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ANNUAL REPORT 2020-21

Indian Institute of Technology Jodhpur

Annual Report
2020-2021

Indian Institute of Technology Jodhpur

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Professor Santanu Chaudhury
Director, IIT Jodhpur

Preface

Despite the COVID Pandemic during 2020-21, IIT Jodhpur has progressed on all fronts, including infrastructure, academics, research, and technology development. Institute has taken several steps to facilitate online academic ecosystem, like organising workshops on online pedagogy and setting up of processes for informal connect with the students through online extra-curricular and co-curricular events. Adequate measures were taken to manage COVID situation in the campus through extensive testing, managing isolation facility, ensuring medical care and arranging vaccination camps so that students on campus as well as campus residents remain safe. This year IIT Jodhpur has adopted a new vision, mission, and strategic plan for the institute. Two new schools, namely, School of Management & Entrepreneurship and the School of Artificial Intelligence and Data Science have been established and they have become completely functional with induction of new faculty members and operation of newly introduced academic programmes. The Institute has embarked on an ambitious mission to establish itself as one of the top destinations in the country for a wholesome education with the right mix of flexible academics, cutting-edge research, curiosity-driven innovation and a curriculum built on technology foresight. We look forward to another eventful year and continue our journey of progress and national development.

IIT Jodhpur

Vision, Mission & Goals

Vision

A future-driven institute for nurturing excellence of thought; creating, preserving, and imparting knowledge; and using transformational technologies/interventions with a multidisciplinary approach for responding to societal challenges and aspirations.

Mission

- Foster humanitarian values, passion for learning, and creativity in faculty and students
- Move towards high quality, futuristic educational, and research ecosystem
- Develop socially responsible faculty, students, and future leaders, committed to creating a self-reliant India
- Catalyze a professional internal culture along with enabling infrastructure and ancillary services
- Forge effective national as well as international collaboration and partnership with industry and academia for diverse purposes and activities.

Goals

- **Curriculum**

  To assimilate balanced, broad-based as well as specialized education in all curricula with opportunities for different kinds of students and their interests.

- **Pedagogy**

  To establish systems for dynamic development, implementation, and evaluation of futuristic pedagogy including blended-hybrid teaching and experiential learning.

- **Research**

  Have a globally engaged research ecosystem with state-of-the-art facilities in place, for attaining leadership in research on academic, social, national, and industrial fronts while capitalizing on emerging and in-demand opportunities.

- **Outreach**

  To be the Institute of Choice for a lifelong learning journey of working professionals, alumni, and the community.

- **Institutional Collaboration**

  Have an efficient platform in place for forging impactful partnerships with academia, research institutes, business organizations, civil society, governments, and other agencies across the world for contributing to larger goals for humanity.

- **Industry Connect**

  Ensure ease of collaboration with industry for joint research/ projects, IPR development, technology transfer, and encouraging entrepreneurship/ startups, along with efficient supporting infrastructure and systems.

Financial Plan

Set up innovative resource mobilization mechanisms and expenditure management systems, embedded in the internal budgetary processes, to have ample resources/ funds for actualizing the institute's vision and goals.

Infrastructure

Institute will have secure, evolving futuristic digital and physical infrastructure and ancillary services to meet all its needs, along with knowledge infrastructure for supporting learning and enabling skill development.

Student Life Cycle

Students will find at IIT Jodhpur (i) a vibrant learning environment, with opportunities for excelling in curricular, co-curricular and extracurricular activities, (ii) an effective career development process for their successful initiation to the professions of their choice and (iii) a strong linkage with alumni through regular interactions, support for their lifelong learning and professional development; and enabling their active participation as a stakeholder in the affairs of the institute.

Agile Organization

Ensure that IITJ continues to be an agile organization for both stability and dynamism as a network of teams with a people-centric culture that operates through fast but considered decision cycles which are enabled by technology, and guided by a powerful common purpose to co-create value for all stakeholders of the institute.

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
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Additional Secretary (Technical Education)
Council Nominee
Department of Higher Education
Ministry of Education
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New Delhi 110 001

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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
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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

Chief Secretary
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
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Email: registrar@iitj.ac.in

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 Education
Shastri Bhawan
New Delhi 110001
Email: ashe-mhrd@gov.in

Sh. Ashoke Guha
Member
CFO (MLCP JV)
Delhi International Airport
P. Ltd, GMR Group
New Delhi 110 037
Email: ashoke_guha@yahoo.co.in

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

Sh. P. G. Basak
Secretary to the Finance Committee
Offg. Registrar
Indian Institute of Technology
Jodhpur, N. H. 62, Nagaur Road
Karwad, Jodhpur 342 037
Email: registrar@iitj.ac.in

Senate

Constitution of Senate

The Director, Ex-officio, who shall be the Chairman of the Senate	Prof. Santanu Chaudhury, Director, IIT Jodhpur and Chairman, Senate
The Deputy Director, Ex-officio	Vacant
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; and	Dr. Sanjeev Misra, Director, AIIMS Jodhpur
	Prof. H. P. Kincha, Chairman, Karnataka State Innovation Council, Bangalore
	Prof. Purnima Singh, Deptt. of Humanities & Social Sciences, IIT Delhi
The professors appointed or recognized as such by the Institute for the purpose of imparting instruction in the Institute.	Prof. S.R. Vadera, Deptt. of Physics
	Prof. Surajit Ghosh, Deptt. of BB
	Prof. Mayank Vatsa, Deptt. of CS&E
	Prof. Richa Singh, Deptt. of CS&E
	Prof. Joydeep Dutta, AIDE, (w.e.f. 09.02.2021 (FN)
	Prof. Neeraj Jain, Deptt. of BB, (w.e.f. 12.02.2021 (FN)
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; and	Dr. Sanjeev Misra, Director, AIIMS Jodhpur
	Prof. H. P. Kincha, Chairman, Karnataka State Innovation Council, Bangalore
	Prof. Purnima Singh, Deptt. of Humanities & Social Sciences, IIT Delhi
Deans	Prof. Surajit Ghosh, Dean (R&D)
Heads of the Departments or Schools as may be established by the Institute.	**Department of Bioscience and Bioengineering**
	Dr. Meenu Chhabra
	Department of Chemical Engineering
	Prof. P.K. Tewari
	Department of Chemistry
	Dr. Ritu Gupta (Upto 30.08.2020) Dr. Manikandan Paranjothy (w.e.f. 01.09.2020)
	Department of Computer Science & Engineering
	Dr. Gaurav Harit (Upto 30.08.2020) Prof. Richa Singh (w.e.f. 01.09.2020)
	Department of Electrical Engineering
	Dr. Anil Kumar Tiwari (Upto 30.08.2020) Dr. Arun Kumar Singh (w.e.f. 01.09.2020)
	Department of Humanities & Social Sciences
	Dr. Ankita Sharma
	Department of Mathematics
	Dr. Gaurav Bhatnagar (Upto 31.08.2020) Dr. Puneet Sharma (w.e.f. 01.09.2020)

Heads of the Departments or Schools as may be established by the Institute.	**Department of Mechanical Engineering**
	Dr. Prodyut R. Chakraborty
	Department of Metallurgical & Materials Engineering
	Prof. B.P. Kashyap
	Department of Physics
	Prof. S. R. Vadera
	Department of Civil & Infrastructure Engineering
	Dr. Ranju Mohan
	School of Management & Entrepreneurship
	Prof. Atanu Ghosh (upto 04.02.2021) Dr. Krishna Kumar Balaraman (w.e.f. 05.02.2021)
	School of Artificial Intelligence & Data Science
	Presently, Director, IIT Jodhpur
	Centre for Emerging Technologies for Sustainable Development
	Dr. Anand K. Plappally
	Centre for Technology Foresight & Policy
	Dr. Deepak M. Fulwani
	IDRP Dr. S. C. Bose (w.e.f. 1.1.2021)
One or more members of academic 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.	**Department of Bioscience and Bioengineering**
	Dr. Sushmita Jha, Associate Professor
	Department of Chemical Engineering
	Dr. Deepak Arora, Associate Professor
	Department of Chemistry
	Dr. Rakesh Kumar Sharma, Associate Professor
	Department of Civil & Infrastructure Enggg.
	Dr. Debanjan Guha Roy, Assistant Professor
	Department of Computer Science & Engineering
	Prof. Richa Singh (Upto 27.10.2020) Prof. Mayank Vatsa, Professor (w.e.f.28.10.2020)
	Department of Electrical Engineering
	Dr. Shree Prakash Tiwari, (Upto 30.11.2020) Dr. Mahesh Kumar (w.e.f. 01.12.2020)
	Department of Humanities & Social Sciences
	Dr. V. Hari Narayanan, Associate Professor
	Department of Mathematics
	Dr. Gaurav Bhatnagar, Associate Professor

One or more members of academic 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.	**Department of Mechanical Engineering**
	Dr. Anand K. Plappally, Associate Professor
	Department of Metallurgical & Materials Engineering
	Dr. Appala Naidu Gandi, Assistant Professor
	Department of Physics
	Dr. Ashutosh Kumar Alok, Associate Professor
	IDRP, IRC
	Prof. S.R. Vadera (Upto 31.12.2020) Dr. S.C. Bose (w.e.f. 1.1.2021)
	School of Management & Entrepreneurship
	Dr. Krishna Kumar Balaraman (Upto 04.02.2021) Dr. Sankalp Pratap (w.e.f. 05.02.2021)
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.	Dr. Souvik Bhattacharyya, Vice Chancellor, BITS Pilani
	Dr. Jitendra Balakrishnan, CTO-Products, Sterlite Technologies
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 Upto (04.03.2021) 1. General Secretary, Student Senate 2. General Secretary, Co-curricular Affairs 3. General Secretary, PG Academic Interaction Council 4. General Secretary, UG Academic Interaction Council 5. General Secretary, Hostel Affairs (w.e.f. 05.03.2021)
Invitees	1. Professor-in-charge (Faculty) 2. Associate Dean (Infrastructure) (upto 31.12.2020) Professor-in-charge (Infrastructure) (w.e.f. 01.01.2021) 3. Associate Dean (Academics –UG) 4. Associate Dean (Academics –PG) 5. Associate Dean (Students) 6. Associate Dean (R&D) 7. Associate Dean (International Relations & Outreach) 8. Associate Dean (Planning & Resources Generation)
Secretary to the Senate	Sh. P.G. Basak Offg. Registrar

Buildings and Works Committee

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

Professor Neeraj Gupta
Member
Department of Architecture,
Central University of Rajasthan
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District Ajmer-305817
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Professor B. Bhattacharjee
Member
Emeritus Professor
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Indian Institute of Technology
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Sh. Ramesh Chand Jain
Member
Additional Chief Engineer (Retd.)
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Dr. B. Ravindra
Member
Associate Dean (Infrastructure)
Indian Institute of Technology
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Karwad, Jodhpur 342037
Email: ravib@iitj.ac.in
(Tenure upto 31.12.2020)

Prof. Amitava Mitra
Member
Professor-in-charge
(Infrastructure)
(w.e.f. 01.01.2021)

Sh. Anil Kumar Jain
Member
Flat 9-B, Tower -X, Meghdutam Apartments, Plot F-21C, Sector 50, NOIDA (UP) 201301
Mob: 9810826028 P- 0120 4903191
Email: akjain54@yahoo.com
(w.e.f. 8.06.2020)

Sh. P. G. Basak
Secretary to the B&WC
Officiating Registrar
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Email: registrar@iitj.ac.in

Chief Project Manager
Special Invitee
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Nirman Bhawan
Jodhpur 342011
eMail: cpmiitjpz.cpwd@gov.in
Mobile: (+91) 98181 80952

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 (upto 31.08.2020)	Research & Development
Shree Prakash Tiwari (w.e.f. 01.09.2020)	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 (Upto 31.12.2020)
Heads of the Departments /Center/School	
Department of Bioscience and Bioengineering	
Dr. Meenu Chhabra	
Department of Chemical Engineering	
Prof. P. K. Tewari	
Department of Chemistry	
Dr. Ritu Gupta (Upto 31.08.2020)	
Dr. Manikandan Paranjothy (w.e.f. 01.09.2020)	
Department of Computer Science & Engineering	
Dr. Gaurav Harit (Upto 31.08.2020)	
Prof. Richa Singh (w.e.f. 01.09.2020)	
Department of Electrical Engineering	
Dr. Anil Kumar Tiwari (Upto 31.08.2020)	
Dr. Arun Kumar Singh (w.e.f. 01.09.2020)	
Department of Humanities & Social Sciences	
Dr. Ankita Sharma	
Department of Mathematics	
Dr. Gaurav Bhatnagar (Upto 31.08.2020)	
Dr. Puneet Sharma (w.e.f. 01.09.2020)	

