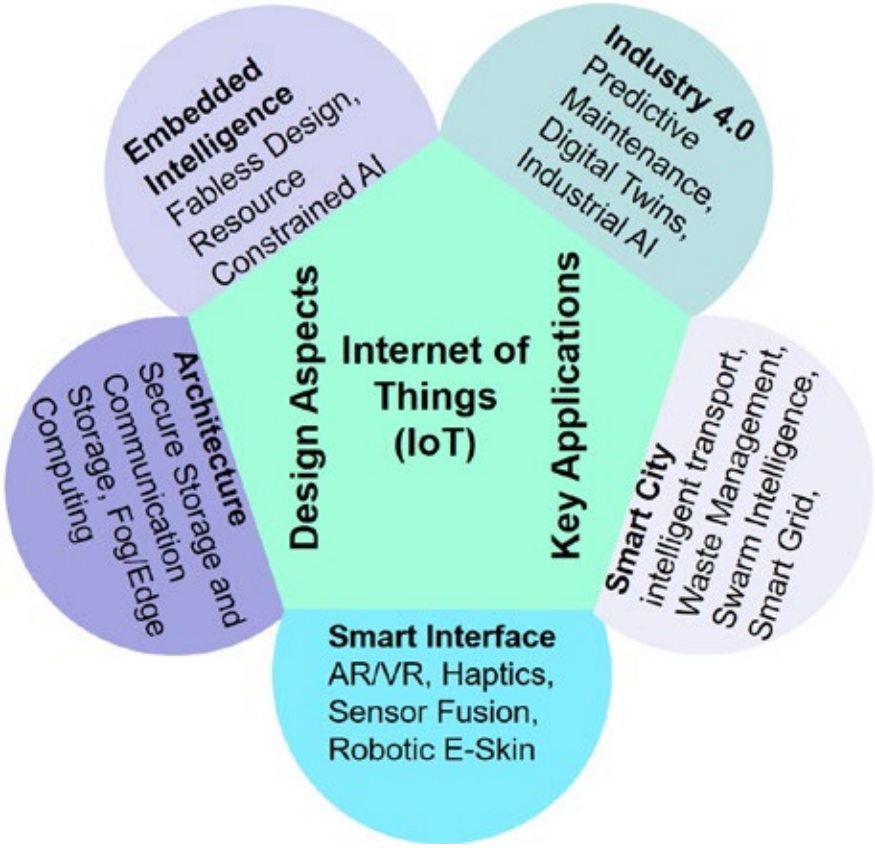
Sl. No.	Name of the Speaker	Date
1.	Dr. Arjun Ghosh Associate Professor of Literature Indian Institute of Technology Delhi	16 August 2019
2.	Dr. Dibyadyuti Roy Assistant Professor Indian Institute of Management Indore	30 September 2019
3.	Dr. Nirmala Menon Associate Professor of English Indian Institute of Technology Indore	5 November 2019

Internet of Things (IoT) & Applications

Internet of Things (IoT) has gained immense interest for applications in smart agriculture, transportation, environment monitoring, healthcare, and smart wearable, Industrial IoT, and many other applications. Sensors are the key components to communicate with surroundings, which have to be both highly sensitive and selective as well. On the other hand, the data collected from sensors have to be analyzed and used for making Processes and Systems smarter. IoT and applications area is a highly multidisciplinary area involving various areas of Materials, Devices, Sensors, Circuits, Communication, and Data Analytics, and their applications in IoT system development. Inter-Disciplinary Research Platform (IDRP) on the Internet of Things (IoT) & Applications is created to work with a holistic approach for seamless integration of technologies.



The IDRP on IoT & Applications will facilitate the research and development in multiple areas including Industry 4.0, Health, Agriculture, Infrastructure, Transportation, Environmental Monitoring, and Infrastructure Safety encompassing complete ecosystem for simulation, design, development, characterization, and testing. R&D ecosystem of Jodhpur which includes IITJ, AIIMS, NLU, and Police University, can be an ideal combination for innovation in various areas of AIoT, such as in environment, healthcare, and cybersecurity.



The IDRP on IoT & Applications offers Ph.D. in a wide range of emerging and challenging interdisciplinary research areas such as AIoT, Industry 4.0, Smart City, Smart Infrastructure, Smart Grid, Environment Monitoring, Intelligent Transportation, etc. This unique interdisciplinary Ph.D. program addresses the gap between real-life challenges and Technology by using a holistic approach. Please visit Research Area to know the associated research areas, facilities, and associated faculty members.

The Ph.D. students are trained to conduct high-quality cutting-edge research demonstrated through tangible deliverables and to publish in top-ranking journals and conferences. Specially-designed courses on technical communication and Intellectual Property Rights enable students in quality expression as well as patent landscaping for potential IP and business translation of their work. Weekly colloquium enables the students to keep open avenues of sharing ideas and learning from peers. Students have round-the-clock access to high-end research and computational facilities, and also have the opportunity of one additional year of fellowship after thesis submission to engage in translational and entrepreneurial initiatives arising out of their Ph.D. work. On graduation, the doctoral students are trained in critical thinking, research, development, operations, and management of emerging technological challenges for both industry and academia.

The following Faculty Members from different departments are associated with this IDRP:

Department of Electrical Engineering

1. Shree Prakash Tiwari, Coordinator
2. Mahesh Kumar
3. Amandeep Kaur
4. Arpit Khandelwal
5. Soumava Mukherjee
6. Saakshi Dhanekar
7. Harshit Agarwal
8. Arun Kumar Singh
9. Aashish Mathur
10. Sandeep Kumar Yadav
11. Manish Narwaria
12. Himanshu Kumar
13. Rajendra Nagar
14. Amit Bhardwaj
15. Nitin Bhatia
16. Deepakkumar M. Fulwani
17. Anil Kumar Tiwari

18. Dushyant Sharma
19. Abdul Gafoor Shaik
20. Kamaljit Rangra

Department of Computer Science & Engineering

21. Sumit Kalra
22. Debasis Das
23. Deepak Mishra
24. Ravi Bhandari

Department of Civil & Infrastructure Engineering

25. Deepika Bhattu
26. Debanjan Guha Roy

Department of Mechanical Engineering

27. Anand Krishnan Plappally
28. Hardik Kothadia
29. Ankur Gupta
30. Barun Pratiher

Department of Bioscience & Bioengineering

31. Meenu Chhabra

Department of Chemical Engineering

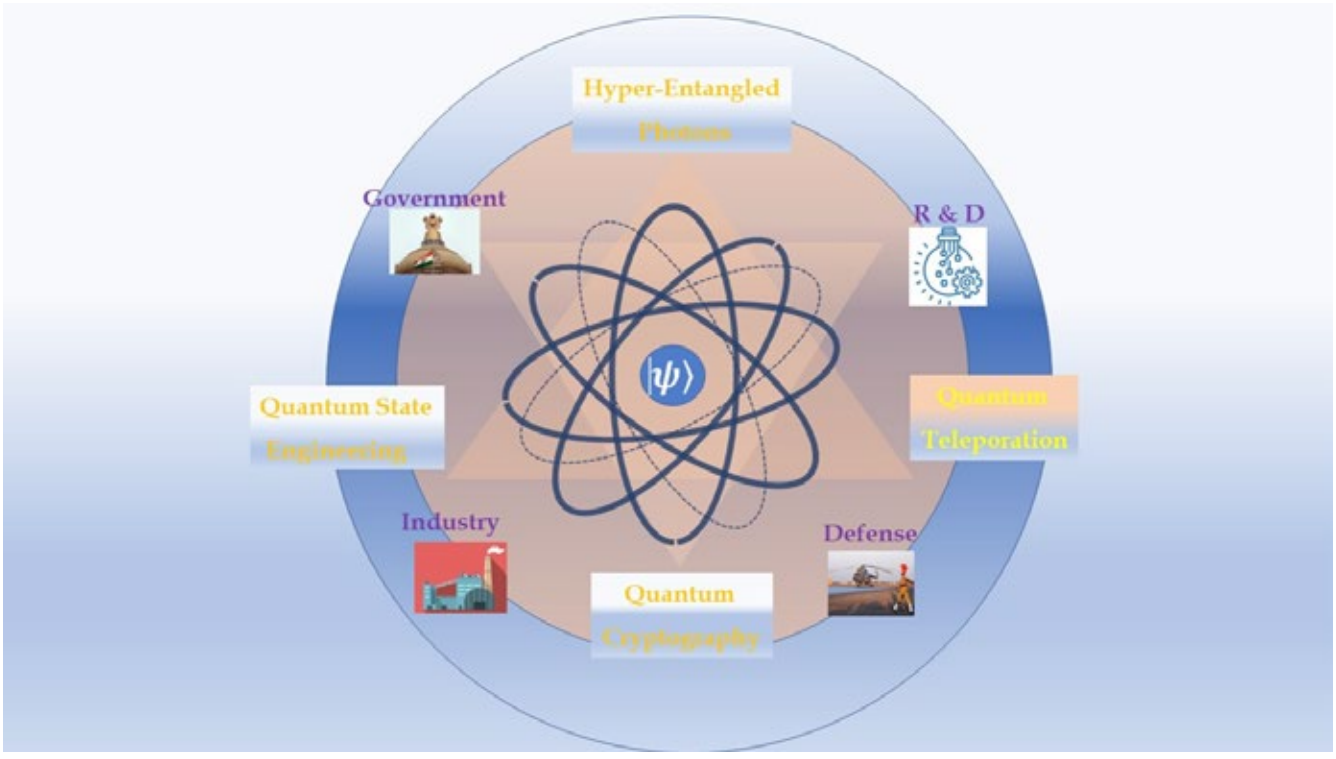
32. Deepak Arora

Department of Physics

33. Ambesh Dixit

Quantum Information and Computation (QIC)

The Quantum Information and Computation (QIC) group at IIT Jodhpur is working towards analyzing classical and quantum correlations from the perspective of a practical interface between quantum optics and quantum information processing. Such correlations occupy a central position in the quest for understanding and harvesting the power of quantum mechanics and fundamentals of quantum information processing. As a group, we are addressing some of the key issues in characterizing multiqubit entanglement. From the applications perspective, the spectrum includes, but is not limited to, quantum key distribution, quantum dense coding, quantum teleportation, quantum cryptography, quantum game theory and quantum secure communication.



For a practical implementation of any quantum information task, it is important to consider the role of noise on the chosen task. The group is interested in the systematic study of quantum information and computation in realistic scenarios, including the effect of ambient noise, using ideas and techniques of Open Quantum Systems. At present, following faculty members are involved in the group.

Department of Physics

1. Subhashish Banerjee, Coordinator
2. V. Narayanan

Department of Chemistry

3. Atul Kumar

Department of Mathematics

4. Kiran K. Hiremath
5. Vivek Vijay

Department of Mechanical Engineering

6. B. Ravindra

Department of Electrical Engineering

7. Mahesh Kumar
8. Harshit Agarwal

Department of Computer Science & Electrical Engineering

9. Suman Kundu
10. Debasis Das

Over the last century, Quantum Mechanics has emerged as a fundamental ingredient for understanding various facets of nature such as atomic and sub-atomic physics, quantum optics and a plethora of phenomena in condensed matter physics. Modern developments in computing could be said to have started from the work of Alan Turing, while information theory was put on the pedestal of modern science by the efforts of Claude Shannon. The amalgamation of quantum physics with computing and information theory could be historically traced from the works of EPR (Einstein, Podolsky and Rosen), followed by that of John Bell and culminating in efforts made by Charles Bennett. This was further cemented by the efforts of William Wootters. Experimental developments over the last few decades have brought the subject of quantum information to the threshold of technology development.

The interdisciplinary research group in Quantum Information and Computation (QIC) at IIT Jodhpur is envisioned to lead us towards establishing a consilience between diverse academic spaces. In this inter-disciplinary joint collaboration, we propose to study quantum correlations in nonclassical states from the perspective of a practical interface between quantum optics and quantum information processing. Such correlations occupy a central position in the quest for understanding and harvesting the power of quantum mechanics and fundamentals of quantum information processing. Another dimension would be to analyze and characterize multiqubit entangled states for establishing shared communication network among multiple users; one of the key issues in applications such as quantum key distribution, quantum dense coding, quantum teleportation, quantum cryptography, quantum game theory and quantum secure communication.

The intricacy of the problem increases even further when one considers real conditions, i.e., the interaction between the principal system and environment, leading to decoherence, which adversely impacts the efficiency of quantum systems; in general. In fact, for a practical implementation of any quantum information task, it is important to consider the role of noise on the chosen task. The systematic study of quantum mechanics in realistic scenarios, including the effect of ambient noise, can be made by using ideas and techniques of Open Quantum Systems. In the proposed collaboration, we will make systematic use of Open Quantum Systems to study various facets of quantum information and computation, including quantum cryptographic tasks.

Presently the IDRP is offering Ph.D. program in Quantum Information & Computation.

Robotics & Mobility Systems (RMS)

The Inter-Disciplinary Research Platforms (IDRPs) on Robotics and Mobility Systems (RMS) is a multi-disciplinary initiative with focus on solving open research problems requiring an integrated approach through the fusion of knowledge from multiple fields.

The vision of IDRP on RMS is:

Advancing the frontiers by imparting advanced knowledge and promoting research and innovation in the fields of

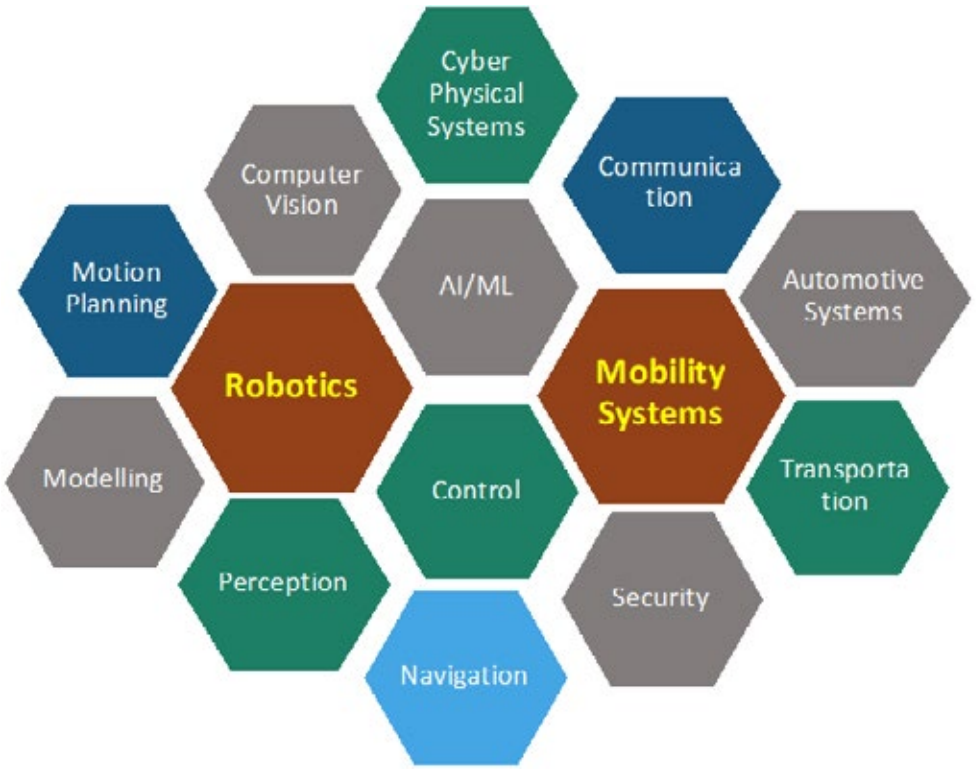
1. Robotics
2. Mobility Systems

The objectives of IDRP on RMS are:

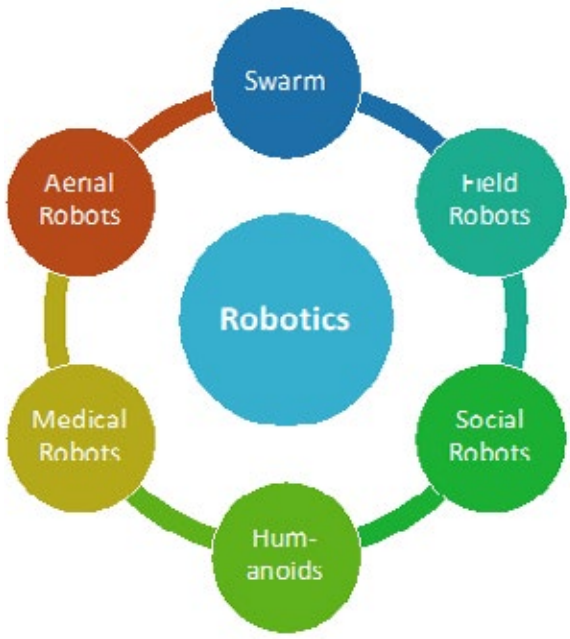
- To produce professionals with deep knowledge, and analytical and experimental research skills to handle problems in the domains of Robotics and Mobility Systems;
- To promote technology development and create entrepreneurial opportunities in the area.

The following schematics represent the scope and application areas of the IDRP on RMS.

Scope of RMS-IDRP



Application Area



The following Faculty Members from different Departments in the Institute are associated with this IDRP, in different areas:

Computer Vision and Haptics

Department of Computer Science & Engineering

1. Professor Santanu Chaudhury
2. Chiranjoy Chattopadhyay

Department of Electrical Engineering

3. Himanshu Kumar
4. Rajendra Nagar
5. Amit Bhardwaj
6. Manish Narwaria

Robotics and Control

Department of Mechanical Engineering

7. Suril V. Shah, Coordinator

Department of Electrical Engineering

8. Niladri Sekhar Tripathy
9. Anoop Jain
10. Deepakkumar M. Fulwani

Dynamics, Design and Manufacturing

Department of Mechanical Engineering

11. C.Venkatesan
12. Kaushal A. Desai
13. Nipun Arora

Communication

Department of Electrical Engineering

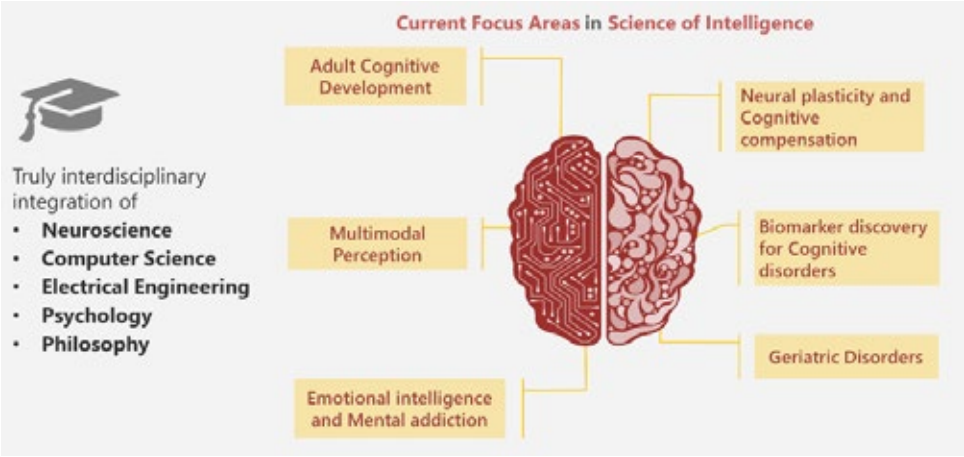
14. Aashish Mathur
15. Arpit Khandelwal

The Ph.D. program offered by the IDRP on RMS is one of the few nationwide programs where students can earn a doctorate in Robotics/Mobility Systems. The program is inherently interdisciplinary, bringing together areas of research that would otherwise be spread across different departments or separate universiti es.

The Thematic Areas of Research in this IDRP are:

- Robotics: Research in Robotics aimed at overcoming challenges in perception, manipulation, navigation in unstructured and unknown dynamic environments with focus on application to defense, medical, manufacturing and social domains.
- Mobility Systems: Research in Mobility Systems aimed at addressing challenges of future mobility in e-drive, autonomous driving, communication and control from the perspective of cyber-physical system.

Science of Intelligence (SoI)



It is the age of AI revolution. Computers today can perform many tasks which until recently, could only be done by people. A contemporary machine vision system could identify faces, even matching them to specific identities, and many of the objects in the scene. However, unlike a human being, in most of the cases it will fail to interpret and explain what is happening in an image. It is not really known what understanding an image by a human brain means. We do not know how to engineer a system which can possess common sense, can flexibly adapt to new situations, and can deal effectively with uncertainty while planning like a normal human being. To build next-generation AI systems, there is a need to understand the algorithms used by the brain and the hardware needed to run these algorithms. Current focus on the engineering of intelligence must be complemented by scientific investigations of natural intelligence. The Interdisciplinary Research Platform (IDRP) on Science of Intelligence aims to address the core questions about intelligence – its nature, how it is manifested in the brain, and how it could be implemented in machines.

Currently a Ph.D. program in Science of Intelligence (SoI) is being offered by the IDRP. The following Faculty Members from different Departments are associated with the IDRP.

1. Prof. Santanu Chaudhury, Mentor

Department of Humanities and Social Sciences

2. Ankita Sharma, Coordinator
3. Hari Narayanan

Department of Computer Science & Engineering

4. Mayank Vatsa
5. Richa Singh
6. Sumit Kalra
7. Deepak Mishra
8. Romi Banerjee

Department of Electrical Engineering

9. Anil Kumar Tiwari
10. Rajlaxmi Chouhan

Department of Bioscience & Bioengineering

11. Sushmita Jha
12. Sushmita Paul

School of Management and Entrepreneurship

13. Venkat Ram Reddy Ganuthula

Science of Intelligence is a multifaceted approach to understand human intelligence and machine cognition. The interdisciplinary research group in the area of Science of Intelligence aims to explore research questions and social applications of cognitive computing and socio-cognitive behaviors. The objective is to develop data-driven models using machine learning, artificial intelligence, and deep learning to understand the areas of (but not limited to):

- Adult cognitive development,
- Emotional intelligence and mental addiction and the possibility of technological intervention,
- Multimodal perception,
- Neural plasticity and cognitive compensation,
- Implication in developmental and geriatric disorders, and
- Biomarker discovery for cognitive disorders.

The following activities were organized by the IDRP on SoI during the FY 2019-20:

- The IDRP Science of Intelligence, IIT Jodhpur and IIT Delhi jointly organized the International Workshop on Science of Intelligence during 18 - 19 January 2020, at IIT Jodhpur. The aim of the workshop was to converge, in coordination with researchers across the country, to formulate a program on the science of intelligence. This two-day event witnessed expert lectures and panel discussion by eight eminent scientists and speakers on cognitive science and artificial intelligence from around the world.

Smart Health Care (SHC)

The Smart Health Care IDRP aspires to create significant scientific and technological advancements in the area of Healthcare by bringing together a multidisciplinary team of scientists working in the interface of Biology, Chemistry, Healthcare & Engineering. The research is intended to focus on designing and developing sustainable solutions for point-of-care health devices, drug discovery, affordable diagnostics, bio-compatible implants, and remote health care, including telemedicine. The IDRP platform is expected to support the development of various eHealth and mHealth based solutions for improving the quality of healthcare and making it available to large segments of the society.

The major objectives of this IDRP are:

- Augmenting existing methods for medical research using machine learning and artificial intelligence-based approaches;
- Designing new and optimizing existing point-of-care health devices;
- Identifying novel methods for early diagnosis and personalized treatments;
- Creating a platform to use various electronic, mechanical, and bio-sensors for improving the remote health care facilities.

The following schematic represents the key focus areas of research in the IDRP on Smart Health Care.

The following Faculty Members from different Departments are associated with this IDRP:

Department of Bioscience & Bioengineering

1. Sushmita Jha, Coordinator
2. Surajit Ghosh
3. Meenu Chhabra
4. Sushmita Paul
5. Sudipta Bhattacharyya
6. Raviraj Vankayala
7. Indranil Banerjee

Department of Computer Science & Engineering

8. Santanu Chaudhury
9. Richa Singh
10. Sumit Kalra
11. Suman Kundu
12. Deepak Mishra

Department of Electrical Engineering

13. Anil Kumar Tiwari
14. Kamaljit Rangra
15. Saakshi Dhanekar
16. Amandeep Kaur
17. Niladri Sekhar Tripathy

Department of Mechanical Engineering

18. Kaushalkumar A. Desai
19. Suril Vijaykumar Shah
20. Shrutidhara Sarma

Department of Metallurgical & Materials Engineering

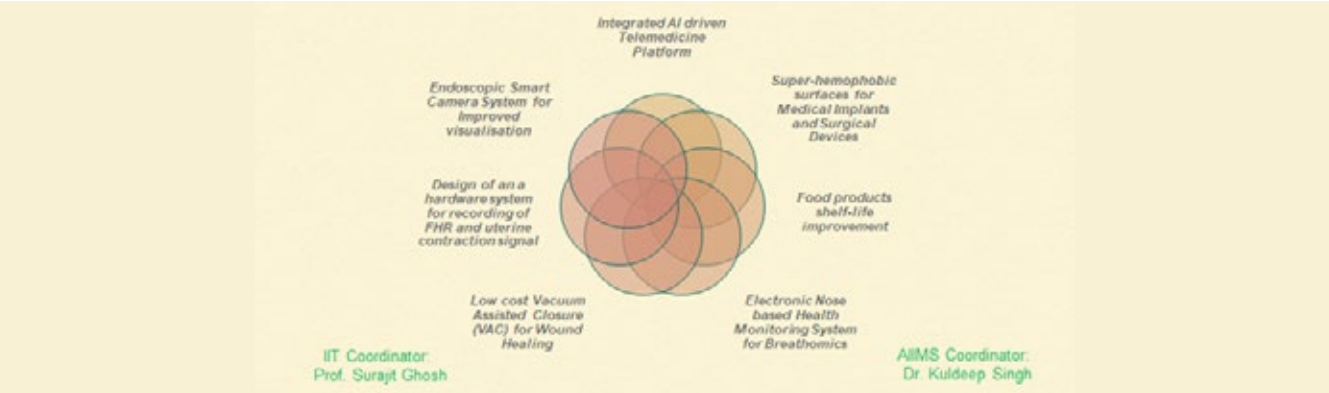
21. Ravi, K. R.
22. Abir Bhattacharya

Department of Physics

23. Sampat Raj Vadera
24. Somnath Ghosh
25. Ram Prakash

Besides a Ph.D. program in Smart Health Care, Master's, Ph.D. and Master's-Ph.D. dual degree Programs in Medical Technologies are offered jointly by IIT Jodhpur & AIIMS Jodhpur. The Master's, Master's-PhD and PhD program in Medical technologies aims to provide a common platform for doctors and engineers fostering knowledge sharing and innovation leading to development of indigenous healthcare devices and systems through the process of incubation and entrepreneurship. This program has been designed to be open and will evolve to create a synergy between skill sets of technologists and medical practitioners. This will also create a unique collaborative platform that integrates technology and medicine to solve problems in human health and encourage entrepreneurship in healthcare technologies. The following schematics represent the teaching-learning process for Medical Technologies program and proposed research activities in the Med-Tech Park jointly with AIIMS, Jodhpur.

Research Activities-MED TECH Park (In Close Association With AIIMS)



Space Technologies

The Inter Disciplinary Research Platform on Space Technologies at IIT Jodhpur offers a Ph.D. Program in Space Technologies. Space Science and Technology (SST) is an Interdisciplinary program emphasizing on (i) the fundamental aspects of Sciences in expanding our knowledge of the Universe and (ii) the realization of end product meeting some of the needs for Space Technology. The Ph.D. program in Space Science and Technology at IIT Jodhpur comprises of both the science as well as engineering/technology components and offers opportunity to explore career in fundamental as well as Space worthy interdisciplinary research.

Scope and objectives of the program

The program will offer fundamental training to the PhD students in respective fields. The fundamental research will include the exploration of the Universe (Space physics, chemistry and biology). Further, program provides opportunity towards the technological developments realizing the transition of basic research in to Space related technologies.

Salient features of the program

IIT Jodhpur has highly qualified and experienced faculty with very wide research background in different domains of Science and Technology. The program will provide an opportunity to work on highly demanding and technologically challenging research problems in Space Science and Technology (SST) covering fundamental aspects such as exploring the Universe and applied aspects such as development of functional materials to the integrated devices, secured communications and other related Space applications adopting a system approach.

The space being so vast and varied with almost infinite number of stellar objects and perhaps more number of unknowns than knowns, offers huge opportunities to carry out fundamental research so as to develop better understanding of the Universe. Further, space also offers wide range of opportunities for its exploitation for a number of technological applications such as remote sensing using sensors operating over a range of wavelength regions including visible, infrared, microwave, etc. It comprises of both the science as well as engineering/technology components. The proposed interdisciplinary research program on Space Science and Technology will be a collective multi-disciplinary effort to address key scientific and engineering issues in both exploring as well exploiting the space.

Professor S. R. Vadera, Department of Physics, is the Coordinator for this IDRP.

Staff Members

The following are the Staff Members engaged in various Offices and Departments of the Institute:

Staff Members

Kshema Prakash	Deputy Librarian
Amardeep Sharma	Deputy Registrar
Jayita Sarkar	Scientific Officer
Anand Padegaonkar	Assistant Executive Engineer (Civil)
Shakti Ranjan Patra	Assistant Registrar
Himmat Singh	Assistant Registrar
Narendra K. Singh	Senior Technical Superintendent
Rimpesh Katiyar	Senior Technical Superintendent
Ashish Kachchawaha	Senior Superintendent
Gaurav Nigam	Senior Superintendent
Sandeep Singh Chandel	Senior Superintendent
Vinay Kumar	Assistant Engineer (Electrical)
Amit Kumar	Junior Engineer (Electrical)
Ashish Kumar	Junior Engineer (Civil)
Bharat Pareek	Technical Superintendent
Dheerendra Kumar Yadav	Technical Superintendent
Poonam Chand Sankhla	Technical Superintendent
Rinkesh Kumar Mangal	Technical Superintendent
Naresh Chouhan	Superintendent
Sharabh Pradhan	Superintendent
Laxman Singh	Junior Superintendent
Amit Kumar Soni	Assistant Library & Information Officer
Chunni Chhatwani	Assistant Library & Information Officer
Kamlesh Kumar J. Patel	Assistant Library & Information Officer
Arjun Das	Physical Training Instructor
Dhani Ram	Stenographer
Darsh Kumar Khatwani	Senior Assistant
Gurpreet Kaur Virdi	Senior Assistant
Sharad Srivastava	Senior Assistant
T. Madhavi Lata	Senior Assistant
Ram Singh Ratnu	Senior Technical Assistant
Gajraj Sharma	Technical Assistant
Ganpat Choudhary	Technical Assistant
Praveen Suthar	Technical Assistant

Staff Members

Shubham Pandey	Technical Assistant
Swati Kushwaha	Assistant
Vivek Verma	Technical Assistant
Dhaval Bhai M Raiyani	Junior Technical Assistant
Kailash Chander	Junior Technical Assistant
Naveen Kumar	Junior Technical Assistant
Poonam	Junior Technical Assistant
Ravi Jangid	Junior Technical Assistant
Sampatlal N. Suthar	Junior Technical Assistant
Rakesh Kumar	Junior Assistant
Arjun Singh	Junior Assistant
Dheeraj Upadhyay	Junior Assistant
Ganesh Kumawat	Junior Assistant
Ishmeet Singh	Junior Assistant
Lalit Mohan	Junior Assistant
Mahesh Kumar Meena	Junior Assistant
Narayan Dadhich	Junior Assistant
Neeraj Kumar	Junior Assistant
Ramniwas Dhayal	Junior Assistant
Rashmi Dhyani	Junior Assistant
Sapna Sankhla	Junior Assistant
Shankar Singh	Junior Assistant
Shashank Choudhary	Junior Assistant
Shyam Sunder Singh	Junior Assistant
Suresh Chandra Phulara	Junior Assistant
Tilotama Singh	Junior Assistant

Staff Members (Standing Committee)

S. C. Bose	Advisor (Academics)
P. G. Basak	Advisor (Administration)
S. D. Jatav	Audit Officer
V. S. Rathore	Associate Project Officer
Kirity Kumar Roy	Advisor (Industry-Academia Interface)
Ritu Jangid	English Language Instructor
Bhagya Rajeswari S.	English Language Instructor
Mohit Mathur	Manager (Facilities)
Ronika Yadav	Medical Officer

Academics

Currently, the Institute offers the following Academic Programs:

1. Bachelor of Technology Programs

1. B.Tech. (Biotechnology)
2. B.Tech. (Computer Science and Engineering)
3. B.Tech. (Electrical Engineering)
4. B.Tech. (Mechanical Engineering)

2. Master of Science Programs

1. M.Sc. (Chemistry)
2. M.Sc. (Mathematics)
3. M.Sc. (Physics)

3. Master of Technology Programs

1. M.Tech. (Bioscience & Bioengineering)
2. M.Tech. (Computer Science & Engineering)
3. M.Tech. (Computer Science and Engineering- AI)
4. M.Tech. (Electrical Engineering – Cyber Physical System)
5. M.Tech. (Electrical Engineering – Sensors and Internet of Things)
6. M.Tech. (Mechanical Engineering – Advanced Manufacturing and Design)
7. M.Tech. (Mathematics – Data and Computational Science)
8. M.Tech. (Mechanical Engineering – Thermofluids Engineering)
9. M.Tech. (Metallurgical & Materials Engineering)
10. M.Tech. (Executive (AI))

4. Doctor of Philosophy Programs

1. Ph.D. with specialization in Biosciences and Bioengineering
2. Ph.D. with specialization in Chemistry
3. Ph.D. with specialization in Computer Science & Engineering
4. Ph.D. with specialization in Electrical Engineering
5. Ph.D. with specialization in Humanities & Social Sciences
6. Ph.D. with specialization in Mathematics
7. Ph.D. with specialization in Mechanical Engineering
8. Ph.D. with specialization in Metallurgical & Materials Engineering
9. Ph.D. with specialization in Physics

5. Master of Science – Master of Technology Programs

1. Mathematics & Data Science

6. Master of Technology – Doctor of Philosophy (M.Tech.-Ph.D.) Dual Degree Programs

1. M.Tech.-Ph.D. Dual Degree (Bioscience & Bioengineering)
2. M.Tech.-Ph.D. Dual Degree (Computer Science & Engineering)
3. M.Tech.-Ph.D. Dual Degree (Artificial Intelligence)
4. M.Tech.-Ph.D. Dual Degree (Communication Engineering)
5. M.Tech.-Ph.D. Dual Degree (Cyber Physical Systems)
6. M.Tech.-Ph.D. Dual Degree (Sensors and Internet of Things)
7. M.Tech.-Ph.D. Dual Degree (Data and Computational Sciences)
8. M.Tech.-Ph.D. Dual Degree (Metallurgical & Materials Engineering)
9. M.Tech.-Ph.D. Dual Degree (Design Engineering)
10. M.Tech.-Ph.D. Dual Degree (Advanced Manufacturing and Design)
11. M.Tech.-Ph.D. Dual Degree (Thermofluids Engineering)

7. Doctor of Philosophy Program in Inter-disciplinary Areas

1. Ph.D. (AUV Technologies)
2. Ph.D. (Cognitive Science)
3. Ph.D. (Digital Humanities)
4. Ph.D. (IoT & Applications)
5. Ph.D. (Quantum Information and Computation)
6. Ph.D. (Smart Healthcare)
7. Ph.D. (Space Technologies)

Ph.D. Theses Defense

The following Ph.D. Students defended their theses successfully during this year:

Sl. No.	Name of the Student	Title of Thesis	Supervisor	Department	Date of Defense
1.	Raj Kumar Satankar	Local Soil and Organic Waste Based Composites and Ceramics of Western Rajasthan	Dr. Anand Krishnan Plappally, and Dr. Rakesh Kumar Sharma	Mechnical Engineering	19 April 2019
2.	Aditya Raw Gautam	Nonlinear Control for Mitigation of Second- order Harmonic Ripple Problem in Single-Phase Inverters	Deepak M. Fulwani	Electrical Engineering	23 April 2019
3.	Shilpa Pandey	Some Methods for Annotation Localization and Writer Identification for Processing Annotated Documents	Dr. Gaurav Harit	Computer Science and Engineering	7 May 2019
4.	Nidhi Sharma	The Role of Nucleotide-Binding Domain, Leucine Rich Repeat Containing receptors in Inflammation, Cell death and Glioma	Dr. Sushmita Jha	Bioscience and Bioengineering	15 May 2019
5.	Ankisha Vijay	Bioremediation of Low LevelUranium (VI) Waste Including Denitrification Using Microbial Fuel Cell	Dr. Meenu Chhabra	Bioscience and Bioengineering	23 May 2019
6.	Vishal Sharma	Quantum Communication Under Noisy Environment: From Theory to Applications	Dr. Subhashish Banerjee	Physics	28 May 2019
7.	Bhuvnesh Rathore	Wavelet- Alienation Based Protection Scheme for Transmission Systems	Dr. Abdul Gafoor	Electrical Engineering	3 June 2019
8.	Ayeman Amanullah	Proteasomal Dysfunctions Induced Anti-Proliferative Strategies of NSAIDs Engender Mitochondrial Abnormalities and Apoptosis	Dr. Amit Mishra	Bioscience and Bioengineering	19 July 2019
9.	Anurag Sahu	In-situ sensitization and photoelectrode material for II-VI quantum Dot sensitized solar cells and detailed balance limiting efficiency	Dr. Ambesh Dixit and Co-Supervisor Kiran Kumar Hiremath	Enrolled in the Focus Group System Science	22 July 2019
10.	Divya Sharma	Content Based Analysis and Retrieval of Architectural Floor plans	Dr. Chiranjoy Chattopadhyay	Computer Sceince & Engineering	22 July 2019
11.	Dharmesh Kumar	Solar Radiation Data Quality Analysis and Gap Filling Approaches	Dr. B. Ravindra	Mechanical Engineering	24 July 2019
12.	Giriraj Vyas	Organic Molecular Memory Devices based on small Molecule – polymer Hybrid	Dr. Satyajit Sahu	Physics	27 Sep 2019

Sl. No.	Name of the Student	Title of Thesis	Supervisor	Department	Date of Defense
13.	Sana Maidullah	Context Effect in Consumer Decision Making: Role of Choice Characteristic and Individual Factors	Dr. Ankita Sharma	Humanities & Social Science	06 Dec 2019
14.	Gurveer Singh	On the Evaluation and Cleaning of an Open Volumetric Air Receiver: A Step Towards Realizing Solar Convective Furnace System in Arid Deserts	Dr. Laltu Chandra	Mechanical Engineering	10 Dec 2019
15.	Ribhav Mishra	Rejuvenation Mechanisms of LRSAM1E3 Ubiquitin Ligase Against Misfolded Proteins Aggregation Linked Neurodegenerative Diseases	Dr. Amit Mishra	Bioscience & Bioengineering	13 Dec 2019
16.	Vikash Chandra Janu	Surface Fluorinated Hematite for Energy, Stealth and Environmental Applications	Dr. Rakesh K. Sharma and Dr. N. Kumar, Ex-Director, Defense Laboratory Jodhpur	Chemistry	29 Jan 2020
17.	Kumar Rahul	Saliency Enabled Image Compression and its Quality Assessment	Dr. Anil Kumar Tiwari	Electrical Engineering	30 Jan 2020
18.	Deepak Kumar	Nuclear Magnetic Resonance (NMR) investigation of molecular interactions in model drug delivery systems	Dr. Samanwita Pal	Chemistry	03 Feb 2020
19.	Amit Bhati	Bandwidth Enhancement of Microwave Absorbers Using Engineered Planar Structures	Dr. Vivek Dixit and Dr. Kirankumar R. Hitemath	Mathematics	06 Feb 2020
20.	Rakhi, N. K.	Computational Gastronomy: Analysis of the basis of flavor in Indian cuisine and health impact of spices	HoD Department of Bioscience & Bioengineering and Dr. Ganesh Bagler	Bioscience and Bioengineering	11 Feb 2020
21.	Chandni Kumari	Multifunctional ZnO and BiFeO3: Synthesis, Characterization and Device Applications	Dr. Ambesh Dixit	Physics	12 Feb 2020
22.	Nupur Rathore	Sliding Mode Control Strategies to Improve Energy Efficiency and Power Converters	Dr. Deepak M. Fulwani	Electrical Engineering	17 Mar 2020
23.	Dileep Kumar	Some Results on Multidimensional Shift Spaces	Dr. Puneet Sharma	Mathematics	18 Mar2020

Collaborations

The Institute has signed Memoranda of Understanding (MoUs) with several international and national universities, agencies for furthering cooperation on specific fronts. These MoUs are:

List of MoUs/Letter of Intent signed by the IIT Jodhpur with various Institutions/organizations/companies

1.	IIT Jodhpur and NARA Institute of Science and Technology, National University Corporation (NAIST), Japan	04.05.2019	To develop and promote mutual cooperative relationship in the fields of Education and Academic Research, and to promote academic exchanges between IIT Jodhpur and NAIST.
2.	M/s. Samsung India Electronics Private Limited (SIEL) and IIT Jodhpur	15.05.2019	Carrying out Research & Development including but not limited to reports, updates, commentaries, outputs, other written documents etc.
3.	IIT Jodhpur and Council of Scientific & Industrial Research (CSIR), New Delhi	02.08.2019	IITJ and CSIR desire to implement, in the areas of mutual interest, cooperative and collaborative activities, which would address multidisciplinary scientific, technological and educational problems of relevance to the country.
4.	ANSYS Software Pvt. Ltd., IIT Jodhpur, and Entuple Technologies Pvt Ltd	29.08.2019	To promote the Industry-Academic interaction activities especially in the field of Electric vehicles, IOT, Antenna Design and le design and associated technologies and to promote research, capability and technology development in the same area.
5.	IIT Jodhpur and Samsung India Electronics Private Limited (SIEL).	12.09.2019 executing & w.e.f. 16.09.2019	Academic collaboration by way of special industry oriented courses, jointly by IIT-Jodhpur & SIEL, technical talks & industry expert lectures/demonstrations, minor/major student projects & student technical contests at IIT-Jodhpur subject to the consent of the concerned faculty and the department in this regard. SIEL will support running industry-oriented courses & provide the education to IIT Jodhpur students as agreeable to IIT-Jodhpur keeping in forefront the interest of the students and that for purpose of providing students, an education as per the need of the market.
6.	College of Life Sciences, Kaohsiung Medical University, Taiwan and IIT Jodhpur (Letter of Intent)	17.10.2019	To Develop Academic and Educational cooperation and to promote mutual understanding between the two universities and further extend the academic and educational cooperation through following programs and activities: • Exchange of Faculty, Researchers and administrative staff; • Exchange of students and developing study programs; • Exchange of academic information and materials; • Implementation of Dual-degree programs; and • Study abroad programs; joint educational programs; joint supervision of Ph.D. Scholars.