Department of Mechanical Engineering

Dr. Prodyut R. Chakraborty

Department of Metallurgical & Materials Engineering

Prof. B. P. Kashyap

Department of Physics

Prof. S.R. Vadera

Department of Civil & Infrastructure Engineering

Dr. Ranju Mohan

School of Management & Entrepreneurship

Prof. Atanu Ghosh (upto 04.02.2021)

Dr. Krishna Kumar Balaraman (w.e.f. 05.02.2021)

School of Artificial Intelligence & Data Science

Presently, Director, IIT Jodhpur

Centre for Emerging Technologies for Sustainable Development

Dr. Anand K. Plappally

Centre for Technology Foresight & Policy

Dr. Deepak M. Fulwani

IDRP

Dr. S. C. Bose (w.e.f. 1.1.2021)

Professors In-Charge	
C. Venkatesan	Faculty
S. R. Vadera	Stores & Purchase
Amitava Mitra	Infrastructure Engineering (w.e.f. 01.01.2021)
Registrar	
P. G. Basak	Advisor (Admin) & Offg. Registrar

Other Functionaries	
Amardeep Sharma	Estate Officer
Amardeep Sharma	Public Relations Officer
Amardeep Sharma, (upto 10.01.2021)	Central Public Information Officer
Ashok Kumar Khanduri, (w.e.f. 11.01.2021)	
Ananya Debnath	Nodal Officer, Unnat Bharat Abhiyan
Appala Naidu Gandi	Nodal Officer for OBC, PwD, and Minorities
Atul Kumar	Green Initiatives Officer
S. C. Bose	Transparency Officer
Gaurav Bhatnagar	Liaison 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	Liaison Officer for SC and ST
Ritu Gupta	Nodal Officer, GIAN Program
Shree Prakash Tiwari	Liaison Officer for EWS
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)

The Institute

Organization of Academic and Research Activities

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

Departments

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

Interdisciplinary Research Platforms (IDRPs)

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

Schools

1. School of Management & Entrepreneurship
2. School of Artificial Intelligence & Data Science

Centres

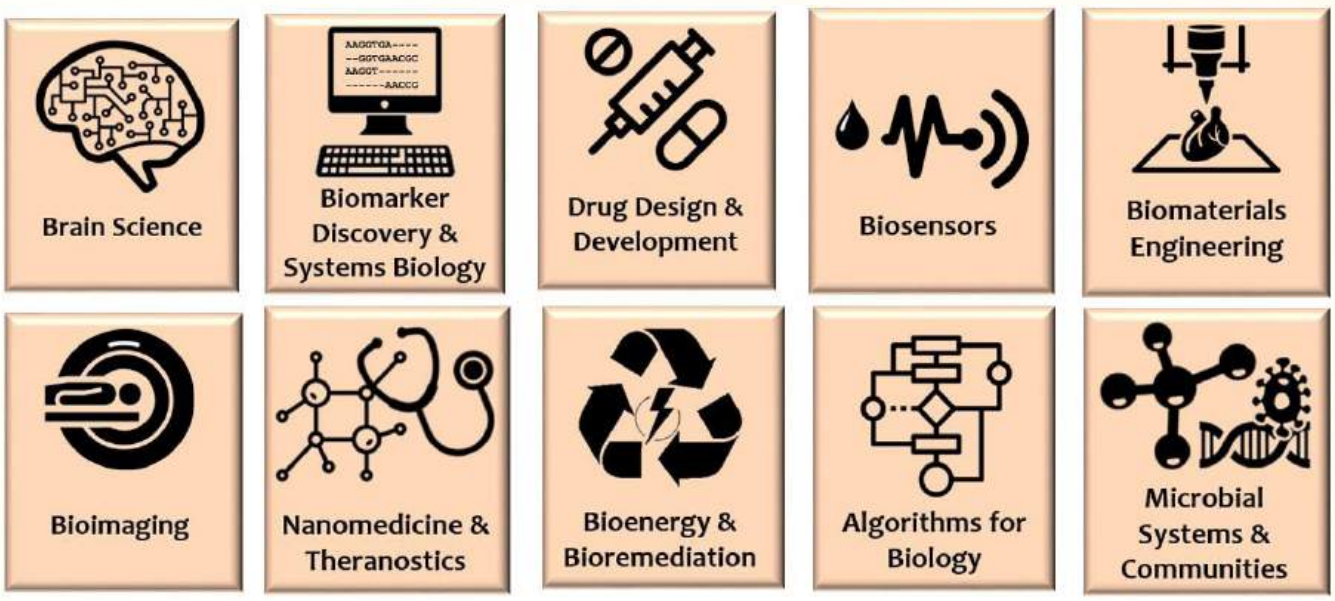
1. Center for Emerging Technologies for Sustainable Development
2. Center for Technology Foresight and Policy
3. Technology Innovation & Start-up Centre
4. Jodhpur City Knowledge & Innovation Centre

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:



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

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
Statistical Genetics and Big Data Analytics

Sudipta Bhattacharyya
Structural Biology; Enzyme Chemistry and Protein Engineering

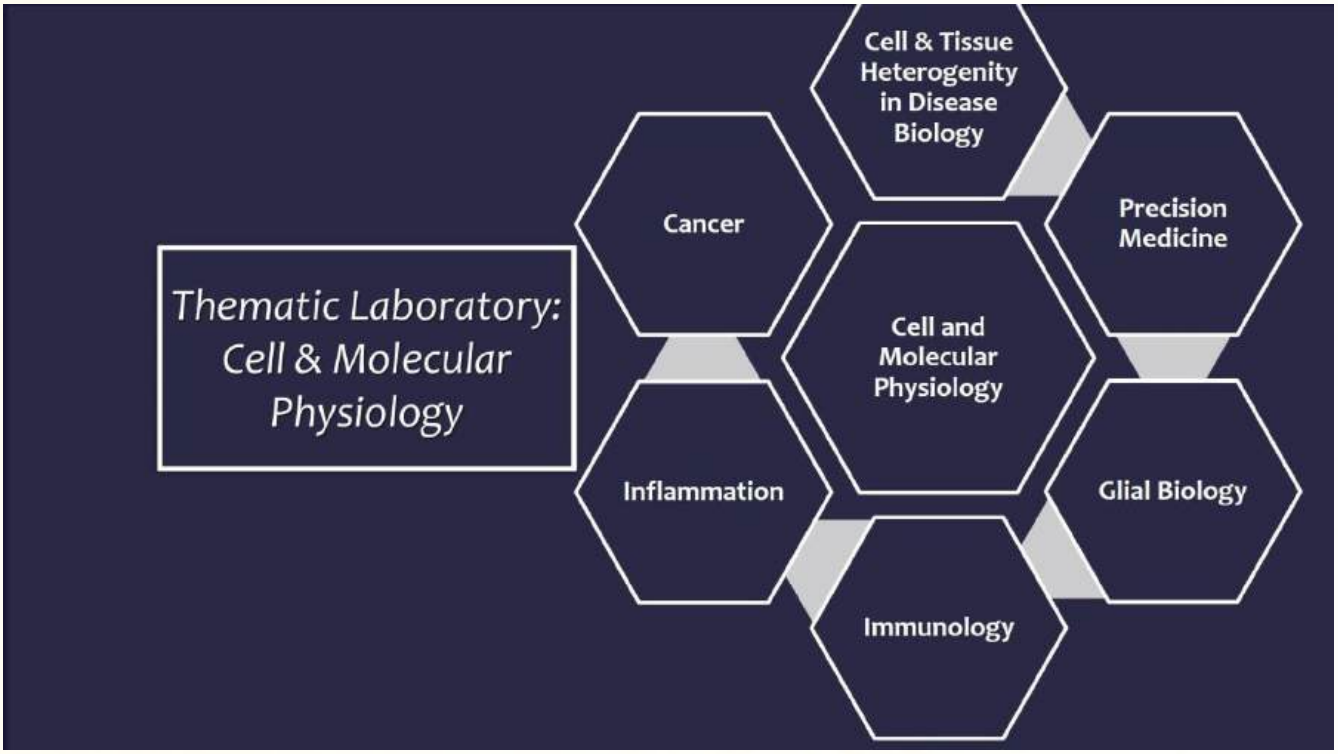
The following new faculty members joined the department during this financial year.

Faculty Members & Research Areas

Neeraj Jain
Neuroscience/Mammalian Sensory and Motor Systems; Tactile Information Processing; Brain Plasticity; Spinal Cord Injuries; Brain-Computer Interface; Brain Networks

The following laboratories are functioning in the Bioscience and Bioengineering department.

1. Cell and Molecular Physiology

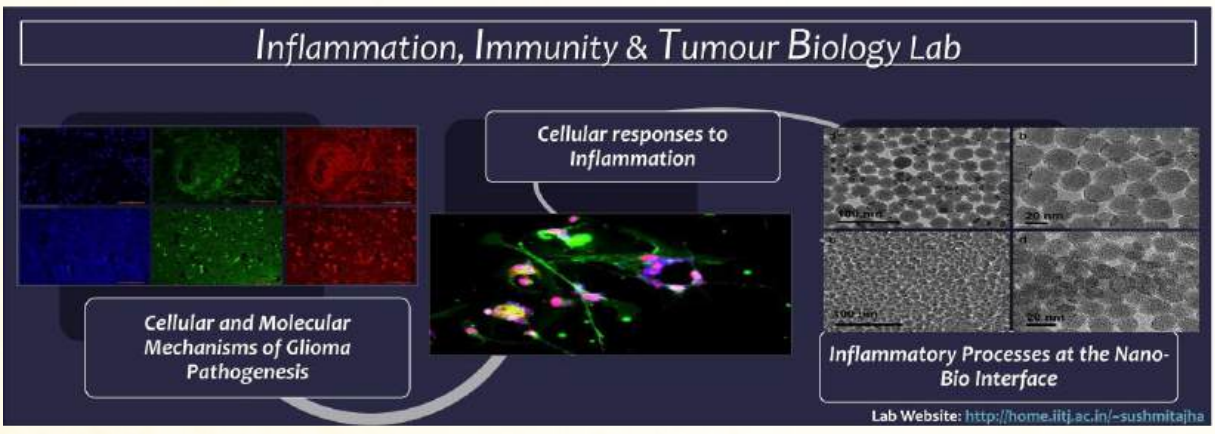


Groups under this theme

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.

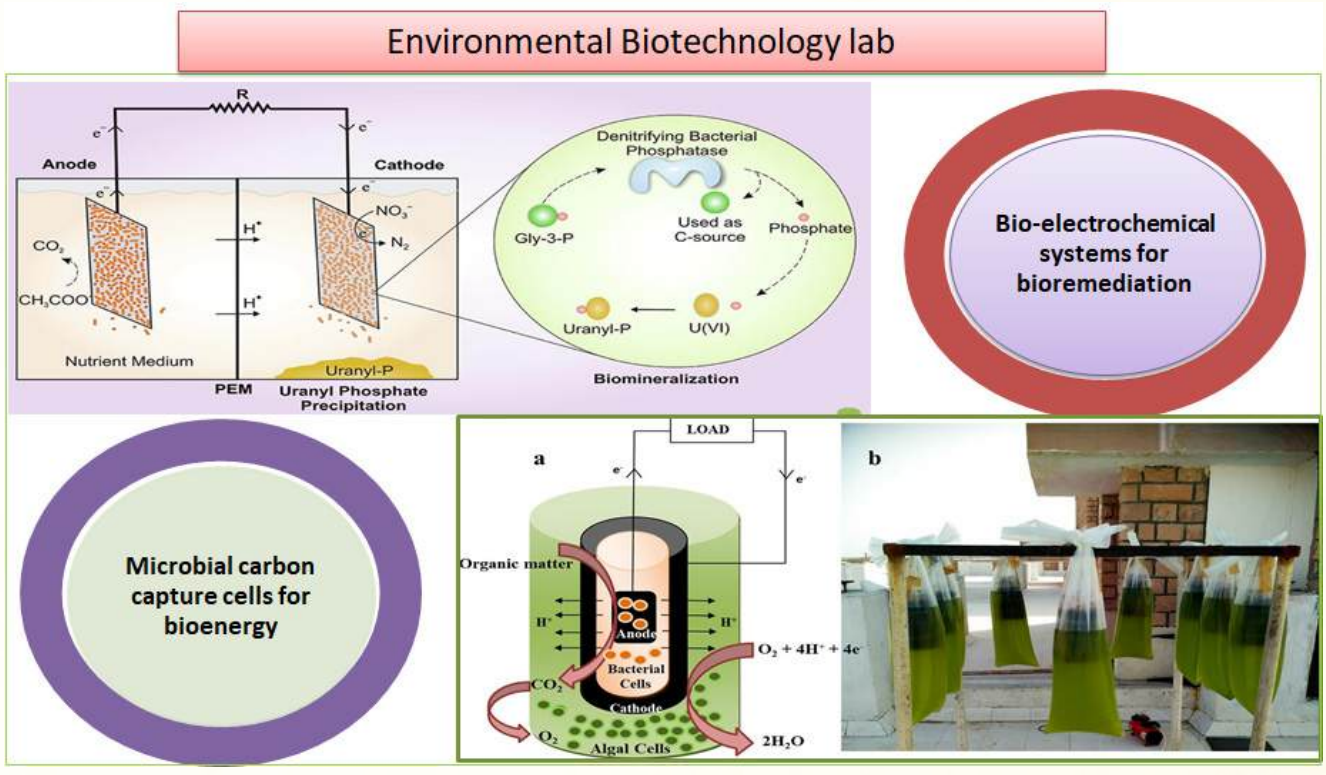
In this regard, the laboratory has established collaborations with colleagues from within the department of bioscience and bioengineering, within the institute (department of computer science, mechanical engineering and humanities & social sciences) and across institutions (AIIMS Jodhpur and ACTREC, 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 IIT Jodhpur. 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.

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

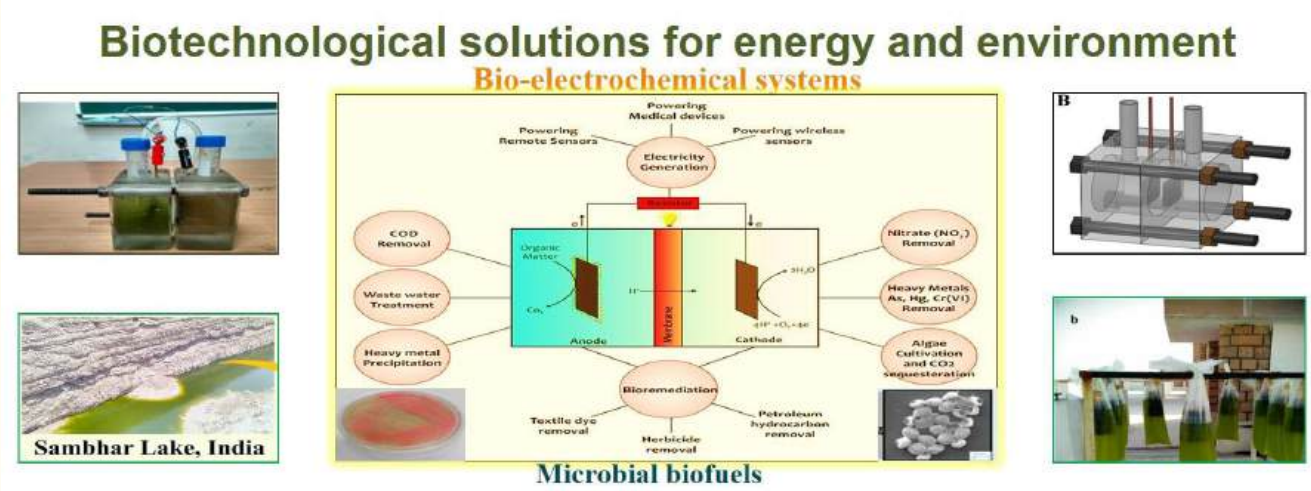
2. Environmental Biotechnology Laboratory



Environmental biotechnology thematic lab at IIT Jodhpur 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

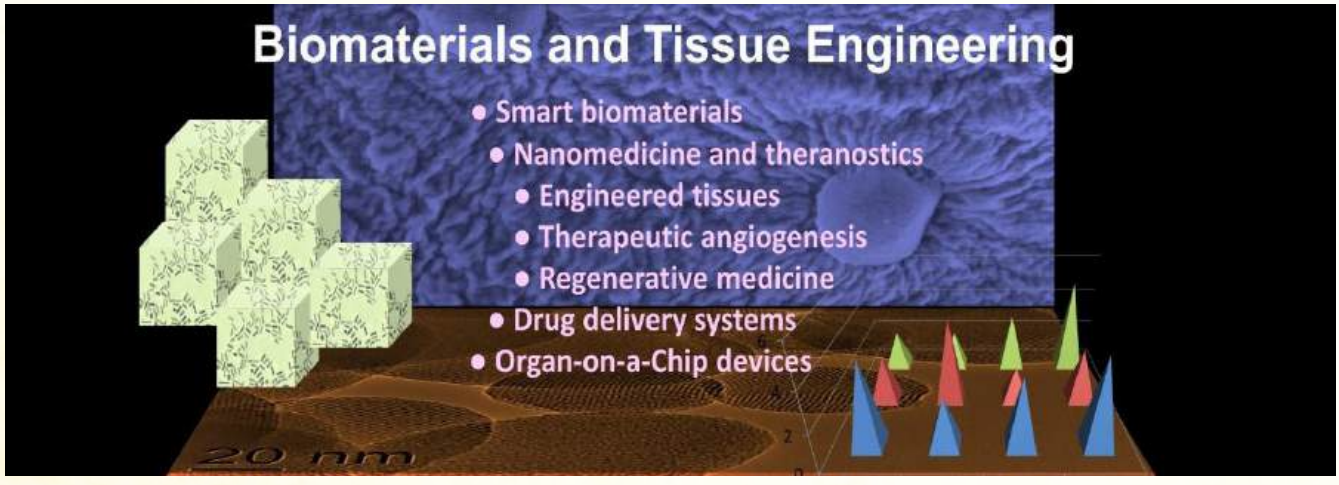
1. Bioenergy & Bioremediation Group



The Environmental Biotechnology Laboratory at IIT Jodhpur carries out research in the areas of bioenergy and bioremediation. Researchers in the lab investigate 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 have 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.

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

3. Biomaterials & Tissue Engineering Laboratory

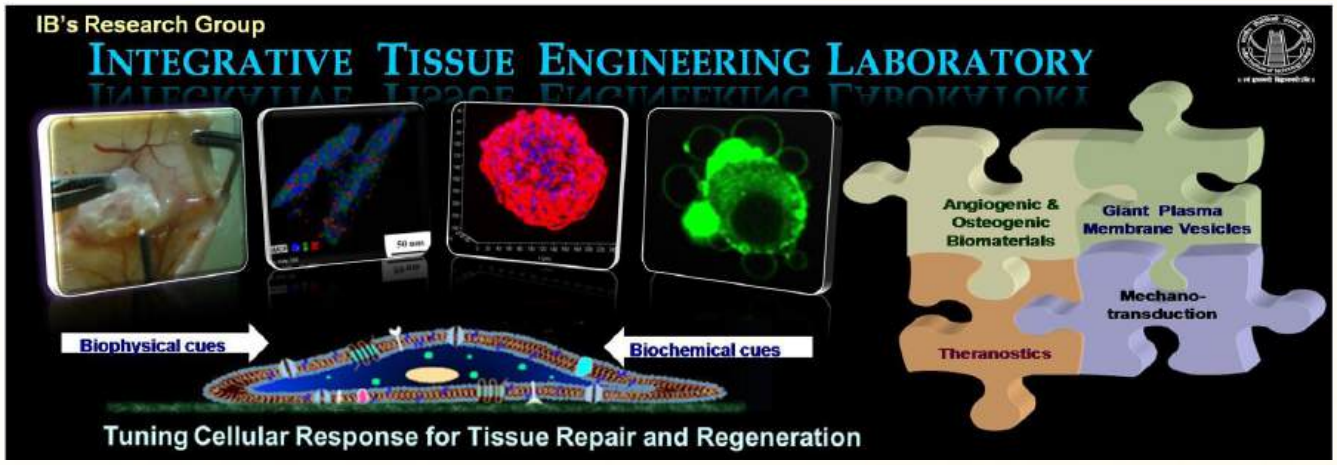


Biomaterials and Tissue Engineering is a transdisciplinary knowledge domain and encompasses sub domains of material science, chemistry, physics, cell and molecular biology, chemical engineering, mechanical engineering, nanotechnology and microfluidics. Rapid evolution of biomaterials and tissue engineering 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 certainty such factors can be manipulated spatio-temporally to engineer the outcome of tissue engineering and regenerative medicine.



In pursuance of the goal, a trans-disciplinary approach has been adopted 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

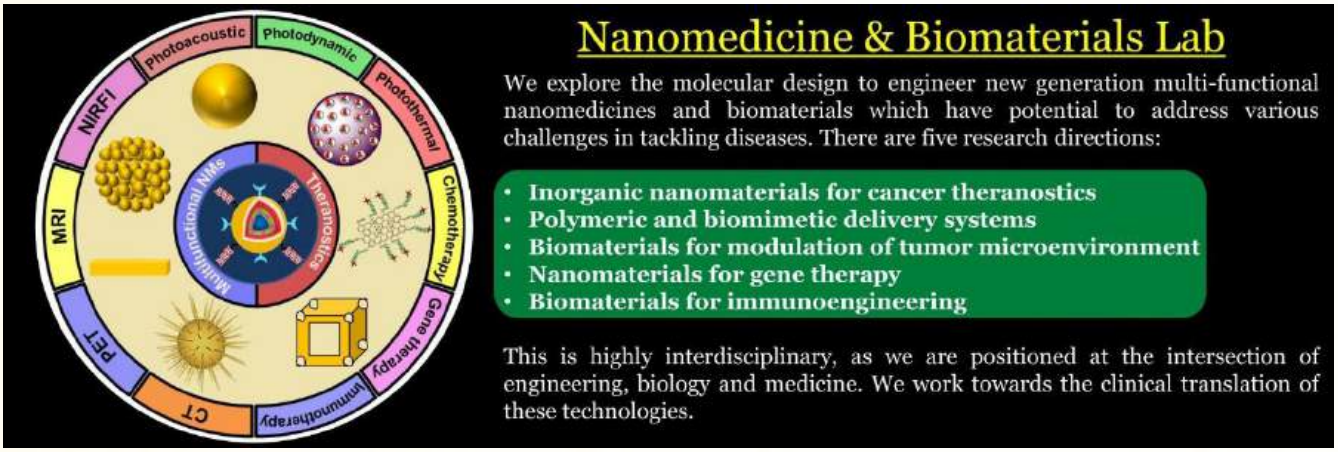
(ii) Mechanistic analysis of osteogenic differentiation and biomaterial induced osteogenesis

(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

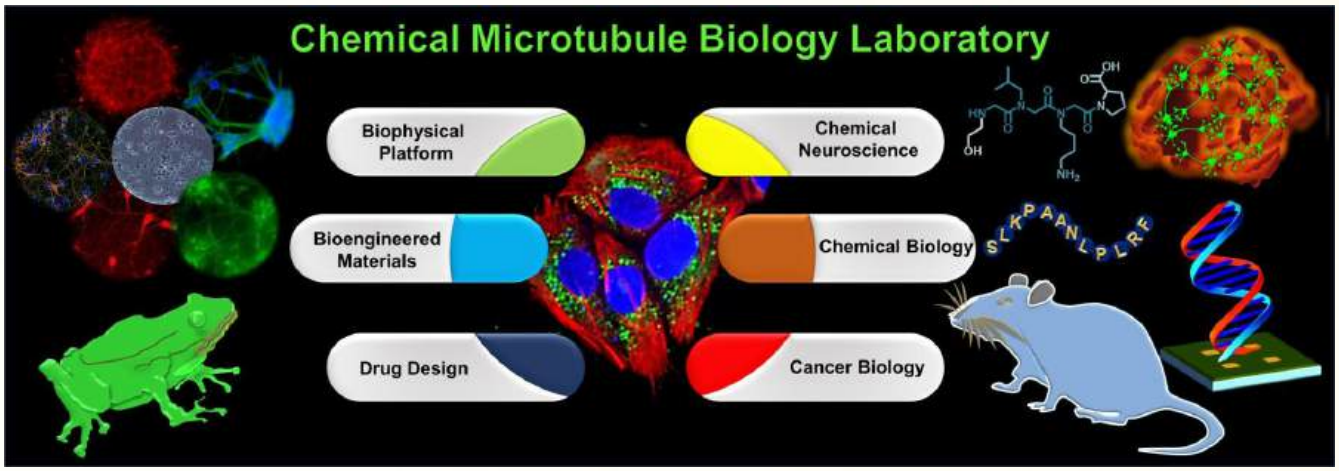
Chemical Biology by definition known as a scientific discipline across the fields of chemistry and biology that includes application of chemical techniques, tools and synthetic compounds for the study and manipulation of biological systems. Chemical Biology research theme originated in the 1990s.