7.	Cognizant Technology Solutions India Pvt. Ltd. and IIT Jodhpur	18.12.2019	Research and Development Agreement
8.	Defence Laboratory (DRDO) Jodhpur and IIT Jodhpur	18.12.2019	To Promote relations that mutually benefit each Institute, this being the primary aim of R&D and Academic collaboration and S&T cooperation towards developing new as well as improved products & technologies for strategic defence techniques.
9.	IIT Jodhpur and IITJ Technology Innovation Start-up Centre	01.01.2020	Promote technology Thought and action and Prepares needed technical human resources to meet the technology challenges of the nation.
10.	IIT Jodhpur and Robosurg Med-Tech Pvt. Ltd.	16.01.2020	To Provide Research Advisory and conduct activities related to SSI robotic Project.
11.	IIT Jodhpur and PhiMetrics Telecom Value Added Services Pvt. Ltd.	24.01.2020	MoU for the research project titled “Voice and Video Analysis”
12.	IIT Jodhpur and Oil India Limited	24.01.2020	To collaborate for promotion of Research, innovation & education and provide a model for industry-academia partnership
13.	IIT Jodhpur & Dayalbagh Educational Institute Dayalbagh, Agra & Environtech Instruments PVT. LTD. New Delhi	24.01.2020	Development of sensors with IMPRINT SERB project
14.	IIT Jodhpur and Umalaxmi Organics Pvt. Ltd	24.01.2020	Umalaxmi Organics has expressed its intent and offer to avail the services of Institute for consultancy on research methodology and technical know-how, inputs, guidance and strategic insights and opportunity to participate in iron impurity Removal Project.
15.	IIT Jodhpur & BlockApps AI Private Limited (Bangalore)	19.02.2020 w.e.f. 01.01.2020	Development of Segmentation Algorithms for Surveillance and AI-assisted Health Diagnosis

Research

Ongoing R&D Projects

Department of Biosciences and Bioengineering				
(1)	**Deposition of Particulate Matter in Lungs** Board of Research in Nuclear Science (BRNS), Department of Atomic Energy (DAE)			
	PI: Sushmita Jha	Rs.24.79 Lakhs	Start Date: 12-Mar-14	End Date: 31-Mar-19 Project Closure in Progress
(2)	**Development of low-cost Microbial Carbon Capture (MCC) cells for algae cultivation and powers generation** Department of Biotechnology (DBT)			
	PI: Meenu Chabbra	Rs.77.59 Lakhs	Start Date: 24-Dec-14	End Date: 23-Dec-19 Closure Pending
(3)	**Development of anti-alzheimer peptide from taxol pocket of β-tubulin** Science and Engineering Research Board (SERB)			
	PI: Surajit Ghosh	Rs. 54.17 Lakhs	Start Date: 22-Oct-19	End Date: 31-Dec-19 Closure in-Progress
(4)	**Integrative Approach for Identification of Disease Genes of Type II Diabetes** Science and Engineering Research Board (SERB)			
	PI: Sushmita Paul	Rs. 26.76 Lakhs	Start Date: 30-Mar-17	End Date: 29-Mar-20 Closure Pending
(5)	**Expression analysis of inflammasome-forming NLRs in gliomas for identification of novel therapeutic interventions** Department of Biotechnology (DBT)			
	PI: Sushmita Jha	Rs. 42.15 Lakhs	Start Date: 06-Sep-17	End Date: 05-Sep-20
(6)	**Muc-1 receptor targeted nano-liposome containing peptide-drug-nanocage for breast cancer and cancer stem cell** Department of Biotechnology (DBT)			
	PI: Surajit Ghosh	Rs.17.54 Lakhs	Start Date: 22-Oct-19	End Date: 31-Dec-20
(7)	**Molecular studies to delineate the role of nitric oxide/nitric oxide synthase in neutrophil maturation, survival and functions.** Science and Engineering Research Board (SERB)			
	PI: Madhu Dixit	Rs. 88.40 Lakhs	Start Date: 15-May-18	End Date: 23-Feb-21
(8)	**Role of Centriole Protein, CPAP in neurodevelopmental disorder** Science and Engineering Research Board (SERB)			
	PI: Priyanka Singh	Rs. 38.74 Lakhs	Start Date: 28-Nov-18	End Date: 27-Nov-21
(9)	**Modulation of a-Synuclein Amyloid Assemblt by Human Chaperone-like Proteins** Science and Engineering Research Board (SERB)			
	PI: Neha Jain	Rs. 41 Lakhs	Start Date: 22-May-19	End Date: 21-May-22
(10)	**Hospital-associated ESKAPE pathogens: Unraveling novel regulatory layers controlling virulence and persistence.** The Wellcome Trust, Department of Biotechnology India Alliance			
	PI: Shankar Manoharan	Rs. 164.88 Lakhs	Start Date: 17-Jan-18	End Date: 31-Aug-22
(11)	**Elucidating the role of centrosome protein CEP152 in primary microcephaly** Department of Biotechnology (DBT)			
	PI: Priyanka Singh	Rs. 59.50 Lakhs	Start Date: 27-Feb-20	End Date: 26-Feb-23
(12)	**GenomeIndia: Cataloguing the genetic Variation in Indians** Department of Biotechnology (DBT)			
	PI: Sushmita Paul Co PI: Sushmita Jha	Rs. 115 Lakhs	Start Date: 28-Feb-20	End Date: 27-Feb-23
(13)	**Multimodal Approach for Repairing of Brain Damage: Small Molecule Mediated Neurogenesis from Stem Cells and Transplantation of Regenerated Neurons through Novel Scaffolds** Science and Engineering Research Board (SERB)			
	Pi: Surajit Ghosh	Rs. 279.57 Lakhs	Start Date: 30-Mar-20	End Date: 29-Mar-23

Department of Chemistry				
(14)	**Catalytic Upgrading of Bio-Oil to Transport Fuel** Department of Biotechnology (DBT)			
	PI: Rakesh Sharma	Rs. 94.79 Lakhs	Start Date: 24-Dec-14	End Date: 23-Dec-19 Closure Pending
(15)	**Utilization of hydrogen as fuel in cement production** Ultratech Cement			
	PI: Rakesh Sharma	Rs. 10 lakhs	Start Date: 01-Oct-19	End Date: 31-May-20
(16)	**Solid State Nuclear Magnetic Resonance (NMR) assessment of zinc oxide (ZnO) nanomaterial-based drug delivery systems** Science and Engineering Research Board (SERB), Department of Science & Technology (DST)			
	PI: Samanwita Pal Co PI: Ambesh Dixit	Rs. 34.45 Lakhs	Start Date: 28-Aug-17	End Date: 27-Aug-20
(17)	**New Single Source Precursors for Potential Nanostructured Bi2Te3/sb2Te3 System Based Thermoelectric Materials** Science and Engineering Research Board (SERB)			
	PI: Ramesh K. Metre	Rs. 32.12 Lakhs	Start Date: 05-Oct-17	End Date: 04-Oct-20
(18)	**Development of Catalytic Diastereo and Enantiodivergent Tandem Reactions** Department of Science & Technology (DST)			
	PI: Nirmal Kumar Rana	Rs. 35.00 Lakhs	Start Date: 02-Jul-18	End Date: 01-Nov-20
(19)	**Development of electrochemical energy storage from carbon rich waste** Science and Engineering Research Board (SERB)			
	PI: Ritu Gupta Co PI: Rakesh Sharma	Rs. 37.17 Lakhs	Start Date: 02-Mar-17	End Date: 31-Dec-20
(20)	**Impact of Rainwater Harvesting on Groundwater Quality in India with Specific Reference to Fluoride and Mircropollutants** Department of Science & Technology (DST)			
	PI: Rakesh Sharma	Rs. 75.27 Lakhs	Start Date: 10-May-18	End Date: 09-May-21
(21)	**Tandem Annulations Involving Metallocarbenes: Towards Diverse Molecular Architectures** Science and Engineering Research Board (SERB)			
	PI: Sandip Murarka	Rs. 33.00 Lakhs	Start Date: 10-Jul-18	End Date: 09-Jul-21
(22)	**Multiparticle Entanglement, Nonlocality and Quantum Information processing- Analysing the role and applications of statistical correlations** Science and Engineering Research Board (SERB)			
	PI: Atul Kumar	Rs. 19.50 Lakhs	Start Date: 18-Mar-19	End Date: 18-Mar-22
(23)	**Chiral Calix-crowns for asymmetric phase transfer catalyst** Department of Science & Technology (DST)			
	PI: Pragati R Sharma	Rs. 34.68 Lakhs	Start Date: 01-Oct-19	End Date: 30-Sep-22
(24)	**Modeling Organic and Biochemical phenomena via direct chemical dynamics simulations** Science and Engineering Research Board (SERB)			
	PI: Manikandan Paranjothy	Rs. 51.88 Lakhs	Start Date: 06-Feb-20	End Date: 05-Feb-23
(25)	**Investigating asymmetric mixed surfactant bilayers using dual-scale simulations to correlate bilayer properties with thermodynamics of asymmetry** Science and Engineering Research Board (SERB)			
	PI: Ananya Debanath Co PI: Santosh Mogurampelly	Rs. 44.36 Lakhs	Start Date: 07-Feb-20	End Date: 06-Feb-23
Department of Computer Science & Engineering				
(26)	**Secure Vehicular Communication and Routing in future Intelligent Transportation Systems (ITS)** Science and Engineering Research Board (SERB)			
	PI: Debasis Das	Rs. 19.81 Lakhs	Start Date: 26-Jul-19	End Date: 03-Nov-19 Project Settlement in progress

(27)	**Digital Representation Generation for Efficient Retrieval of Bangla Document Images in Digital Libraries** IITK, Ministry of Human Resource Development (MHRD)			
	PI: Santanu Chaudhury, CO PI: Gaurav Harit	Rs. 76 Lakhs	Start Date: 01-Mar-19	End Date: 31-Jan-20 Closure Pending
(28)	**Strengthening Handwriting Recognition & Smart Annotation** Samsung India Electronics Pvt. Ltd.			
	PI: Gaurav Harit Co PI: Santanu Chaudhury	Rs. 13.82 Lakhs	Start Date: 03-Jul-19	End Date: 14-May-20
(29)	**Software as a service for OCR system for Odia Documents Images** Ministry of Electronics & Information Technology (MEITY)			
	PI: Santanu Chaudhury Co PI: Gaurav Harit	Rs. 20.16 Lakhs	Start Date: 26-Mar-19	End Date: 25-Sep-20
(30)	**Detecting Spoofing and Digital Attacks on Face Images** Ministry of Electronics & Information Technology (MEITY)			
	PI: Richa Singh Co PI: Mayank Vatsa	Rs. 72.15 Lakhs	Start Date: 01-Oct-19	End Date: 30-Sep-20
(31)	**Information Access from Document Images of Indian Languages** Ministry of Human Resource Development (MHRD) & Ministry of Electronics & Information Technology (MEITY)			
	PI: Gaurav Harit (as a Co PI)	Rs. 80 Lakhs	Start Date: 25-Oct-17	End Date: 24-Oct-20
(32)	**Development of Multimodal Search Framework for Architectural Floor Plan** Science and Engineering Research Board (SERB)			
	PI: Chiranjoy Chattopadhayay	Rs. 24.58 Lakhs	Start Date: 30-Mar-17	End Date: 29-Oct-20
(33)	**Text and Image Semantic Graphic** Ministry of Human Resource Development (MHRD)			
	PI: Gaurav Harit	Rs. 44.67 Lakhs	Start Date: 13-May-19	End Date: 12-May-21
(34)	**Detection and Prevention of Forged Obscene Images/Videos in the Social Networks using Machine Learning (A Social Media Engine for Discovering Doctoring in Obscene Multimedia)** MHA			
	PI: Mayank Vatsa Co PI: Richa Singh	Rs. 197.28 Lakhs	Start Date: 01-May-20	End Date: 31-Aug-21
(35)	**Indian Heritage in Digital Space of Interdisciplinary Cyber Physical Systems** Department of Science & Technology (DST)			
	PI: Santanu Chaudhury	Rs. 1275.55 Lakhs	Start Date: 25-Mar-19	End Date: 24-Mar-22
(36)	**Understanding Semantic Association Between Visual and Textual Data: What lies ahead** Department of Science & Technology (DST)			
	PI: Yashashwi Verma	Rs. 35 Lakhs	Start Date: 29-Nov-19	End Date: 15-Oct-22
(37)	**Predictive Maintenance and Quality Control in industries under Industry 4.0** Science and Engineering Research Board (SERB)			
	PI: Sumit Kalra Co PI: Santanu Chaudhury & Chiranjoy Chattopadhyay	Rs. 54.54 Lakhs	Start Date: 24-Oct-19	End Date: 23-Oct-22
(38)	**Resource Constrained AI** Ministry of Electronics & Information Technology (MEITY)			
	PI: Deepak Mishra, Co PI: Amandeep Kaur	Rs. 39.82Lakhs	Start Date: 28-Feb-20	End Date: 27-Feb-23
Department of Electrical Engineering				
(39)	**Transforming Healthcare Through Tech-dinor** IBM			
	PI: Sandeep Kumar Yadav	Rs. 14.25 Lakhs	Start Date: 02-Dec-14	End Date: 01-Dec-16 Project Extension is in-progress

(40)	**Computationally efficient fixed complexity sphere decodes for multiuser MIMO communications** Science & Engineering Research Board (SERB)			
	PI: Arun Kumar Singh	Rs. 22.82 Lakhs	Start Date: 13-Jan-16	End Date: 12-Jan-19 Project Extension is in-progress
(41)	**Design and Development of Tunable RF Filters based on Ferroelectric Thin Films by Sputtering** Defence Research & Development Organization (DRDO)			
	PI: Mahesh Kumar Co PI: Satyajit Sahu	Rs. 20Lakhs	Start Date: 04-Dec-17	End Date: 03-Dec-19 Settlement pending from funding agency
(42)	**Design and Development of Midrange (≥10 km) RF Transceiver system to transmit Nuclear Radiation Sensor Data** Defence Research & Development Organization (DRDO), Jodhpur			
	PI: Arpit Khandelwal, Co PI: Suril V. Shah	Rs. 9.60 Lakhs	Start Date: 17-Dec-18	End Date: 16-Dec-19 Settlement pending from funding agency
(43)	**Design and development of NavIC Receiver** Ministry of Electronics & Information Technology (Meity)			
	PI: Arun Kumar Singh	Rs. 64.55 Lakhs	Start Date: 18-Oct-17	End Date: 17-Apr-20
(44)	**Fundamentals of Photovoltaics** Ministry of Human Resource Development (MHRD)			
	PI: Mahesh Kumar	Rs. 5.68 Lakhs	Start Date: 23-May-20	End Date: 28-Jun-20
(45)	**Hub and Spoke Consortia for e2W and e3W Electric Drives-Design Development of Prototyping of Advanced IM and Synchronous Reluctance Drives and Vehicle Integration for e2W and e3W Applications** Department of Heavy Industry (NFTDC)			
	PI: Deepak Fulwani	Rs. 24.40 Lakhs	Start Date: 31-Aug-18	End Date: 30-Aug-20
(46)	**Noise-enhanced Edge-preserving Image Denoising using Stochastic Resonance** Science & Engineering Research Board (SERB)			
	PI: Rajlaxmi Chauhan	Rs. 26.64 Lakhs	Start Date: 17-Mar-17	End Date: 16-Sep-20
(47)	**Special Manpower development Program for Chips to System Design (SMDP-C2SD)** Ministry of Electronics & Information Technology (MeitY)			
	PI: Shree Prakash Tiwari Co PI: Deepak Fulwani	Rs.60.38 Lakhs	Start Date: 11-Aug-15	End Date: 30-Nov-20
(48)	**Functional Materials** Ministry of Human Resource Development (MHRD)			
	PI: Mahesh Kumar	Rs. 5.68 Lakhs	Start Date: 02-Nov-20	End Date: 11-Dec-20
(49)	**Design and analysis of multi-channel incoherent beam combination system** Defence Research & Development Organization (DRDO)			
	PI: Arpit Khandelwal	Rs. 9.60 Lakhs	Start Date: 21-Jan-20	End Date: 20-Jan-21
(50)	**High Performance Low Voltage Flexible Organic Field-Effect Transistors for Circuit and Sensing Applications** Science & Engineering Research Board (SERB)			
	PI: Shree Prakash Tiwari	Rs. 51.70 Lakhs	Start Date: 15-Sep-18	End Date: 14-Sep-21
(51)	**Design and Development of Substrate Integrated Waveguide (SIW) and Empty SIW (ESIW) Based RF-Microwave Components** Science & Engineering Research Board (SERB)			
	PI: Arani Ali Khan	Rs. 25.43Lakhs	Start Date: 26-Dec-19	End Date: 25-Dec-21
(52)	**Experimental Investigation and Performance Evaluation of HARQ Technique for Free-Space Optical Communication Systems** Science & Engineering Research Board (SERB)			
	PI: Aashish Mathur	Rs. 42.84 Lakhs	Start Date: 24-May-19	End Date: 24-May-22
(53)	**Substrate Integrated Coaxial Line (SICL) based Circuits and Systems for millimeter wave application** Department of Science & Technology (DST)			
	PI: Soumava Mukherjee	Rs.35.00 Lakhs	Start Date: 20-Sep-17	End Date: 19-Sep-22

(54)	**Development of low-cost sensors for monitoring of odours in ambient air** Science & Engineering Research Board (SERB)			
	PI: Mahesh Kumar	Rs. 107.75 Lakhs	Start Date: 14-Nov-19	End Date: 13-Nov-22
(55)	**Development of low-cost sensors for monitoring of odours in ambient air** Envirotech Instruments Pvt. Ltd.			
	PI: Mahesh Kumar	Rs. 13 Lakhs	Start Date: 14-Nov-19	End Date: 13-Nov-22
(56)	**Large area synthesis of 2DMoS2structures for low power and fast NO2 Gas Sensor** Science & Engineering Research Board (SERB)			
	PI: Mahesh Kumar	Rs. 40.81 Lakhs	Start Date: 30-Dec-19	End Date: 29-Dec-22
(57)	**Development of System to Mitigate Second Order Harmonic Ripple in AC/DC Microgrid using Advanced Control Techniques** Science & Engineering Research Board (SERB)			
	PI: Deepak Fulwani	Rs. 41.47 Lakhs	Start Date: 11-Feb-20	End Date: 10-Feb-23
(58)	**Angel-resolved photoelectron (ARPES) studies of doped 2D MoS2** UGC-DAE Consortium for Scientific Research (UGC-DAE-CSR)			
	PI: Mahesh Kumar	Rs. 1.35 Lakhs	Start Date: 05-Mar-20	End Date: 04-Mar-23
Department of Humanities & Social Sciences				
(59)	**Where the Bougainvillea Blooms: Stories of Place from a Resilient Landscape** Omayal Achi and A. R. Arunachalam Foundation			
	PI: Vidya Sarveswaran	Rs. 0.5 Lakhs	Start Date: 04-Sep-14	End Date: 03-Sep-15 Project Extension is in-progress
(60)	**Wisdom as Cognitive and motivational-emotional heuristics in ecologically rational decision making** Department of Science &Technology (DST)			
	PI: Ankita Sharma	Rs. 22.30 Lakhs	Start Date: 29-Apr-15	End Date: 28-Apr-18 Project Extension is in-progress
(61)	**Public Outreach Grant** The Rachel Carson Centre for Environment and Society, Munich, Germany			
	PI: Vidya Sarveswaran	Euro 1500	Start Date: 05-Jun-17	End Date: 04-Jun-19 Project Extension is in-progress
Department of Mathematics				
(62)	**Multimedia security based on biometrics for copyright protection and authentication** Science & Engineering Research Board (SERB)			
	PI: Gaurav Bhatnagar	Rs. 13.44 Lakhs	Start Date: 13-Nov-14	End Date: 12-Nov-17 Project Extension is in-progress
(63)	**Automorphism Groups of Induced Symbolic Systems** National Board for Higher Mathematics (NBHM)			
	PI: Puneet Sharma	Rs. 3.32 Lakhs	Start Date: 31-Mar-17	End Date: 30-Mar-20 Closure Pending
(64)	**Validation of Jodhpur Instrumented Kursi Against Dual Energy X-Ray Absorptiometry to Diagnose Sarcopenia in Older Indians** ICMR			
	PI: Vivek Vijay, CO PI: Sandeep Kumar Yadav	Rs. 11.01 Lakhs	Start Date: 01-Oct-19	End Date: 30-Sep-20
(65)	**Eigenvalue type problems related to linear and quasi-linear operators** Department of Science & Technology (DST)			
	PI: Abhishek Sarkar	Rs. 35 Lakhs	Start Date: 01-Apr-19	End Date: 31-Mar-24

Department of Mechanical Engineering				
(66)	**Bifurcation and stability assessment of a highly lightweight rotor-bearing system with moving platform** Science & Engineering Research Board (SERB)			
	PI: BarunPratiher	Rs. 21.80 Lakhs	Start Date: 17-Jul-14	End Date: 16-Jul-17 Project Extension is in-progress
(67)	**Hybrid reactionless manipulation and visual servoing of a satellite mounted robot for autonomous on orbit services** Department of Science & Technology (DST)			
	PI: Suril V. Shah	Rs. 35 Lakhs	Start Dare: 27-Jan-16	End Date: 28-Nov-18 Project Extension in progress
(68)	**Thermal Design of PCM Cool and Warm Vest** Defence Research & Development Organization (DRDO), Jodhpur			
	PI: Prodyut Ranjan Chakraborty Co PI: Akshay Prakash	Rs. 9.96 Lakhs	Start Date: 02-Dec-15	End Date: 30-Jun-19 Project Extension is in-progress
(69)	**Minimizing deflection induced surface errors in end milling of thin walled components** Science & Engineering Research Board (SERB)			
	PI: KaushaL A. Desai	Rs. 15.34 Lakhs	Start Date: 26-Jul-16	End Date: 25-Jul-19 Project Extension is in-progress
(70)	**Local Composite geotextile mats for soil and water conservation in western Rajasthan** Department of Science & Technology (DST)			
	PI: Anand K. Plappally	Rs. 19.80 Lakhs	Start Date: 30-Aug-16	End Date: 29-Aug-19 Project Extension is in-progress
(71)	**Performance Testing of ACC Tube Bundles Along with Establishing Their Theoretical Correlation** Thermax SPX Energy Technologies Limited			
	PI: Hardik Kothadia	Rs. 29.15 Lakhs	Start Date: 27-Mar-19	End Date: 26-Sep-19 Project Extension is in-progress
(72)	**Design and Analysis of Indigenous Autopilot System for Quadrotor** Defence Research & Development Organization (DRDO)			
	PI: C Venkatesan Co PI: Arpit Khandelwal & Suril V Shah	Rs. 9.96 Lakhs	Start Date: 01-Dec-19	End Date: 30-May-20
(73)	**Multiphysics Modeling& Analysis of Energy Technologies & Systems** Ministry of Human Resource Development (MHRD)			
	PI: Shobhana Singh	Rs. 5.68 Lakhs	Start Date: 14-Mar-20	End Date: 14-Aug-20
(74)	**Development of Highly Efficient Low-Cost Insulation for power plants** Ministry of Human Resource Development (MHRD)			
	PI: Sudipto Mukhopadhyay	Rs. 93.47 Lakhs	Start Date: 07-May-18	End Date: 06-May-21
(75)	**Development of Paired Neck Chamber Device for Assessment of Baroreflex Sensitivity** Department of Sceince & Technology (DST)			
	PI: KaushaL A. Desai Co PI: Suril V Shah	Rs. 26.32 Lakhs	Start Date: 01-Aug-19	End Date: 31-Jul-21
(76)	**Cascaded Latent Heat Storage (CLHS) for high temperature CSP applications material development and characterization to lab-scale setup** Department of Sceince & Technology (DST)			
	PI: ProdyutRanjanChakraborty Co PI: Laltu Chandra, Ambesh Dixit, and SaptarshiBasu	Rs. 58.44 Lakhs	Start Date: 03-Aug-18	End Date: 02-Aug-21
(77)	**Mitigation of weldability issues and residual stresses in dissimilar welded joints of ultra-supercritical power plants** Science & Engineering Research Board (SERB)			
	PI: Chandan Pandey	Rs. 25.26 Lakhs	Start Date: 01-Jan-20	End Date: 31-Dec-21

(78)	**Development of lead free piezoelectric based Nano-generator: Modeling, Simulator and Experimental Realization** Science & Engineering Research Board (SERB)			
	PI: Barun Pratiher Co PI: Ambesh Dixit	Rs. 53.53 Lakhs	Start Date: 23-May-19	End Date: 22-May-22
(79)	**Reactionless Maneuvering and Visual Servoing for Space Flying Robot and Half Humanoid** Indian Space Research Organization (ISRO)			
	PI: Suril V. Shah, CO PI: Kaushal A Desai & C Venkatesan	Rs. 43.86 Lakhs	Start Date: 01-Jun-20	End Date: 31-May-22
(80)	**Dynamic Studies for Half-humanoid and Spaceflying Robot** Indian Space Research Organization (ISRO)			
	PI: Suril V. Shah Co PI: C. Venkateshan	Rs. 16.84 Lakhs	Start Date: 01-Jun-20	End Date: 31-May-22
(81)	**Development of Light-weight and Flexible Multi-link Robotic Manipulator Mounted on Mobile Platform: Modelling, Simulation and Physical Realization** Science & Engineering Research Board (SERB)			
	PI: Barun Pratiher	Rs. 39.64 Lakhs	Start Date: 21-Nov-19	End Date: 20-Nov-22
(82)	**Design and Development of Indigenous On-board Autopilot and Vision-based Navigation Systems for Autonomous Flight of Hover Capable Rotary-wing Vehicles** Science & Engineering Research Board (SERB)			
	PI: Suril V. Shah, Co PIs: Deepak Fulwani, Arpit Khandelwal, Kaushal A. Desai, Chiranjoy Chattopadhyay, and C. Venkatesan	Rs. 46.22 Lakhs	Start Date: 20-Mar-20	End Date: 19-Mar-23
Department of Metallurgical and Materials Engineering				
(83)	**Quantitative assessment of Hot tearing characteristics of Aerospace Magnesium Alloys** Aeronautical Research & Development Board			
	PI: Ravi K R	Rs. 5.77 Lakhs	Start Date: 05-Aug-19	End Date: 31-May-20
(84)	**Study of the Effects of Stress-State and Strain-Rate on Constitutive Response of Polymer Gels via Experiments and Continuum Mechanics Modeling** Science & Engineering Research Board (SERB)			
	PI: Abir Bhattacharyya	Rs. 30.60 Lakhs	Start Date: 21-Dec-19	End Date: 20-Dec-21
(85)	**Thermoelectric Performance Study Using First-Principles Calculations Based Methods** Science & Engineering Research Board (SERB)			
	PI: Appala Naidu Gandi	Rs. 22.59Lakhs	Start Date: 02-Apr-19	End Date: 01-Apr-22
(86)	**Design and Fabrication of Indigenous Powder Fed Metal Additive Manufacturing Machine** Department of Sceince & Technology (DST)			
	PI: Ravi K R	Rs. 215.50 Lakhs	Start Date: 01-Aug-19	End Date: 31-Jul-22
(87)	**Chemical Reactions and Energy Transfer in Atmospheric N2/O2/Ar-Boron Nitride Surface Collisions: Applications in Modelling Spacecraft Materials** Department of Sceince & Technology (DST)			
	PI: Moumita Majundar Co PI: BP Kashyap (Mentor)	Rs. 33.63 Lakhs	Start Date: 30-Nov-19	End Date: 29-Nov-22
Department of Physics				
(88)	**Investigation of magnetoelectric coupling in CiI-xTMxOMultiferroic System** Board of ResearchIn Nuclear Science (BRNS)Mumbai			
	PI: Ambesh Dixit	Rs. 23.42 Lakhs	Start Date: 27-Mar-14	End Date: 26-Mar-17 Project Extension is in-progress
(89)	**Development of III-Nitrides thin film(s) for high frequency saw device applications** Department of Sceince & Technology (DST)			
	PI: Ambesh Dixit	Rs. 22.62 Lakhs	Start Date: 01-Apr-13	End Date: 30-Jun-18 Project Extension is in-progress

(90)	**Quantum Information and Computation 2019** Multiple Agencies			
	PI: Subhashish Banerjee	Rs. 1.45 Lakhs	Start Date: 08-Dec-19	End Date: 11-Dec-19 Closure Pending
(91)	**Probing Magnetic Structures and Spin Flop transition in bulk and nanostrutured FeVo4 Multoferroic System** Department of Sceince & Technology (DST)			
	PI: Ambesh Dixit	Rs. 6.60 Lakhs	Start Date: 13-Jan-16	End Date: 31-Dec-19 Closure Pending
(92)	**Development of nanostructured Cu2ZnSn(S/Se)4 thin films and their electronic properties for next generation solar photovoltaic applications** Department of Sceince & Technology (DST)			
	PI: Ambesh Dixit	Rs. 37.22 Lakhs	Start Date: 18-Mar-17	End Date: 17-Mar-20 Closure Pending
(93)	**Photo-Rechargeable Perovskite Batteries for Future Mobility** Department of Sceince & Technology (DST)			
	PI: Shahab Ahmad	Rs. 27.65Lakhs	Start Date: 03-Oct-18	End Date: 02-Oct-20
(94)	**Synthesis and study of properties of electrochemically active composites based on lithium intercalated silicates of iron, manganese, cobalt and having high electron conductivity corbosilicides of transition metal** Department of Sceince & Technology (DST)			
	PI: Ambesh Dixit	Rs. 23.31 Lakhs	Start Date: 22-Nov-18	End Date: 07-Nov-20
(95)	**Magnetars with Superfluid Core** Science & Engineering Research Board (SERB)			
	PI: Monika Sinha	Rs. 20.60 Lakhs	Start Date: 21-Mar-18	End Date: 20-Mar-21
(96)	**Possibilities and Device Applications of Degenerate Optical Microcavities** Science & Engineering Research Board (SERB)			
	PI: Somnath Ghosh	Rs. 34.89 Lakhs	Start Date: 09-May-18	End Date: 08-May-21
(97)	**Generation of Entangled Photons and its application to Quantum Computation and Information Processing** Department of Sceince & Technology (DST)			
	PI: V. Narayanan Co PI: Subhashish Banerjee	Rs. 208.92 Lakhs	Start Date: 24-Apr-19	End Date: 23-Apr-22
(98)	**Photo-Rechargeable Organo-Halide Perovskite-Transition Metal Dichalcogenide Batteries** Science & Engineering Research Board (SERB)			
	PI: Shahab Ahmad	Rs. 48.98 Lakhs	Start Date: 22-Mar-19	End Date: 21-Mar-22
(99)	**Sulphur Nanoparticles Reinforced Hierarchical Assemblies of Carbon nanotubes for Efficient Lithium-Sulphur Batteries** Department of Sceince & Technology (DST)			
	PI: Shahab Ahmad	Rs. 86.86 Lakhs	Start Date: 09-Oct-19	End Date: 08-Oct-22
Smart Health Care (IDRP)				
(100)	**Development of an AI platform for Human Health** Ministry of Electronic &Information Technology (MEITY)			
	PI: Santanu Chaudhury, Co PI: SushmitaJha, Sushmita Paul, SumitKalra, Kaushal A Desai	Rs. 386.54 Lakhs	Start Date: 02-Mar-20	End Date: 01-Mar-23

Completed Projects

Department of Bioscience & Bioengineering

(1) ***How LRASM1 gene regulates cellular protein quality control functions? Implications in neurodegeneration and ageing***

Science and Engineering Research Board (SERB)

PI: Amit Mishra *Rs. 23.10 Lakhs* *Start Date: 26-Sep-16* *End Date: 15-Oct-19*

Outcome: *In our current study, here we observed that LRSAM1 E3 ubiquitin ligase promotes the proteasomal degradation of QC E3 ubiquitin ligase E6-AP. Angelman Syndrome (AS) neurodevelopmental disorder is linked with the UBE3A gene, which encodes E3 ubiquitin ligase E6-AP. We have observed the co-localization and clear recruitment of LRSAM1 with E6-AP protein and also notice that LRSAM1 induces the endogenous turnover of E6-AP. Partial depletion of LRSAM1 elevates the levels of E6-AP and affect overall cell cycle regulatory proteins (p53 and p27) expression including the rate of cellular proliferation. Hence current finding provides a wonderful opportunity to better understand the basis of molecular pathomechanism of AS disorder. Additionally, this study touches upon the novel potential molecular strategy to regulate the levels of one QC E3 ubiquitin ligase with the help of another E3 ubiquitin ligase, which can ameliorate disorders and provide possible therapeutic approach for abnormal protein aggregation diseases. Here our current project findings for the first time also demonstrate that E3 ubiquitin Ligase LRSAM1 is really interesting new gene (RING) class protein that suppresses the accumulation of misfolded proteins and also alleviates their deleterious cytotoxic effects. We have also observed that LRSAM1 expression is induced under stress conditions and a partial depletion of LRSAM1 endogenous levels aggravates mitochondrial abnormalities and severely affects cells survival during proteotoxic insults. Overall, our current finding indicates that LRSAM1 is able to alleviate cytotoxic insults mediated by variety of stress events and most likely interplay a significant role in between different components of cellular protein quality control mechanism.*

These findings will help us to better understand the problem of proteopathies linked with aberrant protein accumulation and open new possibilities to better elucidate about the molecular mechanisms involved in the pathologies of neurodegeneration and aging. We have also shown that Myricetin, a flavonoid, can eliminate various abnormal proteins from the cellular environment via modulating endogenous levels of Hsp70 chaperone and quality control (QC) E3 ubiquitin ligase E6-AP. We have observed that Myricetin treatment suppresses the aggregation of different aberrant proteins. Myricetin also enhances the elimination of various toxic neurodegenerative diseases associated proteins from the cells, which could be reversed by the addition of putative proteasome inhibitor (MG132). Remarkably, Myricetin can also stabilize E6 AP and reduce the misfolded proteins inclusions, which further alleviates cytotoxicity. Taken together these findings suggested that new mechanistic and therapeutic insights based on small molecules mediated regulation of disturbed protein quality control mechanism, which may result in the maintenance of the state of proteostasis. The present research focuses on the most critical ideas about cellular protein quality control system and discusses about the bio-physiological significance of LRSAM1 and E6-AP E3 ubiquitin ligases. Taken together these results provide an extensive clue that ageing and neurodegenerative diseases linked protein homeostasis failure can be ameliorated in near future with the development of possible promising therapeutic strategies aiming metastable subproteome components linked with protein misfolding and aggregation.

(2) ***Bioremediation of low-level wastes including denirtrification using microbial fuel cells***

Board of Research in Nuclear Science (BRNS)

PI: Meenu Chabbra *Rs. 22.73 Lakhs* *Start Date: 12-Mar-13* *End Date: 26-Nov-19*

Co PI: Atul Kumar

Outcome: *Process for nuclear waste treatment tested at BARC*
Four High impact publications.

Department of Chemistry

(3) ***Solid State High Energy Density Lithium Ion Rechargeable & Technology***

Department of Science & Technology (DST) IPRC

PI: Rakesh Sharma *Rs. 6.45 Lakhs* *Start Date: 26-Jun-14* *End Date: 11-Nov-19*

Outcome: *This bilateral project is with collaboration with the University of Minho, Portugal is highly successful and represented an excellent partnership due to the complementary skills of the two research groups. In this project, five novel cathode materials developed for high-temperature lithium-ion batteries at ~5 V. The Gd and Dy doped cathodes have offered smaller particle size and enhanced capacity at high C rate compared to pristine LMO cathode. These materials offered fast charging, high recyclability, and excellent performance between -20 to 70°C. The project has generated nine joint peer-reviewed high impact publications, one PhD, and two master's projects.*

Department of Computer Science & Engineering

(4) ***Netapp Faculty Fellowship: Edge Computing***

NETAPP

PI: Subhajit Sidhanta *Rs. 5 Lakhs* *Start Date: 2-Feb-18* *End Date: 1-Jun-19*

Project Transferred to IIT Bhilai

Department of Electrical Engineering

(5) ***Design Vetting of 01 MW Micro grid based Solar power plant at Militry Station Brichgunj***

RAMA Refelection Pvt.Ltd.