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 developments 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.



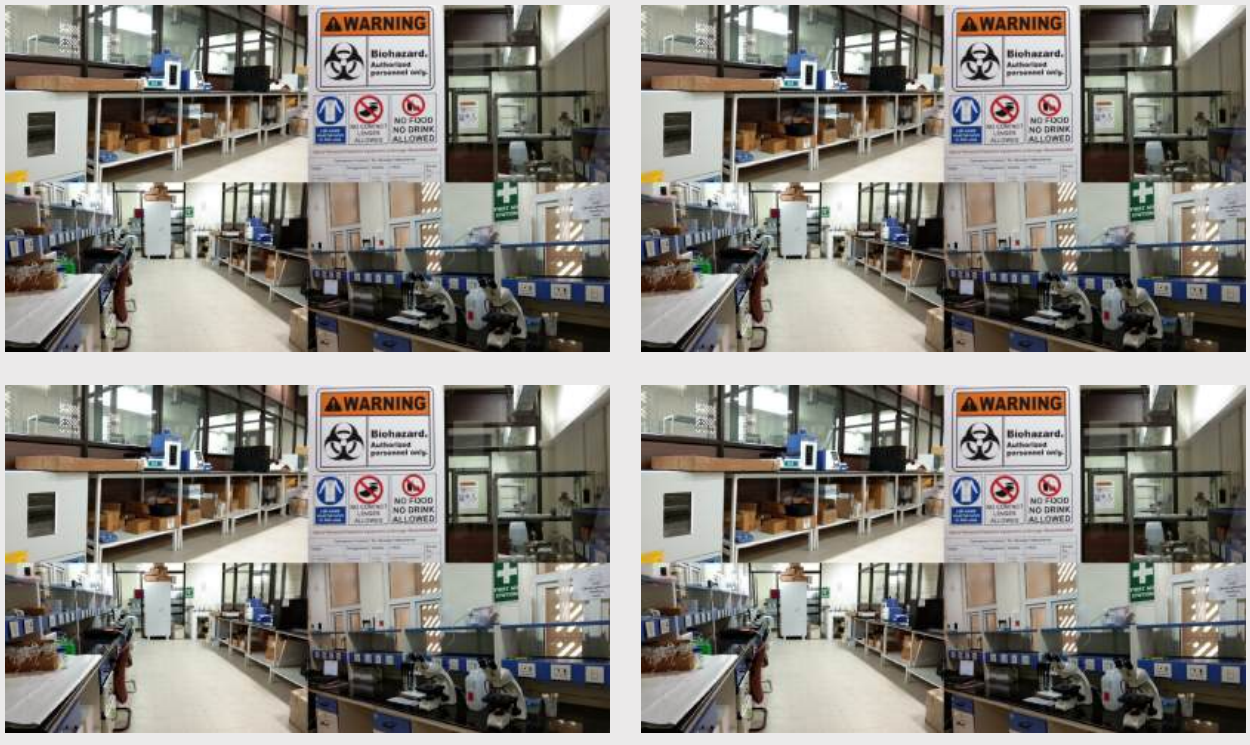
Microtubules perform a large number of functions in neurons such as cargo transport, neuronal migration, maintaining polarized structures, to name a few. Microtubule stability is not only critical for the neuronal polarization process fundamental to their development and plasticity, but has a role in 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, the 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 models 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 the 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

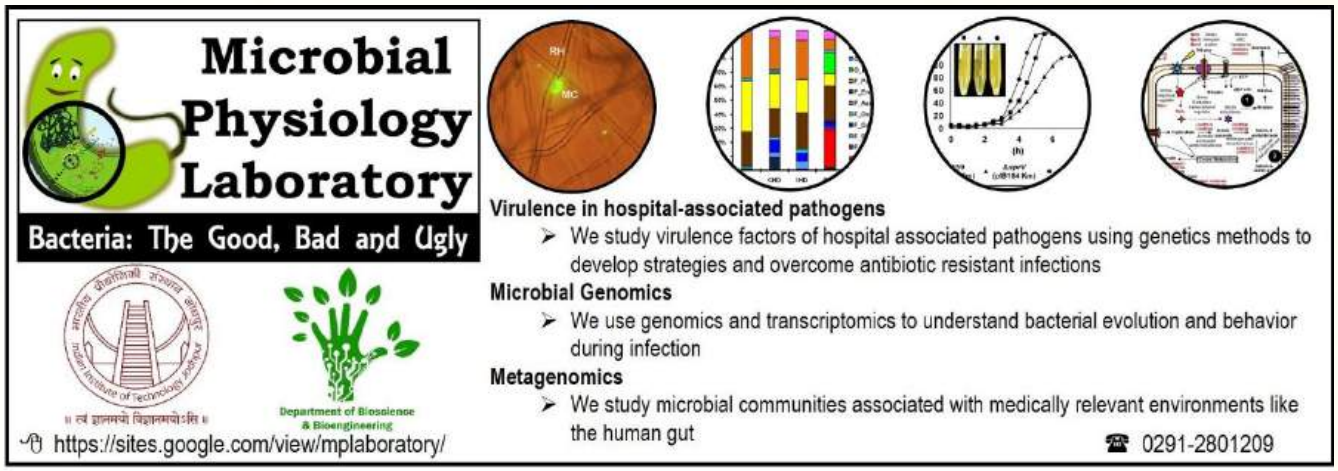
The Microbial Physiology laboratory (MPL) has two major focus areas:

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

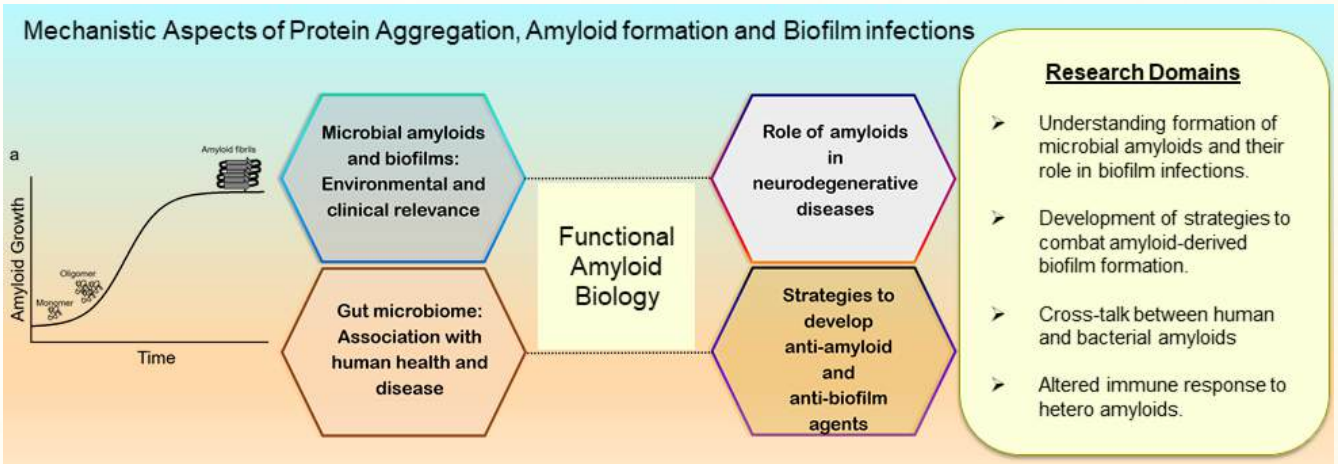
   We explore the human gut microbiota in the context of health and diseased states to identify patterns that contribute to a better physiological state



2. Biofilms & Amyloid Biology Group

This is an exclusive group with diverse yet overlapping interests. The research in the 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 models. 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.



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

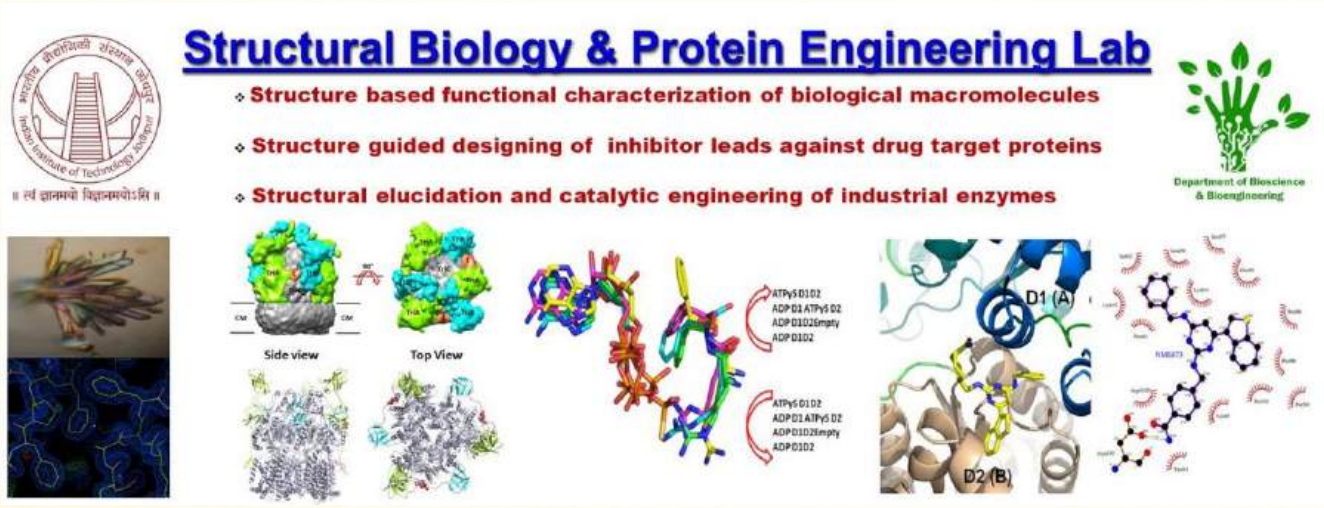
6. Biophysics Laboratory

"Seeing is believing" … according to this famous quote, visual inspection paves the most convincing way to divulge naturally occurring phenomena. In the 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

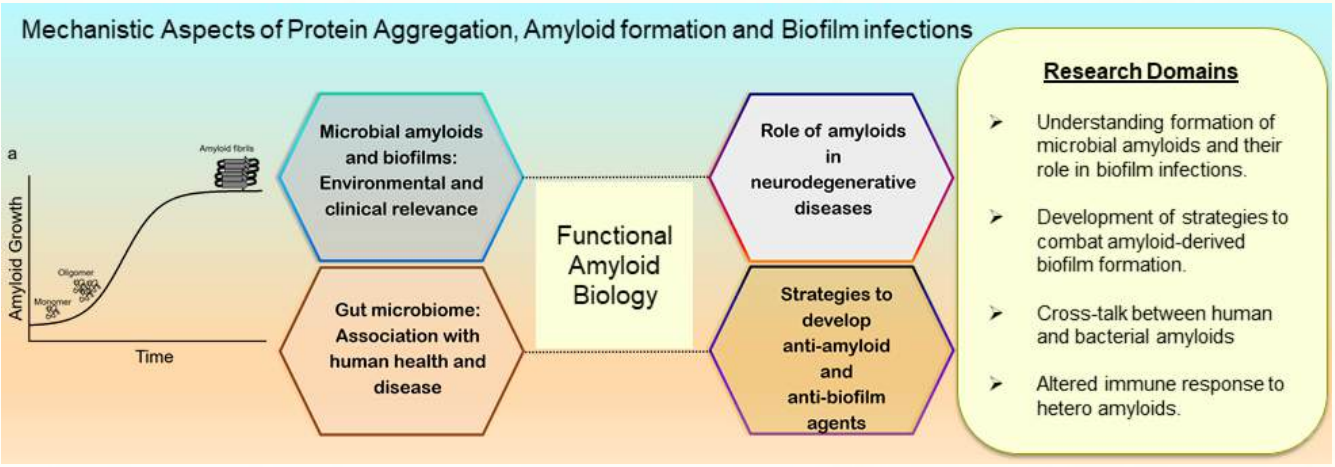
1. Structural Biology & Protein Engineering Group

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 us 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.

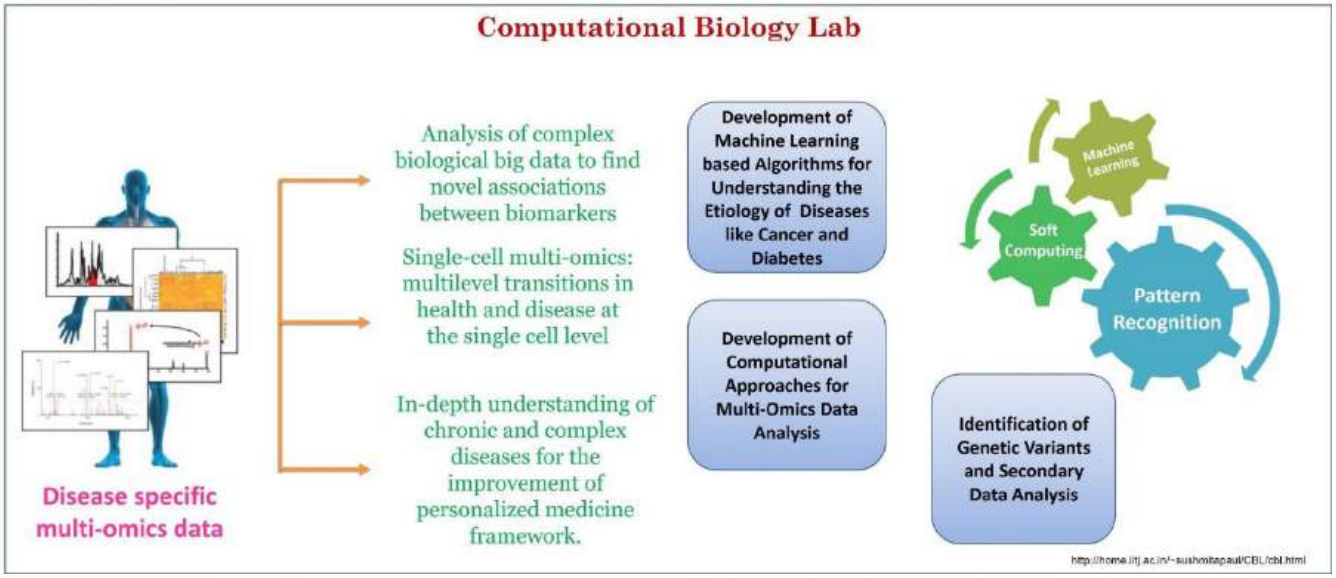
Groups under this theme

1. Computational Biology Group

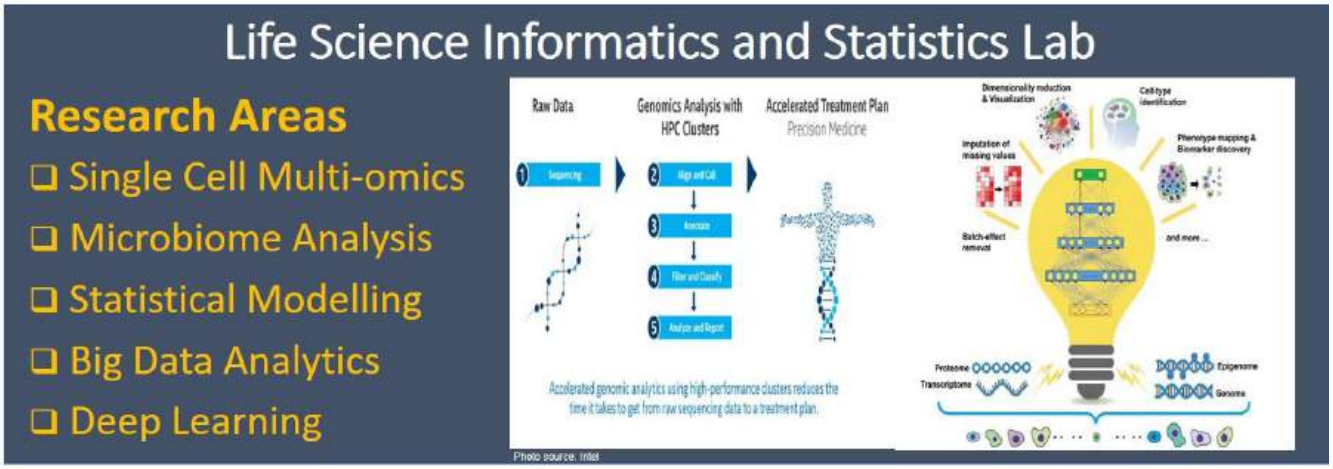
Computational Biology Lab (CBL) is established to carry out fundamental and advanced research in the fields of computational biology and bioinformatics. Dr. Sushmita Paul's research group carries out research in multi-omics data analysis, development of pattern recognition algorithms for analysing high 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 subtypes. 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 the Indian population, sub-grouping of the 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.

1. Servers
2. Workstations
3. Desktops

Software Developed

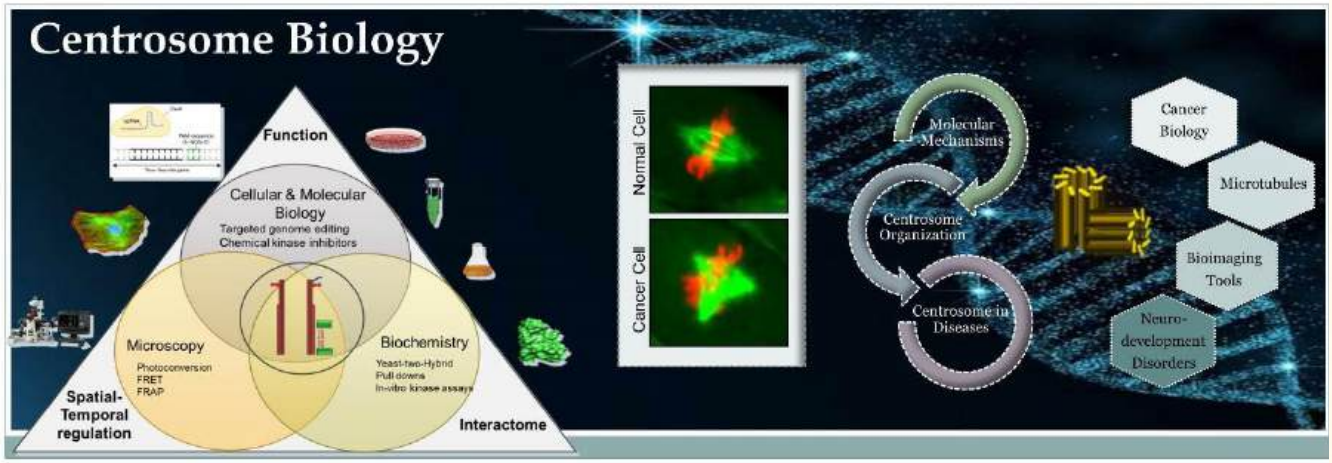
RFCM3 (http://home.iitj.ac.in/~sushmitapaul/CBL/softwares.html)

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.

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

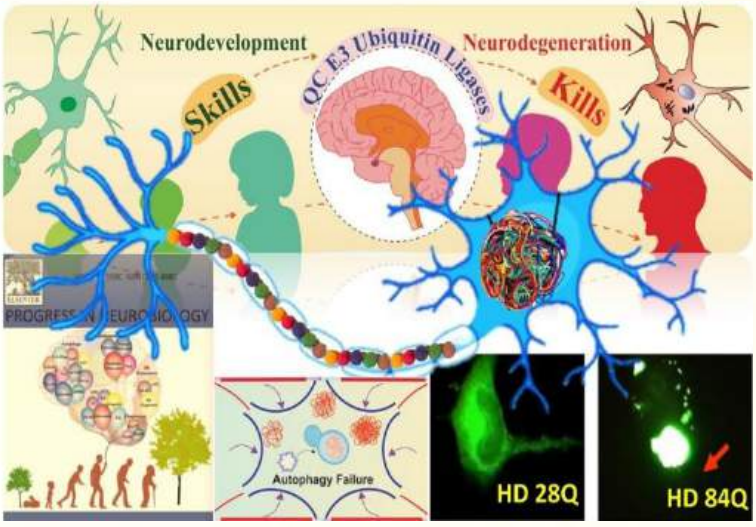
9. Neuroscience & Neuroengineering Laboratory

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 a 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.



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. Real Time PCR
10. Thermal cycler
11. Electrophoresis systems
12. Automated cell counter
13. Sonicator
14. Gene pulser system
15. Cryotome

Outreach

The following Outreach activities have been undertaken by the Faculty Members at IIT Jodhpur During the FY 2020-21.

1. Dr. Sushmita Paul delivered a plenary lecture at Faculty development programme on Effective Teaching and Learning Practices in Computational Biology, Organized by the Department of Biotechnology, In Association with the teaching learning centre, NIT Warangal, March 2021.
2. Dr. Sushmita Paul delivered 14th IBSE Seminar at the IIT Madras, December 2020.
3. Dr. Sushmita Paul delivered Invited talk at the Inbix2020, December 2020.
4. Dr Sushmita Jha Organized a Workshop on Medical Technologies on 25th Sep 2021
5. Dr Sushmita Jha Initiated and organized The Biodesign Talk series. The First talk was organized on 10th July 2021.
6. Dr Sushmita Jha was one of the co-organizers of the NeuroFem India International conference organized by BiaswatchIndia and Alba Network, 9-11th April 2021
7. Dr Sushmita Jha delivered an invited talk at 4th Global Cancer Summit, 2021 Biogenesis Health Cluster, Online, 24th April 2021
8. Dr Sushmita Jha delivered an invited talk at Bioroom, a virtual biology seminar series across the globe, Online, 29th Sep 2020
9. Dr Sushmita Jha presented research at The American Association of Immunologists Annual Meeting, organized by the AAI, Online 10-15th May 2021
10. Dr Sushmita Jha was selected for the EMBO | EMBL Symposium: Organoids: Modelling Organ Development and Disease in 3D Culture, Virtual 21 – 24th October 2020
11. Dr Sushmita Jha, was an invited speaker at the 'Career Convention' event held at Sri Aurobindo Centre of New Education, 24 July 2021.
12. Dr. Priyanka Singh was part of the organizing team for the 1st International Conference on Data Science in Biology (Sep 3 – 5, 2020)
13. Dr. Neha Jain was one of the panelists for the panel discussion on 'Taking India Biofilms Society outside India' on 27th Feb 2021 organised by Indian Biofilm Society.
14. Dr. Pankaj Yadav co-organized 1st International Conference on Data Science in Biology (Sep 3 – 5, 2020).
15. Dr. Pankaj Yadav organized the FDP Workshop on Advances in Bioinformatics sponsored by the Ministry of Electronics and Information Technology (MeitY), NIT, Warangal, India.
16. Dr. Pankaj Yadav organized the FDP on Computer Science and Biology sponsored by ATAL academy, MNIT, Jaipur, India.
17. Dr. Raviraj Vankayala was 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" (6 June 2020).
18. Dr. Raviraj Vankayala was invited as a speaker in a national webinar organized by Vignan College of Pharmacy, Guntur, Andhra Pradesh and delivered a talk entitled "Engineering Inorganic and Biomimetic Nanostructures for Theranostic Applications" (26 June 2020).
19. Dr. Raviraj Vankayala was invited as a speaker at KPR Institute of Engineering and Technology (KPRIET), Coimbatore and delivered a talk entitled "Nanomaterials for Biomedical Applications" (15 July 2020).
20. Dr. Surajit Ghosh organized the second Industry Day of IIT Jodhpur, 12-13th March 2021
21. Dr. Surajit Ghosh organized the Virtual ROADSHOW on Inauguration of BIRAC-BioNEST Incubator @TISC, IIT Jodhpur, 22nd February 2021
22. Dr. Surajit Ghosh organized the Virtual Roadshow/Web seminar on Vigyan se Vikas-Showcasing Potential, Journey and Impact of Biotechnology on the Society, 28th June 2021
23. Dr. Indranil Banerjee delivered a keynote address in the International conference on new horizons in pharmaceutical research-2021 (ICNHPR-2021), organized by the Indian Society of Technical Education, (New Delhi, India) and Kanak Manjari Institute of Pharmaceutical Sciences (Odisha, India)
24. Dr. Indranil Banerjee delivered an invited talk at "Water, Energy and Environment: Challenges and Solutions (WEE-2021)" organized by GITAM, Hyderabad.
25. Dr. Indranil Banerjee delivered an invited talk at Bioengineering Conference 2020, NIT Rourkela, Odisha, India.
26. Dr. Shankar Manoharan delivered a lecture on "Gut microbiome analysis" as an invited speaker in a Refresher Course on "Recent Trends in Lifesciences" organized by the Human Resource Development Centre, Madurai Kamaraj University.
27. Dr. Shankar Manoharan was selected to attend an EMBO Laboratory Leadership course organized by the DBT/ Wellcome Trust India Alliance (India Alliance) and EMBO.