PI: Deepak Fulwani *Rs. 0.53 Lakhs* *Start date: 6-Aug-19* *End Date: 31-Jan-20*

Outcome: *A single line diagram provided to verify functioning of the Microgrid. Based on verifying different operating modes, the proposed Microgrid supposed to function as intended. The components can be broadly classified as: energy generation system, energy storage battery system, energy backup diesel generator system, data exchange system, Microgrid protection system, load system, and control system. The energy is generated by the PV Source, which are connected in series and parallel to obtain the rated power demand from load. Energy storage and energy backup are used to ensure the reliability of the installed Microgrid, in case of inadequate power from PV Source. The batteries are used to maintain a constant frequency during load fluctuations. The centralized energy management system regulates the charging and discharging mode of battery. It also controls the circuit breakers which protect the system during faults. The scope of the report is limited to just overall functioning of the system and does not, by any means, extend to individual component quality and other related aspects. Based on the provided single line diagram, the proposed Microgrid system is expected to operate as desired.*

Department of Physics

(6) ***A Study of quantum correlations: Squeezing and its various facets***

Council of Scientific and Industrial Research (CSIR)

PI: Subhashish Banerjee *Rs. 5.10 Lakhs* *Start date: 22-Aug-16* *End Date: 15-Nov-19*

Outcome: *Quantum correlations occupy a central position in the quest for understanding and harvesting the power of quantum mechanics. Here, we study quantum correlations in nonclassical states such as multiphoton squeezed state, from the prospective of a practical interface between quantum optics and quantum information processing. One of the principle tasks of the project is to study quantum correlations in non-classical states from the prospective of an interface between quantum optics and quantum information. Further, the effect noise on these systems needs to be understood. This is addressed here by a careful investigation of non-classical features in a physical system comprised of a cavity with two ensembles of two-level atoms. Noise causes the transition from quantum to classical behavior and manifest itself in the form of irreversible processes such as decoherence and dissipation. From the perspective of the implementation of any quantum information task, it is important to consider the role of noise on the chosen task. We study the contribution of decoherence to quantum cryptographic tasks. Further, a number of features of quantum information processing including quantum correlations, are studied using non- Markovian noise channels, i.e., channels endowed with memory, are used.*

(7) ***Application specialty optical fibers and towards 1D random lasers in disordered lattices***

Department of Science & Technology (DST)

PI: Somnath Ghosh *Rs. 35 Lakhs* *Start Date: 28-Mar-17* *End Date: 20-Dec-19*

Outcome:

- *As targeted in the project, we have reported a broadband fiber-optic based light source with low divergence covering the entire wavelength window of 1.5–3.5 μm with mode area as large as 1100 μm2.*
- *A new fiber optic light source (discrete supercontinuum pulsed source) spreading over 1.85-2.45 μm which exactly matches with the first mid-IR atmospheric transmission window has been designed for defence and spectroscopic applications.*
- *A specialty photonic bandgap fiber design scheme has been reported based on rapidly varying dispersion profile to achieve stable parabolic pulse propagation. Such fiber design has further been developed by engineering the periodic cladding of the Bragg fiber with variable thickness to reduce the higher order dispersive effect. Pulse propagation and reshaping through such specialty fiber has been studied numerically and stable parabolic pulse with linear chirp and wide spectrum has been obtained at the output end of the 8 m long Bragg fiber. Such stable breaking free optical pulse is very attractive for applications in biomedical surgery, imaging, chemical sensing, strategic purposes, spectroscopy and many more.*

(8) ***Synchrony Based Evolution of Various Biological and Artificial Systems to Understand Complex Computational Aspects***

Department of Science & Technology (DST)

PI: Satyajit Sahu *Rs. 35 Lakhs* *Start date: 13-Mar-13* *End date: 4-Feb-20*

Outcome: *The project had dual purpose. First, we studied the natural system where information processing is happening and second, from the study whatever we observed we tried to implement on an artificial systems where similar kind of interaction can be mimicked. Following these two steps we studied microtubule which is a component found in the neuron of living beings. Device using microtubule was studied extensively and its behaviour was tried to observe in an artificial system of synthetic molecules. We found that the synthetic molecules obeyed the similar kind of behaviour as microtubule did and in fact, we realized that a group of synthetic molecules can also be used as an electronic component. For example, we observed that a group of four DDQ molecules can work as an electronic counter. This counter can be used for studying the interaction between the molecules which act as molecular motor.*

Consultancy Projects

Department of Chemistry				
(1)	**Towards the development of low-cost water quality sensors - Phase I** *Panasonic R&D Center of India*			
	PI: Rakesh Kumar Sharma	*Rs. 2.35 Lakhs*	*Start Date: 01 Oct 2014*	*End Date: N/A*
(2)	**Towards the development of low-cost water quality sensors - Phase II** *Panasonic R&D Center of India*			
	PI: Rakesh Kumar Sharma	*Rs. 64.37 Lakhs*	*Start Date: 16 Feb 2015*	*End Date: N/A*
Department of Mechanical Engineering				
(3)	**Short term course on Helicopter dynamics and handling qualities** *Defense Research & Development Organization (DRDO), Government of India*			
	PI: Suril Vijaykumar Shah; *Co-PI: C. Venkatesan*	*Rs. 3.72 Lakhs*	*Start Date: 15 Feb 2017*	*End Date: N/A*
(4)	**Visual Servoing of Mobile Manipulator with application to smart warehouse and smart factory** *Tata Consultancy Limited*			
	PI: Suril Vijaykumar Shah	*Rs. 10.12 Lakhs*	*Start Date: 01 Jul 2017*	*End Date: N/A*
(5)	**Helicopter Dynamics and Handling Quality** *ASTE Bangalore*			
	PI: C. Venkatesan	*Rs. 3.42 Lakhs*	*Start Date: 10 Dec 2018*	*End Date: N/A*
(6)	**01 mw Micro grid based solar power plant at Military Station Brichgunj (Port Blair) under Military engineering services port Blair** *RAMA Reflection Pvt. Ltd.*			
	PI: Barun Pratiher	*Rs. 0.7 Lakhs*	*Start Date: 10-Sep-19*	*End Date: N/A*
Department of Physics				
(7)	**Hunting of New Physics Through b-> S Transitions** *Council of Scientific and Industrial Research, New Delhi*			
	PI: Ashutosh K Alok *Co PI: S. Banerjee*	*Rs.11.92 Lakhs*	*Start Date: 01-Jan-13*	*End Date: N/A* *End Date is not applicable, as consultancy projects offers continues transactions*

Fellowship Projects

Department of Bioscience & Bioengineering				
(1)	**Identification, assessment and characterization of E3 ubiquitin ligases implicated in the neurodegenerative diseases** *Ramalingaswami Fellowship Project*			
	PI: Amit Mishra	*Rs. 74.50 Lakhs*	*Start Date: 15 July 2011*	*End Date: 14 Feb 2017* *Project Closed in August 2020*
Department of Chemistry				
(2)	**Outreach Workshop-Prime Minister's Fellowship for Doctoral Research** *Science and Engineering Research Board (SERB)*			
	PI: Samanwita Pal	*Rs.2.37 Lakhs*	*Start date: 12-Feb-19*	*End Date: 31-Mar-19* *Project Extension is in-progress*
Department of Computer Science & Engineering				
(3)	**Young Faculty Research Fellowship (YFRF) of Visvesvarya PhD Scheme** *Ministry of Electronics and Information Technology (MeitY)*			
	PI: Gaurav Harit	*Rs. 22.2 Lakhs*	*Start Date: 22 Jan 2018*	*End Date: 21 Jan 2020*
(4)	**Mitigating Adversarial Perturbations in Deep Learning *(Swarnajayanti Fellowship)*** *Department of Science & Technology (DST)*			
	PI: Mayank Vatsa	*Rs. 86.94 Lakhs*	*April 2019*	*March 2024*
Department of Electrical Engineering				
(5)	**Visvesvaraya Ph.D. Scholarship Scheme for Electronics & IT (Part-2)** *Media Lab Asia*			
	PI: A. K. Tiwari	*Rs. 3 Cr.*	*Start Date: 21 Oct 2014*	*End Date: 31 July 2010*
(6)	**Visvesvaraya Ph.D. Scholarship Scheme for Electronics & IT (Part-1)** *Media Lab Asia*			
	PI: A. K. Tiwari	*Rs. 3 Cr.*	*Start Date: 21 Oct 2014*	*End Date: 20 Oct 2019*
(7)	**Young Faculty Research Fellowship (YFRF) of Visvesvaraya PhD Scheme** *Ministry of Electronics and Information Technology (MeitY)*			
	PI: Deepak Fulwani	*Rs. 37 Lakhs*	*Start Date: 01 Feb 2018*	*End Date: 31 Jan 2021*
(8)	**Young Faculty Research Fellowship (YFRF) of Visvesvaraya PhD Scheme** *Ministry of Electronics and Information Technology (MeitY)*			
	PI: S. P. Tiwari	*Rs. 37 Lakhs*	*Start Date: 24 Jan 2018*	*End Date: 22 July 2021*
Department of Physics				
(9)	**Design and Development of Metal Oxide Hole Transporting Material (HTM) based Inverted Perovskite Solar Cell (iPSC) Under Ambient Conditions** *Department of Science & Technology (DST), Government of India*			
	PI: Ambesh Dixit	*Rs. 21.18 Lakhs*	*Start Date: 26 Sep 2018*	*End Date: 25 Sep 2023*

Other Projects

Department of Bioscience & Bioengineering				
(1)	**Workshop on Computational Biology and Bioinformatics** *Science and Engineering Research Board-IITJ*			
	PI: Sushmita Paul	*Rs. 2.70 Lakhs*	*Start Date: 26-Jun-19*	*End Date: 25-Dec-19* *Closure Pending*
(2)	**DST Subject Expert Committee (SEC)- Life Science Meeting** *Department of Science & Technology (DST)*			
	PI: Priyanka Singh	*Rs. 12.30 Lakhs*	*Start Date: 06-Feb-19*	*End Date: 31-Mar-20* *Closure Pending*
Department of Chemistry				
(3)	**Unnat Bharat Abhiyan** *Ministry of Human Resource Development (MHRD)*			
	PI: Ananya Debnath	*Rs. 3.77 Lakhs*	*Start Date: 06 Mar 2017*	*End Date: 05 Mar 2020*
Department of Electrical Engineering				
(4)	**Design and Fabrication of Germanium on Silicon near infrared photodetectors** *Department of Science & Technology (DST), Government of India*			
	PI: Saravanan Rajamani	*Rs. 19.20 Lakhs*	*Start Date: 09 Aug 2017*	*End Date: 08 Aug 2019* *Settlement pending from Funding Agency*
(5)	**64th DAE Solid State Physics Symposium** *DAE*			
	PI: Mahesh Kumar	*Rs.5.00 Lakhs*	*Start Date: 16-Jul-19*	*End Date: 31-Jan-20* *Settlement pending from funding agency*
Department of Mechanical Engineering				
(6)	**Ishaan Vikas Program 2016** *IIT Guwahati, Ministry of Human Resource Development & Ministry of Electronics (MHRD)*			
	PI: Barun Pratiher, *Co PI: K. A. Desai*	*Rs.2.57 Lakhs*	*Start Date: 04-Jul-16*	*End Date: 16-Jul-16* *Project Extension is in-progress*
(7)	**Unnat Bharat Abhiyan (RCI)** *IIT Delhi*			
	PI: Anand K. Plappally	*Rs. 5 Lakhs*	*Start Date: 31 Mar 2019*	*End Date: 31 Mar 2020*
Department of Physics				
(8)	**KVPY Interview 2019** *IISc Banglore*			
	PI: Sampat Raj Vadera	*Rs.4.5 Lakhs*	*Start Date: 05-Feb-20*	*End Date: 24-Mar-20* *Closure Pending*

Patents & Publications

The following are the details of Patents and Publications for the FY 2019-20.

List of Patents

Department of Bioscience & Bioengineering

Development of a portable, low cost hypoxia chamber, From IIT Jodhpur
Dr. Sushmita Jha
PATENT Published (Application No. 201811017208)

Department of Chemistry

Composition, substrates and methods thereof
G.U. Kulkarni, K.D.M. Rao, R. Gupta, B Radha, S. Kiruthika,
US10626279B2, 2020

Department of Computer Science & Engineering

Automatic Speech Generation Patent [Published]
Dr. Sumit Kalra & Dr. Arpit Khandelwal (IIT Jodhpur), Dr. Abhinav Dixit, Dr. Amit Goyal & Dr. Nithin (AIIMS Jodhpur)
India Patent Office 201911035856 (2019)

Department of Electrical Engineering

Algorithm for Blind Signal Modulation Recognition
Sandeep Kumar Yadav, Gaurav Jajoo, Yogesh Kumar
Copyright filed, Diary number: 1067/2020-CO/SW, Status: Registered (ROC NO. SW-13342/2020)

List of Publications

Department of Bioscience & Biotechnology

Journal Papers

1. Gallaud E., Nair A. R., Horsley A., Monnard A., Singh P., Pham T.T., Garcia D. S., Ferrand A and Cabernard C. (2020). Dynamic centriolar localization of Polo and Centrobin in early mitosis primes centrosome asymmetry. PLOS BIOLOGY, 18(8). ISSN: 1544-9173. https://doi.org/10.1371/journal.pbio.3000762
2. Jaiswal, S., & Singh, P. (2020). Centrosome dysfunction in human diseases. *Seminars in Cell and Developmental Biology*. ISSN: 10849521 (ISSN). https://doi.org/10.1016/j.semcdb.2020.04.019
3. Sampson TR, Challis C, Jain N, Shastri G, Thron T, Wittung-Stafshede P, Gradinaru V, M. R. Chapman MR, and Mazmanian SK. (2020). A gut bacterial amyloid promotes alpha-synuclein aggregation and motor impairment in mice. ELIFE, 9. ISSN: 2050-084X. https://doi.org/10.7554/eLife.53111
4. Jain, N., & Mansuri, A. (2020). Stopping the unstoppable: Unconventional methods to prevent the biofilm growth. Current Drug Discovery Technologies, 17(4), 515–522. ISSN: 15701638 (ISSN). https://doi.org/10.2174/1570163816666190726153441
5. Thangudu, S., Kulkarni, S. S., Vankayala, R., Chiang, C.-S., & Hwang, K. C. (2020). Photosensitized reactive chlorine species-mediated therapeutic destruction of drug-resistant bacteria using plasmonic core-shell Ag@AgCl nanocubes as an external nanomedicine. NANOSCALE, 12(24), 12970–12984. ISSN: 2040-3364. https://doi.org/10.1039/d0nr01300e
6. Thangudu, S., Kalluru, P., & Vankayala, R. (2020). Preparation, Cytotoxicity, and In Vitro Bioimaging of Water Soluble and Highly Fluorescent Palladium Nanoclusters. Bioengineering, 7(1), 20. ISSN: 2306-5354. https://doi.org/10.3390/bioengineering7010020
7. Nuthalapati, K., Vankayala, R., Chiang, C.-S., & Hwang, K. C. (2020). Size and Shape Effects of Near-Infrared Light-Activatable Cu-2(OH)PO4 Nanostructures on Phototherapeutic Destruction of Drug-Resistant Hypoxia Tumors. PARTICLE & PARTICLE SYSTEMS CHARACTERIZATION, 37(5). ISSN: 0934-0866. https://doi.org/10.1002/ppsc.202000001
8. Agrawal, I., & Jha, S. (2020b). Mitochondrial Dysfunction and Alzheimer's Disease: Role of Microglia. Frontiers in Aging Neuroscience, 12. ISSN: 16634365 (ISSN). https://doi.org/10.3389/fnagi.2020.00252
9. Agrawal, I., Saxena, S., Nair, P., Jha, D., & Jha, S. (2020). Obtaining Human Microglia from Adult Human Brain Tissue. Journal of Visualized Experiments : JoVE, (162). ISSN: 1940087X (ISSN). https://doi.org/10.3791/61438
10. Sharma, N., & Jha, S. (2020). Amorphous nanosilica induced toxicity, inflammation and innate immune responses: A critical review. Toxicology, 441. ISSN: 0300483X (ISSN). https://doi.org/10.1016/j.tox.2020.152519
11. Agrawal, I., & Jha, S. (2020a). Comprehensive review of ASC structure and function in immune homeostasis and disease. MOLECULAR BIOLOGY REPORTS, 47(4), 3077–3096. ISSN: 0301-4851. https://doi.org/10.1007/s11033-020-05345-2
12. Sharma, N., Saxena, S., Agrawal, I., Singh, S., Srinivasan, V., Arvind, S., … Jha, S. (2019). Differential Expression Profile of NLRs and AIM2 in Glioma and Implications for NLRP12 in Glioblastoma. Scientific Reports, 9(1). ISSN: 20452322 (ISSN). https://doi.org/10.1038/s41598-019-44854-4
13. Nair, J. B., Mohapatra, S., Joseph, M. M., Maniganda, S., Gupta, V., Ghosh, S., & Maiti, K. K. (2020). Tracking the Footprints of Paclitaxel Delivery and Mechanistic Action via SERS Trajectory in Glioblastoma Cells. ACS Biomaterials Science and Engineering, 6(9), 5254–5263. ISSN: 23739878 (ISSN). https://doi.org/10.1021/acsbiomaterials.0c00717
14. Adak, A., Das, G., Khan, J., Mukherjee, N., Gupta, V., Mallesh, R., & Ghosh, S. (2020). Extracellular Matrix (ECM)-Mimicking Neuroprotective Injectable Sulfo-Functionalized Peptide Hydrogel for Repairing Brain Injury. ACS BIOMATERIALS SCIENCE & ENGINEERING, 6(4), 2287–2296. ISSN: 2373-9878. https://doi.org/10.1021/acsbiomaterials.9b01829
15. Mukherjee, N., Nandi, S., Garg, S., Ghosh, S., Ghosh, S., Samat, R., & Ghosh, S. (2020). Targeting Chondroitin Sulfate Proteoglycans: An Emerging Therapeutic Strategy to Treat CNS Injury. ACS Chemical Neuroscience, 11(3), 231–232. ISSN: 1948-7193. https://doi.org/10.1021/acschemneuro.0c00004
16. Mukherjee, N., Nandi, S., Ghosh, S., Garg, S., & Ghosh, S. (2020). Three-Dimensional Microfluidic Platform with Neural Organoids: Model System for Unraveling Synapses. ACS Chemical Neuroscience, 11(2), 101–102. ISSN: 1948-7193. https://doi.org/ 10.1021/acschemneuro.9b00654

17. Sarkar, S., Gulati, K., Mishra, A., & Poluri, K. M. (2020). Protein nanocomposites: Special inferences to lysozyme based nanomaterials. INTERNATIONAL JOURNAL OF BIOLOGICAL MACROMOLECULES, 151, 467–482. ISSN: 0141-8130. https://doi.org/10.1016/j.ijbiomac.2020.02.179

18. Ribhav Mishra, Ayeman Amanullah, Arun Upadhyay, Rohan Dhiman, Ankur Rakesh Dubey, Sarika Singh, Amit Prasad and Amit Mishra. (2020). Ubiquitin ligase LRSAM1 suppresses neurodegenerative diseases linked aberrant proteins induced cell death. International Journal of Biochemistry and Cell Biology, 120. ISSN: 13572725 (ISSN). https://doi.org/10.1016/j.biocel.2020.105697

19. Rimanpreet Kaur, Naina Arora, Majeed Abdulwahid Jamakhani, Shelvia Malik, Pramod Kumar, Farhan Anjum, Shweta Tripathi, Amit Mishra and Amit Prasad. (2020). Development of multi-epitope chimeric vaccine against Taenia solium by exploring its proteome: an in silico approach. EXPERT REVIEW OF VACCINES, 19(1), 105–114. ISSN: 1476-0584. https://doi.org/10.1080/14760584.2019.1711057

20. Gupta, N., Regar, H., Verma, V. K., Prusty, D., Mishra, A., & Prajapati, V. K. (2020). Receptor-ligand based molecular interaction to discover adjuvant for immune cell TLRs to develop next-generation vaccine. International Journal of Biological Macromolecules, 152, 535–545. ISSN: 01418130 (ISSN). https://doi.org/10.1016/j.ijbiomac.2020.02.297

21. A. Y. Rangrez, L. Kilian, K. Stiebeling, S. Dittmann, P. Yadav, E. Schulze-Bahr, N. Frey, D. Frank. (2020). Data on the role of cardiac α-actin (ACTC1) gene mutations on SRF-signaling. Data in Brief, 28. ISSN: 23523409 (ISSN). https://doi.org/10.1016/j.dib.2019.105071

22. Parveen, A., Mustafa, S. H., Yadav, P., & Kumar, A. (2019). Applications of Machine Learning in miRNA Discovery and Target Prediction. Current Genomics, 20(8), 537–544. ISSN: 1875-5488. https://doi.org/10.2174/1389202921666200106111813

23. Gangele, K., Jamsandekar, M., Mishra, A., & Poluri, K. M. (2019). Unraveling the evolutionary origin of ELR motif using fish CXC chemokine CXCL8. Fish & Shellfish Immunology, 93, 17–27. ISSN: 1050-4648. https://doi.org/10.1016/j.fsi.2019.07.034

24. Mishra, A., Behura, A., Mawatwal, S., Kumar, A., Naik, L., Mohanty, S. S., Manna, D., Dokania, P., Mishra, A., Patra, S. K., & Dhiman, R. (2019). Structure-function and application of plant lectins in disease biology and immunity. Food and Chemical Toxicology, 134, 110827. ISSN: 0278-6915. https://doi.org/10.1016/j.fct.2019.110827

25. Gupta, S., Biswas, J., Gupta, P., Singh, A., Tiwari, S., Mishra, A., & Singh, S. (2019). Salubrinal attenuates nitric oxide mediated PERK:IRE1α: ATF-6 signaling and DNA damage in neuronal cells. Neurochemistry International, 131, 104581. ISSN: 0197-0186. https://doi.org/10.1016/j.neuint.2019.104581

26. Joshi, V., Mishra, R., Upadhyay, A., Amanullah, A., Poluri, K. M., Singh, S., Kumar, A., & Mishra, A. (2019). Polyphenolic flavonoid (Myricetin) upregulated proteasomal degradation mechanisms: Eliminates neurodegenerative proteins aggregation. Journal of Cellular Physiology, 234(11), 20900–20914. ISSN: 1097-4652. https://doi.org/10.1002/jcp.28695

27. Arora, N., Kaur, R., Anjum, F., Tripathi, S., Mishra, A., Kumar, R., & Prasad, A. (2019). Neglected agent Eminent disease: Linking Human Helminthic infection, inflammation and malignancy. Frontiers in Cellular and Infection Microbiology, 9. ISSN: 2235-2988. https://doi.org/10.3389/fcimb.2019.00402

28. Nishino, K., Watanabe, S., Shijie, J., Murata, Y., Oiwa, K., Komine, O., Endo, F., Tsuiji, H., Abe, M., Sakimura, K., Mishra, A., & Yamanaka, K. (2019). Mice deficient in the C-terminal domain of TAR DNA-binding protein 43 develop age-dependent motor dysfunction associated with impaired Notch1–Akt signaling pathway. Acta Neuropathologica Communications, 7(1), 118. ISSN: 2051-5960. https://doi.org/10.1186/s40478-019-0776-5

29. Mishra, R., Upadhyay, A., Prajapati, V. K., Dhiman, R., Poluri, K. M., Jana, N. R., & Mishra, A. (2019). LRSAM1 E3 ubiquitin ligase: molecular neurobiological perspectives linked with brain diseases. Cellular and Molecular Life Sciences, 76(11), 2093-2110. ISSN: 1420-9071. https://doi.org/10.1007/s00018-019-03055-y

30. Pandey, R. K., Ojha, R., Chatterjee, N., Upadhyay, N., Mishra, A., & Prajapati, V. K. (2019). Combinatorial screening algorithm to engineer multiepitope subunit vaccine targeting human T-lymphotropic virus-1 infection. Journal of Cellular Physiology, 234(6), 8717-8726. ISSN: 1097-4652. https://doi.org/10.1002/jcp.27531

31. Vyas, S., & Chhabra, M. (2019). Assessing oil accumulation in the oleaginous yeast Cystobasidium oligophagum JRC1 using dairy waste cheese whey as a substrate. 3 Biotech, 9(5), 173. ISSN: 2190-5738. https://doi.org/10.1007/s13205-019-1701-0

32. Saxena, S., & Jha, S. (2019). Role of the nucleotide-binding domain, leucine rich containing (NLR) proteins in glioblastoma angiogenesis. IBRO Reports, 6(Supplement), S307–S308. ISSN: 2451-8301. https://doi.org/10.1016/j.ibror.2019.07.952

33. Khan, E., Mishra, S. K., Mishra, R., Mishra, A., & Kumar, A. (2019). Discovery of a potent small molecule inhibiting Huntington's disease (HD) pathogenesis via targeting CAG repeats RNA and Poly Q protein. Scientific Reports, 9(1), 1–15. ISSN: 2045-2322. https://doi.org/10.1038/s41598-019-53410-z

Department of Chemistry

Journal Papers

1. Sindhu, A., Pradhan, R., Lourderaj, U., & Paranjothy, M. (2019). Theoretical investigation of the isomerization pathways of diazenes: torsion vs. inversion. Physical Chemistry Chemical Physics, 21(28), 15678-15685. ISSN: 1463-9084. https://doi.org/10.1039/C8CP05953E
2. Tharmalingam, B., Mathivanan, M., Dhamodiran, G., Saravana Mani, K., Paranjothy, M., & Murugesapandian, B. (2019). Star-Shaped ESIPT-Active Mechanoresponsive Luminescent AIEgen and Its On–Off–On Emissive Response to Cu2+/S2–. ACS Omega, 4(7), 12459–12469. ISSN: 2470-1343. https://doi.org/10.1021/acsomega.9b00845
3. Godara, S., & Paranjothy, M. (2019). Competing Molecular and Radical Pathways in the Dissociation of Halons via Direct Chemical Dynamics Simulations. The Journal of Physical Chemistry A, 123(40), 8527–8535. ISSN: 1089-5639. https://doi.org/10.1021/acs.jpca.9b06564
4. Mahto, P., Rana, N. K., Shukla, K., Das, B. G., Joshi, H., & Singh, V. K. (2019). Asymmetric Multifunctional Modular Organocatalysis: One-Pot Direct Strategy to Enantiopure α,β-Disubstituted γ-Butyrolactones. Organic Letters, 21(15), 5962–5966. ISSN: 1523-7060. https://doi.org/10.1021/acs.orglett.9b02094
5. Shukla, K., Shah, S., Rana, N. K., & Singh, V. K. (2019). An efficient and highly diastereoselective synthesis of carbocyclic spiropyrazolones via one-pot sequential dual organo-silver catalyzed Michael-hydroalkylation reactions, 60(1), 92-97. Tetrahedron Letters. ISSN: 0040-4039. https://doi.org/10.1016/j.tetlet.2018.11.064
6. Kaur, H., & Kumar, A. (2019). Nonlocal correlations and noise in different settings of a two-player game. Quantum Information Processing, 19(2), 57. ISSN: 1573-1332. https://doi.org/10.1007/s11128-019-2545-6
7. Kaur, H., & Kumar, A. (2019). An Improved Ping-Pong Protocol Using Three-Qubit Nonmaximally Nonorthogonal Entangled States. Zeitschrift Fur Naturforschung - Section A Journal of Physical Sciences. ISSN: 09320784 (ISSN). https://doi.org/10.1515/zna-2018-0448
8. Singha, N., Srivastava, A., Pramanik, B., Ahmed, S., Dowari, P., Chowdhuri, S., Das, B. K., Debnath, A. & Das, D. (2019). Unusual confinement properties of a water insoluble small peptide hydrogel. Chemical Science, 10(23), 5920–5928. ISSN: 2041-6539. https://doi.org/10.1039/C9SC01754B
9. Srivastava, A., Malik, S., & Debnath, A. (2019). Heterogeneity in structure and dynamics of water near bilayers using TIP3P and TIP4P/2005 water models. Chemical Physics, 525, 110396. ISSN: 0301-0104. https://doi.org/10.1016/j.chemphys.2019.110396
10. Srivastava, A., Karmakar, S., & Debnath, A. (2019). Quantification of spatio-temporal scales of dynamical heterogeneity of water near lipid membranes above supercooling. Soft Matter, 15(47), 9805-9815. ISSN: 1744-6848. https://doi.org/10.1039/C9SM01725A
11. Dahiya, V., Anand, B. G., Kar, K., & Pal, S. (2020). In vitro interaction of organophosphate metabolites with bovine serum albumin: A comparative 1H NMR, fluorescence and molecular docking analysis. Pesticide Biochemistry and Physiology, 163, 39-50. ISSN: 0048-3575. https://doi.org/10.1016/j.pestbp.2019.10.004
12. Ansari, A. J., Pathare, R. S., Kumawat, A., Maurya, A. K., Verma, S., Agnihotri, V. K., Joshi, R., Metre, R. K., Sharon, A., Pardasani, R. T., & Sawant, D. M. (2019). A diversity-oriented synthesis of polyheterocycles via the cyclocondensation of azomethine imine. New Journal of Chemistry, 43(35), 13721–13724. ISSN: 1369-9261. https://doi.org/10.1039/C9NJ02874A
13. Mishra, A., Betal, A., Pal, N., Kumar, R., Lama, P., Sahu, S., & Metre, R. K. (2019). Molecular Memory Switching Device Based on a Tetranuclear Organotin Sulfide Cage [(RSnIV)4(μ-S)6]·2CHCl3·4H2O (R = 2-(Phenylazo)phenyl): Synthesis, Structure, DFT Studies, and Memristive Behavior. ACS Applied Electronic Materials, 2(1), 220-229. ISSN: 2637-6113. https://doi.org/10.1021/acsaelm.9b00703
14. Urgunde, A. B., Kamboj, V., Kannattil, H. P., & Gupta, R. (2019). Layer-by-Layer Coating of Cobalt-Based Ink for Large-Scale Fabrication of OER Electrocatalyst. Energy Technology, 7(9), 1900603. ISSN: 2194-4296. https://doi.org/10.1002/ente.201900603

15. Bahuguna, G., Chaudhary, S., Sharma, R. K., & Gupta, R. (2019). Electrophilic Fluorination of Graphitic Carbon for Enhancement in Electric Double-Layer Capacitance. Energy Technology, 7(11), 1900667. ISSN: 2194-4296. https://doi.org/10.1002/ente.201900667

16. Bahuguna, G., Adhikary, V. S., Sharma, R. K., & Gupta, R. (2020). Ultrasensitive Organic Humidity Sensor with High Specificity for Healthcare Applications. Electroanalysis, 32(1), 76-85. ISSN: 1521-4109. https://doi.org/10.1002/elan.201900327

17. Ansari, A. J., Joshi, G., Sharma, P., Maurya, A. K., Metre, R., Agnihotri, V. K., Chandaluri, C. G., Kumar, R., Singh, S. & Sawant, D. M. (2019). Pd-Catalyzed four-Component Sequential Reaction Delivers a Modular Fluorophore Platform for Cell Imaging, 84(7), 3817–3825. The Journal of Organic Chemistry. ISSN: 0022-3263. https://doi.org/10.1021/acs.joc.8b02845

18. Sharma, P., Solanki, M., & Sharma, R. K. (2019). Metal-functionalized carbon nanotubes for biomass conversion: base-free highly efficient and recyclable catalysts for aerobic oxidation of 5-hydroxymethylfurfural. New Journal of Chemistry, 43(26), 10601–10609. ISSN: 1369-9261. https://doi.org/10.1039/C9NJ01555H

19. Budhwan, R., Yadav, S., & Murarka, S. (2019). Late stage functionalization of heterocycles using hypervalent iodine(III) reagents. Organic & Biomolecular Chemistry, 17(26), 6326–6341. ISSN: 1477-0539. https://doi.org/10.1039/C9OB00694J

20. Sawant, D. M., Sharma, S., Pathare, R. S., Joshi, G., Kalra, S., Sukanya, S., Maurya, A. K., Metre, R. K., Agnihotri, V. K., Khan, S., Kumar, R., & Pardasani, R. T. (2018). Relay tricyclic Pd(II)/Ag(I) catalysis: design of a four-component reaction driven by nitrene-transfer on isocyanide yields inhibitors of EGFR. Chemical Communications, 54(82), 11530–11533. ISSN: 1364-548X. https://doi.org/10.1039/C8CC05845H

21. Shukla, P., Metre, R. K., Du, M.-H., Kong, X.-J., & Das, S. (2019). [5×1 + 1×1] Hexanuclear Lanthanide(III) Cocrystal Complexes: Syntheses, Structures, and Magnetic Properties. European Journal of Inorganic Chemistry, 2019(16), 2216–2223. ISSN: 1099-0682. https://doi.org/10.1002/ejic.201900163

22. Sharma, P. R., Pandey, S., Soni, V. K., Choudhary, G., & Sharma, R. K. (2019). Macroscopic recognition of iodide by polymer appended calix[4]amidocrown resin. Supramolecular Chemistry, 31(9), 634–644. ISSN: 1061-0278. https://doi.org/10.1080/10610278.2019.1676425

23. Das, S., Parida, S. K., Mandal, T., Sing, L., Sarkar, S. D., & Murarka, S. (2020). Organophotoredox-Catalyzed Cascade Radical Annulation of 2-(Allyloxy)arylaldehydes with N-(acyloxy)phthalimides: Towards Alkylated Chroman-4-one Derivatives. Chemistry – An Asian Journal, 15(5), 568-572. ISSN: 1861-471X. https://doi.org/10.1002/asia.201901735

24. Pandey, S., Sharma, P. R., Soni, V. K., Choudhary, G., & Sharma, R. K. (2020). On the study of cucurbit[6]uril and 4-tert-butylcalix[6]arene as multifunctional lubricant additives. New Journal of Chemistry, 44(8), 3425–3433. ISSN: 1369-9261. https://doi.org/10.1039/D0NJ00191K

25. Singhal, R., Thorne, D., LeMaire, P. K., Martinez, X., Zhao, C., Gupta, R. K., Uhl, D., Scanley, E., Broadbridge, C. C., & Sharma, R. K. (2020). Synthesis and characterization of CuS, CuS/graphene oxide nanocomposite for supercapacitor applications. AIP Advances, 10(3), 035307. ISSN: 2158-3226. https://doi.org/10.1063/1.5132713

26. Srivastava, A., & Debnath, A. (2019). Cylindrical to spherical shape transformations of micelles using all-atom and coarse-grained molecular dynamics simulations. AIP Conference Proceedings, 2142(1), 130004. ISSN: 0094-243X. https://doi.org/10.1063/1.5122512

Book Chapters

1. Budhwan, R., Garg, G., Namboothiri, I. N. N., & Murarka, S. (2019). Hypervalent iodine(III) reagents in the synthesis of heterocyclic compounds. In O. A. Attanasi, P. Merino, & D. Spinelli (Eds.), Targets in Heterocyclic Systems: Chemistry and Properties (Vol. 23, pp. 27–52). Italy: Societa Chimica Italiana. ISBN: 978-88-949521-6-2. http://dx.medra.org/10.17374/targets.2020.23.27

Department of Computer Science & Engineering

Journal Papers

1. Mishra, D., Chaudhury, S., Sarkar, M., & Soin, A. S. (2019). Ultrasound Image Segmentation: A Deeply Supervised Network With Attention to Boundaries. IEEE Transactions on Biomedical Engineering, 66(6), 1637–1648. ISSN: 1558-2531. https://doi.org/10.1109/tbme.2018.2877577

2. Verma, Y. (2019). Diverse image annotation with missing labels. Pattern Recognition, 93, 470–484. ISSN: 0031-3203. https://doi.org/10.1016/j.patcog.2019.05.018

3. Goyal, S., Bhavsar, S., Patel, S., Chattopadhyay, C., & Bhatnagar, G. (2019). SUGAMAN: describing floor plans for visually impaired by annotation learning and proximity-based grammar. IET IMAGE PROCESSING, 13(13), 2623–2635. ISSN: 1751-9659. https://doi.org/10.1049/iet-ipr.2018.5627
4. Sharma, D., Gupta, N., Chattopadhyay, C., & Mehta, S. (2019). A novel feature transform framework using deep neural network for multimodal floor plan retrieval. International Journal on Document Analysis and Recognition (IJDAR), 22(4), 417-429. ISSN: 1433-2825. https://doi.org/10.1007/s10032-019-00340-1
5. Vasudev, H., Das, D., & Vasilakos, A. V. (2020). Secure message propagation protocols for IoVs communication components. Computers & Electrical Engineering, 82, 106555. ISSN: 0045-7906. https://doi.org/10.1016/j.compeleceng.2020.106555
6. Limbasiya, T., & Das, D. (2020). Lightweight Secure Message Broadcasting Protocol for Vehicle-to-Vehicle Communication. IEEE Systems Journal, 14(20), 520 - 529. ISSN: 1932-8184. https://doi.org/10.1109/JSYST.2019.2932807
7. Das, D. (2020). A hybrid algorithm for secure cloud computing. International Journal of Wireless and Mobile Computing, 18(2), 116–122. ISSN: 17411084 (ISSN). https://doi.org/10.1504/IJWMC.2020.105693
8. Limbasiya, T., & Das, D. (2019). Identity based proficient message verification scheme for vehicle users. Pervasive and Mobile Computing, 60, 101083. ISSN: 1574-1192. https://doi.org/10.1016/j.pmcj.2019.101083
9. Limbasiya, T., & Das, D. (2019). ESCBV: energy-efficient and secure communication using batch verification scheme for vehicle users. Wireless Networks. ISSN: 1572-8196. https://doi.org/10.1007/s11276-019-02104-5
10. Ghosh, J., & Das, D. (2019). Femtocells Underlaid Macro-Cellular Networks. IETE Technical Review (Institution of Electronics and Telecommunication Engineers, India). ISSN: 02564602 (ISSN). https://doi.org/10.1080/02564602.2019.1682693
11. Ghosh, S., Singh, R., & Vatsa, M. (2020). Subclass Heterogeneity Aware Loss for Cross-Spectral Cross-Resolution Face Recognition. IEEE Transactions on Biometrics, Behavior, and Identity Science, 2(3), 245–256. ISSN: 2637-6407. https://doi.org/10.1109/tbiom.2020.2984324
12. Tripathi, A., Gupta, A., Chaudhury, S., & Singh, A. (2019). Image super resolution using distributed locality sensitive hashing for manifold learning. Multimedia Tools and Applications, 78(18), 25673–25684. ISSN: 1573-7721. https://doi.org/10.1007/s11042-019-07799-4
13. Dang, S., & Chaudhury, S. (2019). Novel relative relevance score for estimating brain connectivity from fMRI data using an explainable neural network approach. Journal of Neuroscience Methods, 326, 108371. ISSN: 0165-0270. https://doi.org/10.1016/j.jneumeth.2019.108371

Conference Papers

1. Kaur, A., & Mishra, D. (2019). A reconfigurable cyclic ADC for biomedical applications. In Proceedings of the 2019 IEEE Biomedical Circuits and Systems Conference (BioCAS) (pp. 1-4). Nara, Japan: IEEE. ISBN: 978-1-5090-0617-5. https://doi.org/10.1109/BIOCAS.2019.8919110
2. Limbasiya, T., & Das, D. (2020). SearchCom: Vehicular Cloud-based Secure and Energy-Efficient Communication and Searching System for Smart Transportation. In Proceedings of the 21st International Conference on Distributed Computing and Networking (pp. 1–10). Kolkata, India: Association for Computing Machinery. ISBN: 978-1-4503-7751-5. https://doi.org/10.1145/3369740.3369772
3. Bajaj, K., Limbasiya, T., & Das, D. (2020). An Efficient Message Transmission and Verification Scheme for VANETs. In D. V. Hung & M. D´Souza (Eds.), Distributed Computing and Internet Technology (pp. 127–143). Cham: Springer International Publishing. ISBN: 978-3-030-36987-3. https://doi.org/10.1007/978-3-030-36987-3_8
4. Limbasiya, T., Das, D., & Sahay, S. K. (2019). Secure Communication Protocol for Smart Transportation Based on Vehicular Cloud. In Proceedings of the 2019 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2019 ACM International Symposium on Wearable Computers (pp. 372–376). London, UK: ACM. ISBN: 978-1-4503-6869-8. https://doi.org/10.1145/3341162.3349305
5. Vasudev, H., & Das, D. (2019). Work-in-Progress: SAFE: Secure Authentication for Future Entities Using Internet of Vehicles. 2019 IEEE Real-Time Systems Symposium (RTSS), 560–563. Hong Kong: IEEE. ISBN: 978-1-72816-463-2. https://doi.org/10.1109/RTSS46320.2019.00064
6. Patel, A., Shah, N., Limbasiya, T., & Das, D. (2019). VehicleChain: Blockchain-based Vehicular Data Transmission Scheme for Smart City. In 2019 IEEE International Conference on Systems, Man and Cybernetics (SMC) (pp. 661–667). Bari, Italy: IEEE. ISBN: 978-1-72814-569-3. https://doi.org/10.1109/SMC.2019.8914391

7. Kumar, A., Limbasiya, T., & Das, D. (2019). BlockCom: Blockchain-based efficient communication and storage protocol. In Bao V.N.Q. & Thanh T.T. (Eds.), Proc. Asia-Pacific Conf. Commun., APCC (pp. 473–478). Ho Chi Minh City, Vietnam: IEEE. ISBN: 9781728136790. https://doi.org/10.1109/APCC47188.2019.9026512
8. Das, D. (2019). Improving Throughput and Energy Efficiency in Vehicular Ad-Hoc Networks using Internet of Vehicles and Mobile Femto Access Points. In TENCON 2019 – 2019 IEEE Region 10 Conference (TENCON) (pp. 1270–1274). Kochi, India: IEEE. ISBN: 978-1-7281-1895-6. https://doi.org/10.1109/TENCON.2019.8929626
9. Singh, M., Limbasiya, T., & Das, D. (2019). Pseudo-identity Based Secure Communication Scheme for Vehicular Ad-hoc Networks. In 2019 IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS) (pp. 1-6). Goa, India: IEEE. https://doi.org/10.1109/ANTS47819.2019.9118077.
10. Jain, M., Sanyal, A., Goyal, S., Chattopadhyay, C., & Bhatnagar, G. (2019). A framework for the conversion of textual bigdata into 2d architectural floor plan. In 2019 IEEE Fifth International Conference on Multimedia Big Data (BigMM) (pp. 404–410). Singapore: IEEE. ISBN: 9781728155272. https://doi.org/10.1109/BigMM.2019.00022
11. Jain, A., Agarwal, P., Mujumdar, S., Gupta, N., Mehta, S., & Chattopadhyay, C. (2019). Radial Loss for Learning Fine-grained Video Similarity Metric. In ICASSP 2019 — 2019 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) (pp. 1652–1656). Brighton, United Kingdom: IEEE. ISBN: 978-1-4799-8131-1. https://doi.org/10.1109/ICASSP.2019.8683003
12. Goyal, S., Mistry, V., Chattopadhyay, C., & Bhatnagar, G. (2019). BRIDGE: Building plan repository for image description generation, and evaluation. In 2019 International Conference on Document Analysis and Recognition (ICDAR) (pp. 1071–1076). Sydney, Australia: IEEE. ISBN: 9781728128610. https://doi.org/10.1109/ICDAR.2019.00174
13. Singla, V., Malav, I. K., Kaur, J., & Kalra, S. (2019). Develop Leave Application using Blockchain Smart Contract. In 2019 11th International Conference on Communication Systems & Networks (COMSNETS) (pp. 547–549). Bengaluru, India: IEEE. ISBN: 9781538679029. https://doi.org/10.1109/COMSNETS.2019.8711422
14. Kalra, S., & Prabhakar, T. V. (2020). Multi-tenant Quality Attributes to Manage Tenants in SaaS Applications. In 2020 IEEE International Conference on Software Architecture Companion (ICSA-C) (pp. 83–88). Salvador, Brazil: IEEE. ISBN: 9781728174150. https://doi.org/10.1109/ICSA-C50368.2020.00025
15. Kundu, S. (2020). Total Influence and Hybrid Simulation of Independent Cascade Model using Rough Knowledge Granules. In 2020 4th International Conference on Computational Intelligence and Networks (CINE) (pp. 1-6). Kolkata, India: IEEE. ISBN: 9781728156880. https://doi.org/10.1109/CINE48825.2020.234405
16. Jain, H., & Harit, G. (2019). An unsupervised sequence-to-sequence autoencoder based human action scoring model. In 2019 IEEE Global Conference on Signal and Information Processing (GlobalSIP) (pp. 1-5). Ottawa, ON, Canada: IEEE. ISBN: 9781728127231. https://doi.org/10.1109/GlobalSIP45357.2019.8969424
17. Sharma, D., & Harit, G. (2019). Associating Field Components in Heterogeneous Handwritten form Images using Graph Autoencoder. In 2019 International Conference on Document Analysis and Recognition Workshops (ICDARW) (Vol. 5, pp. 41–46). Sydney, Australia: IEEE. ISBN: 978-1-72815-054-3. https://doi.org/10.1109/ICDARW.2019.40079
18. Singh, R., Agarwal, A., Singh, M., Nagpal, S., & Vatsa, M. (2020). On the Robustness of Face Recognition Algorithms Against Attacks and Bias. Proceedings of the AAAI Conference on Artificial Intelligence, 34(09), 13583–13589. https://doi.org/10.1609/aaai.v34i09.7085
19. Jindal, S., Sood, R., Singh, R., Vatsa, M., and T. Chakraborty (2020). NewsBag: A Benchmark Multimodal Dataset for Fake News Detection, SafeAI 2020: The AAAI Workshop on Artificial Intelligence Safety, pages 138-145.
20. Kumar, P., Vatsa, M., & Singh, R. (2020b, March). Detecting Face2Face Facial Reenactment in Videos. 2020 IEEE Winter Conference on Applications of Computer Vision (WACV), Snowmass Village, CO, USA: IEEE. ISBN:978-1-7281-6553-0. https://doi.org/10.1109/wacv45572.2020.9093628
21. Singh, A. K., Mishra, A., Shekhar, S., & Chakraborty, A. (2019). From strings to things: Knowledge-enabled VQA model that can read and reason. Proc IEEE Int Conf Comput Vision, 2019-October, 4601–4611. Institute of Electrical and Electronics Engineers Inc. ISBN: 15505499 (ISSN); 9781728148038 (ISBN). https://doi.org/10.1109/ICCV.2019.00470
22. Ralekar, C., Choudhary, S., Gandhi, T. K., & Chaudhury, S. (2019). Intelligent Identification of Ornamental Devanagari Characters Inspired by Visual Fixations. In 2019 International Conference on Document Analysis and Recognition Workshops (ICDARW) (Vol. 5, pp. 14–19). Sydney, Australia: IEEE. ISBN: 978-1-72815-054-3. https://doi.org/10.1109/ICDARW.2019.40074

23. Tripathi, A., Srivastava, S., Lall, B., & Chaudhury, S. (2019). Guided Compositional Generative Adversarial Networks. In 2019 IEEE International Conference on Systems, Man and Cybernetics (SMC) (pp. 3586–3591). Bari, Italy: IEEE. ISBN: 978-1-72814-569-3. https://doi.org/10.1109/SMC.2019.8914284

24. Sharma, M., Makwana, M., Upadhyay, A., Singh, A. P., Badhwar, A., Trivedi, A., Saini, A., & Chaudhury, S. (2019). Robust Image Colorization Using Self Attention Based Progressive Generative Adversarial Network. 2019 IEEE/CVF Conference on Computer Vision and Pattern Recognition Workshops (CVPRW), 2188–2196. Long Beach, CA, USA: IEEE. ISBN: 978-1-72812-506-0. https://doi.org/10.1109/CVPRW.2019.00272

Book Chapters & Papers in Conference Proceedings

1. Belfin, R. V., Grace Mary Kanaga, E., & Kundu, S. (2020, June). Application of Machine Learning in the Social Network. Recent Advances in Hybrid Metaheuristics for Data Clustering, 61–83. ISBN: 9781119551621. https://doi.org/10.1002/9781119551621.ch4

2. Aggarwal, R., Harit, G., & Tiwari, A. K. (2019). Symbol Spotting in Offline Handwritten Mathematical Expressions. In S. Sundaram & G. Harit (Eds.), Document Analysis and Recognition (pp. 52–64). Singapore: Springer Singapore. ISBN: 9789811393617. https://doi.org/10.1007/978-981-13-9361-7_5

3. Sharma, D., Harit, G., & Chattopadhyay, C. (2019). Attributed Paths for Layout-Based Document Retrieval. In S. Sundaram & G. Harit (Eds.), Document Analysis and Recognition (Vol. 1020, pp. 15–26). Singapore: Springer Singapore. ISBN: 9789811393617. https://doi.org/10.1007/978-981-13-9361-7_2

4. Aggarwal, R., Harit, G., & Tiwari, A. K. (2020). Structural Analysis of Offline Handwritten Mathematical Expressions. In B. B. Chaudhuri, M. Nakagawa, P. Khanna, & S. Kumar (Eds.), Proceedings of 3rd International Conference on Computer Vision and Image Processing (pp. 213–225). Springer Singapore. ISBN: 978-981-329-291-8. https://doi.org/10.1007/978-981-32-9291-8_18

5. Srivastava, D., & Harit, G. (2020). Cell Extraction and Horizontal-Scale Correction in Structured Documents. In B. B. Chaudhuri, M. Nakagawa, P. Khanna, & S. Kumar (Eds.), Proceedings of 3rd International Conference on Computer Vision and Image Processing (pp. 53–64). Springer Singapore. ISBN: 978-981-329-291-8. https://doi.org/10.1007/978-981-32-9291-8_5

6. Srivastava, D., & Harit, G. (2020). Word Spotting in Cluttered Environment. In B. B. Chaudhuri, M. Nakagawa, P. Khanna, & S. Kumar (Eds.), Proceedings of 3rd International Conference on Computer Vision and Image Processing (pp. 161–172). Springer Singapore. ISBN: 978-981-329-291-8. https://doi.org/10.1007/978-981-32-9291-8_14

7. Gupta, R., Anand, P., Kaushik, V., Chaudhury, S., & Lall, B. (2019). Data Driven Sensing for Action Recognition Using Deep Convolutional Neural Networks. In B. Deka, P. Maji, S. Mitra, D. K. Bhattacharyya, P. K. Bora, & S. K. Pal (Eds.), Pattern Recognition and Machine Intelligence (pp. 250–259). Cham: Springer International Publishing. ISBN: 978-3-030-34869-4. https://doi.org/10.1007/978-3-030-34869-4_28

8. Sikarwar, H., Das, D., & Kalra, S. (2020). Efficient Authentication Scheme Using Blockchain in IoT Devices. In L. Barolli, F. Amato, F. Moscato, T. Enokido, & M. Takizawa (Eds.), Advanced Information Networking and Applications (pp. 630–641). Cham: Springer International Publishing. ISBN: 978-3-030-44041-1. https://doi.org/10.1007/978-3-030-44041-1_56

9. Maiti, S., Gidde, P., Saurav, S., Singh, S., Dhiraj, & Chaudhury, S. (2019). Real-Time Vehicle Detection in Aerial Images Using Skip-Connected Convolution Network with Region Proposal Networks. In B. Deka, P. Maji, S. Mitra, D. K. Bhattacharyya, P. K. Bora, & S. K. Pal (Eds.), Pattern Recognition and Machine Intelligence (pp. 200–208). Cham: Springer International Publishing. ISBN: 978-3-030-34869-4. https://doi.org/10.1007/978-3-030-34869-4_22

10. Bajaj, K., Limbasiya, T., & Das, D. (2020). An Efficient Message Transmission and Verification Scheme for VANETs. In D. V. Hung & M. D´Souza (Eds.), Distributed Computing and Internet Technology (pp. 127–143). Cham: Springer International Publishing. ISBN: 978-3-030-36987-3. https://doi.org/10.1007/978-3-030-36987-3_8

Department of Electrical Engineering

Journal Papers

1. Dasgupta, A., Parihar, S. S., Agarwal, H., Kushwaha, P., Chauhan, Y. S., & Hu, C. (2020). Compact Model for Geometry Dependent Mobility in Nanosheet FETs. IEEE ELECTRON DEVICE LETTERS, 41(3), 313–316. ISSN: 0741-3106. https://doi.org/10.1109/LED.2020.2967782

2. Dasgupta, A., Parihar, S. S., Kushwaha, P., Agarwal, H., Kao, M.-Y., Salahuddin, S., ... Hu, C. (2020). BSIM Compact Model of Quantum Confinement in Advanced Nanosheet FETs. IEEE TRANSACTIONS ON ELECTRON DEVICES, 67(2), 730–737. ISSN: 0018-9383. https://doi.org/10.1109/TED.2019.2960269

3. Jain, A., & Ghose, D. (2020). Trajectory-Constrained Collective Circular Motion With Different Phase Arrangements. IEEE TRANSACTIONS ON AUTOMATIC CONTROL, 65(5), 2237–2244. ISSN: 0018-9286. https://doi.org/10.1109/TAC.2019.2940233
4. Sikri, A., Mathur, A., & Srinivas, K. V. (2019). Performance analysis of coordinate interleaved plc system with rayleigh channel gain under nakagami-m additive noise. IET Communications, 13(7), 857–862. ISSN: 17518628. https://doi.org/10.1049/iet-com.2018.5008
5. Mathur, A., Ai, Y., Cheffena, M., & Kaddoum, G. (2019). Secrecy Performance of Correlated alpha-mu Fading Channels. IEEE COMMUNICATIONS LETTERS, 23(8), 1323–1327. ISSN: 1089-7798. https://doi.org/10.1109/LCOMM.2019.2920347
6. Ai, Y., Mathur, A., Kong, L., & Cheffena, M. (2020). Effective Throughput Analysis of α-η-κ-μ Fading Channels. IEEE Access, 8, 57363–57371. ISSN: 21693536. https://doi.org/10.1109/ACCESS.2020.2982279
7. Kumar, Y., Sheoran, M., Jajoo, G., & Yadav, S. K. (2020). Automatic modulation classification based on constellation density using deep learning. IEEE Communications Letters, 24(6), 1275–1278. ISSN: 10897798. https://doi.org/10.1109/LCOMM.2020.2980840
8. Bharti, A. K., Yadav, S. K., & Jaswal, S. (2020). Feature Binding of Sequentially Presented Stimuli in Visual Working Memory. FRONTIERS IN PSYCHOLOGY, 11. ISSN: 1664-1078. https://doi.org/10.3389/fpsyg.2020.00033
9. Jajoo, G., Kumar, Y., & Yadav, S. K. (2019). Blind Signal PSK/QAM Recognition Using Clustering Analysis of Constellation Signature in Flat Fading Channel. IEEE COMMUNICATIONS LETTERS, 23(10), 1853–1856. ISSN: 1089-7798. https://doi.org/10.1109/LCOMM.2019.2929127
10. Kaur, A., Mishra, D., & Sarkar, M. (2020). A Power Efficient Image Sensor Readout With On-Chip δ -Interpolation Using Reconfigurable ADC. IEEE Sensors Journal, 20(13), 6833–6840. ISSN: 1558-1748. https://doi.org/10.1109/jsen.2019.2922709
11. Raj, A., Shah, N. A., Tiwari, A. K., & Martini, M. G. (2020). Multivariate Regression-Based Convolutional Neural Network Model for Fundus Image Quality Assessment. IEEE Access, 8, 57810–57821. ISSN: 21693536. https://doi.org/10.1109/ACCESS.2020.2982588
12. Shinde, T. S., Tiwari, A. K., Lin, W., & Shen, L. (2020). Background foreground boundary aware efficient motion search for surveillance videos. Signal Processing: Image Communication, 82. ISSN: 09235965. https://doi.org/10.1016/j.image.2019.115775
13. Lin, W., Shinde, T. S., Dai, W., Liu, M., He, X., Tiwari, A. K., & Xiong, H. (2020). Adaptive lossless compression of skeleton sequences. SIGNAL PROCESSING-IMAGE COMMUNICATION, 80. ISSN: 0923-5965. https://doi.org/10.1016/j.image.2019.115659
14. Singh, M., & Shaik, A. G. (2020). Incipient fault detection in stator windings of an induction motor using Stockwell transform and SVM. IEEE Transactions on Instrumentation and Measurement, 1. ISSN: 1557-9662. https://doi.org/10.1109/tim.2020.3002444
15. Kamala Devi, K., & Shaik, A. G. (2019a). Detection and discrimination of islanding and faults in distribution system with distributed generation by using wavelet based alienation approach. Indonesian Journal of Electrical Engineering and Informatics, 7(3), 405–414. ISSN: 20893272 (ISSN). https://doi.org/10.11591/ijeei.v7i3.947
16. Satya Krishna, I., & Mukherjee, S. (2020). Design of Wideband Microstrip to SICL Transition for Millimeter-Wave Applications. IEEE Access, 8, 4250–4254. ISSN: 21693536 (ISSN). https://doi.org/10.1109/ACCESS.2019.2962905
17. Mukherjee, S., & Biswas, A. (2019). Compact high gain half-mode substrate integrated waveguide cavity antenna using hybrid mode. INTERNATIONAL JOURNAL OF RF AND MICROWAVE COMPUTER-AIDED ENGINEERING, 29(12, SI). ISSN: 1096-4290. https://doi.org/10.1002/mmce.21919
18. Kumar, R., Goel, N., Hojamberdiev, M., & Kumar, M. (2020). Transition metal dichalcogenides-based flexible gas sensors. Sensors and Actuators, A: Physical, 303. ISSN: 09244247 (ISSN). https://doi.org/10.1016/j.sna.2020.111875
19. Kumar, Rahul, Zheng, W., Liu, X., Zhang, J., & Kumar, M. (2020). MoS2-Based Nanomaterials for Room-Temperature Gas Sensors. ADVANCED MATERIALS TECHNOLOGIES, 5(5). ISSN: 2365-709X. https://doi.org/10.1002/admt.201901062
20. Xu, Y., Lou, C., Zheng, L., Zheng, W., Liu, X., Kumar, M., & Zhang, J. (2020). Highly sensitive and selective detection of acetone based on platinum sensitized porous tungsten oxide nanospheres. SENSORS AND ACTUATORS B-CHEMICAL, 307. ISSN: 0925-4005. https://doi.org/10.1016/j.snb.2019.127616
21. Bhati, V. S., Hojamberdiev, M., & Kumar, M. (2020). Enhanced sensing performance of ZnO nanostructures-based gas sensors: A review. Energy Reports, 6, 46–62. ISSN: 23524847. https://doi.org/10.1016/j.egyr.2019.08.070

22. Agrawal, Abhay, V., Kumar, R., Yang, G., Bao, J., Kumar, M., & Kumar, M. (2020). Enhanced adsorption sites in monolayer MoS2 pyramid structures for highly sensitive and fast hydrogen sensor. INTERNATIONAL JOURNAL OF HYDROGEN ENERGY, 45(15), 9268–9277. ISSN: 0360-3199. https://doi.org/10.1016/j.ijhydene.2020.01.119
23. Sharma, Prashant, Bhati, V. S., Kumar, M., Sharma, R., Mukhiya, R., Awasthi, K., & Kumar, M. (2020). Development of ZnO nanostructure film for pH sensing application. APPLIED PHYSICS A-MATERIALS SCIENCE & PROCESSING, 126(4). ISSN: 0947-8396. https://doi.org/10.1007/s00339-020-03466-w
24. Kumar, R., Goel, N., Agrawal, A. V., Raliya, R., Rajamani, S., Gupta, G., … Kumar, M. (2019). Boosting Sensing Performance of Vacancy-Containing Vertically Aligned MoS2 Using rGO Particles. IEEE Sensors Journal, 19(22), 10214–10220. ISSN: 1530437X. https://doi.org/10.1109/JSEN.2019.2932106
25. Nigam, A., Bhati, V. S., Bhat, T. N., Dolmanan, S. B., Tripathy, S., & Kumar, M. (2019). Sensitive and Selective Detection of Pb2+ Ions Using 2,5-Dimercapto-1,3,4-Thiadiazole Functionalized AlGaN/GaN High Electron Mobility Transistor. IEEE Electron Device Letters, 40(12), 1976–1979. ISSN: 07413106. https://doi.org/10.1109/LED.2019.2947141
26. Singh Bhati, V., Nathani, A., Nigam, A., Sharma, C. S., & Kumar, M. (2019). PAN/(PAN-b-PMMA) derived nanoporous carbon nanofibers loaded on ZnO nanostructures for hydrogen detection. Sensors and Actuators, B: Chemical, 299. ISSN: 09254005. https://doi.org/10.1016/j.snb.2019.126980
27. Goel, N., Kumar, R., Jain, S. K., Rajamani, S., Roul, B., Gupta, G., Kumar, M., Krupanidhi, S. B. (2019). A high-performance hydrogen sensor based on a reverse-biased MoS2/GaN heterojunction. NANOTECHNOLOGY, 30(31). ISSN: 0957-4484. https://doi.org/10.1088/1361-6528/ab1102
28. Rahman, M. T., Kabir, M. F., Gurung, A., Reza, K. M., Pathak, R., Ghimire, N., Baride, A., Wang, Z., Kumar, M. Qiao, Q. (2019). Graphene Oxide-Silver Nanowire Nanocomposites for Enhanced Sensing of Hg2+. ACS APPLIED NANO MATERIALS, 2(8), 4842–4851. ISSN: 2574-0970. https://doi.org/10.1021/acsanm.9b00789
29. Sharma, N.L., Rajamani, S., Shengurov, V., Baidus, N., Korolev, D., Nikolskaya, A., Mikhaylov, A., Tetelbaum, D. and Kumar, M. (2019). Sequential nitrogen ion implantation in Si-based GaAs matrix and subsequent thermal annealing process: electrical characterization. Proceedings of the Indian National Science Academy, 681–687. ISSN: 0370-0046. https://doi.org/10.16943/ptinsa/2019/49575
30. Kumar, Anil, & Singh, A. K. (2020). A Novel Multipath Mitigation Technique for GNSS Signals in Urban Scenarios. IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY, 69(3), 2649–2658. ISSN: 0018-9545. https://doi.org/10.1109/TVT.2019.2962919
31. Kumar, H., Gupta, S., & Subramanian, V. K. (2020). Blur parameter locus curve and its applications. IET Image Processing, 14(2), 297–309. ISSN: 1751-9667. https://doi.org/10.1049/iet-ipr.2019.0577
32. Kumar, Amit, Ashudeep, Bansal, D., Kumar, P., Anuroop, Khushbu, & Rangra, K. (2020). Post-release deformation and curvature correction of an electrothermally actuated MEMS bilayer platform. MICROELECTRONIC ENGINEERING, 221. ISSN: 0167-9317. https://doi.org/10.1016/j.mee.2019.111192
33. Agrawal, V. K., Patel, R., Boolchandani, D., Varma, T., & Rangra, K. (2020). Sensitivity and reliability enhancement of a MEMS based wind speed sensor. Microelectronics Reliability, 104, 113513. ISSN: 0026-2714. https://doi.org/10.1016/j.microrel.2019.113513
34. Kumar, Amit, Ashudeep, Bansal, D., Kumar, P., Anuroop, Khushbu, & Rangra, K. (2020). Post-release deformation and curvature correction of an electrothermally actuated MEMS bilayer platform. MICROELECTRONIC ENGINEERING, 221. ISSN: 0167-9317. https://doi.org/10.1016/j.mee.2019.111192
35. Varun, I., Bharti, D., Mahato, A. K., Raghuwanshi, V., & Tiwari, S. P. (2020). High-Performance Flexible Resistive RAM With PVP:GO Composite and Ultrathin HfO x Hybrid Bilayer. IEEE Transactions on Electron Devices, 67(3), 949–954. ISSN: 1557-9646. https://doi.org/10.1109/ted.2020.2964910
36. Raghuwanshi, V., Bharti, D., Mahato, A. K., Shringi, A. K., Varun, I., & Tiwari, S. P. (2020). High Performance Flexible Organic Field-Effect Transistors with Barium Strontium Titanate Gate Dielectric Deposited at Room Temperature. ACS Applied Electronic Materials, 2(2), 529–536. ISSN: 2637-6113. https://doi.org/10.1021/acsaelm.9b00779
37. Kumari, C., Varun, I., Tiwari, S. P., & Dixit, A. (2020). Interfacial layer assisted, forming free, and reliable bipolar resistive switching in solution processed BiFeO3 thin films. AIP Advances, 10(2), 025110. ISSN: 2158-3226. https://doi.org/10.1063/1.5134972
38. Raghuwanshi, V., Bharti, D., Mahato, A. K., Varun, I., & Tiwari, S. P. (2019a). Operationally Stable Organic FETs with Bilayer Dielectrics on Low-Cost Flexible Polyimide Substrate. IEEE Transactions on Electron Devices, 66(11), 4915–4920. ISSN: 00189383. https://doi.org/10.1109/TED.2019.2941325

39. Chaturvedi, S., Fulwani, D., & Guerrero, J. M. (2020). Adaptive-SMC Based Output Impedance Shaping in DC Microgrids Affected by Inverter Loads. IEEE TRANSACTIONS ON SUSTAINABLE ENERGY, 11(4), 2940–2949. ISSN: 1949-3029. https://doi.org/10.1109/TSTE.2020.2982414

40. Rathore, N., Fulwani, D., Rathore, A. K., & Gautam, A. R. (2019). Adaptive sliding mode based loss-free resistor for power-factor correction application. IEEE Transactions on Industry Applications, 55(4), 4332–4343. ISSN: 00939994. https://doi.org/10.1109/TIA.2019.2912799

41. Gautam, A. R., Fulwani, D., Makineni, R. R., & Rathore, N. (2020). ISMC for Boost-Derived DC-DC-AC Converter: Mitigation of 2 omega-Ripple and Uncertainty, and Improvement in Dynamic Performance. IEEE TRANSACTIONS ON POWER ELECTRONICS, 35(4), 4353–4364. ISSN: 0885-8993. https://doi.org/10.1109/TPEL.2019.2939134

Conference Papers

1. Tripathy, N. S., Chamanbaz, M., & Bouffanais, R. (2019). Robust Stabilization of Resource Limited Networked Control Systems Under Denial-of-Service Attack. 2019 IEEE 58th Conference on Decision and Control (CDC), 7683–7689. Nice, France: IEEE. ISBN: 978-1-72811-398-2. https://doi.org/10.1109/CDC40024.2019.9030027

2. H. Agarwal, P. Kushwaha, A. Dasgupta, M.-Y. Kao, T. Morshed, G. Workman, K. Shanbhag, X. Li, Y. S. Chauhan, S. Salahuddin and C. Hu, "BSIM-IMG: Advanced Model for UTBSOI Transistors with Back Gate Inversion", IEEE EDTM Electron Devices Technology and Manufacturing Conference, Penang, Malaysia, Mar. 2020

3. Mohan, V., Mathur, A., Aishwarya, V., & Bhargav, S. (2019). Secrecy Analysis of PLC System with Channel Gain and Impulsive Noise. 2019 IEEE 90th Vehicular Technology Conference (VTC2019-Fall), 1–6. Honolulu, HI, USA: IEEE. ISBN: 978-1-72811-220-6. https://doi.org/10.1109/VTCFall.2019.8890986

4. Shukla, B. K., Jain, H., Vijay, V., Yadav, S., & Hewson, D. (2020). A Fusion-Based Approach to Identify the Phases of the Sit-to-Stand Test in Older People. *2020 National Conference on Communications (NCC)*, 1–6. Kharagpur, India: IEEE. ISBN: 978-1-72815-120-5. https://doi.org/10.1109/NCC48643.2020.9056092

5. Shukla, B.K., S.K. Yadav, V. Vijay, A. Mathur, and D.J. Hewson. Can the Five -Times Sit-to-Stand Test be used to assess both muscle strength and physical performance when detecting sarcopenia, 10th International Conference on Frailty and Sarcopenia Research. Toulouse, France (March 2020), 11-13.

6. Shukla, R., Yadav, S. K., & Mukherjee, S. (2019). Frequency Tunable Inverted-V HF Dipole Antenna Using Channel Extension Technique. *2019 IEEE Indian Conference on Antennas and Propagation (InCAP)*, 1–4. Ahmedabad, India: IEEE. ISBN: 978-1-72812-577-0. https://doi.org/10.1109/InCAP47789.2019.9134668

7. Shukla, B.K., Yadav, S. K., V. Vijay, A. Mathur, and D.J. Hewson "Development of an instrumented chair to measure sit-to-stand velocity in older people" Gericon 2019. Vellore, Tamil Nadu, (December 2019), 6-7.

8. Shaik, M., Yadav, S. K., & Shaik, A. G. (2019). Distribution Feeder Protection Using Uncorrelated Symmetrical Dot Patterns. TENCON 2019 - 2019 IEEE Region 10 Conference (TENCON), 1875–1880. Kochi, India: IEEE. ISBN: 978-1-72811-895-6. https://doi.org/10.1109/TENCON.2019.8929382

9. Hewson, D.J., B.K. Shukla, J.N.C. Bassement, Yadav, S. K., V. Vijay, and A. Mathur "Development of Indian-specific thresholds for fall screening tests" Gericon 2019. Vellore, Tamil Nadu, (6-7 December 2019)

10. Shaik, M., Shaik, A. G., & Yadav, S. K. (2019). S-Transform Based Protection Scheme for Distribution System Integrated with Solar Power Plant. *2019 2nd International Conference on Smart Grid and Renewable Energy (SGRE)*, 1–6. Doha, Qatar: IEEE. ISBN: 978-1-72812-960-0. https://doi.org/10.1109/SGRE46976.2019.9020891

11. Shaik, M., Yadav, S. K., & Shaik, A. G. (2019). Fast Protection Scheme for Distribution System using Hilbert-Huang Transform. *2019 IEEE 16th India Council International Conference (INDICON)*, 1–4. Rajkot, India: IEEE. ISBN: 978-1-72812-327-1. https://doi.org/10.1109/INDICON47234.2019.9029100

12. Anuj Kumar Bharti, Sandeep Kumar Yadav, Snehlata Jaswal, "Location modulates the effect of simultaneous but not sequential presentation on feature binding: An fMRI study" In Proc: 35th annual meeting of the International Society for Psychophysics (Fechner Day-2019), 30 Oct-2 Nov 2019, Antalya, Turkey.

13. Kaur, A., Karthik, M. B., & Sarkar, M. (2020). A CMOS Image Sensor with Column-Parallel Cyclic-SAR ADC. *2020 IEEE International Symposium on Circuits and Systems (ISCAS)*, 1–5. Sevilla, Spain: IEEE. ISBN: 978-1-72813-320-1. https://doi.org/10.1109/ISCAS45731.2020.9180948

14. Kaur, A., & Mishra, D. (2019). A reconfigurable cyclic ADC for biomedical applications. *2019 IEEE Biomedical Circuits and Systems Conference (BioCAS)*, 1–4. Nara, Japan: IEEE. ISBN: 978-1-5090-0617-5. https://doi.org/10.1109/BIOCAS.2019.8919110

15. Shreshth Saini, Divij Gupta, and Anil Kumar Tiwari, "Detector-SegMentor Network for Skin Lesion Localization and Segmentation", National Conference on Computer Vision, Graphics, and Image Processing, KLE Technological University, Hubli, India, 22-24 Dec. 2019.
16. Ridhi Agrwal, Gaurav Harit, Anil Kumar Tiwrai, DocDescribor : Digits + Alphabets + Math Symbols - A complete OCR for handwritten documents, National Conference on Computer Vision, Graphics, and Image Processing, KLE Technological University, Hubli, India, 22-24 Dec. 2019.
17. Singh, Megha and Abdul Gafoor Shaik. "Entropy based broken rotor-bar fault detection and estimation of its severity in a three-phase induction motor", accepted in International Conference on Electrical Machines'20, Gothenburg, Sweden, Paper ID- SD-003972.
18. Chawda, G. S., & Shaik, A. G. (2019). Adaptive Reactive Power Control of DSTATCOM in Weak AC Grid with High Wind Energy Penetration. *2019 IEEE 16th India Council International Conference (INDICON)*, 1–4. Rajkot, India: IEEE. ISBN: 978-1-72812-327-1. https://doi.org/10.1109/INDICON47234.2019.9029010
19. Chawda, G. S., & Shaik, A. G. (2019). Smooth Grid Synchronization in Weak AC Grid with High Wind Energy Penetration using Distribution Static Compensator. *2019 2nd International Conference on Smart Grid and Renewable Energy (SGRE)*, 1–6. Doha, Qatar: IEEE. ISBN: 978-1-72812-960-0. https://doi.org/10.1109/SGRE46976.2019.9020671
20. I. S. Krishna, S. Mukherjee, (2020). "Broadband Substrate Integrated Coaxial Line Based 5th Order Bandpass Filter for Millimeter-wave Applications", Presented in URSI Regional Conference on Radio Science, (RCRS), 2020, 12-14 february 2020 at IIT (BHU) Varanasi.
21. Baghel, N., & Mukherjee, S. (2020). Substrate Integrated Coaxial Line Excited Wideband Millimeter Wave Bow-Tie Antenna. *2020 URSI Regional Conference on Radio Science (URSI-RCRS)*, 1–5. Varanasi, India: IEEE. ISBN: 978-90-825987-8-0. https://doi.org/10.23919/URSIRCRS49211.2020.9113559
22. Singh, A., Meena, J., Baghel, N., & Mukherjee, S. (2020). Design of Printed Dipole Antenna for Enhanced Coverage Efficiency. *2020 URSI Regional Conference on Radio Science (URSI-RCRS)*, 1–6. Varanasi, India: IEEE. ISBN: 978-90-825987-8-0. https://doi.org/10.23919/URSIRCRS49211.2020.9113550
23. Sarkar, A., Mukherjee, S., Biswas, A., & Akhtar, M. J. (2019). Electronically beam switchable High Gain Leaky-wave Antenna using TE20 Mode Substrate Integrated Waveguide for Large beam Scanning. *2019 IEEE MTT-S International Microwave and RF Conference (IMARC)*, 1–4. Mumbai, India: IEEE. ISBN: 978-1-72814-040-7. https://doi.org/10.1109/IMaRC45935.2019.9118679
24. Krishna, I. S., & Mukherjee, S. (2019). Compact Substrate Integrated Coaxial Line Quadrature Hybrid with Harmonic Rejection. *2019 IEEE Asia-Pacific Microwave Conference (APMC)*, 1149–1151. Singapore, Singapore: IEEE. ISBN: 978-1-72813-517-5. https://doi.org/10.1109/APMC46564.2019.9038650
25. Shukla, S., & Mukherjee, S. (2019). Compact Ka band Bias Tee Network Using Substrate Integrated Coaxial Line technology. *TENCON 2019 - 2019 IEEE Region 10 Conference (TENCON)*, 1212–1215. Kochi, India: IEEE. ISBN: 978-1-72811-895-6. https://doi.org/10.1109/TENCON.2019.8929698
26. Baghel, N., & Mukherjee, S. (2019). Design of a Substrate Integrated Coaxial Line based Dual Beam 6x4 Double Slot Antenna Array for Millimeter Wave Application. *TENCON 2019 - 2019 IEEE Region 10 Conference (TENCON)*, 1440–1443. Kochi, India: IEEE. ISBN: 978-1-72811-895-6. https://doi.org/10.1109/TENCON.2019.8929333
27. Idury, S. K., & Mukherjee, S. (2019). Design of a Substrate Integrated Half Mode Coaxial Cavity Filter with Multiple Transmission Zeros. *2019 49th European Microwave Conference (EuMC)*, 200–203. Paris, France: IEEE. ISBN: 978-2-87487-055-2. https://doi.org/10.23919/EuMC.2019.8910757
28. Adarsh Nigam and Mahesh Kumar "Ultra-low-level detection of Hg2+ ions using MoS2 functionalized AlGaN/GaN HEMT" Symposium on 2D Materials and Devices 2019, IIT Jodhpur, Sept 27-28 2019.
29. Rahul Kumar and Mahesh Kumar "NO2 gas sensor based on CVD grown two-dimensional MoS2" Symposium on 2D Materials and Devices 2019, IIT Jodhpur, Sept 27-28 2019.
30. Neeraj Goel and Mahesh Kumar "Determination of band offsets in transition metal dichalcogenides heterojunctions" Symposium on 2D Materials and Devices 2019, IIT Jodhpur, Sept27-28 2019
31. Vijendra Singh Bhati and Mahesh Kumar "Enhancement in hydrogen gas sensing properties based on 2-D nanomaterial loaded ZnO nanostructure" Symposium on 2D Materials and Devices 2019, IIT Jodhpur, Sept 27-28 2019.
32. Surajit Das, Rahul Kumar, Jitendra Singh, and Mahesh Kumar "Growth of Wafer Scale 2D WS2 by Vapor Transport Process for Advanced Electronics Device Application" Symposium on 2D Materials and Devices 2019, IIT Jodhpur, Sept 27-28 2019.

33. Amit Kumar Shringi and Mahesh Kumar "Fabrication and characterization of ferroelectric thin film based devices for microwave application" Symposium on 2D Materials and Devices 2019, IIT Jodhpur, Sept 27-28 2019.
34. Adarsh Nigam and Mahesh Kumar "Detection of Heavy Metal Ions using AlGaN/GaN High Electron Mobility Transistor (HEMT)" ICMAT 2019, Singapore, June 23-28, 2019.
35. Nigam, A., & Kumar, M. (2020). Detection of cadmium ions Byg-C3N4 functionalization on AlGaN/GaN high electron mobility transistor. AIP Conference Proceedings, 2265(1), 030216. ISSN: 0094-243X. https://doi.org/10.1063/5.0016583
36. Kumar, H., Gupta, S., & Venkatesh, K. S. (2019). A Novel Blurring based Method for Video Compression. 2019 IEEE Global Conference on Signal and Information Processing (GlobalSIP), 1–5. Ottawa, ON, Canada: IEEE. ISBN: 978-1-72812-723-1. https://doi.org/10.1109/GlobalSIP45357.2019.8969315
37. Khan, A. A., & Kanti Mandal, M. (2019). Mode De-coupling of a Dual Mode SIW Resonator and Its Application in Designing a Self-Diplexing Radiator. *2019 IEEE MTT-S International Microwave and RF Conference (IMARC)*, 1–4. Mumbai, India: IEEE. ISBN: 978-1-72814-040-7. https://doi.org/10.1109/IMaRC45935.2019.9118727
38. Mahato, A. K., Raghuwanshi, V., Bharti, D., Varun, I., & Tiwari, S. P. (2019). Effect of Polymer Blend on Electrical Performance and Photo-Response of TIPS-Pentacene OFETs. *2019 IEEE 14th Nanotechnology Materials and Devices Conference (NMDC)*, 1–4. Stockholm, Sweden: IEEE. ISBN: 978-1-72812-637-1. https://doi.org/10.1109/NMDC47361.2019.9083993
39. Kumari, C., Varun, I., Pal, M., Tiwari, S. P., & Dixit, A. (2019). Reliable and forming free bipolar resistive switching in solution derived Ag/BiFe0.99Cr0.01O3/FTO device. 2019 IEEE 14th Nanotechnology Materials and Devices Conference (NMDC), 1–4. Stockholm, Sweden: IEEE. ISBN: 978-1-72812-637-1. https://doi.org/10.1109/NMDC47361.2019.9083989
40. Raghuwanshi, V., Bharti, D., Mahato, A. K., Varun, I., & Tiwari, S. P. (2019). UV cured PVP gate dielectric for Flexible Organic Field Effect Transistors. 2019 IEEE International Conference on Flexible and Printable Sensors and Systems (FLEPS), 1–3. Glasgow, United Kingdom: IEEE. ISBN: 978-1-5386-9304-9. https://doi.org/10.1109/FLEPS.2019.8792232
41. Raghuwanshi, V., Bharti, D., Mahato, A. K., Varun, I., & Tiwari, S. P. (2019). TIPS-Pentacene:PS Blend Organic Field-Effect Transistors with Hybrid Gate Dielectric on Paper Substrate. 2019 International Symposium on VLSI Technology, Systems and Application (VLSI-TSA), 1–5. Hsinchu, Taiwan: IEEE. ISBN: 978-1-72810-942-8. https://doi.org/10.1109/VLSI-TSA.2019.8804675

Department of Humanities & Social Science

Journal Papers

1. Maidullah, S., & Sharma, A. (2019). Decision making in the era of infobesity: A study on interaction of gender and psychological tendencies. Humanities and Social Sciences Reviews, 7(5), 571–586. ISSN: 23956518. https://doi.org/10.18510/hssr.2019.7567
2. Naz, F. (2019). Gender Division of Labour in Rural Gujarat: Hierarchy, Untouchable Women and the Case of Water. *Special Issue: Ecology of Work.* Lahore Journal of Policy Studies, 8(1), 37-58.
3. Thimm, V., & Chaudhuri, M. (2019). Migration as mobility? An intersectional approach. Applied Mobilities, 1–16. ISSN: 2380-0135. https://doi.org/10.1080/23800127.2019.1573780
4. Sharma, K. (2019). Hand-crafted identities: Sartorial taste and belonging amongst elite women in urban India. Journal of Material Culture, 25(1), 60–75. ISSN: 1460-3586. https://doi.org/10.1177/1359183519846155
5. Sharma, K. (2019). The Orientalisation of the Sari—Sartorial Praxis and Womanhood in Colonial and Post-Colonial India. South Asia: Journal of South Asian Studies, 42(2), 219–236. ISSN: 1479-0270. https://doi.org/10.1080/00856401.2019.1577700
6. Paul, A., and Sarveswaran, V., (2019). Interconnectedness of Humans and Non-humans in Barbara Kingsolver's Prodigal Summer. Asian Quarterly: An International Journal of Contemporary Issues. 17. 95-
7. Tribhuvan, P. (2020). Going to Work `High': Negotiating Boundaries while Doing Ethnography of Drugs. SOCIAL EPISTEMOLOGY, 34(1, SI), 55–63. ISSN: 0269-1728. https://doi.org/10.1080/02691728.2019.1681561
8. Vasan, S., Mehta, V., & Tribhuvan, P. (2019). Characterising the relationship between forest dependent peoples and state forest management institutions in the Global South. Environmental Research Letters, 14(8), 083001. ISSN: 1748-9326. https://doi.org/10.1088/1748-9326/ab2925

Conference Papers

1. George K.J. (2019). Artificial Intelligence, Digitalized Decision Making, and Legitimacy of Decisions. International Conference on Digital Humanity: Ethical Analyses and Responses in the Age of Transformation, Societas Ethica, Tutzing, Germany, 27-30 June 2019.
2. Shukla, S. and Chaudhuri, M. (2019). "Negotiating Gender in Information Technology: A Postcolonial Perspective." 5th World Congress on Women, Bengaluru, India, 8 September 2019.
3. Saraswati, S. and Chaudhuri, M. (2019). "Changing Contours of Marriage in Bhopalgarh, Rajasthan: An Empirical Study." 5th World Congress on Women, Bengaluru, India, 8 September 2019.
4. Brunnquell, C., Chattopadhyay, C., Chaudhuri, M., and Goodman, P. (2019). "Cultural Transformative Learning: Uncovering Fake News using Information and Communication Technology", Global Studies Conference, Krakow, Poland, 27-28 June 2019.
5. Sharma, K. and Chattopadhyay, C. (2020). "Project CRAFT: Handicrafts and Handlooms", International Heritage Symposium & Exhibition, DST-IIT Delhi, National Museum (New Delhi), Jan 15-16, 2020.

Book Chapters

1. Hari Narayanan, V. (2020). *"Containment of Cognitive Biases: A Mindful Approach"* in Existential Predicaments and Transformational Philosophy. Jaipur: Society for Philosophical Praxis, Counselling and Spiritual Healing. Pp. 15-30, ISBN: 13-978-81-932632.

Book (Edited)

1. A Routledge Handbook of Ecocriticism and Environmental Communication, Edited by Slovic, S., Rangarajan, S., and Sarveswaran, V., March 2019, Routledge, USA.