Department of Civil & Infrastructure Engineering

The Department of Civil and Infrastructural Engineering came into existence in the Year 2020. 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 have 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 systems.

Faculty Members & Research Areas

Ranju Mohan
Head of the Department
Traffic flow theory; Macroscopic and Microscopic modelling of traffic flow; Connected and autonomous vehicles; Dynamic Traffic Assignment

Amit Kumar Rathi
Reliability analysis and design, uncertainty quantification, stochastic modelling and mechanics, laminated composite materials, vibration control and structural health monitoring

Amit Sharma
Atmospheric Chemistry; Air Pollution; Climate change; Impact on crops and human health

Bhupendra Singh
Sustainable Pavement Materials, Pavement Analysis, Pavement Design

Debanjan Guha Roy
Rock mechanics; Reservoir geomechanics, Engineering geology; Poromechanics

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

Pradeep Kumar Dammala
Earthquake Geotechnics, Seismic Soil Liquefaction, Soil-Structure-Interaction, Ground Improvement and Soil Stabilization, Physical and numerical modelling in geotechnics, Sustainable geotechnics

P. Ravi Prakash
Computational Mechanics, Structural Fire Engineering, Application of AI in Structural Engineering

Tekcham Gishan Singh
Thin-walled Structures; Tubular Steel Structures; Cold-formed, hot-rolled & welded steel structures; Perforated Steel Structures; Steel-concrete composite structures.

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

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

Outreach

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

1. Dr. Amit Kumar Rathi delivered invited talk at AICTE sponsored online STTP on Structural Health Monitoring and Seismic Protection of Structural and Infrastructural Systems (Phase-IV), Bannari Amman Institute of Technology, Erode, India during 05-10 October 2020.
2. Dr. Amit Kumar Rathi delivered an invited talk at online STC on Advances In Structural Engineering (ASE2021), National Institute of Technology Hamirpur, Hamirpur, India during 11-15 January 2021.
3. Dr. Amit Kumar Rathi delivered expert talk at TEQIP III sponsored STTP on Advances in Earthquake Resistant Design of Structures (AERDS2021) at Sardar Vallabhbhai National Institute of Technology, Surat, India during 18-22 January 2021.
4. Dr. Amit Kumar Rathi participated in the DRI Dialogue for Coalition for Disaster Resilient Infrastructure (CDRI) – Academia collaboration at New Delhi during 4-5 March 2021
5. Dr. Pradeep Kumar Dammala was an expert speaker for FDP program titled "Earthquake Geotechnics" organized by NIT Andhra Pradesh during 22nd and 26th September, 2020
6. Dr. Ranju Mohan served as a Program Committee member for the 13th International Conference on COMmunication Systems & NETworkS (COMSNETS 2021), January 5-9, Bengaluru, India.
8. Dr. Bhupendra Singh has delivered two lectures in the Faculty Development Programme on "Design and Evaluation of Flexible Pavements in Indian Context" at IIT Jammu on 02nd February, 2021.
9 Dr. Bhupendra Singh has delivered three lectures on "Characterization of Bitumen", "Design of Hot Bituminous Mixes" and "Design of Warm & Cold Bituminous Mixes" during the Training Program on "Pavement Materials & Quality Control – Part-1 at VNIT Nagpur on 18th and 19th Feb 2021.

Department of Chemical Engineering

The vision of the Department of Chemical Engineering is: 'To become a globally recognized department of chemical engineering through its contribution in emerging and demand-driven areas with a multidisciplinary approach.' With this vision, under-graduate (B.Tech.) and post-graduate (M.Tech., M.Tech.-Ph.D. and Ph.D.) programs in Chemical Engineering were started and the first batch of students were admitted with the mission to:

- empower students with fundamentals of chemical engineering and emerging concepts.
- become a center of excellence in process engineering intelligence, molecular engineering and sustainability.
- To engage in a research program for translation of molecular information into discovery of sustainable products and processes.
- To create a research ecosystem which encourages students and research scholars to find solutions for diverse environmental and societal issues as a part of the social scientific responsibility.
- To become a net positive department through start-up culture, consultancy, technology transfer, industry-academia interaction.

The main goals of the Department are focussed on (i) imparting knowledge in core domains of chemical engineering as well as emerging and demand-driven areas, which would enable the students to convert challenges into opportunities; (ii) collaborative programs with industry and other academic institutes for constant upkeep of skills in line with industry

needs, delivering high impact research and contributing to modernization of local industrial traditions; (iii) become lead institution in thrust research areas and develop centers of excellence in Molecular Engineering, Sustainability and Process Engineering Intelligence; and (iv) gradual generation of financial resources.

Chemical Engineering Department is sharing its expertise with the Jodhpur District Administration (JoDA), Bureau of Indian Standards (BIS); 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 a MoU with the industries for providing consultancy services. Department is also actively involved in Scientific Social Responsibility (SSR), setting up several water purification units for providing clean drinking water to students in rural and remote schools in the neighbourhoods and other societal initiatives.

Department enjoys the benefit of the guidance from Professor Devang Khakhar, Former Director, Indian Institute of Technology Bombay. Professor Khakhar is associated with the Department of Chemical Engineering as Scholar-in-Residence.

Devang Khakhar
Scholar-in-Residence

The following Faculty Members are 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.

Angan Sengupta
Atomistic and Molecular to Multi-scale Modelling & Simulations for Free Energy Calculation of Various Type of Surfaces; Theoretical Material Design for CO2 capture, H2 storage, Water Treatment & Fuel Cell; Continuum Modelling & Simulations, Transport Process Modelling & Simulations; Fire and Explosion Modelling & Simulations, Safety & Reliability Modelling & Simulations

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

Nirmalya Bachhar
Multiscale modeling, Colloids and nanomaterial, Polymer nanocomposite

Praveen Kumar Sappidi
Multiscale modeling, Molecular simulation, Free energy simulations, Contaminant separation materials, Ionic liquid based solvents, Polymeric materials

Prasenjit Sarkar
Biochemical engineering, Biomolecular engineering

Prashant Kumar Gupta
Electrochemical Energy Storage Devices (Lithium, Sodium and Zinc Ion Battery), Electrocatalysis (HER, OER, CER, and Electrochemical CO2 Reduction), Electrochemical Biosensors

Ramesh Asapu
Photocatalysis: Application in environmental remediation. Metal halide perovskites, Plasmonic nanomaterials. Physical Systems Modeling: Photocatalytic Reactors, Automotive and Building HVAC systems.

Vikky Anand
Electrohydrodynamics; Multiphase flow; Eharlectro-desalting for water-in-oil emulsion system; Soft matter; Rheology of crude oils.

Outreach

The following Outreach activities have been undertaken by the Faculty Members at IIT Jodhpur during the FY 2020-21.

1. Prof. Pradip Tewari along with the team of Dr. Nirmalya Bachar, Dr. Angan Sengupta, Dr. Prashant K Gupta, Dr. Vikky Anand is involved in the develop ment of oxygen concentrators.
2. Prof. Pradip Tewari, Dr. Prashant K Gupta, Dr. Vikky Anand, have visited the local plants in Jodhpur and suggested operational and performance improvements in the production of oxygen.
3. Prof. Padip Tewari and Dr. Vikky Anand have visited textile and steel plants to provide technical support/suggestions to maintain the water quality in wastewater treatment plants.
4. Through Centre for Emerging Technologies for Sustainable Development (CETSD), proactive measures were continued by the Department to ensure clean water for drinking in primary and secondary schools of (i) Khadaat village in Sirohi district, (ii) Dhanuri village in Pindwara of Sirohi district, & (iii) Luna villages in Jhunjhunu district during the pandemic time by designing and installing ultra-filtration membrane assisted adsorption based water purification units. Membrane based units were installed in two more schools in Jheepasini village and Roodiya village. One unit was installed for treatment, recycle and reuse of greywater in a school of Jheepasini village during the pandemic. It has provided critical support to the student's health, capacity building and awareness.
5. Dr. Nirmalya Bachar has visited the MDM Hospital Jodhpur to help in their in-house oxygen plants.
6. The first Industrial Day of the Chemical Engineering Department of IIT Jodhpur was organized on 12th June2021. The event was inaugurated by our beloved Director Prof. Santanu Chaudhury, and featured webinars from organizations such as the Centre for Cellular and Molecular Platforms (C-CAMP, a DBT-supported organization) and Algo8. This event was organized to increase the academia industry interaction helping students in exploring career options, and provide motivation for startups and possible collaborations.
7. Talk by Dr. Angan Sengupta in Faculty Development Program sponsored by AICTE-ISTE at Department of Chemical Engineering, Gharda Institute of Technology, Lavel
8. Dr. Angan Sengupta is a member of DLJ-IIT Jodhpur.
9. Dr. Angan Sengupta and Professor Pradip Tewari are involved in research work with Algo8 to provide solutions on Heat Exchanger Networking and Fouling problem to IOCL.
10. Invited talk was delivered by Dr. Prashant Kumar Gupta in one-week faculty development program on 'Renewable and Clean Energy Conversion Technologies and Materials' organized under TEQIP-III by JNTUA Anantapur & Bikaner Technical University.
11. Keynote address was delivered by Prof. Tewari on 'Sustainability: Water, Energy, Environment Nexus' during International webinar organised by MNIT Jaipur (21-23 March 2021)
12. Keynote address was delivered by Prof. Tewari on 'New Strategies in Water Treatment and Desalination' during International Water Day Webinar organised by Indian Desalination Association & NIOT Chennai on 22 March 2021.

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 Continuous Flow Chemistry

Subrata Chakraborty
Organometallics, Homogeneous Catalysis

Dibyendu Kumar Sasmal
Assistant Professor
Biophysical chemistry; Single molecule fluorescence imaging; T cell immunology; Ion channel and neurotransmitter; Femtosecond ultrafast fluorescence spectroscopy; Fluorescence correlation spectroscopy; Electrophysiology: Single channel patch-clamp

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.