Department of Mathematics

Journal Papers

1. Singh, S. P., & Bhatnagar, G. (2019). A Novel Biometric Inspired Robust Security Framework For Medical Images. IEEE Transactions on Knowledge and Data Engineering, 1. ISSN: 1558-2191. https://doi.org/10.1109/tkde.2019.2935710
2. Singh, S. P., & Bhatnagar, G. (2020). A robust blind watermarking framework based on Dn structure. JOURNAL OF AMBIENT INTELLIGENCE AND HUMANIZED COMPUTING, 11(5, SI), 1869–1887. ISSN: 1868-5137. https://doi.org/10.1007/s12652-019-01296-0.
3. Singh, S. P., & Bhatnagar, G. (2019b). A simplified watermarking algorithm based on lifting wavelet transform. Multimedia Tools and Applications, 78(15), 20765–20786. ISSN: 13807501. https://doi.org/10.1007/s11042-019-7394-x
4. Goyal, S., Bhavsar, S., Patel, S., Chattopadhyay, C., & Bhatnagar, G. (2019). SUGAMAN: describing floor plans for visually impaired by annotation learning and proximity-based grammar. IET IMAGE PROCESSING, 13(13), 2623–2635. ISSN: 1751-9659. https://doi.org/10.1049/iet-ipr.2018.5627
5. Kant, K., Mandal, M., & Nelakanti, G. (2020). Error Analysis of Jacobi Spectral Galerkin and Multi-Galerkin Methods for Weakly Singular Volterra Integral Equations. Mediterranean Journal of Mathematics, 17(1). ISSN: 16605446 (ISSN). https://doi.org/10.1007/s00009-019-1462-3
6. Kaur, D. (2019). Classification of extraspecial p-groups using quadratic forms. Mathematics Student, 88(3–4), 27–38. ISSN: 00255742. http://www.indianmathsociety.org.in/mathstudent-part-2-2019.pdf
7. Choudhary, S., & Hiremath, K. R. (2019). Numerical investigation of disordered patch resonator absorbers. APPLIED PHYSICS A-MATERIALS SCIENCE & PROCESSING, 125(9). ISSN: 0947-8396. https://doi.org/10.1007/s00339-019-2904-2
8. Hazra, N. K., & Misra, N. (2020a). On relative ageing of coherent systems with dependent identically distributed components. Advances in Applied Probability, 52(1), 348–376. ISSN: 00018678. https://doi.org/10.1017/apr.2019.63
9. Kundu, P., Hazra, N. K., & Nanda, A. K. (2020). Reliability study of series and parallel systems of heterogeneous component lifetimes following proportional odds model. Statistics, 54(2), 375–401. ISSN: 02331888. https://doi.org/10.1080/02331888.2020.1722670
10. Hazra, N. K., & Finkelstein, M. (2019). COMPARING LIFETIMES OF COHERENT SYSTEMS WITH DEPENDENT COMPONENTS OPERATING IN RANDOM ENVIRONMENTS. JOURNAL OF APPLIED PROBABILITY, 56(3), 937–957. ISSN: 0021-9002. https://doi.org/10.1017/jpr.2019.53

11. Morgan, J., Sharma, V. (2020). Global existence of solutions to volume-surface reaction diffusion systems with dynamic boundary conditions. Differential Integral Equations 33(3/4). 113--138. ISSN: 0893-4983. https://projecteuclid.org/euclid.die/1584756015

12. Sengupta, S., Ghosh, S., Saha, S., & Chakraborty, S. (2019). Rotational instabilities in microchannel flows. Physics of Fluids, 31(5), 054101. ISSN: 1089-7666. https://doi.org/10.1063/1.5088438

13. Sengupta, S., Ghosh, S., Saha, S., & Chakraborty, S. (2019). Coriolis force-driven instabilities in stratified miscible layers on a rotationally actuated microfluidic platform. PHYSICAL REVIEW FLUIDS, 4(11). ISSN: 2469-990X. https://doi.org/10.1103/PhysRevFluids.4.113902

14. Sharma, P., & Kumar, D. (2019). Matrix characterization of multidimensional subshifts of finite type. Applied General Topology, 20(2), 407–418. ISSN: 15769402. https://doi.org/10.4995/agt.2019.11541

15. Raghav, M., & Sharma, P. (2019). Alterations and Rearrangements of a Non-autonomous Dynamical System. BULLETIN OF THE IRANIAN MATHEMATICAL SOCIETY, 45(5), 1431–1441. ISSN: 1017-060X. https://doi.org/10.1007/s41980-019-00206-6

Conference Papers

1. Choudhary, S., & Hiremath, K. R. (2019). Random Phase Gradient Metasurface for Broadband RCS Reduction. TENCON 2019 - 2019 IEEE Region 10 Conference (TENCON), 1452–1454. Kochi, India: IEEE. ISBN: 978-1-72811-895-6. https://doi.org/10.1109/TENCON.2019.8929656

2. Choudhary, S., & Hiremath, K. R. (2019). Random Checkerboard Metasurface for wideband RCS reduction. 2019 Thirteenth International Congress on Artificial Materials for Novel Wave Phenomena (Metamaterials), X-089-X–091. Rome, Italy: IEEE. ISBN: 978-1-72810-477-5. https://doi.org/10.1109/MetaMaterials.2019.8900891

3. Shukla, B.K., S.K. Yadav, V. Vijay, A. Mathur, and D.J. Hewson. Can the Five-Times Sit-to-Stand Test be used to assess both muscle strength and physical performance when detecting sarcopenia? 10th International Conference on Frailty and Sarcopenia Research. Toulouse, France, 11-13 March 2020.

4. Shukla, B. K., Jain, H., Vijay, V., Yadav, S., & Hewson, D. (2020). A Fusion-Based Approach to Identify the Phases of the Sit-to-Stand Test in Older People. 2020 National Conference on Communications (NCC), 1–6. Kharagpur, India: IEEE. ISBN: 978-1-72815-120-5. https://doi.org/10.1109/NCC48643.2020.9056092

5. S. Ghosh and Laurence Rongyy, Direct numerical simulation of autocatalytic chemical front with nonlinear surface tension profile, 3rd International Conference on Engineering Mathematics and Computing (ICEMC 2020), Haldia, India, February 5-7, 2020.

6. S. Goyal, V. Mistry, C. Chattopadhyay and G. Bhatnagar, "BRIDGE: Building Plan Repository for Image Description Generation, and Evaluation," Proc. International Conference on Document Analysis and Recognition (ICDAR), Sydney, Australia, 2019, pp. 1071- 1076.

7. M. Jain, A. Sanyal, S. Goyal, C. Chattopadhyay and G. Bhatnagar, "A Framework for the Conversion of Textual BigData into 2D Architectural Floor Plan," Proc. IEEE Fifth International Conference on Multimedia Big Data (BigMM), Singapore, Singapore, 2019, pp. 404-410.

Book Chapters

1. Sani M., Behera H., Ghosh S. (2020) Stability Analysis of a Film Flow Down an Incline in the Presence of a Floating Flexible Membrane. In: Manna S., Datta B., Ahmad S. (eds) Mathematical Modelling and Scientific Computing with Applications. ICMMSC 2018. Springer Proceedings in Mathematics & Statistics, vol 308. Springer, Singapore. ISBN: 978-981-15-1338-1. https://doi.org/10.1007/978-981-15-1338-1_19

2. Singh S.P., Bhatnagar G. (2019) A Novel Watermarking Technique for Multimedia Security. In: Singh A., Mohan A. (eds) Handbook of Multimedia Information Security: Techniques and Applications. Springer, Cham. ISBN:

   978-3-030-15887-3. https://doi.org/10.1007/978-3-030-15887-3_5

3. Kumar S., Bhatnagar G. (2019) SIE: An Application to Secure Stereo Images Using Encryption. In: Singh A., Mohan A. (eds) Handbook of Multimedia Information Security: Techniques and Applications. Springer, Cham. ISBN: 978-3-030-15887-3. https://doi.org/10.1007/978-3-030-15887-3_3

4. Bhatnagar, G., Liu, Z. and Wu, Q.M.J. (2019). Multimodal Medical Image Fusion in NSCT Domain, In: Big Data in Multimodal Medical Imaging, A.E. Baz and J. Suri (Eds.), CRC Press, 2019. ISBN: 9781315146102. https://doi.org/10.1201/b22410

Department of Mechanical Engineering

Journal Papers

1. Gupta, A., Sundriyal, P., Basu, A., Manoharan, K., Kant, R., & Bhattacharya, S. (2019). Nano-finishing of MEMS-based platforms for optimum optical sensing. Journal of Micromanufacturing, 3(1), 39–53. ISSN: 2516-5992. https://doi.org/10.1177/2516598419862676
2. Jyoti Biswal, H., Vundavilli, P. R., & Gupta, A. (2019). Investigations on the effect of electrode gap variation over pulse-electrodeposition profile. IOP Conference Series: Materials Science and Engineering, 653, 012046. ISSN: 1757-899X. https://doi.org/10.1088/1757-899X/653/1/012046
3. Kumar, C., Monde, A. D., Bhattacharya, A., & Chakraborty, P. R. (2019). Modeling of dendrite growth in undercooled solution sodium acetate trihydrate. E3S Web of Conferences, 128, 01023. ISSN: 2267-1242. https://doi.org/10.1051/e3sconf/201912801023
4. Kumar, C., Monde, A. D., Bhattacharya, A., & Chakraborty, P. R. (2019). Modeling of dendrite growth in undercooled solution sodium acetate trihydrate. E3S Web of Conferences, 128, 01023. ISSN: 2267-1242. https://doi.org/10.1051/e3sconf/201912801023
5. Khan, Waris Nawaz, & Chhibber, R. (2020). Effect of Intermetallic and Secondary Phases on Dry and Wet Sliding Wear Behavior of Super Duplex Stainless Steel. TRIBOLOGY TRANSACTIONS, 63(3), 403–414. ISSN: 1040-2004. https://doi.org/10.1080/10402004.2019.1694731
6. Sharma, L., & Chhibber, R. (2020). Experimental Investigation of Thermo-Physical Properties of SAW Slag. SILICON, 12(8), 1787–1798. ISSN: 1876-990X. https://doi.org/10.1007/s12633-019-00286-3
7. Sharma, L., & Chhibber, R. (2020). Design & development of SAW fluxes using CaO–SiO2–CaF2 and CaO–SiO2–Al2O3 flux systems. Ceramics International, 46(2), 1419–1432. ISSN: 02728842. https://doi.org/10.1016/j.ceramint.2019.09.106
8. Sharma, L., & Chhibber, R. (2019). Design and development of submerged arc welding fluxes using TiO2-SiO2-CaO and SiO2-CaO-Al2O3 flux system. PROCEEDINGS OF THE INSTITUTION OF MECHANICAL ENGINEERS PART E-JOURNAL OF PROCESS MECHANICAL ENGINEERING, 233(4), 739–762. ISSN: 0954-4089. https://doi.org/10.1177/0954408918794036
9. Sharma, L., & Chhibber, R. (2019). Design of TiO2-SiO2-MgO and SiO2-MgO-Al2O3-Based Submerged Arc Fluxes for Multipass Bead on Plate Pipeline Steel Welds. JOURNAL OF PRESSURE VESSEL TECHNOLOGY-TRANSACTIONS OF THE ASME, 141(4). ISSN: 0094-9930. https://doi.org/10.1115/1.4043375
10. Sharma, L., & Chhibber, R. (2019). Design of CaO-SiO2-CaF2 and CaO-SiO2-Al2O3 Based Submerged Arc Fluxes for Series of Bead on Plate Pipeline Steel Welds - Effect on Carbon and Manganese Content, Grain Size and Microhardness. Journal of Pressure Vessel Technology, Transactions of the ASME, 141(3). ISSN: 00949930. https://doi.org/10.1115/1.4043298
11. Mahajan, S., Kumar, J., & Chhibber, R. (2020). High-Temperature Wettability Investigations on Laboratory-Developed CaO-CaF2-SiO2-Al(2)O(3)Flux System-Based Welding Electrode Coatings for Power Plant Applications. SILICON, 12(11), 2741–2753. ISSN: 1876-990X. https://doi.org/10.1007/s12633-019-00374-4
12. Mahajan, S., & Chhibber, R. (2019). Hot Corrosion Study of 9Cr–1Mo Boiler Steel Exposed to Different Molten Salt Mixtures. Transactions of the Indian Institute of Metals, 72(9), 2329–2348. ISSN: 09722815 (ISSN). https://doi.org/10.1007/s12666-019-01685-1
13. Mahajan, S., & Chhibber, R. (2019). Design and development of CaO-SiO2-CaF2 and CaO-SiO2-Al2O3 based electrode coatings to weld low alloy ferritic steels for power plant applications. CERAMICS INTERNATIONAL, 45(18, A), 24154–24167. ISSN: 0272-8842. https://doi.org/10.1016/j.ceramint.2019.08.124
14. Mahajan, S., & Chhibber, R. (2019). Design and Development of Shielded Metal Arc Welding (SMAW) Electrode Coatings Using a CaO-CaF2-SiO2 and CaO-SiO2-Al2O3 Flux System. JOM, 71(7), 2435–2444. ISSN: 1047-4838. https://doi.org/10.1007/s11837-019-03494-9
15. Vaishnav, S., Agarwal, A., & Desai, K. A. (2020). Machine learning-based instantaneous cutting force model for end milling operation. JOURNAL OF IN-LIGENT MANUFACTURING, 31(6), 1353–1366. ISSN: 0956-5515. https://doi.org/10.1007/s10845-019-01514-8
16. Agarwal, A., & Desai, K. A. (2020). Importance of bottom and flank edges in force models for flat-end milling operation. International Journal of Advanced Manufacturing Technology, 107(3–4), 1437–1449. ISSN: 02683768. https://doi.org/10.1007/s00170-020-05111-5

17. Malviya, M., & Desai, K. A. (2020). Build orientation optimization for strength enhancement of fdm parts using machine learning based algorithm. Computer-Aided Design and Applications, 17(4), 783–796. ISSN: 16864360. https://doi.org/10.14733/cadaps.2020.783-796
18. Arora, N., Agarwal, A. & Desai, K.A. (2019). Modelling of Static Surface Error in End-milling of Thin-Walled Geometries. International Journal of Precision Technology. 8(2/3/4). 107-123. http:// DOI: 10.1504/IJPTECH.2019.100947.
19. Saxena, V., Deswal, H., Pattanayak, B., & Kothadia, H. (2020). Experimental study on effect of system pressure on two-phase flow pressure drop at sub-atmospheric conditions. Materials Today: Proceedings, 28, 2268–2274. ISSN: 2214-7853. https://doi.org/10.1016/j.matpr.2020.04.559
20. Pandey, C. (2020). The Characterization of Soft Fine-Grained Heat-Affected Zones in P91 Weldments under Creep Exposure Conditions. STEEL RESEARCH INTERNATIONAL, 91(1). ISSN: 1611-3683. https://doi.org/10.1002/srin.201900342
21. Pandey, C. (2020). Mechanical and Metallurgical Characterization of Dissimilar P92/SS304 L Welded Joints Under Varying Heat Treatment Regimes. Metallurgical and Materials Transactions A: Physical Metallurgy and Materials Science, 51(5), 2126–2142. ISSN: 10735623. https://doi.org/10.1007/s11661-020-05660-0
22. Thakare, J. G., Pandey, C., Mahapatra, M. M., & Mulik, R. S. (2019). An assessment for mechanical and microstructure behavior of dissimilar material welded joint between nuclear grade martensitic P91 and austenitic SS304 L steel. Journal of Manufacturing Processes, 48, 249–259. ISSN: 15266125. https://doi.org/10.1016/j.jmapro.2019.10.002
23. Pandey, C. (2019). Effect of heat treatment on mechanical behavior and microstructure feature of the thermal aged P91 steel. MATERIALS RESEARCH EXPRESS, 6(9). ISSN: 2053-1591. https://doi.org/10.1088/2053-1591/ab2e5e
24. Thakare, J. G., Pandey, C., Mulik, R. S., & Mahapatra, M. M. (2019). Microstructure and mechanical properties of D-Gun sprayed Cr3C2-NiCr coating on P91 steel subjected to long term thermal exposure at 650 °c. Materials Research Express, 6(11). ISSN: 20531591. https://doi.org/10.1088/2053-1591/ab5265
25. Pandey, C., Sirohi, S., Mahapatra, M. M., Kumar, P., & Bansal, K. K. (2019). Role of Heat Treatment on Grain Refinement and Microhardness of 9Cr–1Mo–V–Nb Steel. Metallography, Microstructure, and Analysis, 8(4), 472–478. ISSN: 21929262. https://doi.org/10.1007/s13632-019-00555-y
26. Phadatare, H. P., & Pratiher, B. (2020). Nonlinear modeling, dynamics, and chaos in a large deflection model of a rotor–disk–bearing system under geometric eccentricity and mass unbalance. Acta Mechanica, 231(3), 907–928. ISSN: 00015970 (ISSN). https://doi.org/10.1007/s00707-019-02559-9
27. Kumar, Pravesh, & Pratiher, B. (2020). Modal analysis and dynamic responses of a rotating Cartesian manipulator with generic payload and asymmetric load. MECHANICS BASED DESIGN OF STRUCTURES AND MACHINES, 48(1), 48–67. ISSN: 1539-7734. https://doi.org/10.1080/15397734.2019.1624174
28. Kumar, P., & Pratiher, B. (2019a). Modal characterization with nonlinear behaviors of a two-link flexible manipulator. Archive of Applied Mechanics, 89(7), 1201–1220. ISSN: 09391533 (ISSN). https://doi.org/10.1007/s00419-018-1472-9
29. Jakhar, A., Rath, P., Chakraborty, P. R., &Mahapatra, S. K. (2020). Thermal anisotropy in binary alloy solidification: An equivalent isotropic model. Numerical Heat Transfer, Part B: Fundamentals, 1-27.
30. Teja, H. K., Balachandran, A., & Shah, S., V. (2019). Optimal whole-body motion planning of humanoids in cluttered environments. ROBOTICS AND AUTONOMOUS SYSTEMS, 118, 263–277. ISSN: 0921-8890. https://doi.org/10.1016/j.robot.2019.04.004
31. Dutta, A., Salunkhe, D. H., Kumar, S., Udai, A. D., & Shah, S. V. (2019). Sensorless full body active compliance in a 6 DOF parallel manipulator. Robotics and Computer-Integrated Manufacturing, 59, 278–290. ISSN: 07365845. https://doi.org/10.1016/j.rcim.2019.04.010
32. Setu, S., Abhishek, A., & Venkatesan, C. (2019). Time-Domain System Identification of Helicopters Using Nonlinear Acceleration and Jerk Prediction Model. Journal of Aircraft, 56(3), 1272–1280. ISSN: 1533-3868. https://doi.org/10.2514/1.c035273

Conference Papers

1. Malviya, M., & Desai, K. (2019). Build Orientation Optimization for Strength Enhancement of 3-D Printed Parts Using Machine Learning-based Algorithm. Proceedings of CAD'19, 232–236. Singapore: CAD Solutions LLC. https://doi.org/10.14733/cadconfP.2019.232-236

2. Jain, V., Dewangan, R., & Mukhopadhyay, S. (2019). Effect of Different Reaction Mechanisms On Numerical Modeling of Hcci Engine. Proceeding of Proceedings of the 25th National and 3rd International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMTC-2019), 163–168. IIT Roorkee, Roorkee, India: Begellhouse. ISBN: 978-1-56700-496-0. https://doi.org/10.1615/IHMTC-2019.280
3. Kumar, V., Mukhopadhyay, S., Chandra, L., & Shekhar, R. (2019). Experiment and One-dimensional Mathematical Model for the Heat Transfer in a Solar Convective Furnace. Proceeding of Proceedings of the 25th National and 3rd International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMTC-2019), 181–186. IIT Roorkee, Roorkee, India: Begellhouse. ISBN: 978-1-56700-496-0. https://doi.org/10.1615/IHMTC-2019.310
4. Monde, A. D., Bhattacharya, A., & Chakraborty, P. R. (2019). Shrinkage induced flow and Free surface evolution during solidification of pure metal. E3S Web of Conferences, 128, 06011. ISSN: 2267-1242. https://doi.org/10.1051/e3sconf/201912806011
5. Sharma, M., Dandotiya, D., & Chakraborty, P. R. (2019). Modeling of Convective Heat Transfer from the Free Surface of Gravity Driven Vertical Falling Water Film. Proceeding of Proceedings of the 25th National and 3rd International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMTC-2019), 1085–1090. IIT Roorkee, Roorkee, India: Begellhouse. ISBN: 978-1-56700-496-0. https://doi.org/10.1615/IHMTC-2019.1820
6. Shrivastava, A., Kumar, M., Kumar, D., & Chakraborty, P. R. (2019). CFD Analysis of Concentric Tube in Tube Latent Heat Thermal Energy Storage Unit. Proceeding of Proceedings of the 25th National and 3rd International ISHMT-ASTFE Heat and Mass Transfer Conference (IHMTC-2019), 1055–1060. IIT Roorkee, Roorkee, India: Begellhouse. ISBN: 978-1-56700-496-0. https://doi.org/10.1615/IHMTC-2019.1770
7. Tallamraju, R., Salunkhe, D. H., Rajappa, S., Ahmad, A., Karlapalem, K., & Shah, S. V. (2019). Motion Planning for Multi-Mobile-Manipulator Payload Transport Systems. 2019 IEEE 15th International Conference on Automation Science and Engineering (CASE), 1469–1474. Vancouver, BC, Canada: IEEE. ISBN: 978-1-72810-356-3. https://doi.org/10.1109/COASE.2019.8842840
8. Raina, D., Mithun, P., Shah, S. V., & Kumar, S. (2019). A Novel Image-based Path Planning Algorithm for Eye-in-Hand Visual Servoing of a Redundant Manipulator in a Human Centered Environment. 2019 28th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), 1–8. New Delhi, India: IEEE. ISBN: 978-1-72812-622-7. https://doi.org/10.1109/RO-MAN46459.2019.8956330
9. Tallamraju, R., Sripada, V., & Shah, S. V. (2019). Path Planning through Tight Spaces for Payload Transportation using Multiple Mobile Manipulators. 2019 28th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN), 1–6. New Delhi, India: IEEE. ISBN: 978-1-72812-622-7. https://doi.org/10.1109/RO-MAN46459.2019.8956426
10. Ramachandruni, K., Jaiswal, S., & Shah, S. V. (2019). Vision-based control of UR5 robot to track a moving object under occlusion using Adaptive Kalman Filter. Proceedings of the Advances in Robotics 2019, 1–6. Chennai India: ACM. ISBN: 978-1-4503-6650-2. https://doi.org/10.1145/3352593.3352675

Books (Edited)

1. Tyagi, H., Chakraborty, P. R., Powar, S., & Agarwal, A. K. (2020). Solar Energy: Systems, Challenges, and Opportunities (Energy, Environment, and Sustainability) (1st ed. 2020 ed.). Springer. ISBN: 978-981-15-0677-2. http://doi.org/10.1007/978-981-15-0675-8

Book Chapters

1. Ramachandruni, K., Jaiswal, S., & Shah, S. V. (2019). Vision-based control of UR5 robot to track a moving object under occlusion using Adaptive Kalman Filter. ACM Int. Conf. Proc. Ser. Association for Computing Machinery. ISBN: 9781450366502. https://doi.org/10.1145/3352593.3352675
2. Tiwari M., Kathrecha D., Meena K., Desai K.A., Plappally A.K. (2020) Application of Low-Cost Natural Binders in Direct 3-D Printing of Sand Molds. In: Shunmugam M., Kanthababu M. (eds) Advances in Additive Manufacturing and Joining. Lecture Notes on Multidisciplinary Industrial Engineering. Springer, Singapore. https://doi.org/10.1007/978-981-32-9433-2_30
3. Mukesh B.S., Parella R.T., Mukhopadhyay S., Chandra L. (2020) Design and Development of a Concentrated Solar Water Heating System. In: Tyagi H., Chakraborty P., Powar S., Agarwal A. (eds) Solar Energy. Energy, Environment, and Sustainability. Springer, Singapore. https://doi.org/10.1007/978-981-15-0675-8_5
4. Sangwan S., Chakraborty P.R. (2020) Thermodynamic Analysis of Activated Carbon–Ethanol and Zeolite–Water Based Adsorption Cooling Systems. In: Tyagi H., Chakraborty P., Powar S., Agarwal A. (eds) Solar Energy. Energy, Environment, and Sustainability. Springer, Singapore. https://doi.org/10.1007/978-981-15-0675-8_10

Department of Metallurgical & Materials Engineering

Journal Papers

1. Upadhyay, K., Bhattacharyya, A., Subhash, G., & Spearot, D. E. (2019). Quasi-Static and High Strain Rate Simple Shear Characterization of Soft Polymers. Experimental Mechanics, 59(5), 733–747. ISSN: 1741-2765. https://doi.org/10.1007/s11340-019-00507-1
2. Zhu, J., Gandi, A. N., & Gu, M. (2019). Oxygen Doping Enhanced Lithiation in MgCl2 for Battery Applications. Physica Status Solidi (b), 256(11), 1900166. ISSN: 0370-1972, 1521-3951. https://doi.org/10.1002/pssb.201900166
3. Nampoothiri, J., Balasundar, I., Raghu, T., & Ravi, K. R. (2020). Structural and Mechanical Behavior of Al-4.4Cu/2TiB2In-Situ Nanocomposites Fabricated by Post-In-Situ Reaction Ultrasonic Processing. Metallurgical and Materials Transactions B, 51(1), 149–160. ISSN: 1073-5615, 1543-1916. https://doi.org/10.1007/s11663-019-01713-x
4. Prabhu, D. B., Gopalakrishnan, P., & Ravi, K. R. (2020). Morphological studies on the development of chemical conversion coating on surface of Mg–4Zn alloy and its corrosion and bio mineralisation behaviour in simulated body fluid. Journal of Alloys and Compounds, 812, 152146. ISSN: 0925-8388. https://doi.org/10.1016/j.jallcom.2019.152146
5. Ramakrishnan, V., Nair, K. G., Dhakshinamoorthy, J., Ravi, K. R., & Pullithadathil, B. (2020). Porous, n–p type ultra-long, ZnO@Bi2O3 heterojunction nanorods - based NO2 gas sensor: new insights towards charge transport characteristics. Physical Chemistry Chemical Physics, 22(14), 7524–7536. ISSN: 1463-9084. https://doi.org/10.1039/D0CP00567C
6. Prabhu, D. B., Nampoothiri, J., Elakkiya, V., Narmadha, R., Selvakumar, R., Sivasubramanian, R., Gopalakrishnan, P., & Ravi, K. R. (2020). Elucidating the role of microstructural modification on stress corrosion cracking of biodegradable Mg4Zn alloy in simulated body fluid. Materials Science and Engineering: C, 106, 110164. ISSN: 0928-4931. https://doi.org/10.1016/j.msec.2019.110164

Department of Physics

Journal Papers

1. Naikoo, J., Thapliyal, K., Banerjee, S., & Pathak, A. (2019). Quantum Zeno effect and nonclassicality in a PT-symmetric system of coupled cavities. *Physical Review A*, *99*(2), 023820. https://doi.org/10.1103/PhysRevA.99.023820
2. Naikoo, J., Alok, A. K., Banerjee, S., & Sankar, S. U. (2019). Leggett-Garg inequality in the context of three flavor neutrino oscillation. *Physical Review D*, *99*(9), 095001. ISSN: 2470-0029. https://doi.org/10.1103/PhysRevD.99.095001
3. Naikoo, J., Dutta, S., & Banerjee, S. (2019). Facets of quantum information under non-Markovian evolution. *Physical Review A*, *99*(4), 042128. ISSN: 2469-9926, 2469-9934. https://doi.org/10.1103/PhysRevA.99.042128
4. Naikoo, J., Banerjee, S., & Pathak, A. (2019). Interplay between nonclassicality and PT symmetry in an effective two-level system with open system effects. *Physical Review A*, *100*(2), 023836. ISSN: 2469-9934. https://doi.org/10.1103/PhysRevA.100.023836
5. Dixit, K., Naikoo, J., Mukhopadhyay, B., & Banerjee, S. (2019). Quantum correlations in neutrino oscillations in curved spacetime. Physical Review D, 100(5), 055021. ISSN: 2470-0029. https://doi.org/10.1103/PhysRevD.100.055021
6. Malpani, P., Thapliyal, K., Alam, N., Pathak, A., Narayanan, V., & Banerjee, S. (2019). Quantum Phase Properties of Photon Added and Subtracted Displaced Fock States. *Annalen Der Physik*, *531*(11), 1900141. ISSN: 0003-3804, 1521-3889. https://doi.org/10.1002/andp.201900141
7. Malpani, P., Thapliyal, K., Alam, N., Pathak, A., Narayanan, V., & Banerjee, S. (2020). Impact of photon addition and subtraction on nonclassical and phase properties of a displaced Fock state. *Optics Communications*, *459*. ISSN: 0030-4018. https://doi.org/10.1016/j.optcom.2019.124964
8. Malpani, P., Alam, N., Thapliyal, K., Pathak, A., Narayanan, V., & Banerjee, S. (2020). Manipulating Nonclassicality via Quantum State Engineering Processes: Vacuum Filtration and Single Photon Addition. *Annalen Der Physik*, *532*(1). ISSN: 0003-3804. https://doi.org/10.1002/andp.201900337
9. Naikoo, J., Alok, A. K., Banerjee, S., Uma Sankar, S., Guarnieri, G., Schultze, C., & Hiesmayr, B. C. (2020). A quantum information theoretic quantity sensitive to the neutrino mass-hierarchy. Nuclear Physics B, 951. ISSN: 05503213 (ISSN). https://doi.org/10.1016/j.nuclphysb.2019.114872
10. Naikoo, J., & Banerjee, S. (2019). Coherence-based measure of quantumness in (non-) Markovian channels. Quantum Information Processing, 19(1), 29. ISSN: 1573-1332. https://doi.org/10.1007/s11128-019-2533-x.
11. Naikoo, J., Banerjee, S., & Jayannavar, A. M. (2019). Violation of Leggett-Garg-type inequalities in a driven two-level atom interacting with a squeezed thermal reservoir. *Physical Review A*, *100*(6). ISSN: 2469-9926. https://doi.org/10.1103/PhysRevA.100.062132

12. Sharma, V., & Banerjee, S. (2020). Quantum communication using code division multiple access network. *Optical and Quantum Electronics*, *52*(8). ISSN: 0306-8919. https://doi.org/10.1007/s11082-020-02494-3
13. Lisicovas, V., Mariserla, B. M. K., Sahoo, C., Harding, R. T., Man, M. K. L., Wong, E. L., Madéo, J., & Dani, K. M. (2019). Improving Signal and Photobleaching Characteristics of Temporal Focusing Microscopy with the Increase in Pulse Repetition Rate. Methods and Protocols, 2(3), 65. ISSN: 2409-9279. https://doi.org/ 10.3390/mps2030065
14. Mishra, A., Betal, A., Pal, N., Kumar, R., Lama, P., Sahu, S., & Metre, R. K. (2020). Molecular Memory Switching Device Based on a Tetranuclear Organotin Sulfide Cage [(RSnIV)4(μ-S)6]·2CHCl3·4H2O (R = 2-(Phenylazo)phenyl): Synthesis, Structure, DFT Studies, and Memristive Behavior. ACS Applied Electronic Materials, 2(1), 220–229. ISSN: 2637-6113. https://doi.org/10.1021/acsaelm.9b00703
15. Bera, J., & Sahu, S. (2019). Strain induced valley degeneracy: a route to the enhancement of thermoelectric properties of monolayer WS2. RSC Advances, 9(43), 25216–25224. ISSN: 2046-2069. https://doi.org/10.1039/C9RA04470A
16. Dagar, P., Bera, J., Vyas, G., & Sahu, S. (2019). Bidirectional multiple negative differential resistance (BM-NDR): An interplay between interface resistance and redox reaction. Organic Electronics, 71, 303–311. ISSN: 1566-1199. https://doi.org/10.1016/j.orgel.2019.05.031
17. Dey, S., Laha, A., & Ghosh, S. (2020). Nonlinearity-induced anomalous mode collapse and nonchiral asymmetric mode switching around multiple exceptional points. Physical Review B, 101(12), 125432. ISSN: 2469-9969. https://doi.org/10.1103/PhysRevB.101.125432
18. Gandhi, H. K., Laha, A., Dey, S., & Ghosh, S. (2020). Chirality breakdown in the presence of multiple exceptional points and specific mode excitation. Optics Letters, 45(6), 1439–1442. ISSN: 1539-4794. https://doi.org/10.1364/OL.383749
19. Bhattacherjee, S., Mujumdar, S., & Ghosh, S. (2020). Lévy flight of superdiffusive light in coupled waveguide lattices. Physical Review Research, 2(1), 012037. ISSN: 2643-1564. https://doi.org/10.1103/PhysRevResearch.2.012037
20. Bakshi, B., Barh, A., Ghosh, S., Varshney, R. K., & Pal, B. P. (2019). Guided wave photonics for light sources, sensors and passive components at mid-IR. *Asian Journal of Physics*, *28*(10–12), 877–889. ISSN: 0971 - 3093. http://demo050307.hostgator.co.in/content2/vol-28-2019/vol-28-nos-10-12
21. Bhattacherjee, S., Gandhi, H. K., Laha, A., & Ghosh, S. (2019). Higher-order topological degeneracies and progress towards unique successive state switching in a four-level open system. Physical Review A, 100(6), 062124. ISSN: 2469-9926, 2469-9934. https://doi.org/10.1103/PhysRevA.100.062124
22. Biswa, P., & Ghosh, S. (2019). Towards stable delivery of high energy through background-guided similariton pulses. Asian Journal of Physics, 28(7–9), 541–552. ISSN: 0971 - 3093. http://demo050307.hostgator.co.in/content2/vol-28-2019/vol-28-nos-7-9
23. Biswas, P., Gandhi, H. K., & Ghosh, S. (2019). Asymmetric propagation and limited wavelength translation of optical pulses through a linear dispersive time-dynamic system. Optics Letters, 44(12), 3022–3025. ISSN: 1539-4794. https://doi.org/10.1364/OL.44.003022
24. Bhattacherjee, S., Laha, A., & Ghosh, S. (2019). Topological dynamics of an adiabatically varying Hamiltonian around third order exceptional points. Physica Scripta, 94(10), 105509. ISSN: 1402-4896. https://doi.org/10.1088/1402-4896/ab1c8b
25. Bhattacherjee, S., Laha, A., & Ghosh, S. (2019). Encounter of higher order exceptional singularities and towards cascaded state conversion. Physica Scripta, 94(8), 085202. ISSN: 1402-4896. https://doi.org/10.1088/1402-4896/ab03a3
26. Laha, A., Biswas, A., & Ghosh, S. (2019). Minimally asymmetric state conversion around exceptional singularities in a specialty optical microcavity. Journal of Optics, 21(2), 025201. ISSN: 2040-8986. https://doi.org/10.1088/2040-8986/aafd7b
27. Alok, A. K., Kumar, J., Kumar, D., & Sharma, R. (2019). Lepton flavor non-universality in the B-sector: a global analyses of various new physics models. The European Physical Journal C, 79(8), 707. ISSN: 1434-6052. https://doi.org/10.1140/epjc/s10052-019-7219-0
28. Alok, A. K., Dighe, A., Gangal, S., & Kumar, D. (2019). Continuing search for new physics in b → s**μμ** decays: two operators at a time. Journal of High Energy Physics, 2019(6), 89. ISSN: 1029-8479. https://doi.org/10.1007/JHEP06(2019)089
29. Kumar, N., Lamba, R. P., Hossain, A. M., Abhishek, A., & Prakash, R. (2020). Effect of Tapered Interelectrode Gap Region on Pseudospark-Sourced Electron Beam Emission. IEEE Transactions on Electron Devices, 67(3), 1211–1214. ISSN: 0018-9383, 1557-9646. https://doi.org/10.1109/TED.2019.2962872
30. Patra, S., Thakur, P., Soman, B., Puthirath, A. B., Ajayan, P. M., Mogurampelly, S., Chethan, V. K., & Narayanan, T. N. (2019). Mechanistic insight into the improved Li ion conductivity of solid polymer electrolytes. RSC Advances, 9(66), 38646–38657. ISSN: 2046-2069. https://doi.org/10.1039/C9RA08003A

31. Haridasan, N., Kannam, S. K., Mogurampelly, S., & Sathian, S. P. (2019). Rotational Diffusion of Proteins in Nanochannels. The Journal of Physical Chemistry B, 123(23), 4825–4832. ISSN: 1520-6106. https://doi.org/10.1021/acs.jpcb.9b00895
32. Prasad, D., Mogurampelly, S., & Chaudhari, S. R. (2020). R-VAPOL-phosphoric acid based 1H and 13C-NMR for sensing of chiral amines and acids. RSC Advances, 10(4), 2303–2312. ISSN: 2046-2069. https://doi.org/10.1039/C9RA07803G
33. Ivanishchev, A. V., Gridina, N. A., Rybakov, K. S., Ivanishcheva, I. A., & Dixit, A. (2020). Structural and electrochemical investigation of lithium ions insertion processes in polyanionic compounds of lithium and transition metals. Journal of Electroanalytical Chemistry, 860, 113894. ISSN: 1572-6657. https://doi.org/10.1016/j.jelechem.2020.113894
34. Sakhuja, N., Jha, R. K., Chaurasiya, R., Dixit, A., & Bhat, N. (2020). 1T-Phase Titanium Disulfide Nanosheets for Sensing H2S and O2. ACS Applied Nano Materials, 3(4), 3382–3394. ISSN: 2574-0970. https://doi.org/10.1021/acsanm.0c00127
35. Kumari, C., Varun, I., Tiwari, S. P., & Dixit, A. (2020). Interfacial layer assisted, forming free, and reliable bipolar resistive switching in solution processed BiFeO3 thin films. AIP Advances, 10(2), 025110. ISSN: 2158-3226. https://doi.org/10.1063/1.5134972
36. Tiwari, B., Dixit, A., & Rao, M. S. R. (2020). Anomalous magnetic behavior and complex magnetic structure of proximate LaCrO3—LaFeO3 system. Materials Research Express, 6(12), 126119. ISSN: 2053-1591. https://doi.org/10.1088/2053-1591/ab6535
37. Dixit, A., Tripathi, R. P., & Bhandari, N. (2019). Glassy magnetic cronstedtite signatures in Mukundpura CM2 chondrite based on magnetic and Mössbauer studies. Meteoritics & Planetary Science, 54(12), 2902-2907. ISSN: 1945-5100. https://doi.org/10.1111/maps.13395
38. Kumar, R., & Dixit, A. (2019). Corrosion resists Ni, Co co-pigmented nanoporous anodized alumina as spectral selective coating structure for solar thermal applications. Journal of Alloys and Compounds, 810, 151833. ISSN: 0925-8388. https://doi.org/10.1016/j.jallcom.2019.151833
39. Sahani, R. M., Kumari, C., Pandya, A., & Dixit, A. (2019). Efficient Alpha Radiation Detector using Low Temperature Hydrothermally Grown ZnO:Ga Nanorod Scintillator. Scientific Reports, 9(1), 1–9. ISSN: 2045-2322. https://doi.org/10.1038/s41598-019-47732-1
40. Chaurasiya, R., Gupta, G. K., & Dixit, A. (2019). Ultrathin Janus WSSe buffer layer for W(S/Se)2 absorber based solar cells: A hybrid, DFT and macroscopic, simulation studies. Solar Energy Materials and Solar Cells, 201, 110076. ISSN: 0927-0248. https://doi.org/10.1016/j.solmat.2019.110076
41. Chaurasiya, R., & Dixit, A. (2019). Defect engineered MoSSe Janus monolayer as a promising two dimensional material for NO2 and NO gas sensing. Applied Surface Science, 490, 204–219. ISSN: 01694332. https://doi.org/10.1016/j.apsusc.2019.06.049
42. Kumar, R., Usmani, B., & Dixit, A. (2019). W/SS thin film as high temperature infrared reflector for solar thermal applications: intrinsic properties and impact of residual oxygen. Materials Research Express, 6(10), 106408. ISSN: 2053-1591. https://doi.org/10.1088/2053-1591/ab3757
43. Ivanishchev, A. V., Ivanishcheva, I. A., & Dixit, A. (2019). LiFePO4-Based Composite Electrode Material: Synthetic Approaches, Peculiarities of the Structure, and Regularities of Ionic Transport Processes. Russian Journal of Electrochemistry, 55(8), 719–737. ISSN: 1608-3342. https://doi.org/10.1134/S102319351908007X
44. Kumari, C., Pandey, A., & Dixit, A. (2019). Improved rectification ehavior in ZnO nanorods homojunction by suppressing Li donor defects using Li-Ni co-doping. Superlattices and Microstructures, 132, 106154. ISSN: 0749-6036. https://doi.org/10.1016/j.spmi.2019.106154
45. Chaurasiya, R., Raman, R., Tyagi, S., & Dixit, A. (2019). Strain Modulated Optoelectronic Properties of CdO Monolayer. Journal of Electronic Materials, 48(6), 3963–3969. ISSN: 1543-186X. https://doi.org/10.1007/s11664-019-07160-3
46. Gupta, G. K., Chaurasiya, R., & Dixit, A. (2019). Theoretical studies on structural, electronic and optical properties of kesterite and stannite Cu2ZnGe(S/Se)4 solar cell absorbers. Computational Condensed Matter, 19, e00334. ISSN: 23522143. https://doi.org/10.1016/j.cocom.2018.e00334
47. Abdelhamid, E., Laha, S. S., Dixit, A., Nazri, G. A., Jayakumar, O. D., & Nadgorny, B. (2019). Exchange Bias Enhancement and Magnetic Proximity Effect in FeVO4-Fe3O4 Nanoparticles. Journal of Electronic Materials, 48(5), 3297–3303. ISSN: 1543-186X. https://doi.org/10.1007/s11664-019-07083-z
48. Ayala, A. M., Mathews, N. R., Pal, M., Gupta, G. K., Dixit, A., & Mathew, X. (2019). Facile synthesis of Cu2ZnGeS4 thin films from binary metal sulfides and study of their physical properties. Thin Solid Films, 676, 68–74. ISSN: 00406090. https://doi.org/10.1016/j.tsf.2019.02.049
49. Ivanishcheva, I. A., Ivanishchev, A. V., & Dixit, A. (2019). Positive effect of surface modification with titanium carbosilicide on performance of lithium-transition metal phosphate cathode materials. Monatshefte Für Chemie - Chemical Monthly, 150(3), 489–498. ISSN: 1434-4475. https://doi.org/10.1007/s00706-018-2314-8

50. Tiwari, A., Kumawat, S., Rayaprol, S., & Dixit, A. (2019). Neutron diffraction studies on temperature driven crystallographic anisotropy in FeVO4 multiferroic: Evidence of strong magnetostructural correlations. AIP Conference Proceedings, 2115(1), 030526. ISSN: 0094-243X. https://doi.org/10.1063/1.5113365

51. Alok, A. K., Dighe, A., Gangal, S., & Kumar, D. (2019). Continuing search for new physics in b → **sμμ decays: two operators at a time. Journal of High Energy Physics, 89 ,(6)2019. ISSN: 8479-1029. https://doi.org/10.1007/JHEP089(2019)06**

52. Chatterjee, S., & Narayanan, V. (2019). Estimation and optimization of heliostat field for 400 kW to 550 kW optical power using ray tracing method. AIP Conference Proceedings, 2126(1), 030014. ISSN: 0094-243X. https://doi.org/10.1063/1.5117526

53. Bhattacherjee, S., Gandhi, H. K., Laha, A., & Ghosh, S. (2019). Higher-order topological degeneracies and progress towards unique successive state switching in a four-level open system. Physical Review A, 100(6), 062124. ISSN: 2469-9934. https://doi.org/10.1103/PhysRevA.100.062124

54. Sahani, R. M., Kumari, C., Pandya, A., & Dixit, A. (2020). Author Correction: Efficient Alpha Radiation Detector using Low Temperature Hydrothermally Grown ZnO: Ga Nanorod Scintillator. Scientific Reports, 10(1), 1–2. ISSN: 2045-2322. https://doi.org/10.1038/s41598-020-60513-5

55. Dey, S., Laha, A., & Ghosh, S. (2020). Nonlinearity-induced anomalous mode collapse and nonchiral asymmetric mode switching around multiple exceptional points. Physical Review B, 101(12), 125432. https://doi.org/10.1103/PhysRevB.101.125432

Conference Papers

1. Bhattacherjee, S., & Ghosh, S. (2019). Random walk and toward lévy flight of light in waveguide lattice. JSAP-OSA Joint Symposia 2019 Abstracts (2019), Paper 20p_E215_6, 20p_E215_6. Hokkaido, Japan: Optical Society of America. ISBN: 978-4-86348-743-7. https://www.osapublishing.org/abstract.cfm?uri=JSAP-2019-20p_E215_6

2. Laha, A., Laha, A., Biswas, A., & Ghosh, S. (2019). Nonlinearity Controlled Asymmetric Mode-Conversion in an Optical Waveguide Hosting an Exceptional Point. JSAP-OSA Joint Symposia 2019 Abstracts (2019), Paper 20p_E215_4, 20p_E215_4. Hokkaido, Japan: Optical Society of America. ISBN: 978-4-86348-743-7. https://www.osapublishing.org/abstract.cfm?uri=JSAP-2019-20p_E215_4

Book Chapters

1. Kumar, R., & Dixit, A. (2020). Issue and Challenges with High-Temperature Solar Selective Material for Solar Thermal Application. In D. Deb, A. Dixit, & L. Chandra (Eds.), Renewable Energy and Climate Change (Vol. 161, pp. 99–108). Singapore: Springer Singapore. ISBN: 978-981-329-578-0. https://doi.org/10.1007/978-981-32-9578-0_9

2. Tiwari, A., & Dixit, A. (2020). Rare Earth Oxides Based Composites for High Voltage Supercapacitors Applications: A Short Review. In D. Deb, A. Dixit, & L. Chandra (Eds.), Renewable Energy and Climate Change (Vol. 161, pp. 1–10). Singapore: Springer Singapore. ISBN: 978-981-329-578-0. https://doi.org/10.1007/978-981-32-9578-0_1

3. Kumar, R., Vyas, S., Mondal, B., Kumar, R., & Dixit, A. (2020). Fabrication and Thermal Performance Evaluation of Metastable Supercooled Liquid PCM Based Heat Pack. In H. Tyagi, P. R. Chakraborty, S. Powar, & A. K. Agarwal (Eds.), Solar Energy: Systems, Challenges, and Opportunities (pp. 277–282). Singapore: Springer. ISBN: 9789811506758. https://doi.org/10.1007/978-981-15-0675-8_14

4. Swami, J., Dixit, A., & Tiwari, B. (2019). Effect of Magnetic Ordering on Phonon Raman Spectra in Magnetic Systems. In D. K. Singh, S. Das, & A. Materny (Eds.), Advances in Spectroscopy: Molecules to Materials (pp. 289–299). Singapore: Springer. ISBN: 9789811502026. https://doi.org/10.1007/978-981-15-0202-6_21

5. Kumbhakar, S., Kumar Alok, A., Kumar, D., & Sankar, S. U. (2020). New Physics Solutions for $b \to c\tau\nu^-$Anomalies After Moriond 2019. In A. Giri & R. Mohanta (Eds.), *Workshop on Frontiers in High Energy Physics 2019* (pp. 417–423). Singapore: Springer. ISBN: 978-981-15-6292-1. https://doi.org/10.1007/978-981-15-6292-1_53

6. Dixit, K., & Kumar Alok, A. (2020). Effects of Nonstandard Interactions on Coherence in Neutrino Oscillations. In A. Giri & R. Mohanta (Eds.), *Workshop on Frontiers in High Energy Physics 2019* (pp. 343–347). Singapore: Springer. ISBN: 978-981-15-6292-1. https://doi.org/10.1007/978-981-15-6292-1_43

Book (Authored)

1. Kumar, N., & Dixit, A. (2019). Nanotechnology for Defence Applications. Cham: Springer International Publishing. ISBN: 978-3-030-29880-7. https://doi.org/10.1007/978-3-030-29880-7_8

Books (Edited)

1. Deb, D., Dixit, A., & Chandra, L. (Eds.). (2020). Renewable Energy and Climate Change: Proceedings of REC 2019 (Vol. 161). Singapore: Springer Singapore. ISBN: 978-981-329-578-0. https://doi.org/10.1007/978-981-32-9578-0

Outreach

The following Outreach activities have been undertaken by the Faculty Members at IIT Jodhpur During the FY 2019-20.

Workshop on Computational Biology and Bioinformatics (CBB 2019)

Workshop on Computational Biology and Bioinformatics (CBB 2019) was organized at IIT Jodhpur during 31 July-01 August 2019. It focused on contributions dealing with the development of methods for learning from biomedical data, managing those data, and using the data to inform biological discovery, motivated by efforts to improve human health. Several eminent speakers from institutes like, IIT Delhi, IGIB, JNU, ISI, IMSc, shared their rich experience and knowledge through their keynote addresses and invited talks. The workshop was coordinated by Dr. Sushmita Paul from Department of Bioscience & Bioengineering.

Workshop on Transforming India with AI

Workshop on "Transforming India with AI" during 8-9 August 2019 at Indian Institute of Technology Jodhpur and sponsored by NetApp Inc. The workshop had several invited talks from eminent scholars on the aspects of Artificial Intelligence and its applications to a variety of sectors. The workshop was coordinated by Dr. Gaurav Harit from the Department of Computer Science & Engineering.

International Workshop on Big Data in Culture, Design and Heritage, and Fifth IEEE International Conference on Multimedia Big Data (BigMM)

IIT Jodhpur, in coordination with IIT Bombay, organized the International Workshop on Big Data in Culture, Design and Heritage and the Fifth IEEE International Conference on Multimedia Big Data at the National University of Singapore, Singapore during 11-13 September 2019. This workshop aimed to capture the emerging moment of digital humanities and focus on one unavoidable aspect of 'digital' research in culture, design, and heritage: Big Data. The workshop addressed applications of Big Data in digital culture, design, and heritage. It also highlighted the challenges and opportunities that such large-scale multimodal data analytics will bring to the community in these areas. The workshop brought together researchers from the qualitative and quantitative domains on a common platform and facilitated in answering key interdisciplinary research questions.

Symposium on 2D Materials and Devices (S2DMD 2019)

A symposium on the theme "2D Materials and Devices" was jointly organized by IIT Jodhpur and Indian National Young Academy of Sciences (INYAS) at IIT Jodhpur during 27-28 September 2019, by Dr. Mahesh Kumar from the Department of Electrical Engineering and Dr. Satyajit Sahu from the Department of Physics.

Young Investigators Meeting (YIM)

IndiaBioscience and IIT Jodhpur, jointly organized the Regional Young Investigators' Meeting - West at IIT Jodhpur during 31 October-2 November 2019. The meeting included keynote/plenary talks and poster sessions on advanced and emerging themes, as well as invigorating panel discussions on various trends in life sciences research, which aimed at helping to boost the career of young investigators. This meeting served as a great networking platform where young scientists and researchers could share their experiences, approaches, contacts, activities outside the lab and could build new collaborations. The meeting was coordinated by Dr. Sushmita Jha from the Department of Bioscience & Bioengineering.

National Conference on Quantum Information and Computations (QIC) 2019

National Conference on Quantum Information and Computations (QIC) 2019 was organized at IIT Jodhpur during 8-11 December 2019 by the Interdisciplinary Research Program (IDRP)-QIC Group led by Dr. Subhashish Banerjee from the Department of Physics.

11th International Conference on Intelligent Human Computer Interaction (IHCI 2019)

The 11th International Conference on Intelligent Human Computer Interaction (IHCI 2019) was jointly organized by Indian Institute of Information Technology Allahabad (IIITA) and Indian Institute of Technology Jodhpur during 12-14 December 2019 at IIIT Allahabad. The conference was chaired by Dr. Gaurav Harit from Department of Computer Science and Engineering at IIT Jodhpur.

64th DAE Solid State Physics Symposium

The 64th DAE Solid State Physics Symposium was organized during 18-22 December 2019 at Indian Institute of Technology Jodhpur by Bhabha Atomic Research Centre (BARC), Mumbai, sponsored by the Board of Research in Nuclear Sciences (BRNS), Department of Atomic Energy, Government of India.

Igniting excitement for science in young minds – Explorer Series comes to IIT Jodhpur, 6 Jan 2020

Dr. Shankar Manoharan, along with his group organized the The Explorer Series – a popular science talk series designed by the biomedical research-funding charity The Wellcome Trust/DBT India Alliance on 6 January 2020, to inspire young students to the excitement and value of science. Four scientists—Kavita Babu, Indian Institute of Science, Bengaluru, Tavpritesh Sethi, IIIT Delhi, Shankar Manoharan, IIT Jodhpur and Geeta Trilok-Kumar, Institute of Home Economics, New Delhi, took close to 200 school students and undergraduates through their adventurous journeys as scientists. Their talks covered varied scientific topics - from neuroscience and microbiology to nutrition research and artificial intelligence in medicine. Students from Mayoor Chopasni School, Army Public School and Delhi Public School, Jodhpur attended the event, asked pertinent questions and interacted with the researchers. IIT Jodhpur also gave away origami microscopes for the school students, who asked the best questions in the event.

International Workshop on Science of Intelligence 2020

IIT Jodhpur has organized International Workshop on Science of Intelligence during 18 – 19 January 2020, in collaboration with IIT Delhi. The aim of the workshop was to converge, in coordination with researchers across the country, to formulate a programme on the science of intelligence. This two-day event, organized by the Institute's Interdisciplinary Research Group on Cognitive Science, has witnessed expert lectures and panel discussion by eight eminent scientists and speakers on cognitive science and artificial intelligence from around the world. The workshop aimed to address core questions about intelligence – its nature, how it is manifested in living systems and how it could be implemented in machines.

Meeting on Mapping of Science and Technology needs of the State

The State Government of Rajasthan, keeping in mind the requirement of the State for new jobs creation through planning and execution of the S&T Schemes constituted an expert committee under the Chairmanship of Secretary, Department of Science & Technology, Government of Rajasthan, Jaipur, which includes Director IIT Jodhpur, Director IIM Udaipur, Director AIIMS Jodhpur and 5 (five) Subject Professionals from the subjects of Agriculture, education, Medical & Health skill development, employment and entrepreneurship. The committee has been assigned to lay down guidelines and develop a vision document in coordination with the subject experts. A Nodal officer for this program has been appointed from State Department of Science & Technology, GoR, Jaipur. The Secretary, DST, GoR, has sought from all District collectors to identify S&T needs and suggestions for their districts. Also, all universities in the State have been requested to perform gap analysis/ problems identification in their respective districts in which they are situated.

On 18 January 2019 the expert committee meet at IIT Jodhpur. Mrs. Mugdha Sinha, IAS & Secretary, DST Government of Rajasthan chaired the meeting. Following are the highlights of the meeting:

1. Prof. Santanu Chaudhury, Director, IIT Jodhpur, assured about the technical support for the all new ideas and innovations from the Institute.
2. Dr. Deba Dutta, Advisor & Head State S&T Program, DST, GoI, New Delhi, assured to provide all support and expertise from GoI.
3. Prof. Janat Shah, Director, IIM Udaipur, extended his support to develop entrepreneurship environment in the state.
4. Experts from the Institutes in Jodhpur i.e., from Indian Space Research Organization (ISRO), Central Arid Zone Research Institute (CAZRI), Arid Forest Research Institute (AFRI) & All India Institute of Medical Sciences, Jodhpur (AIIMS, Jodhpur) also extended their support to the program.
5. Shri Prakash Raj Purohit, Collector, Jodhpur, apprised the committee about the S&T work happening at Jodhpur.

The main motto of the program is to develop new guidelines and vision document for the Rajasthan state regarding a systematic and sustainable program, which will create and open new doors for the young entrepreneur. The program, in times to come will be helpful in eradication of poverty and will improve the lively hood in the State.

Social Scientific Responsibility (SSR) Activity in Rural Rajasthan

During the year 2019-20, as a part of scientific social responsibility (SSR), several proactive measures were taken to ensure clean water for drinking in primary and secondary schools (3 nos.) of (i) Khadaat village in Sirohi district, (ii) Dhanuri village in Pindwara of Sirohi district, & (iii) Luna villages in Jhunjhunu district. It has provided a critical support to the student's health, capacity building and awareness.

Water contamination due to fluoride is common, particularly in rural and remote areas of Rajasthan. Pressure driven membrane processes play an important role in water purification (Figure 1)

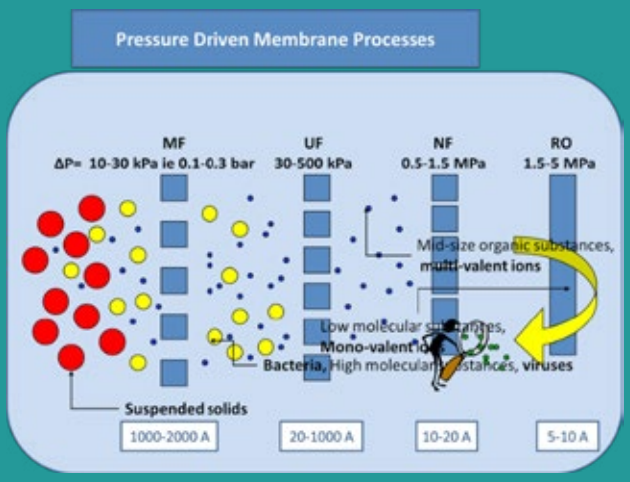


Fig. 1: Pressure Driven Membrane Processes

As a part of SSR activities to address the drinking water contamination issues in rural areas, a decentralized water purification unit was designed for fluoride removal. The ultra-filtration membrane assisted sorption process which runs by gravity was used. It does not require electricity for water purification. Subsequently, IITJ installed and demonstrated the low cost, highly effective indigenous decentralized solution in the form of Ultra filtration (UF) devices to provide clean drinking water in rural areas of Rajasthan particularly in schools. These interventions using UF technology have been carried out in three locations of two districts namely Sirohi and Jhunjhunu, in the first phase.

Installation of Water Purification Units

For this purpose, the site selection was carried out in consultation with District Authorities and Public Health Engineering Department (PHED) and a Government Primary School of 'Khadaat' village in Sirohi District was selected. Khadaat village is located on NH 14, two kilometres away from Ore in Pindwara Region, Sirohi.

After carrying out water analysis, appropriately designed water purification unit based on membrane assisted sorption process was installed (Figure 2). Raw water and product water tanks along with pipe and fittings were also installed for the collection of ground and purified drinking water. The unit is ideal for rural areas and remote locations. It provides purified clean water to school children, free from fluoride contamination as well as secondary contaminants like bacteria, virus, turbidity, suspended solids, colour and odour.

Local participation of teacher, staff and students was ensured in installation and operation of the water purification unit (Figure 3). This helps in operation and maintenance (O&M) by local people at lowest appropriate level as well as adequate capacity building. Primary school students are introduced to practical aspects of education in this unit, which is not very common in primary schools. This acts as an introduction to skill development at primary level itself as well as set an example as novel integrated approach to decentralised community managed system and sustainable water management.

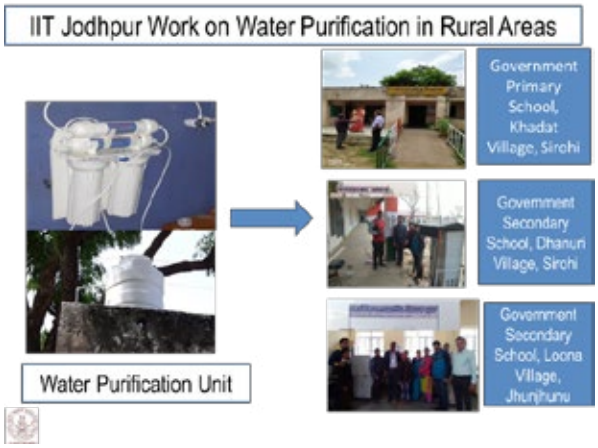


Fig. 2: Water Technology Initiative in Rural and Remote Areas by IIT Jodhpur

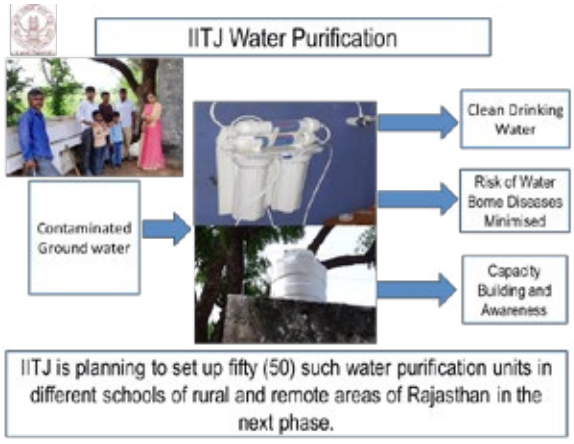


Fig. 3: Water Purification and Local Participation

The installation of another water purification unit was carried out at Rajkiya Uch Madhyamic Vidyalaya (Government Higher Secondary School) in Dhanuri village. The unit was installed with the help of school staff, local manpower and operated by students and staff of school.

In Jhunjhunu district, installation of the UF water purification unit was carried out in Rajkiya Uch Madhyamic Vidyalaya (Government Higher Secondary School) at Luna village. It provides good clean drinking water to the students and staff members.

In less than a year, the decentralised water purification units were installed and being used at above locations in the districts of Sirohi and Jhunjhunu. IITJ is planning to set up sveral such water purification units in different schools of rural and remote areas of Rajasthan in the next phase as a part of Scientific Social Responsibility.

Technical Expertise and Support

The expertise of IIT Jodhpur on water technologies is being translated for the society as well as defence requirements by providing valuable guidance to Defence Laboratory Jodhpur (DLJ) on development of mobile Chemical Biological Radiological Nuclear (CBRN) Water Purification Unit for defence applications.

As a member of 'Technical Committee for Examination and Use of Innovations and Technologies in Drinking Water and Sanitation Sector' constituted by Department of Drinking Water Supply, Ministry of Jal Shakti (GOI), IITJ is helping in innovations and techno-economic appraisal of technologies etc. IITJ is also helping Public Health Engineering Department (PHED), Jodhpur in vetting of technical proposals.

Other Outreach Activities

Department of Bioscience & Bioengineering

1. Indranil Banerjee attended and chaired a session at the 2nd International Conference on Bioprocess for Sustainable Environment and Energy (ICBSEE-India-2020).

Department of Chemistry

1. Dr. Ritu Gupta, coordinator of Vigyan Jyoti Program organized science exhibition and motivational lectures for 50 meritorious girl students of Novodya Vidyalya, Barmer on 19 Jan 2020.
2. Dr. Ritu Gupta, Department of Chemistry, Indian Institute of Technology, along with student team from Department of Chemistry, organized one day event - "Nano Jatha" at Regional Science Center and Science Park, Jaipur on 15 Feb 2020. The event was supported by CeNS, Bangalore and DST-Rajasthan. It included lectures roadshow, exhibition and quiz program on nanotechnology for familiarizing the participants from schools and colleges with the different aspects and applications of nanotechnology.

Department of Computer Science & Engineering

1. Anand Mishra delivered an invited talk on Siemens-IISc workshop organized at IISc Bangalore during December 2019.
2. Prof. Sajal K. Das, Professor and Daniel St. Clair Endowed Chair, delivered an invited talk from Department of Computer Science from Missouri University of Science and Technology Rolla, MO 65409, USA visited Computer Science and Engineering Department at IIT Jodhpur during 30th November- 2nd December 2019.

Department of Electrical Engineering

1. Harshit Agarwal delivered a talk on Compact Modeling and Recent Trends in Nanoelectronics, at MNNIT Allahabad. He also conducted workshop on "My First Neural Network" at IIT-Jodhpur Technical Festival.
2. Amit Bhardwaj delivered a talk on Haptics at NIT Patna
3. Aashish Mathur delivered an invited talk on "Bringing Technologies Together with 5G" organized by BSTTM, IIT Delhi, and Samsung R&D held in IIT Delhi on 17th October 2019.

4. Saakshi Dhanekar did the following:
   (i) Hosted an event to celebrate National Science Day 2020. Also, moderated a session on "What's exciting in Science & Career opportunities in Science" during February 2020 at IIT Jodhpur
   (ii) Organized Young Professionals, Industry and Women in Sensors sessions in IEEE Sensors 2019 held in Montreal during Oct 2019.
5. Soumava Mukherjee delivered the following invited talks:
   (i) "Substrate Integrated Circuits - microwave and millimeterwave Application", IEEE MTT-S Student branch chapter, IIT BHU, 22 August 2020.
   (ii) "SIW Antennas", MNIT Jaipur, on 15 July 2020.
   (iii) "Radiation from planar apertures; waveguide and horn antennas, E&ICT Academy", IIT Guwahati, on 11 May 2019.
6. Arani Ali Khan delivered the following invited talks:
   (i) "Design of Microwave and Millimeter-wave filters," AICTE sponsored short term course organized by department of E&ECE, IIT Kharagpur, during July-2019.
   (ii) "Recent progress in Solid State Power Amplifiers (SSPA)for RF-Microwave applications," organized by IEEE AP-MTT SBC, IIT Kharagpur, West Bengal, during July-2019.
   (iii) "SIW based passive and active circuit designing for microwave and millimeter-wave applications," in SPARC sponsored workshop on Metamaterial Antenna Design and Deep Learning Techniques for Modern Wireless Communications, organized by NIT Tiruchirappalli, during February 2020.
7. Rajlaxmi Chouhan conducted a Workshop on Presentation Skills as a part of IEEE Student Branch & Communications Club of Academics & Careers Society, IIT Jodhpur during April 2019.

Department of Humanities & Social Science

1. Mayurakshi Chaudhuri, Workshop Co-chair and Organizer, International Workshop on Big Data in Culture, Design and Heritage 2019, at the IEEE BigMM Conference. Sponsoring Authority: IEEE-TCMC (Technical Committee on Multimedia Computing), IEEETCSEM (Technical Committee on Semantic Computing). Singapore 2019.
2. Farhat Naz delivered an invited talk on the 'India's Local Self Governance Potential in Disaster Risk Reduction' at the Flood risk management seminar 2019, TH Koln University, Germany.

Department of Mathematics

1. V.V.M.S. Chandramouli, delivered an invited talk at "Workshop on Mathematical Billiards", University of Sydney, Australia, during 24-27 June 2019.

Department of Mechanical Engineering

1. Jaiveer Singh served as "Unnat Bharat Abhiyan (UBA)" mentor for District Churu, Rajasthan this year; and visited the Department of Metallurgical Engineering and Materials Science, IIT Bombay, and delivered a Seminar talk on 13 December 2019.
2. Ankur Gupta offered an Online course "Applied Ergonomics" run on SWAYAM platform by NPTEL in the session from January 2020 to May 2020; and organized an Institute level talk on "Engineering Toys for Medicine and Biology" by Prof. Ravi Saraf, Lowell E. & Betty Anderson Distinguished Professor at The University of Nebraska-Lincoln, USA on 14 October 2019.
3. Arun Kumar R., Visited ISRO Propulsion Research Center (IPRC), Mahendragiri, Tamilnadu, on 29th October 2019 for the project discussion on 'Ejector-Diffuser for High Altitude Testing Facility for Rocket Nozzles'

4. Shobhana Singh did the following:
   (i) Coordinator & Organizer- GIAN course on "Multiphysics modelling of energy systems and technologies".
   (ii) Reviewer-Technical Program Committee member for-CICN 2020 (12th International Conference on Computational Intelligence and Communication Networks)
      a) RES20 (The International Conference on Renewable Energy and Sustainability)
      b) CESA20 (International Conference on Clean Energy, Systems and Smart Applications)
   (iii) Delivered an invited talk on Convener-Convene session on "Sustainable Technologies" during first "Industry Day 2020".
   (iv) Presenter & Mentor- Presented the incubation idea under the programme "Support for Entrepreneurial and Managerial Development through Incubators" initiated by Ministry of Micro, Small & Medium Enterprises (MSME), Government of India.
   (v) Participated and presented poster on incubate idea, an MSME initiative, during DM 's visit at IIT Jodhpur.
5. Hardik Kothadia, delivered the following invited talks:
   (i) Session Chair, 25th National and 3rd International ISHMT-ASTFE Heat and Mass Transfer Conference, during 28-31 December 2019.
   (ii) An expert for project design review meeting, DRDL Jodhpur, on 26 November 2019, Project title: Development of PCM based thermal management technologies for high energy laser applications (PCM-TMS).
6. C. Venkatesan delivered an invited talk on "Helicopter dynamics and handling qualities" as a part of the Test Pilot training program 5-days lecture series at the Air Force Test Pilot School, ASTE, during December 2019.
7. Prodyut Ranjan Chakraborty, delivered the following invited talks:
   (i) "25th National and 3rd International ISHMT-ASTFE Heat and Mass Transfer Conference 2019", Indian Institute of Technology Roorkee, during 28-31 December 2019 (Session Chair)
   (ii) "XII International Conference on Computational Heat, Mass and Momentum Transfer" (ICCHMT 2019), Rome, Italy, Roma Tre University Rome, Sapienza University Rome, Tor Vergata University Rome, during 3rd to 6th September 2019 (Technical Paper presentation).

Department of Physics

1. Subhashish Banerjee served as:
   (i) Coordinator of Faculty Development Program (FDP) on Quantum Science and Technology from 19-30 August 2019, at IIT Jodhpur.
   (ii) Coordinator and Convenor of Conference on Quantum Information and Computation: QIC-2019, at IIT Jodhpur from 8-11 December 2019.
   (iii) Guest Editor of special volume Quantum Aspects of the Universe of the Journal Universe.
2. Shahab Ahmad served as:
   (i) Coordinator: UKIERI Seminar on "Hierarchical Structuring of Micro and Nanoparticles for Li-ion Battery Electrodes" by Prof. Michael De Volder (University of Cambridge, UK) at IIT Jodhpur on 24th Feb 2020.
   (ii) Coordinator: Lecture on "Science via Mirage" by Dr. Aditya Sadhanala (IISc Bangalore) at IIT Jodhpur on 24th February.
3. Prabhat K. Jaiswal delivered a lecture and demonstrated experimental setups during Physics Lab Visit of School Children of Rudiya Village, on 7 September 2019, under Unnat Bharat Abhiyaan (UBA), IITJ.
4. Ashutosh Kumar Alok delivered an invited lecture on "Space Science and Nuclear Science" in a workshop under Rashtriya Avishkar Abhiyan, MHRD at Lal Maidan, Jodhpur on 27th January 2020.

5. Ram Prakash did the following:
   (i) Coordinated an advance workshop on "Intellectual Property, Technology Transfer and Licensing" at IIT Jodhpur during 16-18 January 2020 with the financial support of Department of Science & Technology, Govt. of Rajasthan. There were around 70 registered participants attended the workshop.
   (ii) Coordinated a two-day entrepreneurship event INICIO'2019 during 16-17 November 2019 along with institute Ecell group under IITJ-IIC.
   (iii) Delivered a talk on "Technology Innovation and Startup Initiatives of IIT Jodhpur" in a Brain Storming Session with all Universities & Institutions of Rajasthan, which was organized by DST Rajasthan on 18 September 2019 under the Chairmanship of Secretary, S&T, Govt of Rajasthan.
   (iv) Coordinated an exhibition on marketable product of IITJ Faculties and Students and their demonstration during the launch of the IIT Jodhpur Innovation Complex on the occasion of the Institute Foundation Day on 2 August 2019.
6. Ambesh Dixit delivered a talk on "Interplay between defects and magnetism in 2D CdO monolayer" in Solid State Physics Symposium (DAE), IIT Jodhpur, 2019
7. S. R. Vadera organized KVPY Interviews during 05-07 February 2020, and Chaired a session at the 12th Asia Pacific Microscopy Conference (APMC) on 03 February 2020 at Hyderabad.

Conference Presentations

Department of Humanities & Social Science

1. Ankita Sharma presented a paper on "Personal wisdom development involves pain and suffering: Experimental validation". Asian Association of Social Psychology 2019 conference. Academia Sinica, Taipei, Taiwan, from 11-13 July 2019.
2. V. Hari Narayanan presented the following papers:
   (i) "Metaphors and Life" in the Second International Conference on Philosophy of Meaning in Life held at Waseda University, Tokyo, Japan, from 7-9 October 2019.
   (ii) "Krishnamurti's Secular Spirituality" in the Seminar on J Krishnamurti and the Problems of the World held at Vasant College for Women, Varanasi, from 6-8 February 2020.

3 Vidya Sarveswaran presented a paper on "The Forest as a Sacral space in Bhibutibhushan Bndyopadhyaya's Aranyak," National Conference on Myth, Orality and Culture in Indian Literary traditions, Benares Hindu University, during Nov.- Dec. 2019.

Awards & Recognitions

Department of Bioscience & Bioengineering

Faculty Members

1. Amit Mishra, received the following:
   (i) Excellent Research Award Young Faculty of Institute during 2020
   (ii) Prestigious Honor "Malviya Memorial Award" of BRSI (Biotech Research Society of India) during 2019.
   (iii) Fellow of "Royal Society of Biology, London" during 2019.
2. Neha Jain, Assistant Professor, received the following:
   (i) EMBO travel grant to attend EMBO workshop on Intrinsically Disordered Proteins: From molecules to systems during December 2019.
   (ii) ASM (American Society for Microbiology)-IUSSTF (Indo-US Science and Technology Forum) Visiting Research Professorship to conduct research at Temple University, Philadelphia, USA from June 2019 to July 2019.
   (iii) Early career research award (ECRA) by Science and Engineering Research Board (SERB) from 2019 to 2022.
   (iv) Invited as "Young Investigator Speaker" in Fluorescence and Raman Spectroscopy (FCS) workshop held at TIFR, Hyderabad, during December 2019.
3. Priyanka Singh, Assistant Professor, received the highly prestigious "Har Gobind Khorana-Innovative Young Biotechnologist Award for the year 2019" from the Department of Biotechnology (DBT), Government of India.
4. Raviraj Vankayala, Assistant Professor, received the following:
   (i) Invited as a colloquium speaker in the Department of Applied Chemistry, National Chiao Tung University, Hsinchu, Taiwan, and delivered a talk titled "Inorganic and Biomimetic Nanostructures for Theranostic Applications" on 03 January 2020.
   (ii) Invited as a colloquium speaker in the Department of Medicinal and Applied Chemistry, Kaohsiung Medical University, Kaohsiung, Taiwan, and delivered a talk titled "Engineering Inorganic and Biomimetic Nanostructures for Theranostic Applications" on 06 January 2020.
   (iii) Invited as a speaker in a two-day national webinar on Analytical and Diagnostic tools in Life Sciences organized by Andhra University and Andhra Pradesh Akademi of Sciences, Visakhapatnam and delivered a talk entitled "Engineering Inorganic and Biomimetic Nanostructures for Theranostic Applications" on 06 June 2020.
   (iv) Served as a Guest Editor in MDPI Bioengineering journal for a special issue entitled "Engineering Novel Multifunctional Nanostructures for Various Biomedical Applications".
5. Surajit Ghosh, received the following:
   (i) CDRI Award 2020 for Excellence in Drug Research in the chemical sciences category.
   (ii) Journal of American Chemical Society Young Investigators Virtual Issue during 2019.
6. Sushmita Jha, received the following:
   (i) Invited Talks as speaker: Indian Immunology Society Meeting, on 14th Nov 2019, BARC, Mumbai.
   (ii) International Conference Electron Microscopy & Allied Analytical Techniques conference, from 7-9 June 2019, HP University, Shimla.

Students

1. Sonal Jaiswal, Ph.D. Student in the research group of Dr. Priyanka Singh was among the top 20 participants selected to attend the training course Flourescence Microscopy-FluoMicro@ICGEB at the International Centre for Genetic Engineering and Biotechnology, New Delhi, from 2-4 October 2019.

Department of Chemistry

Faculty Members

1. Ananya Debnath has been appointed as Review Editor in the Editorial Board of Biophysics, (a specialty section within Frontiers in Physics, Frontiers in Physiology and Frontiers in Molecular Biosciences).

Students

1. Ajay Urgunde received award for best poster presentation at ICMAT during 2019, Singapore.
2. Gaurav Bahuguna and Mohit Verma, best poster presentation at Industry Day organized by IIT Jodhpur.

Department of Computer Science & Engineering

Faculty Members

1. Das, D., "Session Chair", Track 2: Enabling Technologies for Smart Cities, The IEEE 25th Asia-Pacific Conference on Communications (APCC) from Nov 6, 2019 - Nov 8, 2019, Ho Chi Minh City, Vietnam.
2. Kalra, S., IMPRINT Sponsored Project Award from SERB.
3. Singh, R. and Vatsa, M., Ethics in AI Award, Facebook.
4. Singh, R. received the following:
   (i) Associate Editor-in-Chief, Pattern Recognition.
   (ii) Associate Editor, Computer Vision and Image Understanding.
   (iii) Vice President of Publications, IEEE Biometrics Council.
   (iv) Program Co-Chair, IEEE International Joint Conference on Biometrics, Houston, USA, during September 2020.
5. Singla, V., Best Research Demo Award for Leave Application using Block chain Smart Contract, COMSNET 2019.
6. Vatsa, M., received the following:
   (i) General Co-Chair, IEEE International Joint Conference on Biometrics, Houston, USA, during September 2020.
   (ii) Program Committee Co-Chair, IEEE International Conference on Advanced Video and Signal based Surveillance, 2021.
   (iii) Associate Editor, Pattern Recognition.
   (iv) Area Editor, Journal of Information Fusion.
7. Vatsa, M. and Singh, R., Organizer, IEEE CVPR Workshop on Fair, Data Efficient and Trusted Computer Vision, USA, during 2020.

Department of Electrical Engineering

Faculty Members

1. Aashish Mathur, received the following:
   (i) Awarded Early Career Research Award during 2019 by Science and Engineering Research Board, DST, Govt. of India.
   (ii) Visiting Faculty at IIIT Kota for the 2nd Semester, 2018-19 for conducting a Fractal Elective course on Topics on Advanced Communication Systems for 8th Sem ECE students.
   (iii) Adjunct Faculty (Part-Time), BSTTM, IIT Delhi from Apr, 2019-2022 for working on the project "Building End to End 5G Test Bed" as a contributor.
   (iv) Awarded the Teaching Excellence Award in 2019 by Indian Institute of Technology Jodhpur in recognition of consistently superior performance in teaching.
2. Abdul Gafoor Shaik was awarded the Teaching Excellence Award during 2019 by Indian Institute of Technology Jodhpur in recognition of consistently superior performance in teaching.
3. Amit Bhardwaj appointed as a Technical Program Committee member of the EAI Intetain during 2020.
4. Anoop Jain, was an excellent reviewer for AIAA Journal of Guidance, Control, and Dynamics from October 1, 2018 - September 30, 2019.
5. Arani Ali Khan received the SERB early career research grant.
6. Harshit Agarwal received the following:
   (i) Appointed Technical member of the IEEE EDS Compact Modeling Committee.
   (ii) Chaired a session on RF Device Modeling, IEEE EDTM, Malaysia.
   (iii) Served as mentor for IEEE Young Professionals, IEEE VLSI Symposium, during 2020.
   (iv) Appeared in Golden Reviewer's list of IEEE TED and EDL journals for two consecutive years.
7. Mahesh Kumar received the following:
   (i) YSAP Mission Award 2019 by Global Young Academy.
   (ii) PHSS Foundation Young Scientist Award by Prof. H. S. Srivastava Foundation during 2019.
8. Rajendra Nagar received the following:
   (i) Awarded with the outstanding research award for best Ph.D. thesis research among all the recipients of the degree of Doctor of Philosophy, IIT Gandhinagar during July 2019.
   (ii) Awarded with the NCC 2019 Graduate Student Day Award for the best Ph.D. thesis work, NCC 2019, IISc Bangalore.
9. Rajlaxmi Chouhan received the following:
   (i) Awarded the Teaching Excellence Award during 2019 by IIT Jodhpur in recognition of consistently superior performance in teaching.

(ii) Received the Late Shri Pralhad P. Chhabria Award during 2019 for Best Woman Professional (Early Career) by Hope Foundation and Research Centre in association with IEEE India Council and IEEE Pune Section, in recognition of research and outreach contributions.

10. Saakshi Dhanekar received the following:

(i) Awarded "IEEE Young Professional Hall of Fame Award" by IEEE Young Professionals in Montreal in during Oct 2019.

(ii) Selected as IEEE Sensors Council Young Professional Committee Chair and Joint Secretary, IEEE Rajasthan Section, this year.

11. Soumava Mukherjee, Selected as Adjunct faculty (part time) in Bharti School of Telecommunication & management, IIT Delhi.

12. Journal paper authored by Adhikary M, Mukherjee S, Biswas A, Akhtar MJ, titled "Air filled substrate integrated waveguide cavity backed slot antenna" has been one of the top downloaded paper in between January 2018 and December 2019 in Microw Opt Technol Lett. 2018;1– 4.

13. Journal paper authored by S. Mukherjee and A. Biswas titled "Design of dual band and dual-polarised dual band SIW cavity backed bow-tie slot antennas" has been identified as most cited paper in IET Microwaves, Antennas & Propagation, vol. 10, no. 9, pp. 1002-1009, 6 18 2016.

14. Journal paper authored by Krishna, I.S. and S. Mukherjee titled "Design of Wideband Microstrip to SICL Transition for Millimeter-Wave Applications" is listed as Top 50 viewed papers in Jan., 2020 in IEEE Access.

Students

1. Idury Satya Krishna received the following:

(i) Ph.D. student of Dr. Soumava Mukherjee, has received prestigious European Microwave Conference Student Grant Award in EuMC 2019 to be held in Paris, France from 28 September - 4 October 2019.

(ii) Ph.D. student of Dr. Soumava Mukherjee, has received prestigious CSIR Foreign Travel Grant for presenting his research paper at APMC 2019.

(iii) Ph.D. student of Dr. Soumava Mukherjee, has received prestigious MTT-S MGA Student Sponsorship Initiative (Asia Pacific Microwave Conference 2019, Singapore) from Microwave Theory and Techniques Society (MTT-S IEEE).

2. Naman Baghel, Ph.D. student of Dr. Soumava Mukherjee, has received prestigious TENCON Travel Grant for presenting his research paper at TENCON during 2019.

3. Om Prakash Mahela, Ph.D. student of Abdul Gafoor Shaik, has been awarded CV Raman Gold Medal for best thesis submitted during 2019 by IIT Jodhpur.

Department of Humanities & Social Science

Faculty Members

1. Kaamya Sharma, Peter Taylor Fellowship for Teaching Assistantship, Kenyon Review Writer's Workshop (Literary Nonfiction), Kenyon College, Ohio, from June 16-22, 2019.

2. Prasenjeet Tribhuvan, Award of Fellowship at the Indian Institute of Advanced Studies, Shimla in during 2020 (currently undergoing)

Department of Mechanical Engineering

Faculty Members

1. Ankur Gupta received the following:

(i) Received "IEI Young Engineers Award 2019-20". (IEI: Institution of Engineers, India) in the Production Engineering Division on 31 May 2019.

2. Chandan Pandey, received the following:

(i) Editorial Board Member: Metals and Materials International.

(ii) Best paper, (Characterization of Microstructure of HAZs in As-Welded and Service Condition of P91 Pipe Weldments), Metals and Materials International Journal, during 2019.

(iii) Paper titled "Characterization of Microstructure of HAZs in As-Welded and Service Condition of P91 Pipe Weldments", adjudged as Best Paper during Springer International Awards during 2019.

3. Jaiveer Singh became National Advisory Board Member of "International Conference on Advances in Materials Processing and Manufacturing Application (iCADMA 2020)" sponsored by SPARC, MHRD India and organized by MNIT Jaipur.

4. Rahul Chhibber received Best Poster Award in Entrepreneurship Section, Industry Day 2020, IIT Jodhpur.

5. Shobhana Singh, received the following:

(i) DUO-India Professor Fellowship Award during 2020 by ASEM, South Korea, 2019.

(ii) Awarded with grant to organize a GIAN course at IIT Jodhpur by MHRD, India, during 2019.

Students

1. Shubhanshu Rai, M.Tech. Student, ME has awarded with an honorarium on selection of his project titled "Natural Convection in an Enclosure Heated From Bottom using OpenFOAM" for case studied under FOSSEE program by IIT Bombay.
2. Smita S., Parth P., Laxmikant D., and Hardik K., Best Poster Award at Industry Day 2020, IIT Jodhpur, during 2020, Testing of Emissivity of the Thermal Paints and Coatings, during January 2020.
3. Harsh Deswal, M.Tech. Student, has been selected for PMRF (Prime Minister Research Fellowship), during December 2019.

Department of Physics

Faculty Members

1. Ashutosh Kumar Alok, Fellowship from Theory Group, CERN, Geneva for a research visit in during 2019.
2. Satyajit Sahu received the following:

   (i) SPARC DUO award for collaborative research with the University of Manchester in during 2019.

   (ii) BRICS Young Researcher fellowship for attending the BRICS conclave in Russia in during 2020.