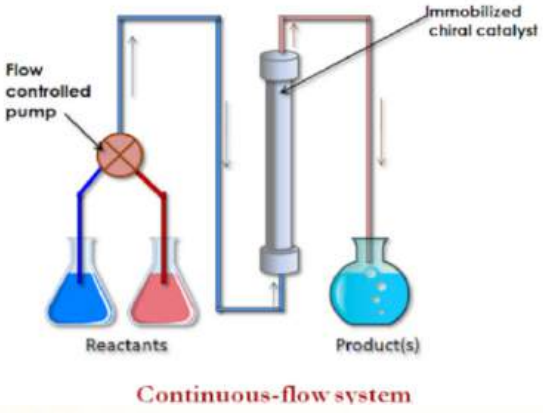



Research Laboratories

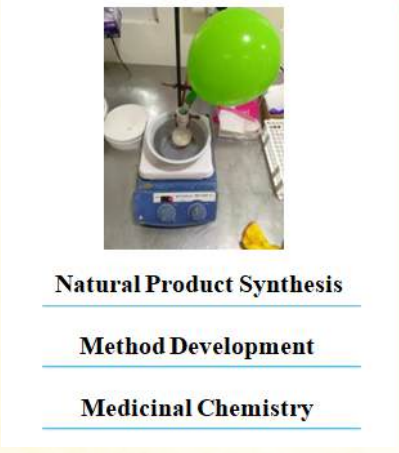
The Department of Chemistry has set up 7 thematic research laboratories for advanced experimental research activities for PhD scholars, project staff and Post-Doctoral Researchers. The details of the research, experimental facilities etc. can be found under the webpages of individual faculty users of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



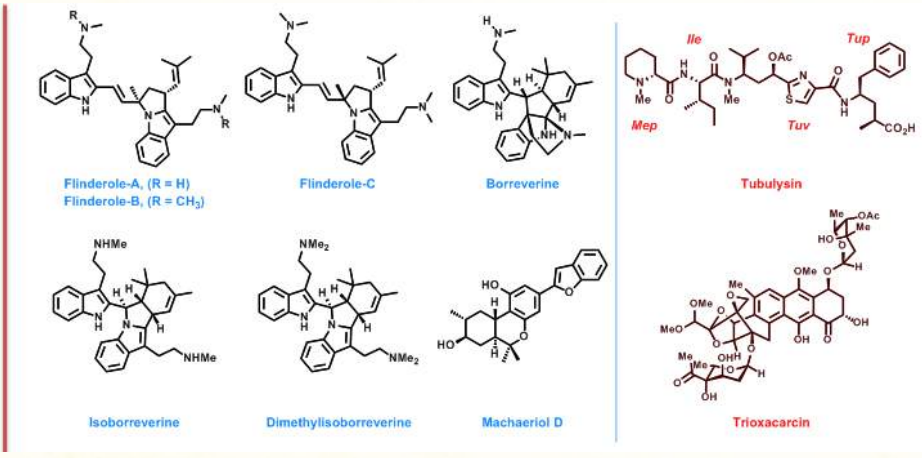
The other research group mainly focuses on the total synthesis of biologically important Natural Product. We are highly interested in method development like metal catalysis, organocatalysis, Lewis acid catalysis and cascades of reactions to resolve the complexity of targeted natural products in access 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.



Natural Product Synthesis

Method Development

Medicinal Chemistry



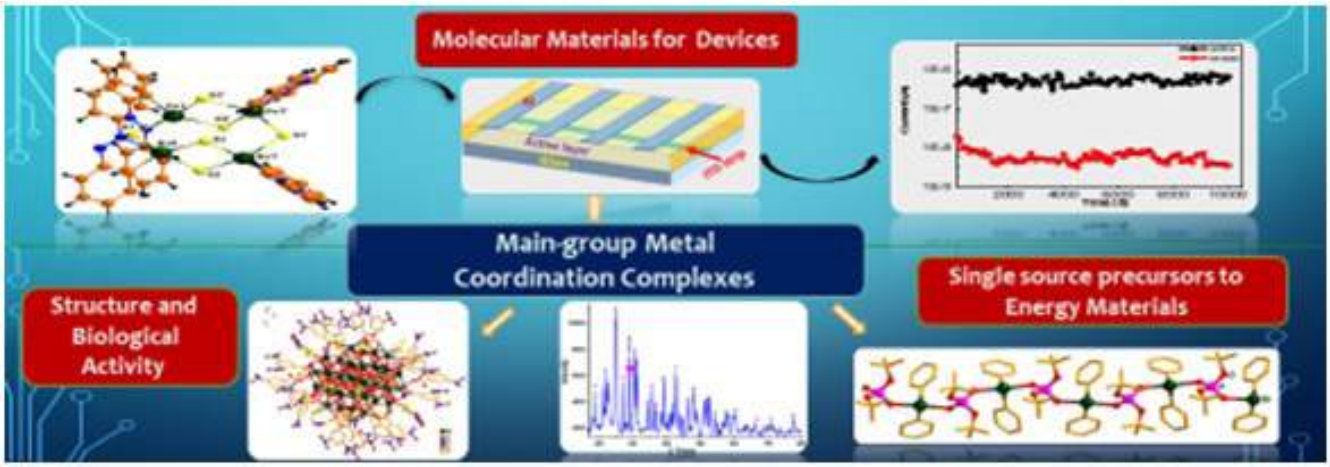
2. C-H functionalization and Photoredox Catalysis Laboratory

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.

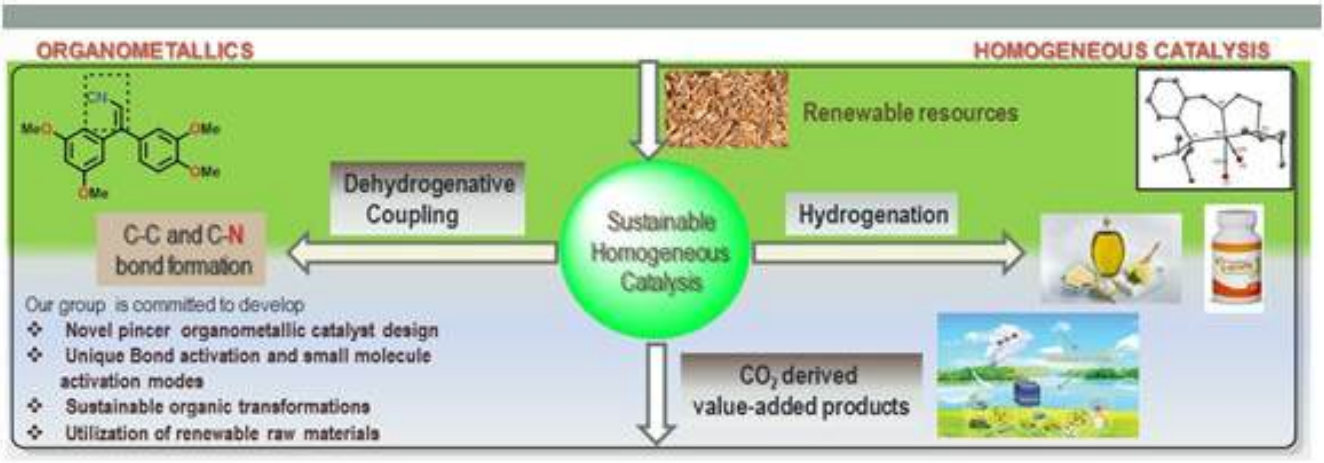
The research group working in this laboratory is dedicated to develop novel sustainable synthetic methods towards molecules of medicinal importance. To this endeavor the group has embarked on developing a diverse array of transition metal catalyzed and metal-free synthetic transformations. The research 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. Dr. Sandip's 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.



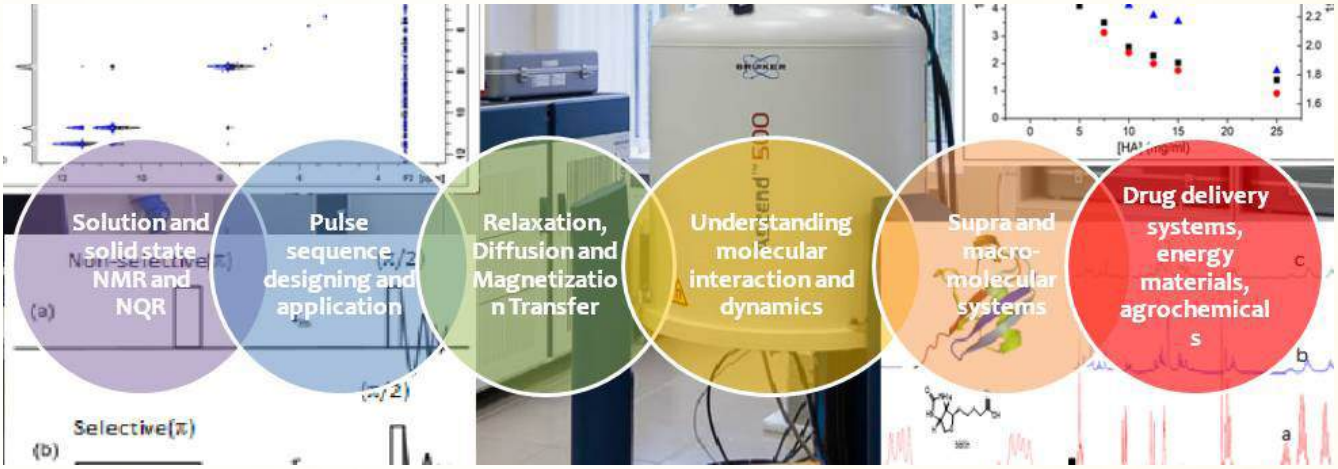
One group is interested to develop and study Main-group organometallic complexes, with focus on applications into materials chemistry. In an effort to gain better understanding of structure and properties of the Main-group Organometallic Complexes, design involving intramolecular coordination approach 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.



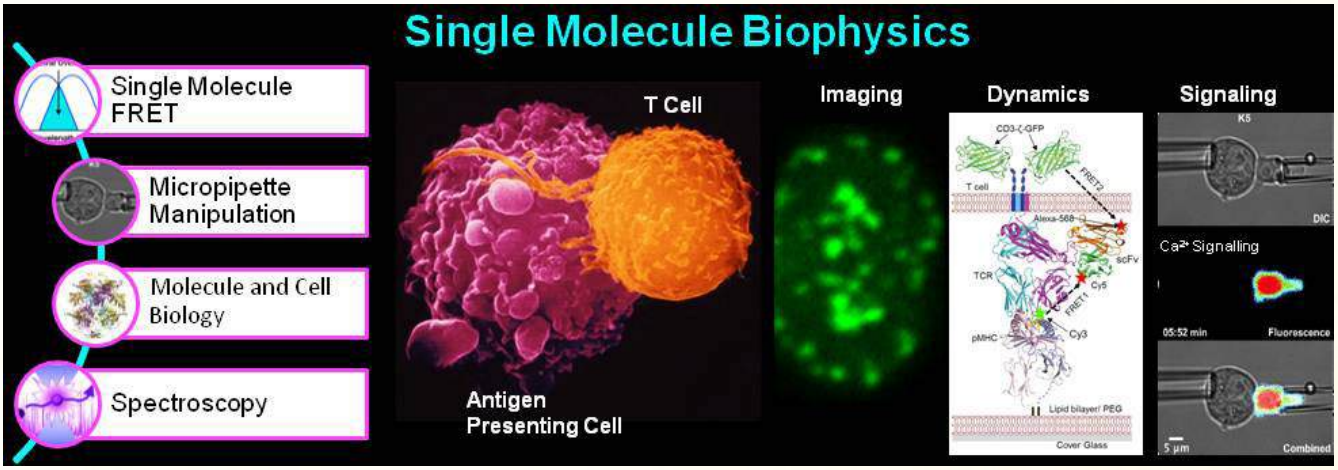
The other group is committed to develop and study Organometallic Catalysis, which shape and guide the processes of the Industry. In an effort to gain better understanding of the transition metal complexes, design of new pincer ligand based organometallic complexes, study their reactivity towards inert 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.

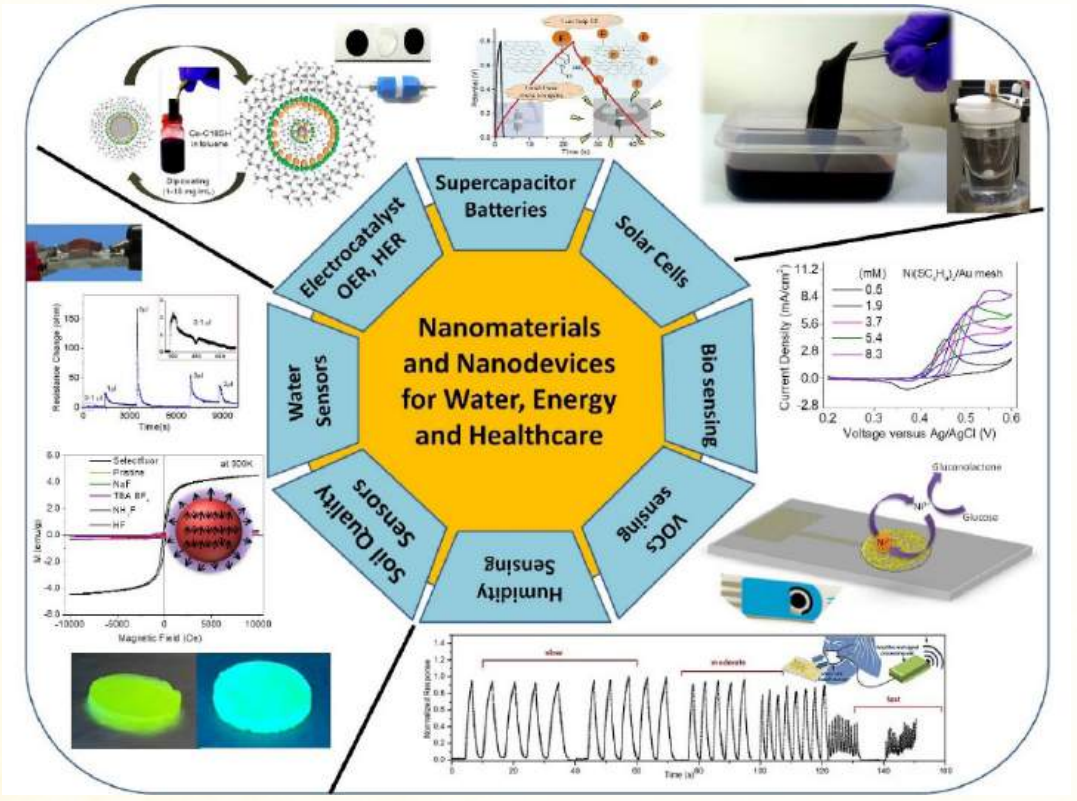


The other research group works to unravel complex sub-cellular functions and dynamics at single-molecule level combining multidisciplinary research areas in molecular/cellular biology, physical chemistry, time-resolved fluorescence spectroscopy, and fluorescence microscopy. The research group is focused 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. Sasmal 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.