Students

1. Chandni Kumari, Best Poster Award for her work on RRAM in IEEE NMDC during 2019, Stockholm.
2. Piyali Biswas, Ph.D. student has won The Best Paper Award (Cash prize and a certificate) in International Conference on Optics & Electro-Optics (ICOL), on 19-22 October 2019, IRDE, Dehradun, India for the paper

   P. Biswas, and S. Ghosh, "Nonreciprocal light propagation in time varying medium".
3. Sibnath Dey, Ph.D. student won The Best Paper Award (Cash prize and a certificate) in the International Symposium on Photonics and Plasmonics (ISSP-2019) on September 23-24, 2019 at Central University of Rajasthan, India for the paper.

Collaborative Activities

Technology Innovation and Startup Centre (TISC)

IIT Jodhpur has set up a startup ecosystem, which essentially reflects freedom to encourage innovative ideas, R&D intensity, industry interaction, IP regime and protection, incentives for faculty/students to ideate/ innovate, institutional setup to handhold entrepreneurs, have startup policies, equities and investments, networks with other incubators, investors, angels and entrepreneurs. IIT Jodhpur Innovation Complex has been inaugurated on the occasion of the Institute Foundation Day on the 2nd August, 2019. As a part of the complex, IIT Jodhpur has setup the Technology Innovation and Startup Center (TISC) as a Section 8 company incorporated on the 3rd July 2019 under the companies Act, 2013. TISC focus is on the Deep Tech to promote startups/programs founded on a scientific discovery or meaningful engineering innovation to solve the big issues that really affect the world around us through transformative technologies. TISC aims to nucleate new age ventures around the focal theme AIoT, unique in the country. This next generation technology is expected to impact all sectors of economy. Deep tech domains of TISC interests include: New materials, especially materials intelligence, Artificial Intelligence, healthcare including Precision Medicine & Multi-omics, Cyber-security, Digital economy, Robotics, Advanced Communications, Quantum Computing, etc. Possible fields for Deep Tech applications include: Agriculture, Food (including processing, analytics and computing), Life sciences, Aerospace, Energy, Defence, etc. TISC nurtures incubation projects supported by the Ministry of MSME and Ministry of Electronics and Information Technology (MeitY), Government of India and has now embarked on establishing the BioNest Bioincubator besides administering a number of entrepreneurship related activities encompassing a multitude programs/stakeholders in the neighbourhood.

TISC infrastructure has been planned around a 21,000 sq. ft. at IIT Jodhpur that would provide office infrastructure to the incubatees with other business support amenities like videoconferencing facilities, meeting spaces and other utilities. The incubatees will have access to the laboratory facilities, faculty and managerial expertise, library & interns available at the institute. A strong industry linkage available with the institute will help incubatees in getting the domain specific dedicated mentorship and networking with potential business partners & customers. Apart from these, this incubation unit will provide trainings, connect with investors, intellectual property protection support and feedback/suggestions for their progress in terms of product development, testing and customer engagement.

TISC envisions an in-house pre-incubation program for encouraging at least 50 startup teams in nascent stage to arrive at proof-of-concept projects and incubate 25 startups in 5 years leading to development of expected 15 new products/technologies, filing of 10-12 patents and success in terms of creating employment to more than 250 people by these startups.

Activities of the Incubation Unit are categorized as:

A. Exclusive IIT Jodhpur entrepreneurship program;

B. Schoool of Management and Entrepreneurship; and

C. Round the year activities, like, Open Houses, Startup Fests, Business Plan Competitions, Ideathons, Sensitization Workshops/Seminars, and Focussed Educational Programmes, Annual Educational Seminar.

The following activities were done in TISC during the FY 2019-20:

1. Advance Workshop on Intellectual Property Technology Transfer and Licensing was jointly organized by the TISC, IIT Jodhpur, and Patent Information Centre (PIC), department of Science and Technology, Government of Rajasthan, in collaboration with Institute Innovation Council of IIT Jodhpur and Cell for IPR Promotion & Management (CIPAM), DPIIT, Government of India during 16-18 January 2020. The workshop had lectures and interactions with experts in the area of patenting, IPR landscape, technology transfer and related laws, etc.

2. A logo design competition was held during February 2020 for designing logos for TISC, Tech Park and Marudhara Foundation.

Jodhpur City Knowledge and Innovation Cluster (JCKIC)

The proposal to set up the Jodhpur City Knowledge and Innovation Cluster (JCKIC) has been sanctioned by the Office of Principal Scientific Adviser (PSA), Government of India with a cost of Rs. 949.70 lakhs. The initial duration of the project is three years. The Jodhpur City Knowledge and Innovation Cluster is one of the six such clusters being set up all over the country under the aegis of the Office of PSA, Government of India. The office of JCKIC will be located at IIT Jodhpur. The project will be executed jointly by various R&D Institutes, Academic Institutes, Government Agencies and Industry of the city of Jodhpur, with IIT Jodhpur as the coordinating agency.

The main objective of the project JCKIC is to create a mechanism for coordinated exploitation of knowledge

base, scientific expertise and resources available among a large pool of academic and R&D Institutions, government agencies and industry in Jodhpur to enable innovation for accelerated growth of the local industry, to generate new initiatives in entrepreneurship and develop solutions related to critical problems faced by the city of Jodhpur and areas around. The main focus of the cluster will be to provide a necessary platform to create synergy between all the stakeholders and make use of the available knowledge as well as to develop advanced technologies, creative skills, state of the art infrastructure and innovative environment in an organized manner, to ensure sustainable and systematic development of city of Jodhpur. The centre will work towards effective intervention of technology innovations for the society at large and industry and governance in particular. Further, the cluster will provide a platform to the young entrepreneurs to work on new and innovative ideas.

The initial focus of the JCKIC will be on the following:

1. To provide innovation-driven impetus to Healthcare and Medical Technology industry in the city.
2. To design and implement digital technologies for value addition to local handicrafts and handlooms.
3. To develop and implement a prototype waste water management system dealing with pollution from the textile industry.
4. To roll out an AI driven initiative for increasing efficiency of traffic and crime management system of the city of Jodhpur.
5. To design and develop an integrated real time data management system for the city of Jodhpur, on top of forthcoming 5G network.

Through interactions with various stakeholders, emphasis will be on the translation of technology innovations into usable products in the areas of Medical Technologies, Craft and Governance. Proposals for Common Facilities in the identified areas will be formulated for funding by appropriate funding agencies including various line ministries of Government of India and Government of Rajasthan. Large pool of facilities and expertise owned by the host agencies of the cluster, including academia, R&D, industries and government will also be exploited to the best possible extent by JCKIC.

The overall guidance to JCKIC will be provided by an Advisory Committee. The committee consists of a galaxy of renowned experts from Academia, Industry, R&D and Government from different parts of the Country. Senior functionaries of the participating institutes of the cluster will also be part of the Cluster Advisory Committee.

Events

Celebration of National Festivals & Observance of Days of National Importance

International Day of Yoga, 21 June 2019

International Yoga Day was organised in the Institute at 6.30 am on 21 June 2019. Professor S. R. Vadera gave opening remarks and yoga exercises were performed by the participants as supervised by qualified instructors.

73rd Independence Day, 15 August 2019

The 73rd Independence Day of the nation was celebrated with patriotic fervour on 15 August 2019. The students of IIT Jodhpur, Kendriya Vidyalaya (KV) – IIT Jodhpur, and the children of employees performed various cultural programs on this occasion.

Innovation Day, 15 October 2019

MoE's (MHRD) Innovation Council has announced the birth anniversary of Bharat Ratna Dr. APJ Abdul Kalam (15 October) to be celebrated as Innovation Day. The Innovation Activity Team of Institution's Innovation Council (IIC 2.0) IIT Jodhpur organized Innovation Day Celebrations on 12 October 2019, in association with Student Science and Technology Society (Students Gymkhana) and IEEE Antenna and Propagation Society Student Branch Chapter. The activities commenced with a Technical Talk on 'Microwave and Millimetre waves: Challenges and Applications' by Dr. Arani Ali Khan, Department of Electrical Engineering. An on-spot quiz contest was held after the talk and winners were given prizes. This was followed by "Introduction to IIC" by Prof. S. R. Vadera (President, IIC 2.0) and Dr. Ram Prakash (Start-up Coordinator, IIC 2.0) at IIT Jodhpur. A short video displaying innovative practices and projects in the Institute was also showcased. This was followed by presentations made by Institute's finalist teams in the Microsoft Code.Fun.Do during 2018-19. The Ideation Contest brought out interesting innovative ideas from both Undergraduate and Postgraduate students. Top three teams were given prizes and certificates. The event concluded with a Vote of Thanks by Dr. Rajlaxmi Chouhan, the Innovation Activity Coordinator for IIC 2.0.

National Unity Day/ Rashtriya Ekta Diwas, 31 October 2019

As per the directives of MHRD, IIT Jodhpur celebrated Rashtriya Ekta Diwas to commemorate the birth anniversary of Sardar Vallabhbhai Patel, popularly known as the Iron Man of India. A Run for Unity was inaugurated by Prof. Bhagwati P. Kashyap, Head Metallurgical & Materials Engineering Department in presence of Prof. Sampat Raj Vadera, Head Physics Department, Dr. Sudipto Mukhopadhyay, Faculty-In-Charge Logistics, P G Basak, Advisor (Admn.) & Offg. Registrar and Shakti Ranjan Patra, Assistant Registrar. Around 40 students participated in the marathon which was along the perimeter of IIT Jodhpur campus, starting from and ending at Lecture Hall Building and included 4 checkpoints along the way. Refreshments were provided to the students for their efforts.

National Education Day, 11 November 2019

On 11 November 2019, to mark the birth anniversary of Maulana Abul Kalam Azad, great freedom fighter, eminent educationist and the first Union Minister of Education, IIT Jodhpur organized National Education Day. The students Gymkhana organised essay writing, elocutions competitions and slogan competition on the importance of education and nation's commitment to all aspects of education among all students. An half day workshop was organised Chaired by Prof. (Dr.) Sampat Raj Vadera, Head Physics Department who urged that there is a clear need to adopt a pragmatic tradition and synthesize our inherent traditional strength with modern day technological innovations in parallel to fulfilling demands of higher education in the country and addressed about various issues related to higher education in India those are to be reflected upon, in august presence of Prof. (Dr.) S.C Bose, Advisor (Academics) who remembered Maulana ji and his social transformation advocacy, national building and particularly its indelible imprints in the field of education, Prof. (Dr.) Bhagwati P. Kashyap, Head Metallurgical & Materials Engineering Department, Prof. (Dr.) Suril Shah, Associate Dean (Academics-UG Programs). The felicitation of dignitaries, faculty and students was done and programme ended with a vote of thanks delivered by Shakti Ranjan Patra, Assistant Registrar (Academics).

Constitution Day, 26 November 2019

Constitution Day was celebrated at IIT Jodhpur on 26 November 2019. The event began with the reading of the Preamble to the Constitution by Prof. S. R. Vadera. Commemoration function of Samvidhan Divas addressed by Hon'ble President of India, Hon'ble Vice-President of India and Hon'ble Prime Minister of India from the Parliament House was live telecasted during the event. The evening of the day began with oath taking ceremony followed by Dr. Vikas Balia delivering a guest lecture on "Discovering Democracy". Prizes were distributed to winners of quiz and essay writing competitions.

71st Republic Day Celebrations at IIT Jodhpur, 26 January 2020

IIT Jodhpur celebrated the 71st Republic Day with zeal and enthusiasm. The event started with unfurling of the national flag by the Director, Prof. Santanu Chaudhury, followed by his address to the IITJ fraternity. The celebrations included narrations, music performances, and Nukkad Natak by the students of IIT Jodhpur, along with dance and drama performances by the students

of Kendriya Vidyalaya (KV) IIT Jodhpur. The children of IITJ campus also gave a music and dance performance. The event was attended by members of faculty, staff, families, and students of the Institute, along with students and teachers of KV IIT Jodhpur. Drawing, poetry and singing competitions was organized by the Office of Students for children in three age categories before the event, and prizes of these competitions were given away during the celebrations.

International Mother Language Day / Matribhasha Diwas 2020, 21 February 2020

IIT Jodhpur celebrated International Mother Language Day (अन्तर्राष्ट्रीय मातृभाषा दिवस) on 21 February 2020 with colorful cultural performances by the students, staff, and faculty members. The event began with an introduction to the historical significance of the celebration and the United Nation's resolution on protection and preservation of mother languages across the world. The event witnessed soulful recitations in Hindi (by students Dipendrasingh Kain, Navin Kumar, Rahul Singh), Rajasthani (by Mr. Naresh Chouhan), and Bangla (by the Director, Prof. Santanu Chaudhury). Diversity in languages of the country was celebrated through songs in Telegu (by Dr. Kshema Prakash and Ms. Saran Prakash), Gujarati (by Dhirajkumar Patanvadiya), and Bangla (by Rittwika Pan, Shubham Agrawal, Dr. Prodyut Chakraborty and Dr. Prasenjit Tribhuvan). A classical Kathak dance on a multilingual song was performed by Manasi Khobragade, Sristi Jain, and Anupama Patel. The event concluded with the multilingual song 'Mile Sur Mera Tumhara' by Kalyani M Sawai, Kartik Aggarwal, Nikhil Mitawa, Devanshi Parmar (B.Tech., I Year), Dr. Kshema Prakash, and Dr. Rajlaxmi Chouhan.

National Science Day 2020, 28 February 2020

National Science Day is celebrated every year on 28th February to commemorate the announcement of the discovery of the 'Raman Effect' by Sir C.V. Raman for which he was awarded the Nobel Prize in 1930. IIT Jodhpur celebrated the day through various activities during 28 February – 01 March 2020. A Stargazing Night was organized by the Astronomy Club of the Science and Technology Society and IIC on 28 February. This year the theme for National Science Day was "Women in Science." As a part of the event, the Institute organized an invited talk on '"Chemistry for Healthy, Wealthy and Happy Lifestyle" by Prof. Sunita Kumbhat, FRSC, Dept. of Chemistry, JNVU Jodhpur on 01 March. This was followed by a panel discussion on "What's exciting in Science & Career opportunities in Science", with members from various science disciplines on the panel. Along with Prof. Kumbhat, the panelists included Dr Sushmita Jha (Bioscience & Bioengineering), Dr. Reetanjali Moharana (Physics), Dr. Meenu Chhabra (Bioscience & Bioengineering), Dr. Atul Kumar (Chemistry), and was moderated by Dr. Saakshi Dhanekar (Electrical Engineering). The panel discussed emerging areas of Quantum Information Processing, Genetic Engineering, Neuroscience, High-energy Physics, etc. The event concluded with the Director's address followed by a Vote of Thanks. The event was attended by science students from across Jodhpur.

International Women's Day 2020, 8 March 2020

IIT Jodhpur organized the Women's Day Celebrations on 09 March. The event started with a presentation on women's representation in society over the decades, UN's Sustainable Development Goal on Gender Equality, contribution of Indian women in STEM fields, and a showcase of gender diversity at IIT Jodhpur. This was followed by a spirited panel discussion on gender equality and equity, underrepresentation of women in STEM fields, role of professional groups and memberships, networking, participation in competitions, hackathons for engineering students, and the role of family in career. The panelists included Dr. Lipika Dey, Dr. Saakshi Dhanekar (Electrical Engineering), Dr. Kshema Prakash (Deputy Librarian), Dr. Farhat Naz (Humanities and Social Sciences), Dr. Neha Jain (Bioscience and Bioengineering), Niveditta (MTech PhD Dual-Degree Student, First-year, CSE), Yasmeena Akhter (First-year PhD student, CSE), and Sabyasachi Pradhan (BTech III year, CSE). The panel was moderated by Dr. Rajlaxmi Chouhan (Electrical Engineering). The event also witnessed cultural activities including a soulful recitation by the students. The Quiz Club of the Student Cultural and Literary Society in association with the IEEE WIE Student Branch Affinity Group of IIT Jodhpur, organized a Women in STEM and Leadership Awareness Quiz. The program witnessed an inspiring address by the Director, Prof. Santanu Chaudhury, and concluded with a Vote of Thanks by Prof. Kamaljit Rangra, Chairman, Committee for Celebration of Commemorative Days (CCCD).

Institute Events

Tech Expo 2019, 11 April 2019

IIT Jodhpur organized its first technical exhibition, Tech Expo 2019, on 11 April 2019. The exhibition showcased exciting technology projects and demonstrations conducted by the students of IIT Jodhpur as a part of its Student Science and Technology Society for social and industrial impact such as healthcare, cyber security, home automation, agriculture, and automobile industries.

The star attractions among the projects included IIT Jodhpur's two-wheeler entry to the Human-powered Vehicle Challenge (HPVC 2019), a Parkinson's Tremor Management device (that won Gold Medal at Inter-IIT TechMeet 2018), self-balancing robot, 3D printer, RC Engine Car, Arduino-based Quadcopter, wearable gaming console, TV Audience Measurement System, LED Cube, Educational DC++, Disaster Chain, RC Plane (of balsa wood), Automation and Home Security system, Smart-city Enabler (winner of Tata Crucible Hackathon Challenge 2019), Secure-IT, Real-time News Notification System, Wheel Mecanum Drive Platform, Jenson-mechanism based Spider Robot, and Buried Clay Pipe Irrigation for Arid regions.

Institute Foundation Day & Launch of IIT Jodhpur Innovation Complex, 2 August 2019

The Institute Foundation Day Ceremony was held on 2 August 2019 at 10.30 am. The ceremony was graced by Dr. Shekhar C. Mande, Director General, Council for Scientific and Industrial Research, and Secretary, Department of Scientific & Industrial Research, Government of India. Dr. R. Chidambaram, Chairman, Board of Governors, IIT Jodhpur was also present for the ceremony. Ahead of the ceremony, tree plantation was done by the dignitaries.

Dr. Shekhar Mande delivered the Foundation Day Lecture in which he spoke about creating jobs for 1 billion people by the year 2028 and remain relevant, suggested some ideas for future and also elucidated the roadmap for Science & Technology in India

On this occasion, a Memorandum of Understanding between Indian Institute of Technology Jodhpur and the Council for Scientific & Industrial Research was signed by the heads of the respective organizations. This MoU is based on the principle of reciprocity and expression of interest for collaboration among both Institutions in Technology Development & Translation, Exchange of academic information and materials, Human Resource Development, Infrastructure sharing, with the belief that the research and educational expansion at both institutions will be enhanced and that mutual understanding between their respective Faculty and Students would promote and contribute towards development of Science & Technology in the Country.

On the occasion of the Decennial Year of the establishment of the Institute, Awards in Teaching Excellence were given to Faculty Members of the Institute, namely, Dr. Abdul Gafoor Shaik, Associate Professor, Department of Electrical Engineering, Dr. Kaushalkumar A. Desai, Associate Professor, Department of Mechanical Engineering, Dr. Rajlaxmi Chouhan, Assistant Professor, Department of Electrical Engineering, Dr. Aashish Mathur, Assistant Professor, Department of Electrical Engineering.

It was followed by the launch of IIT Jodhpur Innovation Complex i.e., the Technology Innovation and Startup Centre (TISC), by Dr. Arabinda Mitra, Scientific Secretary, and Principal Scientific Advisor to the Government of India. A Panel Discussion on Innovation and Entrepreneurship in Engineering Education by IIT Jodhpur faculty and students, and address by Dr. Arabinda Mitra and Chairman BoG IIT Jodhpur took place soon after.

5th Convocation, 17 December 2019

The 5th Convocation ceremony of the Institute was held on 17 December 2019. Chief Guest for the ceremony was Prof. S. C. Dutta Roy, INSA Honorary Scientist, Formerly Professor and Head, Department of Electrical Engineering, IIT Delhi. The ceremony was presided over by Dr. R. Chidambaram, Chairman, Board of Governors, IIT Jodhpur. Prof. Santanu Chaudhury, Director, IIT Jodhpur delivered the welcome address and presented the Institute Report. Degrees were awarded to the graduands of the Institute followed by oath taking by the graduates and presentation of prizes. Convocation address was delivered by the Chief Guest Prof. S. C. Dutta Roy, followed by Chairman's address by Dr. R. Chidambaram.

Industry Day, 24 January 2020

With a plan to engage policymakers, scientists, industry experts, and entrepreneurs in meaningful discussions and formulate a way forward for stronger industry-academia linkages, IIT Jodhpur organized Industry Day on 24 January 2020 with the following objectives.

1. Provide an avenue for potential collaboration opportunities between Industry and IIT Jodhpur
2. Create awareness about different research projects and resources of industry interests being undertaken by IIT Jodhpur
3. Create a platform to discuss the technological challenges industries are facing
4. Initiation of long-term relationships with industries

The themes for this event were Artificial Intelligence and Data Science, Industry 4.0, Smart Healthcare, Sustainable Technologies, and Entrepreneurship. There were eminent speakers who shared their experience, knowledge and insights on the occasion, such as:

- Dr. Shubhashis Sengupta, the Managing Director and Fellow of Accenture Technology Labs and the Head of AI R&D at Accenture Technology Labs, Bangalore.
- Dr. R. R. Sonde, Executive Vice President (Research, Technology & Innovation Centre) & Member of Board of Executive Council, Thermax Ltd.
- Dr. Manish Gupta, Director, Google Research India
- Dr. Aloknath De, CTO, Samsung India
- Dr. Debashish Bhattacharjee, Vice President, Tata Steel

The Institute signed MoUs with Oil India, Umalaxmi Organics Pvt. Ltd., Envirotech, and S S Innovations, on this occasion.

Facilities

Our Campus

Sprawling over 852 acres in three Pockets of Land Located on NH-62, Jodhpur-Nagaur Highway, 25 Kms away from the heart of Jodhpur city. IIT Jodhpur moved to its Permanent Campus during May-June 2017. The Campus was awarded a 5-star rating by the Green Rating for integrated Habitat Assessment (GRIHA) council for its scrupulous planning. The ecological, cultural & social values associated with this site is protected by taking inspiration from the vernacular building layouts, design elements & treatments for the Campus Landscape & architecture. The key elements of the vision for the IIT Jodhpur Campus includes:

- Sustainability & carbon Neutrality: Creating a smart, Intelligent Eco-Campus;
- Campus as "Living Laboratory": Demonstrating futuristic Technologies;
- Respect for the Jodhpur's desert ecology & Local architectural heritage;
- Quality living & learning Environment based on cross-disciplinary interactions; and
- Creation of a unique identity for the prestigious IITs.

The planning of the Campus aims to reach Net-zero Energy, Water & Waste, making the Campus self-sustainable. The other salient features of the Permanent Campus are:

(1) Walking campus, which is pedestrian oriented and bicycle dominant;

(2) Learning facilitated anywhere, anytime with wireless ICT backbone (including Multi-media enabled learning spaces with flexible, shared public spaces);

(3) Thermally comfortable smart buildings with GRIHA 4/5 star compliant buildings and GRIHA LD benchmark campus (including dense desert settlement morphology, low height buildings (up to a maximum of 3 storeys) built with low embodied energy materials, and improved local and traditional methods);

(4) Plantation with native species, soil stabilization, protection from dusty wind to arrest erosion, desertification, and building-up soil moisture over time;

(5) Rain water harvesting, and water reduction and sewage recycling, together greening the site over time; and

(6) Segregated wastes and customized recycling.

Many of the Faculty Members are residing on campus. Initially, there were 60 flats in the Park Avenue residential colony; in the Second Phase of Campus Development, 72 more flats have been constructed. Also, 3 new hostel buildings have been constructed. The salient feature of these hostels is Single AC Room accommodation in all buildings. A dedicated dining hall building caters to the needs of students and other residents. It has a mess and a canteen that serve hygienic and nutritious food. Essential services and amenities have been established to facilitate residents in their day-to-day needs. A Primary Health Center (PHC) runs in the residential area. In this financial year the PHC is managed by M/s. Goyal Hospital & Research Centre, Jodhpur, on contract. Its activities are supervised by the Medical Users' Services Committee in consultation with the Medical Officer of IIT Jodhpur. Basic services (like the groceries, dining and food court, bank, stationery, laundry, beauty parlour and salon services) are operational in the Community Center towards southern side of the Campus. A Kendriya Vidyalaya is functional in the campus, running Classes 1 to 10. It is housed in the First Building of IIT Jodhpur. There is a dedicated bus service for commuting from the Campus to and from the city of Jodhpur. The Staff Members have relocated to the Staff Quarters on campus during February 2019.

The photographs in the pages to follow give a glimpse of the campus of IIT Jodhpur.

A view of the Main Building of IIT Jodhpur

Library Building: The Learning Hub

A view of Park Avenue: Faculty & Officers H

Dining Hall

ISO Certified Primary Health Center

ousing

Blue 1: Boys Hostel, IIT Jodhpur

Shopping Center in the Community Center, Jaisalmer Club

Facilities on Campus

The following are some facilities that are available in Permanent Campus of IIT Jodhpur:

(a) ATM & Bank: The State Bank of India and the Canara Bank, IIT Jodhpur Branch and their ATMs are housed in the Community Centre Building, Lecture Hall Building & Main Administration Building enabling the entire IIT Jodhpur fraternity ease of transactions.

(b) Dining Hall: The Dining Hall Building has a Mess and a Restaurant that cater to the needs of students and employees. They provide hygienic food, fresh juices and various other snacks. The mess offers good quality food, regularly monitored by the Wardens for hygiene and nutritional values, and provided at affordable cost.

(c) Gymnasium: All students hostels have well-equipped gymnasium for students.

(d) Entertainment Room: Every hostel consists of recreation facilities (like TV Rooms, where students can enjoy matches and watch movies) along with indoor games (like table tennis and carroms).

(e) Laundry Service: Students and residents are facilitated with a dedicated laundry service on campus.

(f) Shopping Center: Shops catering to the various primary needs of students and residents, like, grocery, stationery, grooming parlour, milk parlour, are housed in the Community Center Building.

(g) Transport Services: The Institute has a bus service running between the Permanent Campus and Jodhpur City at regular intervals, exclusively for the Students of the Institute.

(h) Medical Services: The Primary Health Center operated by M/s. Goyal Hospital & Research Center Pvt. Ltd., Jodhpur, on contract, provides routine health services to students and residents of the Campus. Besides this fully functional, round-the-clock, Primary Health Center in the campus, IIT Jodhpur avails services from the All India Institute of Medical Sciences, and the associated Hospitals of the S. N. Medical College and some specialized hospitals. The Institute has agreements with a few prominent hospitals for priority treatment to its employees and students. These include: Goyal Hospital and Research Center, Medi Pulse Hospital, and Vasan Eye Care Hospital. Also, the Institute has constituted a Medical Board consisting of Senior Doctors from the Medical College and the AIIMS; advice is taken for enhancement of medical services of the Health Centers and in critical medical cases. IIT Jodhpur has empanelled two hospitals in Jaipur. These two hospitals are accredited by National Accreditation Board for Hospitals & Healthcare, and patients can be referred to these hospitals as per the need of the treatment.

(i) Food Caravan: To cater to the needs of the students, Food Caravans are set up inside the campus.

For its copybook-style Master Plan, the Master Plan of IIT Jodhpur's Permanent Campus has been awarded 5 Star Rating by the Green Rating for Integrated Habitat Assessment (GRIHA) Council under GRIHA LD V1 category on 11 December 2018. The campus design of IIT Jodhpur visualizes all parts of all zones as interdependent, integral network, like the metabolism of a living organism, integrating social, economic and environmental sustainability to become a near-zero emission campus. Unlike a campus where buildings are spread out, increasing infrastructure and water consumption and creating heat islands, this campus uses a series of compact urban clusters typical of desert settlements. The campus is designed to be a flexible plug and play system by using a series of service tunnels, trenches and serviceable shafts that allow easy maintenance and upgrading of all wired and piped services without breaking open a wall, slab or road.

Academic & Research Facilities

The Permanent Campus of IIT Jodhpur spreads across 852 acres of land located ~24 km away from the center of the city of Jodhpur on National Highway 62 towards Nagaur, N-NE from the center of Jodhpur. It has 3 parcels of land. Presently constructions exist in Pockets A and B. The First Phase of Construction is complete with the buildings following buildings that are being used for its academic, research and administrative activities are:

1. Main Building, housing all the administrative offices of the Institute;
2. The Learning Hub, housing the Library of the Institute, and accommodating the Computer Center;
3. Lecture Hall Building with 8 class rooms of 60 seating capacity, 02 class room of 120 seating capacity and a 325-seater and 650-seater classroom each. All the classrooms are air conditioned, equipped with modern learning facilities like the Internet and audio-visual facilities;
4. The Basic Laboratories are established in one building;
5. Department of Computer Science & Engineering (CSE) Building houses the Departments of CSE, Mathematics, and Humanities & Social Sciences. Also, the laboratories of Computer Science & Engineering are established in this building;
6. Departments of Chemistry and Bioscience & Bioengineering are housed in the building of Department of Chemistry;
7. Departments of Electrical Engineering and Physics share the space in the building of Department of Electrical Engineering;
8. Department of Mechanical Engineering also houses the newly established Department of Metallurgical & Materials Engineering and Department of Civil and Infrastructure Engineering;
9. Administrative approval has been received to establish Duchenne Muscular Dystrophy (DMD) Centre established in Primary Health Centre building; and
10. Kendriya Vidyalaya runs in the First Building of IIT Jodhpur in Pocket B.

There are various other buildings which are under construction and are likely to be completed soon. These building are:

(1) Department of Physics;

(2) Department of Metallurgical & Materials Engineering;

(3) Department of Bioscience & Bioengineering;

(4) Department of Chemical Engineering;

(5) Central Instrumentation facility Building.

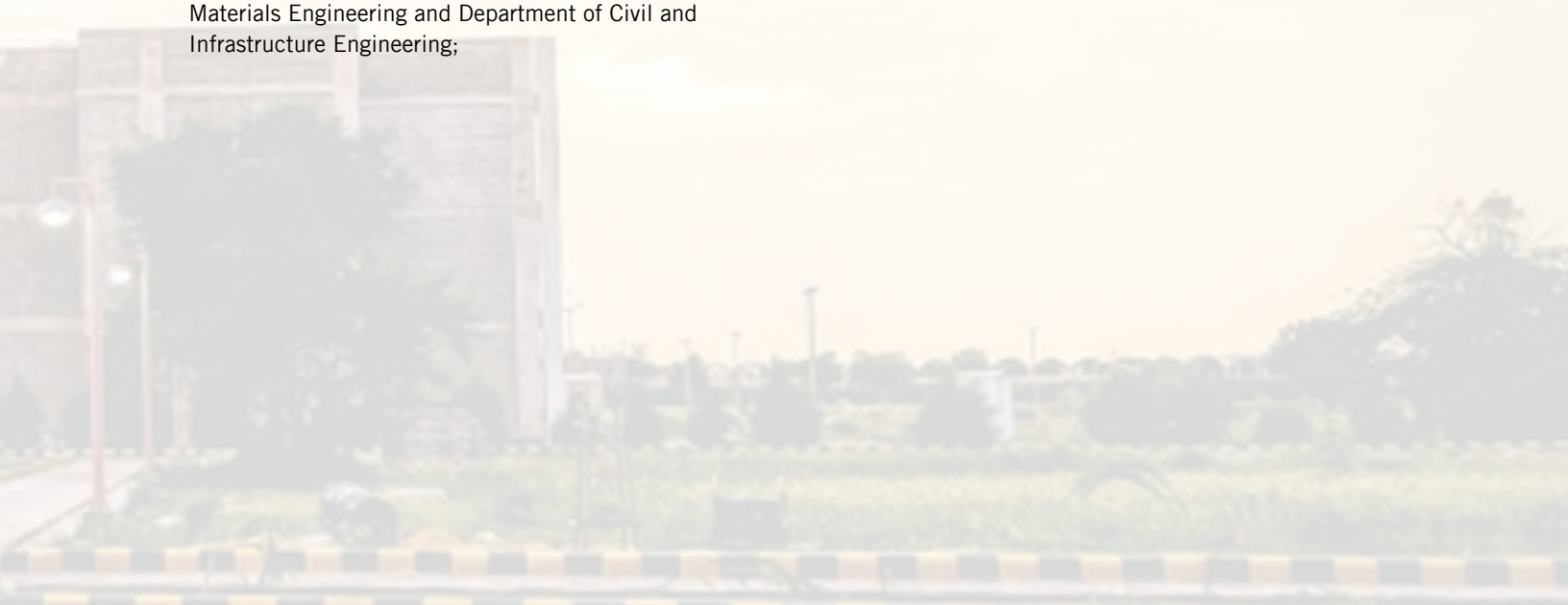
(6) U.G. Workshop Building;

(7) Innovation & Incubation Centre;

(8) Semi-Permanent Building for Animal House, and School of Management & Entrepreneurship;

(9) Laboratories for the Departments of Civil & Infrastructure Engineering, Chemical Engineering, Research Labs and Gymkhana.

The photographs in the following pages provide a glimpse of the Permanent Campus of IIT Jodhpur.



An aerial view of the IIT Jodhpur campus

An aerial view of the Main Building of IIT Jodhpur

Type C: Staff Housing

Type B: Faculty and Officers Housing

Spread of IIT Jodhpur Campus

Student Hostels

Center for Advanced Scientific Equipment (CASE)

Center for Advanced Scientific Equipment (CASE) has been established in the year of 2018. The main objective of CASE is to provide a state-of-the-art instrumentation facility in the multidisciplinary field of research to the faculties and students of IIT Jodhpur as well as personnel from other external research organizations from all over India. At present a total number of 93 high end instruments are under CASE facility. The space allotted for CASE facility (Room No. 111 & 112, Ground Floor, Chemistry Building) houses 22 equipment including various sophisticated equipment such as 500 MHz NMR, Single Crystal XRD, Powder XRD, AFM, SEM, PPMS Dynacool, SQUID, Surface area analyzers, DSC, TGA etc. Rest of the equipment under CASE facility are distributed over other departments of the Institute.


NMR Spectrometer (500 MHz)


UV-VIS spectrometers


FTIR

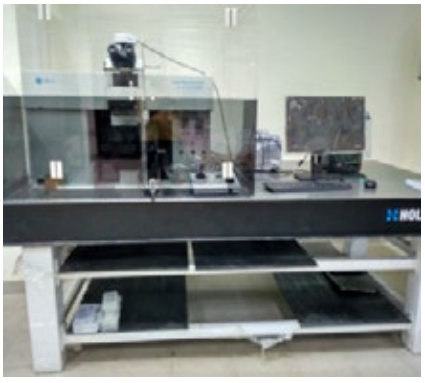

Fluorescence spectrometer


Surface area analyzer


Fuel cell


PPMS DynaCool


SQUID


Raman spectrometer

http://iitj.ac.in/research/index.php?id=research_facilities

Computer Center

The Institute has a modern Computer Center, presently running on a gigabit LAN with 1Gbps internet bandwidth. It is the nucleus of all computing activities for Students, Staff Members and Faculty Members. Several terminals running on Windows and GNU/ Linux operating systems across the campus provide access to several licensed software, like MatLab, Mathematica, Cadence, Mentor Graphic, Ansys, PSCAD and Solidworks. A 802.11/b/g/n Wi-Fi service is enabled in the academic and residential areas. Also, the Computer Centre hosts a High-Performance Computing cluster for scientific research.

Resources

The Institute has five key resources at the Computer Center, namely, the Linux Operating System, SVN Server, GIT Server, OwnCloud and various licensed application software that are used for academic and research purpose. At present there are two labs one with 90 terminals and another with 80 terminals.

Facilities

The Computer Center facilitates networking, computing, Internet access, LDAP and Active Directory ID to all faculties, staff members and students. The institute also extend these facilities through VPN for accessing them from outside the campus.

High Performance Computing

Highly equipped laboratory facilities

Software and Hardware Infrastructure

The Computer Center has the following software and hardware infrastructure to provide several facilities and services inside the campus.

Hardware

- HPC with 42 CPU Compute Nodes and 2 GPU Compute Nodes
- NAS Storage with 250 TB usable space
- SAN Storage with 30 TB usable space
- Cisco Webex Room 70 Dual, Webex Room 55 Single and Webex Board 55: 1 each

Software Licenses

- Red Hat Virtualization: 10 Licenses
- RHEL for HPC: 56 Licenses
- Windows Server 2012, 2016, 2019: 5 Licenses
- Microsoft Windows 10 Professional: 250 Licenses
- Microsoft Office 2016, 2019: 250 Licenses
- Microsoft SQL Server: 1 License
- Microsoft Project Suite: 10 Licenses
- MATLAB Campus License: Unlimited
- WebEx Meeting License: 100

Services

The Institute offers following services through its Computer Center:

- FTP and Web Hosting
- EduRoam Connectivity
- News Group
- IP telephone facility
- Biometric Attendance System for students

Library

The Learning Hub, i.e., the library supports teaching and research activities of the Institute by facilitating acquisition, organization and dissemination of knowledge resources, and also by providing library & information services to IIT Jodhpur community. The Learning Hub of the Institute is situated prominently at the entrance of the academic area of the Institute, stands as the tallest structure on the campus scaling over 15m from the ground; keeps time for the entire campus with a 4-way clock at the clock tower, only the third in the city of Jodhpur. It functions under the guidance of Library Committee, which has representatives from all Departments, and Student Representatives.

Collection

The Library has a rich and growing collection of 14,000 volumes of books approximately, which include textbooks, and books of general and reference nature. A wide range of scholarly journals and databases are also subscribed from various sources for the academic and research purposes of the Institute.

Services & Facilities

The following services and facilities are being provided by the Library to its registered users:

1. Member & Circulation Services,
2. Orientation & User Education,
3. Borrowing Facility,
4. Reference & Information Service,
5. Course Reserves,
6. Current Awareness Service,
7. Inter Library Loan & Document Supply, and
8. Digital Library Facility & Services.

The library services are automated through RFID technology using smart library solution for an effective management of the library and providing enhanced services like, self-check-out, self-check-in (book drop), security of materials, inventory management and finding misplaced items, stock verification, visitor counter, Smart Card issuance, etc.

Digital resources are accessible through the Library website, which is a comprehensive site maintained by Library. These include the Library subscribed resources, online catalogue, lists of useful resources accessible in the open domain like the open access journals, books, repositories, video lectures, open courseware. These resources are continuously updated.

Also, Library maintains a portal for hosting bibliographic listing of the Faculty Publications. Additionally, a course guide portal has also been developed and maintained by Library, wherein, resources i.e., books available in Library, subscribed journals, resources accessible in open domain are listed and linked, course-wise. This platform is very useful for the students in finding topical and course-wise resources. Library also provides remote access to the subscribed scholarly resources and anti-plagiarism checking.

The Learning Hub, Library Building in Permanent Campus, IIT Jodhpur

Stacks & General Section

RFID Gate & Drop-Box

The vital statistics of Library for FY 2019-20, are as follow:

Sl. No.	Description	Statistics
1.	**Books added**	Total 1039
	a. Number of titles added	252
	b. Number of volumes added	1039
2.	**Number of Scholarly Resources subscribed (For CY 2019)**	Total 18
	a. Fulltext resources	12
	b. Research databases	5
3.	**Document Supply & Inter Library Loan service requested fulfilled**	Total 124
	a. Document supply of articles & research papers	158
	b. Books arranged on Inter Library Loans	1
4.	**Circulation Transactions**	Total 34,764
	a. Number of book check-outs	16,630
	b. Number of book check-ins	16,558
	c. Number of book renewals	1,566
	d. Number of book recalls	10

Details of Journal Resources

Library has subscriptions to the following journal resources.

1. Association of Computing Machinery Digital Library,
2. American Chemical Society Journals,
3. American Institute of Physics Journals
4. American Physical Society Journals,
5. American Society for Mechanical Engineers Digital Library,
6. Elsevier Science Journals
7. IEL (IEEE) Online Digital Library,
8. Institute for Studies in Industrial Development (ISID) Database,
9. JStor Archives,
10. MathSciNet,
11. Nature Journal,
12. Oxford University Press Journals,
13. SciFinder Scholar,
14. Scopus,
15. Society of Industrial & Applied Mathematics Journals (SIAM),
16. Springer Journals, and
17. Web of Science.

Also, the Library is a core member of the eShodhSindhu: Consortium for Higher Education Electronic Resources, operated by INFLIBNET Center, Gandhinagar, through which subscriptions to major resources are fulfilled. Besides, the Library is a member of DEveloping Libraries NETwork (DELNET), New Delhi through which the Library meets its Inter Library Loan requirements.

Library subscribes to Plagiarism Detection Tool and Remote Access Tool for its users. Orientation sessions and Library Instruction sessions for Students are conducted by the Library Staff Members during registration of new students and on demand.

Primary Health Center

IIT Jodhpur provides round the clock health care facilities to Students, Faculty and Staff Members of the Institute, at its Permanent Campus. This fully equipped and self-sufficient facility is run by M/s. Goyal Hospital & Research Center Private Limited, Jodhpur, on contract. Presently, the following facilities available at the Primary Health Center (PHC).

1. Qualified Medical Doctors,
2. Regular Visits of Specialist Doctors,
3. Paramedical Staff,
4. Physiotherapy Unit,
5. Pharmacy,
6. 24 Hours Emergency Room, and
7. an ICU Ambulance.

Besides this, IIT Jodhpur is also availing facilities available at the All India Institute of Medical Sciences, S. N. Medical College and some specialized hospitals. The Institute has agreements with a few prominent hospitals for priority treatment to its employees and students. These include: Goyal Hospital and Research Center, Medi Pulse Hospital, and Vasan Eye Care Hospital.

The Health Center coordinates and supervises the treatment of students, employees, and their dependents during hospitalization in other hospitals that are empaneled by the Institute, to provide treatment. On request, the Health Center extends its health care services to Institute visitors during their stay on campus. Under emergency circumstances medical services are also extended to the non-IIT Jodhpur community residents in the residential campus. Details like patient records, medicine procurement/ disbursement, assets, equipment of Health Center are all computerized. Visits of Specialist Doctors are scheduled at the Primary Health Centre on weekends i.e., on Saturday and Sunday.

Staff at the Primary Health Centre

Primary Health Centre on Campus

Sports Facilities

A separate Sports Zone is developed to provide excellent Sports Facilities to both the students as well as Faculty and Staff Members. The playing facilities presently developed are:

(1) Cricket Ground with separate practice pitches;
(2) Foot Ball Ground;
(3) Hockey Ground;
(4) Synthetic Basket Ball Courts;
(5) Synthetic Lawn Tennis Courts; and
(6) Synthetic Athletic Track.

Aerial view of the Sports Grounds at IIT Jodhpur

Basket Ball Courts

Basket Ball Courts

Lawn Tennis Court

In addition, there are facilities such as Badminton Courts, Indoor Table Tennis and Gymnasium in each hostel. Some of the sports facilities under development are:

(1) Volleyball Ground;
(2) Kabaddi Ground; and

Indoor Sports Stadium: with provision of Badminton Courts, Squash Courts, Table Tennis

SC/ST Cell

An SC/ST Cell for ensuring the proper utilization and adopting of reservation policies and guidelines issued by the Government of India, is functional at IIT Jodhpur. The Cell deals with matters related to grievances received from SC/ST employees and students in the Institute. The Cell acts as a communicator between the Institute and the Ministry of Human Research and Development in matters related to SC/ST students and employees in the Institute. IIT Jodhpur has adopted the reservation policy while selecting the students for MCM scholarship. In addition, a substantial number of SC students whose total family income is limited to Rs. 6 lakhs per annum, are deriving the benefit of Central Sector Scholarship of Top-Class Education available from the Ministry of Social Justice and Empowerment.

OBC Cell

An OBC Cell for ensuring the proper utilization and adopting of reservation policies and guidelines issued by the Government of India, is functional at IIT Jodhpur. The Cell deals with matters related to grievances received from OBC employees and students in the Institute. The Cell acts as a communicator between the Institute and the Ministry of Human Research and Development in matters related to OBC students and employees in the Institute.

Student Activities

Students Gymkhana

Students Gymkhana is the organized system of self-governance of the activities of the Student Body at the Institute level. The Students Gymkhana of IIT Jodhpur is established to:

(1) Uphold the spirit of cooperation, fraternity and social bonding among all Students of the Institute, and

(2) Provide a platform for organizing themselves, undertake self-governance, and organize creative activities for the all-rounded mental, physical, social and cultural growth of students.

Similarly, the student activities at the hostel level are organised through Students Regatta.

The Students of the Institute associate and establish the Constitution of the Students Gymkhana in keeping with the tenets of the Gymkhana, and agree to abide by it in all walks of life during their student life. The Students Gymkhana hosts its activities through seven Student Societies, and in turn, each Society comprises of several clubs. A Society is a thematic community of students, furthering the cause of the theme among the students. These societies fulfil the varied interests of the students and contribute to their holistic development.

These seven societies are:

(1) Sports & Games Society,
(2) Cultural & Literary Society,
(3) Design & Arts Society,
(4) Science & Technology Society,
(5) Academics & Careers Society,
(6) Campus Life Society, and
(7) Elected Representatives Society.

Under the overall leadership of the General Secretary, Students Gymkhana, and with the overall guidance of Associate Dean (Students), these societies are run by students with help of Student Secretaries and Faculty Advisors for each society.

Sports & Games Society

Sports & Games produce remarkable athletes, and can nurture humble human beings, who have internalised:

(1) The grace of learning to face victory with humility and defeat with grace; and

(2) The force multiplier effect of teamwork.

The Sports & Games Society has been formed with an intent to promote this spirit, by providing to the campus community facilities for sports & games. This Society aims to inculcate this as essential part of every student's life. This society deals with all the sports (formal physical activities carried out under an agreed set of formal rules with the intent of competition, self-enjoyment or a combination of these intents) and games (informal physical activities carried out under a mutually agreed set of informal rules with the intent of recreation) at the Institute level. It is headed by the Student Secretary (Sports & Games Society), and its membership consists of:

(i) Captains of all Institute Teams of the various Sports and Games; and

(ii) Hostel Secretary (Sports & Games Society) of all the Hostels.

The Sports & Games Society of IIT Jodhpur Students Gymkhana formally adopts all Student Sports & Games, which are included in the annual Inter-IIT Students Sports Meet. These sports include Aquatics, Athletics, Badminton, Basketball, Bridge, Chess, Cricket, Football, Gymnastics, Hockey, Kabaddi, Lawn Tennis, Squash, Table Tennis, Volleyball and Weightlifting.

Culture & Literary Society

Student Culture & Literary activities produce remarkable citizens of the country, and can nurture knowledgeable and skilled human beings, who have internalised:

(1) The diverse cultures of India with equal respect for all; and

(2) The richness of traditional & modern literature of India with desire to share with others.

With this intent of promoting this spirit, Students Gymkhana of IIT Jodhpur provides to the campus community facilities for culture & literary activities. The Student Culture & Literary Society of IIT Jodhpur aims to inculcate this as essential part of every student's life.

This society deals with all the cultural and literary activities at the Institute level. It is headed by the Student Secretary (Cultural & Literary Society), and its membership consists of:

(i) Captains of all Institute Teams of the various Cultural and Literary activities; and

(ii) Hostel Secretary (Cultural & Literary Society) of all the Hostels.

The Cultural & Literary Society of IIT Jodhpur Students Gymkhana formally adopts all Student Culture & Literary activities, which are included in the annual Inter-IIT level and other national level Students Culture & Literary Festivals. These include Student Music Activities, Student Dance Activities, Student Drama Activities, Student Film Activities, Student Literature Activities, Student Quiz Activities, Student Book Activities and Student Newsletter Activities as a Club each.

Design & Arts Society

Design & Arts activities produce skilful citizens of the country, and can nurture artistic and skilled human beings, who have internalised:

(1) The diverse creative arts & crafts of India with equal respect for all; and

(2) The richness of traditional & modern designs of India with desire to share with others.

With this intent of promoting this spirit, Students Gymkhana of IIT Jodhpur provides to the campus community facilities for culture & literary activities. The Student Design & Arts Society of IIT Jodhpur aims to inculcate this as essential part of every student's life.

This society deals with all the design and arts activities at the Institute level. It is headed by the Student Secretary (Design & Arts Society), and its membership consists of:

(i) Captains of all Institute Teams of the various design and arts activities; and

(ii) Hostel Secretary (Design & Arts Society) of all the Hostels.

The Design & Arts Society of IIT Jodhpur Students Gymkhana formally adopts all Student design and arts activities, which are included in the annual Inter-IIT level and other national level Students Design & Arts Festivals. These include Student Animation Activities, Student Design Activities, Student Fine Arts Activities, Student FM Radio Activities, Student Photography, Student Media, and Student Cinematography as a Club each.

Science & Technology Society

Science & Technology activities produce skilful citizens of the country, and can nurture artistic and skilled human beings, who have internalised:

(1) The intriguing magic of science and importance of basic, applied and targeted research; and

(2) The challenges of undertaking technology development for the good of the nation.

Students Gymkhana of IIT Jodhpur intends to promote this inquisitiveness towards science and technology, by providing to the campus community facilities for Science & Technology activities. The Student Science & Technology Society of IIT Jodhpur aims to inculcate this as essential training of every student at the Institute.

This society deals with all the science and technology activities at the Institute level. It is headed by the Student Secretary (Science & Technology Society), and its membership consists of:

(i) Captains of all Institute Teams of the various Science and Technology activities; and

(ii) Hostel Secretary (Science & Technology Society) of all the Hostels.

The Science & Technology Society of IIT Jodhpur Students Gymkhana formally adopts all Student Science & Technology activities, which are included in the annual Inter-IIT level and other national level Students Science & Technology Festivals. These include Student Automobile Activities, Student Robotics Activities, Student Astronomy Activities, Student Aeromodeling Activities, Student Science Activities, Student Electronics Activities and Student Computer Programming Activities as a Club each.

Academics & Careers Society

Academics & Careers are two basic premises of presence of student at the Institute. Each student is expected to internalise:

(1) A basic competence (knowledge, skill and attitude) in the discipline of the Program registered for; and

(2) Clarity on distinction between jobs and careers, and prepare for a planned career in the discipline chosen for the study.

Students Gymkhana of IIT Jodhpur wishes to provide a platform to students to represent their desires, difficulties and concerns during the process of education, by providing a mechanism of representation through the Academics & Careers Society. The Student Academics & Careers Society of IIT Jodhpur aims to actively contribute to providing inputs on academic programs, curricula, teaching and infrastructure through the Office of Academics of the Institute.

This society deals with all the student academics and careers related activities at the Institute level. It is headed by the Student Secretary (Academics & Careers Society), and its membership consists of:

(i) Captains of all Institute Clubs of the various student Academics and Careers related activities; and

(ii) Hostel Secretary (Academics & Careers Society) of all the Hostels.

The Academics & Careers Society of IIT Jodhpur Students Gymkhana formally adopts all Student Academics & Careers activities, which are included in the annual Inter-IIT level and other national level Students Academics & Careers Events. These include Student Career Planning Activities, Student Communications Development Activities, Student Entrepreneurship Skills Development Activities and Student Personality Development Activities as a Club each.

Campus Life Society

Campus Fraternity of students needs to build the personal side of students of life, beyond the purpose of building academic side of life at the Institute. Each student is expected to internalise issues associated with:

(1) The basic needs of shelter and food; and

(2) The safety, health and hygiene.

To provide a platform to students to get real-life experiences and to improve quality of holistic life of students on campus, the Campus Life Society was formed. Also, Students Gymkhana and Students Regatta of IIT Jodhpur actively help in providing the needed interactions and experiences to be able to make considered decision to choose and prepare for a career after graduating from the Institute. The Student Campus Life Society actively works with the Office of Students of the Institute.

This society deals with all the student campus life related activities at the Institute level. It is headed by the Student Secretary (Campus Life Society), and its membership consists of:

(i) Captains of all Institute Clubs of the various student Campus Life related activities;

(ii) Hostel Secretaries (Campus Life Society) of all the Hostels;

(iii) Faculty Member Mentors;

(iv) Staff Member Mentors; and

(v) Senior Student Mentors.

The Campus Life Society of IIT Jodhpur Students Gymkhana formally adopts all Student Campus Fraternity activities at the Institute, including Student Legacy Activities, Student City Tourist Services, Student Dining Services, Student Informal Events, Student Picnics and Social Service Activities as a Club each.

Elected Representatives Society

Student Elected Representatives form a critical interface of students with the Institute, to better the situation on all fronts related to study & living on the campus, and to learn & practice the constitutional way of conducting oneself in & as a community of students. The Student Elected Representatives Society actively works with the Dean (Students).

This society deals with all the student matters specific to each group (program-wise and year-wise) at the Institute level. Student Elections and Student Conduct activities are the major activities of the Student Elected Representatives Society. It is headed by the Student Secretary of the Student Elected Representatives Society (SERS), and its membership consists of all Student Elected Representatives elected from each group of students.

Student Fests & Events

The Students Gymkhana has organized the following events during this financial year.

1. Prometeo'2020 (23 – 26 January 2020, IIT Jodhpur)

Prometeo'20 is the first edition of IIT Jodhpur's National Technical Festival. It derives its name from the Greek word for forethinker and celebrates disruptive technologies through talks, workshops, and competitions. This year's theme for Prometeo'20 was 'Emerging Technologies for Sustainable Development' to address and discuss the possible challenges and solutions towards the United Nation's Sustainable Development Goals (SDGs). The UN identifies 17 such goals expected to be achievable by 2030. The events of this year's Prometeo'20 revolved primarily around the goals with technology-driven solutions. The Prometeo'20 mainly focused on Technical Events/ Hackathons and Workshops. There were nine technical events and four workshops targeting the 17 SDGs as demarcated by the UN. The fest witnessed a footfall of about 700 students from across the Jodhpur with active participation from IIT Jodhpur. The fest was declared open on January 23 by the Director, Prof. Chaudhary, and had inaugural talks by Dr. RR Sonde (VP, Thermax), and Mr. Arun Paul (Electronic Devices).

2. Aaftaab – The IITJ Literature Fest

The year 2019 witnessed the first-ever IITJ annual Literature fest - Aaftaab. The fest included numerous literature events including debates, open mic, poetry competitions, and many more. The opening ceremony had Kavi Sammelan where great poets from across the country were invited. The famous poet Sampat Saral was the center of attraction in the opening ceremony. Also, there was a book signing event and panel discussion catering to a huge audience. Students from colleges across Jodhpur showed great enthusiasm and participation in the competitions.

Exile Dairies @Aaftaab

Kavi Sammelan@Aaftaab

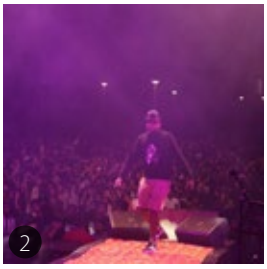
3. Spandan – The Inter-Hostel Cultural Fest of IITJ

Like every year, Spandan was organized to bring out the zeal and competition among the students. Spandan was inaugurated with an EDM night performance by professional DJs. The 2-day long fest saw great competitions among students and hostels. Students challenged their batch mates, seniors, and juniors in all the domains. The competitions were a blend of cultural and arts along with some informal competitions too. Some of the competitions include dance, singing, acting, poetry, jam, painting, fashion show, movie spoof, and many more. Huge participation was witnessed in events like Antakshari and Dumb Charades.

4. IGNUS 2020

IGNUS, the annual socio-cultural festival of IIT Jodhpur has emerged to be one of the largest festivals in Northwest India. It is a mesmerizing feast where many students from all over the country come together to compete in different cultural events. Being a youth festival and aiming to channel the youth of the nation towards social issues, IGNUS has initiated a social campaign - "PRAKRITI".


1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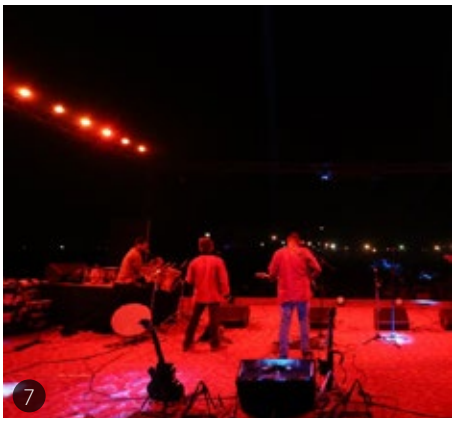
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Photo Captions

1. Antarang@IGNUS2020
2. Performance by Benny Dayal @IGNUS 2020
3. Face Paining Competition @ IGNUS 2020
4. DJ Rhea @IGNUS 2020
5. Fashion Show @IGNUS 2020
6. Nukkad Natak @IGNUS 2020
7. Performance by Indian Ocean Band @ IGNUS
8. T-Shirt Painting Competition
9. Yoga Session @IGNUS 2020
10. Cancer Awareness during Prakriti Campaign
11. Session@Prakriti

5. Rotaract Club

The following are the team's activity during this year:

- Membership growth by 20 times
- Highest Number of registered members in the Rotaract district
- 15+ Community Service Projects
- Strong relation with Rotary Sponsor Club and District

World Literacy Day was celebrated at Ghadav Govt. School with lots of educational, competitive and fun activities. The students were distributed refreshment and stationery kits.

Rotaract Team

6. Marathon on National Sports Day

National Sports Day in IIT Jodhpur was celebrated on 29th August 2019 to commemorate the birth anniversary of hockey legend Major Dhyan Chand. A 3 kms marathon was organized on this occasion. It was inaugurated by Prof. S. R. Vadera, Head, Department of Physics. Around 100 students attended the marathon. Also, a yoga session was also conducted in the evening as a part of the Fit India Movement.

7. Inicio Annual Entrepreneurship Fest

Inicio Annual Entrepreneurship Fest was organized for the students of IIT Jodhpur on 16-17 November 2019.

8. Kridansh (Intra-College Sports Fest) (Feb 2020)

Kridansh, the Intra-College Sports fest of IIT Jodhpur was organized during February 2020.

9. Innovation Day

The Innovation Activity Team of IIC 2.0 IIT Jodhpur organized Innovation Day Celebrations on 12 October 2019 in association with Student Science and Technology Society, IIT Jodhpur. This was consisting of Technical Talks and an Ideation Contest.

10. Framed 2020

During the Academic Year 2019-20, the Annual Art Exhibition of our Institution FRAMED was organized by the Student Design and Arts Society, Students Gymkhana on 1st March 2020. The exhibition showcased various aesthetic artworks of not only the students of IIT Jodhpur and of other institutes in Jodhpur.

11. Scribble Night 2020

It could not be organized this year due to Covid-19 pandemic.

12. Ek Bharat Shresth Bharat (EBSB)

EBSB is a program for promoting national integration through systematic exchange between paired institutes in the cultural, literary, and linguistic fields. Under the EBSB scheme proposed by MHRD, Govt. of India, a visit of IIT Jodhpur students to IIT Guwahati was organized involving the paired states of Rajasthan-Assam from 7-9 March 2020. Students from IIT Jodhpur showcased the various cultural art forms of Rajasthan and learned the versatile culture of Assam including history, lifestyles, food, etc. of Assam. In these three days, several activities were performed together by the students of host institute and of the visiting institute.

Guest Talks/Seminars/Sessions

1. TEDx Talk was attended by the Ecell members on 22nd November 2019.
2. An interactive session with a local entrepreneur Dr. Smita Shah and Mr. Rajeev Balani from Sehat Solutions, Jodhpur, was organized that facilitated the students to interact and pitch their ideas based on the problem statement.
3. Organized a session by iBHubs, a leading technological startup that provided online education material to IIT Jodhpur students free of cost.
4. A session on "80 days to Inter IIT Sports meet", an informal session was organized to motivate the players for sports and to make them aware of the importance of Inter IIT Sports meet, a legacy of 54 years.

Workshops

1. Ideation Workshop on 28-09-2019 by Mr. Gourav Sanghai whose startup acquired its place in Top 10 AI-based start-ups in India and various international recognition. Answered various questions like 'Why to go for Entrepreneurship?', 'Thinking out of the Box', and 'How to get initial funding?
2. IC Engine Dismantling Workshop was organized in November 2019, wherein students got Exposure to the manufacturing and working details of the engine.
3. The Aeromodelling Club of Students Science &Technology Society organized a Workshop on the Science and Construction of RC Planes. This workshop was delivered by the founder of Selcouth India labs. Over 50 students attended this workshop with full enthusiasm. The participants learned the science of remote-controlled aircraft and its control. After the session, materials were distributed to make a fully-functional ready-to-fly RC plane. The participants were divided into two teams. Both the teams assembled and flown their machine successfully. The flying practices were conducted under the supervision of Mr. Hitesh Neve and his team. The students devoted almost 8 hours to this event.
4. During Techfest Robot Making Workshop was organized.
5. The below-mentioned workshops were organized by Shutterbugs during the fall semester of AY 2019-20. The objective of these workshops was to familiarize the attendees with the camera technology and build a solid base foundation for photography professionally so that they would be able to understand the skill and concepts of photography in a much better way and be able to explore more techniques on their own. On an average 34 students of our Institute consistently attended the workshop and hence there was a remarkable difference in the quality of photographers that emerged during the past academic year.

Dates	Purpose
Aug 25, 2019	Introduction to Camera Technology and Types
Aug 26, 2019	Different modes of DSLR
Aug 27, 2019	Manual Mode and Exposure Triangle
Sep 14, 2019	Raw vs JPEG
Sep 15, 2019	Light Painting

6. Frame-X organized the following two workshops:
    - Cinematography Workshop was conducted by Mr. Piyush Shah. He is a Bombay-based cinematographer and filmmaker.
    - Screenwriting Workshop was conducted by Mr. Abhaya Simha. He is a Bangalore-based Kannada filmmaker and screenwriter.

Student Accolades

During the Financial Year 2019-20, students of the Institute received their share of accolades.

Inter-IIT Tech meet 2019-2020

The 8th Inter IIT Tech Meet was hosted by students from IIT Roorkee, from 20-22 December 2019. IIT Jodhpur students attended the 3-day meet along with 23 other IITs to find feasible solutions to real-life industry problems posed by DRDO SASE, BITGRIT Japan, and The Ashoka Foundation. IIT Jodhpur secured 2-bronze medals and 1-silver medal.

Cultural Meet 4.0

A contingent of 127 students represented IITJ in the Inter IIT Cultural Meet 4.0 held at IIT Bombay. The team participated in almost all competitions showcasing dance, music, drama, fine arts, quizzes, literature, and many more. The team stood at 12th position overall among 19 participating institutions. Some noteworthy achievements were 4th position both in Group Dance and Theatre competitions.

Student Counseling Service

The Student Counseling Service is an integral part of IIT Jodhpur since 2008. Every year, it strives to ensure that every student gets to know the Institute in intricate details and to help absorb all that the opportunities that the Institute creates. It works towards making the transition of new Students from their homes to the Institute a memorable one. The objective of Student Counseling Service is to provide friendly support to the new Students for their well-being during their stay on the campus and for their personal & professional developments. In essence, the Student Counseling Service promotes the development of students along three aspects, namely:

(1) Academic: It provides information about different academic programs of the Institute, and suggests efficient time management and study skills,

(2) Extra-Curricular: It strives to develop talents in students, and encourages them to discover their extra-curricular interests/hobbies. Also, it provides an interface with the Institute activities, and provides a platform for interaction with the Institute; and

(3) Personal: It provides a cushion against homesickness, and assists in adjusting to the new environment (including concerns and difficulties arising during their stay at the Institute) by providing personalised guidance. Also, it provides psycho-education and confidential referral services to students.

The Student Counseling Service is headed by a Faculty Member, as the Chairperson of the Student Counseling Service Committee, and ably supported by Faculty Members, Staff Members and senior students. A full-time Student Counselor plays the role of growth coach, well-being moderator and psychological counselor. Besides, the Student Counseling Service strives to:

(1) Maintain a ragging-free campus;

(2) Organize Orientation Program for new students to acquaint them with the Institute;

(3) Organize lectures and trainings on: (a) Career counseling, (b) Stress management, (c) Time management, (d) Health care and hygiene, (e) Vocational training, (f) Relationships, (g) Cope with homesickness, (h) Addiction and others, and (i) motivational lectures by eminent speakers;

(4) Address academic issues of students, e.g., poor academic performance, basic IT skills and language skills of students from non-English background; and

(5) Organize events for encouraging interaction among students of different years, and Staff and Faculty Members.

Events organized by Counselling Service PG Team - Orientation of PG Students 2019

22nd July 2019 – 06th August 2019

Every year Orientation Week is organised by the CS team with the agenda of developing a perception of a "New Home away from home" among new students. The week plays a prominent role in making the students aware about the institute, the facilities institute offers as well as the first formal cum informal interactive session among new students so that they could become more comfortable with the new environment they have stepped into. First day began with the Registration process of the new students. The next day took off with welcome addresses followed by introduction to all basic facilities provided in the campus. The session ends with an explicit introduction towards the fundamental balance of our life, that being said all the mental health related issues, research related motivation and an alumnus meet were discussed in this session. Arna Jharna, a place of Rajasthani folk culture, was visited with students which gave them a perception of the blue city Jodhpur and a crisp recipe towards their new journey at a culturally rich city Jodhpur. The next day sessions were rigged with more motivations to fight with depression and personality development. Moving forward, rules of the academic world and placements were discussed with a Mandatory morning yoga session. With an idea of allowing students to stimulate their inquisitiveness and enthusiasm Informal events were being organized that became the basis for their active participation during their time at the institute at various platforms. A tree plantation drive was also done where each group was given a tree to maintain. To add more productivity, on the last day of the orientation week, A meeting with director sir was organized to enrich students with research ethics and inculcate an idea about how to proceed towards their respective research fields.

PG MEET on 26th September 2019

The PG meet is organised to lighten the students' mood and discuss their problems, which can help them in overcoming some pressure. The meet started with a skit by all members of the counselling service PG team. The skit mostly talked

about depression, tension and anxiety among research students and their fights with personal life and pressure from guides. Then it was an open discussion between all SGs and students. Some students shared their personal stories too which were really touching and motivating towards fighting our emotions and depression even when everything is against you.

Children's Day, 14 November 2019

This was to rejuvenate and relive all those precious reminiscences of our childhood. To endeavour the same some childhood games were organized. All students enjoyed a lot, after all they all get to be a child once again and play all those games that we once used to play in our streets. The games played on this day were three-legged Race, Seven Stones, Dog and Bones, Ice-Water, Tug-of War and slow cycle race. It ended with a bonfire.

Orientation of PG students Jan 2020, 3rd January 2020

The home away from home message was once again delivered by the new PG team to a new batch of students joining in January. The starting of the event was done by the Director Sir by motivating new students for research work, then rules and regulations of academics and leaves were discussed by associate dean of pg and a small session on depression and different emotions by Dr. Prasad Gadkari. After that in the evening some on stage fun was arranged with snacks. The fun activity was done to get them open up with everyone and smile a little. In the end a small dance party of 10 minutes.

Bonfire (23/01/2020)

Three games were played on the event around a bonfire. The events were Open Mic, Antakshri and passing the parcel. The aim for these games was to promote hidden talent among students and make them speak their hearts out, to have camaraderie among students on a musical note and to engage students in fun activities.

Online Events organised During Lockdown Period

The Aim of organizing these events was to integrate monotony with creativity.

1. Online Open Mic: A steadfast tradition in the Live events community, this event was organized to allow students to showcase their talent that also became the basis for live interactive platforms, learning new skills and making connections.
2. Online PMR sessions: Guided by trained professionals, progressive muscle relaxation technique is a simple practice of tensing one muscle group followed by a relaxation phase. The event that is being conducted every week on campus, during lockdown period, has been organized via virtual means of communications followed by online communication platforms such as Google meet.

Career Development Cell

The Career Development Cell (CDC) aspires to work with a vision of providing comprehensive career counseling, addressing career related challenges and helping students to make informed career choices. Using a combination of innovative training methods, skill assessment programs and through a continuous assessment of student interests, the CDC envisages to help students to realize their abilities and overcome their shortcomings in attitude, skills and knowledge. The CDC team conducted training sessions on Soft Skills Training and Preparation for the Final Placements. In 2019-20, more than 70+companies visited the campus. The overall B.Tech. Placement percentage has increased from 84% last year to 91%* this year. A total of 79 students got placement in the year 2019-2020 i.e., 71 B.Tech. Students, 3 M.Sc. and 5 M.Tech. Students have been placed with different companies in the year 2019-20. The average salary offered to B.Tech. Students had also increased to Rs. 16.58 Lakhs from Rs. 14.33 Lakhs.

Some of the renowned companies are HPCL, Oil India, L&T Engineering, Maruti Suzuki, Amazon, Microsoft, Morgan Stanley, Goldman Sachs, Gojek, Tata Consultancy Services etc.

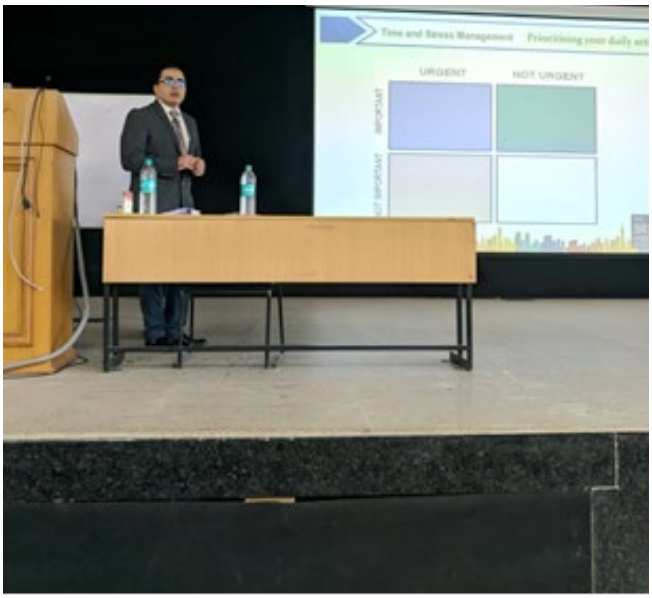
B.Tech. Placement %

Branch	2019-20
Mechanical	83%
Electrical	88%
Computer Science	100%
Overall Placement %	91%

*Placement % is calculated on the basis of number of students registered for placement. M.Tech. Placement % - 19%.

Activities

"Soft Skill Training Session" was organized on 24th August 2020.The training session was conducted for 3rd & 4th year students. The topics covered were: Corporate Etiquettes, Leadership Skills, and Innovative Thinking, Time and Stress Management and Effective use of Social Media.



Training Session was conducted for the final year students for "Preparation for the Final Placements" from 13th September 2019 to 15th September 2019 by Seniors on

Call. The topics covered were: Resume Building, GD, and Personal Interview.

Details of companies and placements are as below.

B.Tech. Placements for the year 2019– 2020					
Sl. No.	Company	Number of Students Selected per Branch			Total Number of Students Placed
		ME	EE	CSE	
1.	HPCL	1	3		4
2.	Goldman Sachs	1		1	2
3.	Morgan Stanley		1	1	2
4.	Go-Jek			4	4
5.	1 MG			2	2
6.	Directi(SRE)			2	2
7.	OYO			1	1
8.	Zolostays			1	1
9.	Optum			1	1
10.	Red Pine Signals		2		2
11.	Sigmoid (Data Science)		1		1
12.	TCS(R&I)	3	3		6
13.	TCS(Innovator)	1			1
14.	Lumenci		1		1
15.	Nucleus Software	1	2	3	6
16.	SMS Data Tech			1	1
17.	LTI		2		2
18.	LnT Engg	1			1
19.	Maruti	4	1		5
20.	ETMedia Labs	2			2
21.	Evalueserve	3	1		4
22.	Broadridge		1		1
23.	Wipro		1		1
24.	Barclays			1	1
25.	Goldman Sachs		1	1	2
26.	Microsoft			2	2
27.	Amazon	1	1	6	8
28.	Morgan Stanley	1			1
29.	SMS Data Tech			1	1
30.	TVS Motors	1			1
31.	Logic Fruit Technology		1		1
32.	Accops			1	1
	Total	**20**	**22**	**29**	**71**

Alumni Relations

The Alumni of IIT Jodhpur have always brought pride to their Alma Mater by excelling in their respective professions as part of multinational companies, esteemed institutions of research, prominent institutions of higher education or rapidly growing entrepreneurial ventures. The Alumni Relations Committee (ARC) of the Institute envisions building a mutually beneficial relationship with Alumni by purposeful engagement. The Committee shall enable and facilitate activities that (1) Benefit our Alumni (2) Foster mutual trust and (3) Promote professional and technical excellence. Last year, the ARC organized several events.

The IIT Jodhpur Alumni Hub

Alumni are key stakeholders of any technical Institute. With this view point, the Alumni Relations Committee, IIT Jodhpur launched the Institute's Alumni hub (www.alumni.iitj.ac.in) in September 2019. This web portal serves as a hub for Alumni to not only network among themselves, but also to remain connected with the Faculty Members, Staff and Students at IIT Jodhpur. The portal promotes technical interactions between Alumni and Students in special-interest groups. It also features an Alumni driven career and internship guidance program. As our Alumni become global denizens, IIT Jodhpur remains proud as ever of their accomplishments.

Alumni Induction Program

The Alumni Induction Program was organized on 16th December 2019 by the ARC Committee. There were around 250 graduands from the graduating batch of 2019, who attended the program. Dr. Shankar Manoharan, Chairperson, ARC, welcomed the Alumni back to the campus. Professor Santanu Chaudhury, Director, IIT Jodhpur addressed the graduands and emphasized the need for active participation of the Alumni in the development of the Institute. Dr. R. Chidambaram, Chairman, Board of Governors, wished the Alumni the very best as they ventured into the real world from IIT Jodhpur. Professor Dutta Roy, Chief Guest for the Convocation graced the occasion with his august presence. Alumni were presented with their Alumni ID cards at the end of the event. Dr. Kaushal Desai, Associate Dean, International Relations & Outreach, proposed the vote of thanks. The event concluded with a fireside dinner organized by the ARC.

Alumni Town Hall Event

The Alumni Relations Committee organized an Alumni TownHall event on the 2nd of January 2020. Alumni from batch of 2015, Kedar Sanjay Vaidya, PhD student, Engineering Mechanics, Virginia Tech, Sankha Narayan Guria, PhD student, Computer Science, University of Maryland, Mounish Kothapally, Program Manager, Microsoft, Pitta Divya Shree, Software Engineer, Google, Vinnakota Sai Rakshit, Risk Modelling & Analytics Specialist, Koyinni Deekshitha, Management Trainee, Reliance Industries Limited, Sanchit Kumar Singh, iOS Developer, Gaana.com visited the Institute. Dr. Shankar Manoharan, Chairperson, ARC welcomed the guests and the Student attendees. The session went on with interactive discussions among the students, the Alumni and the ARC. Dr. Kaushal Desai, Associate Dean, International Relations & Outreach, addressed the audience and encouraged the strengthening of interaction between Students and Alumni. The program concluded with the vote of thanks proposed by Dr. Kaushal Desai.

IIT Jodhpur Annual Alumni Day Event

IIT Jodhpur hosted its Alumni on the First Annual Alumni Day held on 25th January 2020. This event was studded with prominent Alumni from older IITs namely Cdr. Pradeep Prasad, Head/ Program Manager – IBM and GC Member IITACB; Dr. Sanjeev Sanghi, Dean, Alumni Affairs, IIT Delhi; Mr. Damodar Das Lohiya, Managing Director, Lohiya Group; Mr. Satya Narayan Zindal, Advisor, Consultant, Mentor; Mr. Pawan Kumar, Vice President, PanIIT Alumni; and Prof. Varun Arya, Founder & Director of Aravalli Institute of Management. The program began with a Meet, Greet and Network session followed by a tour of the new campus organized for the Alumni. After a 'reconnect' lunch with the Faculty Members, an interactive session "Ask Fest" was also organized where the Students got an opportunity to connect with the Alumni. The evening program began with a panel discussion focused on the "Friends of IIT Jodhpur" program, a brain child of Professor Santanu Chaudhury, Director, IIT Jodhpur. This program views Alumni as key stakeholders in the development of the Institute. All distinguished guests for the evening participated in the panel discussion. The Alumni of IIT Jodhpur also participated enthusiastically. For the first time since it's inception, the REYA (Recognizing Excellence in Young Alumni) award ceremony was held. Mr. Shobhit Srivastava (Class of 2012) and Mr. Siddharth Jain (Class of 2014) bagged the 2019 REYA awards for Entrepreneurial Excellence and Social Contributions respectively. The awardees were honored with an award and a citation signed by the Director, IIT Jodhpur. The invited guests, alumni and students then enjoyed a cultural evening that had been organized by the ARC volunteer team and music club of IIT Jodhpur. The event concluded with the vote of thanks proposed by Dr. Kaushal Desai, Associate Dean, International Relations & Outreach followed by dinner.

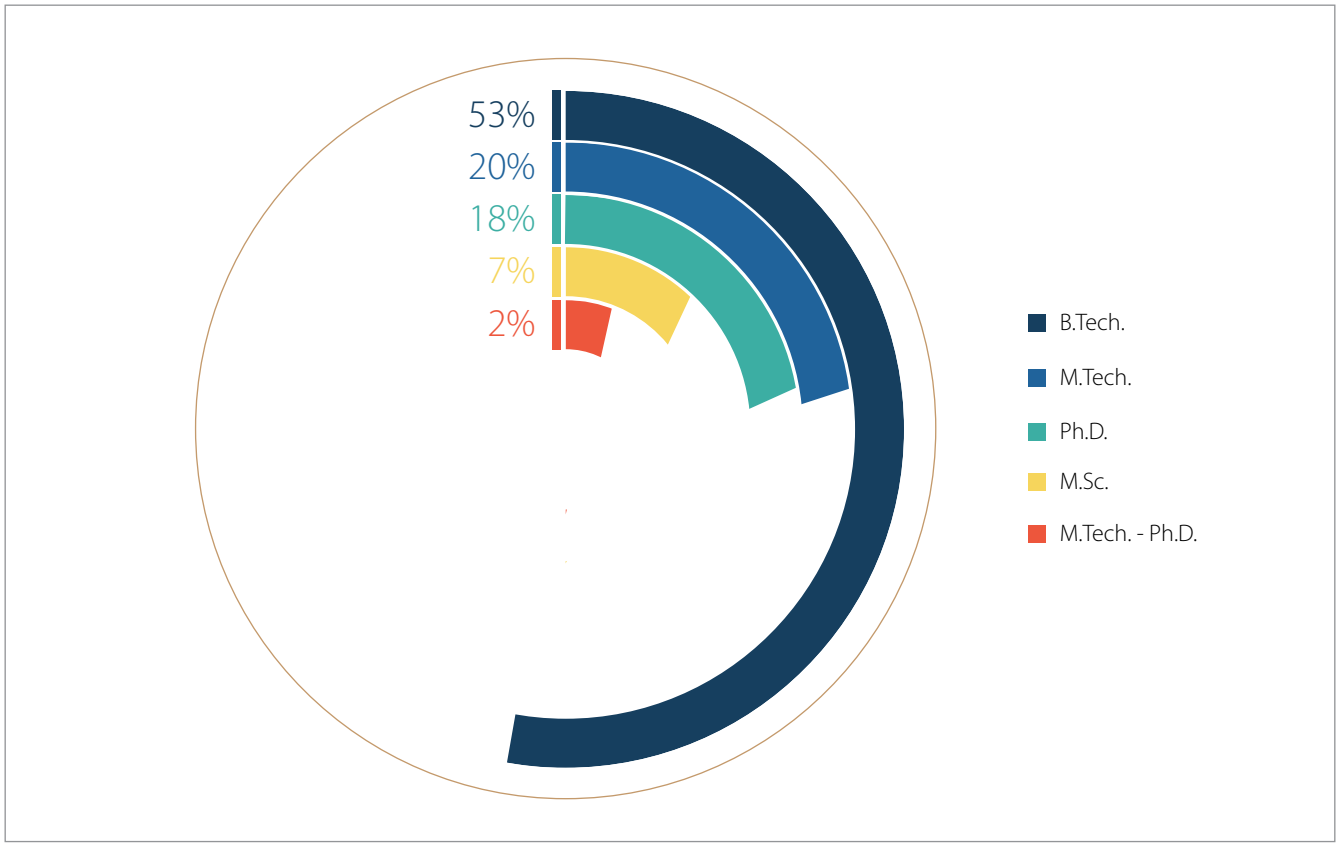
Ask an Alumnus Event

The ARC organized an "Ask an Alumnus" session on the 26th of February with Mr. Rameshwar Prasad Meghwal, Class of 2013, who is currently with Intel. Dr. Kshema Prakash, from the ARC introduced Mr. Meghwal. Mr. Meghwal then interacted with the Students and offered guidance and his views on life after graduating from IIT Jodhpur.

Registered Students in IIT Jodhpur

IIT Jodhpur has, as on 31 March 2020, a total of 1602 students registered in various programs offered by the Institute. The table and chart below depict the program-wise break-up of the registered students in the Institute.

Academic Program	Number of Registered Students
Ph.D.	292
M. Tech. – Ph.D.	23
M. Tech.	313
M.Sc. – M.Tech.	4
M.Sc.	118
B.Tech.	852



Financial Position

INDIAN INSTITUTE OF TECHNOLOGY JODHPUR

Balance Sheet as on 31 March 2020

Amount in Rupees

SOURCES OF FUNDS	Current Year	Previous Year
CORPUS/CAPITAL FUND	10,61,22,01,857	10,32,30,28,379
DESIGNATED/EARMARKED/ENDOWMENT FUNDS		
CURRENT LIABILITIES & PROVISIONS	2,35,45,67,394	64,46,35,550
TOTAL	**12,96,67,69,251**	**10,96,76,63,929**
APPLICATION OF FUNDS		
FIXED ASSETS	**10,08,50,94,842**	**8,74,50,06,255**
Tangible Assets	5,83,56,85,889	5,89,29,51,561
Intangible Assets	3,31,76,028	1,44,91,953
Capital Works-in-Progress	4,21,62,32,925	2,83,75,62,741
INVESTMENTS FROM EARMARKED/ENDOWMENT FUNDS		
Long Term		
Short Term		
INVESTMENTS - OTHERS	72,00,00,000	63,96,00,857
CURRENT ASSETS	1,13,02,70,724	88,55,51,997
LOANS, ADVANCES & DEPOSITS	1,03,14,03,685	69,69,46,288
MISCELLANEOUS EXPENDITURE NOT WRITTEN OFF	-	5,58,532
TOTAL	**12,96,67,69,251**	**10,96,76,63,929**

Grant-in-Aid

Sl. No.	Particulars	Recurring (Object Head 31)	Salary (Object Head 36)	Non-Recurring (Object Head 35)	Total
A	Grants-in-Aid				
	(i) Grant Received during F.Y. 2019-20	34,26,00,000	24,05,00,000	30,22,00,000	88,53,00,000
	(ii) EWS Grant Received during F.Y. 2019-20	1,03,00,000	80,00,000	-	1,83,00,000
	Total Grant Received	**35,29,00,000**	**24,85,00,000**	**30,22,00,000**	**90,36,00,000**