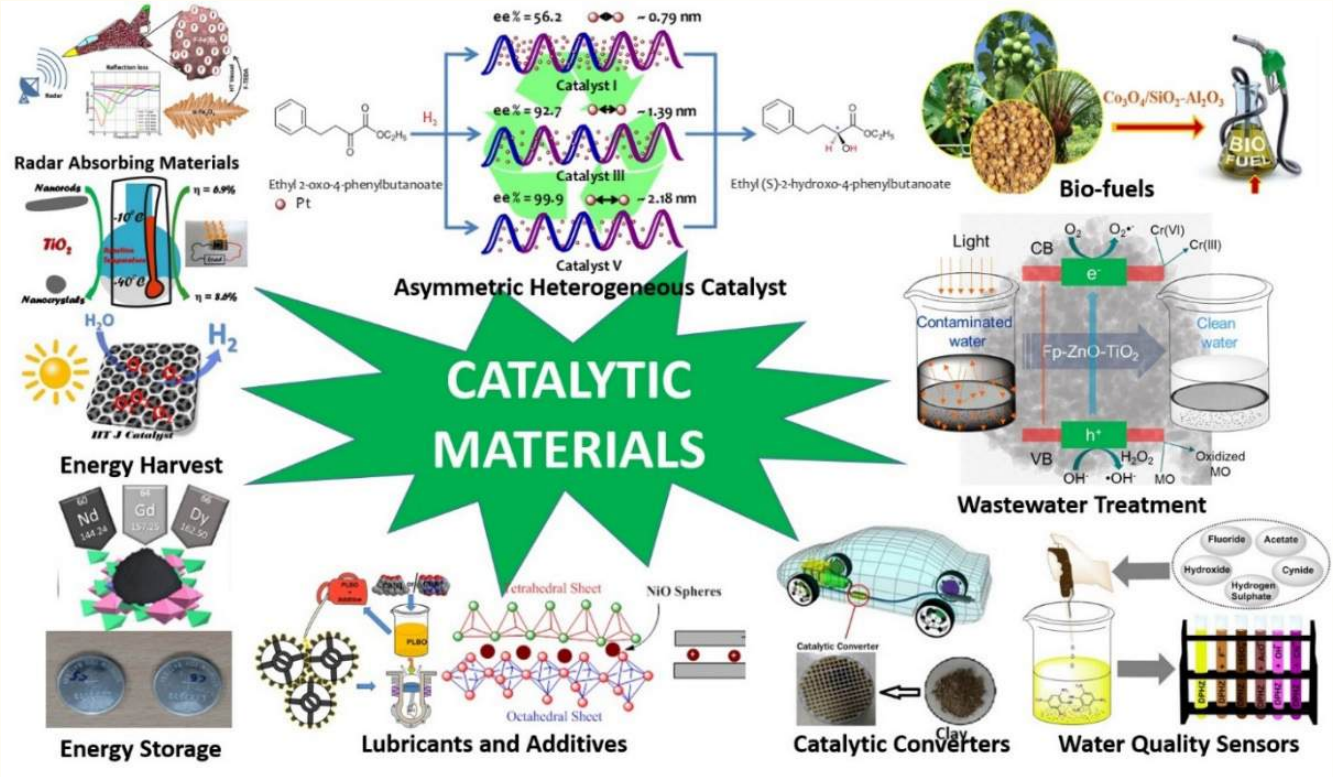
The research group associated with this laboratory works on developing large scale methods for synthesis of nanomaterials and translating them into devices for application in Energy, Water and Healthcare. The present interest includes application of nanomaterials in areas related to water treatment,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

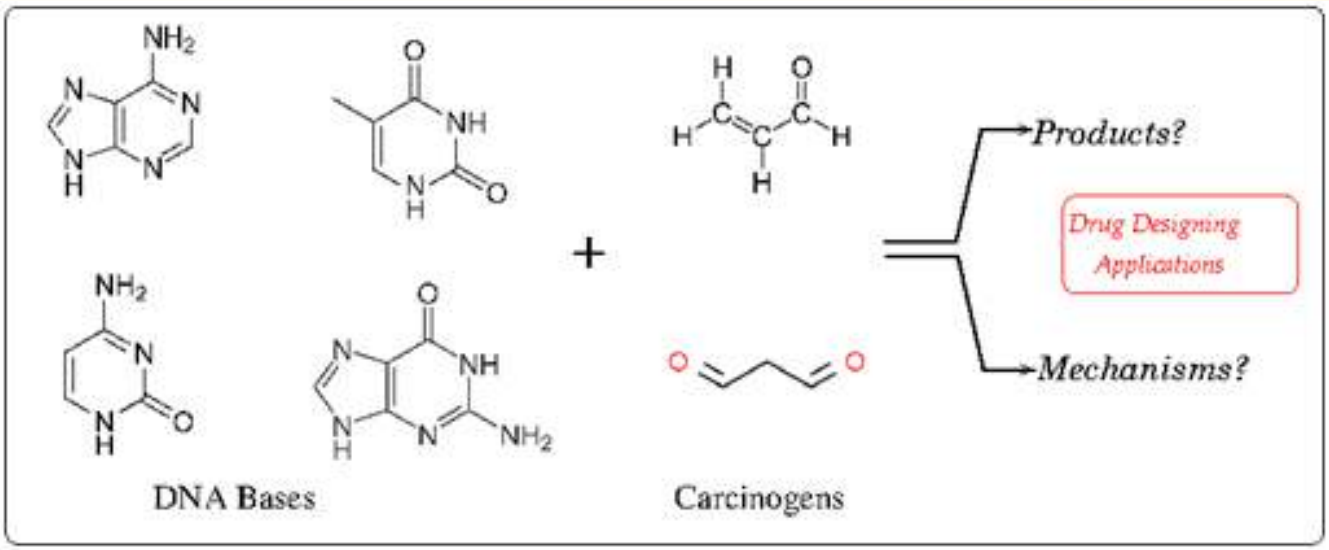
The research group associated with this laboratory focuses on sustainable materials for catalysis. It includes a diverse group of chemists and material scientists specializing in catalysis, feed-stock chemistry, energy harvesting and storage, environmental remediation and fuels. The main goal is to understand 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.



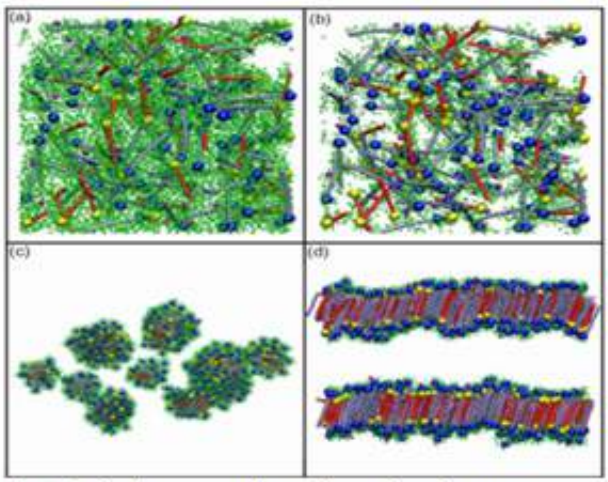
7. Computational Chemistry Laboratory

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.

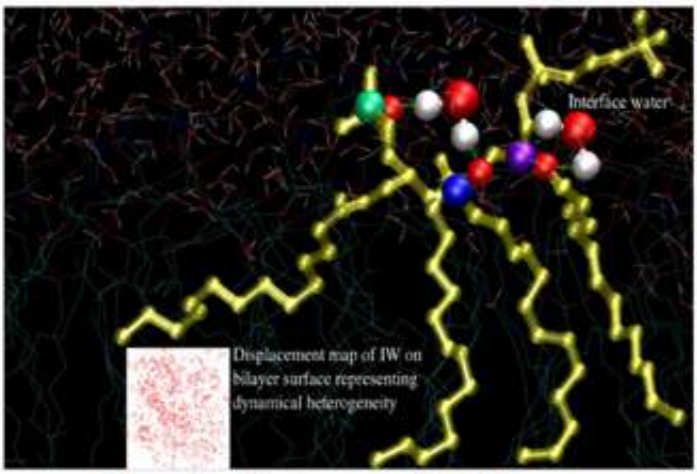
Gas Phase Reaction Dynamics: This work is about studying complex organic reactions in the gas phase to investigate mechanisms and energy flow pathways using state-of-the-art direct dynamics techniques wherein classical Newton's equations are integrated on-the-fly using quantum mechanical potential energies 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.

Outreach

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

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

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.

Academic Programs

The Department of Computer Science and Engineering offers the following academic programs.

Sl. No.	Undergraduate Programs
1	B.Tech. Computer Science and Engineering (CSE)
2	B.Tech. AI and Data Science (AI&DS)

Sl. No.	Postgraduate Programs
1	M.Tech. Computer Science and Engineering (CSE)
2	M.Tech. Artificial Intelligence (AI)
3	Executive M.Tech. AI (for working professionals)

Sl. No.	Doctoral Programs
1	M.Tech.-Ph.D. Dual Degree CSE
2	M.Tech.-Ph.D. Dual Degree AI
3	Ph.D. CSE

Faculty

Following are the faculty members & Young Faculty Associate associated with the department.

Richa Singh
Professor and Head
Ph.D.: West Virginia University

Santanu Chaudhury
Professor
Ph.D.: Indian Institute of Technology Kharagpur

Anand Mishra
Assistant Professor
Ph.D.: International Institute of Information Technology Hyderabad

Chiranjoy Chattopadhyay
Assistant Professor
Ph.D.: Indian Institute of Technology Madras

Debasis Das
Assistant Professor
Ph.D.: Indian Institute of Technology Patna

Deepak Mishra
Assistant Professor
Ph.D.: Indian Institute of Technology Delhi

Gaurav Harit
Associate Professor
Ph.D.: Indian Institute of Technology Delhi

Mayank Vatsa
Professor
Ph.D.: West Virginia University

Romi Banerjee
Assistant Professor
Ph.D.: Calcutta University, Indian Statistical Institute

Suman Kundu
Assistant Professor
Ph.D.: Indian Statistical Institute, Jadavpur University

Sumit Kalra
Assistant Professor
Ph.D.: Indian Institute of Technology Kanpur

Yashaswi Verma
Assistant Professor
Ph.D.: International Institute of Information Technology Hyderabad

Debarati B. Chakraborty
Young Faculty
Associate
Ph.D.: Jadavpur University

Ravi Bhandari
Young Faculty
Associate
Ph.D.: Indian Institute of Technology Bombay

The following faculty members joined the department during the year 2020-21.

Suchetana Chakraborty
Assistant Professor
Ph.D.: Indian Institute of Technology Guwahati

Dip Sankar Banerjee
Assistant Professor
Ph.D.: International Institute of Information Technology Hyderabad

Pallavi Jain
Assistant Professor
Ph.D.: Dayalbagh Educational Institute (Deemed University)

Somitra Sanadhya
Associate Professor
Ph.D.: Indian Statistical Institute, Kolkata

Adjunct Faculty

Sajal K. Das
Professor and Daniel St. Clair Endowed Chair
Missouri University of Science and Technology
Ph.D.: University of Central Florida

Nalini Ratha
Empire Innovation Professor
State University at Buffalo
Ph.D.: Michigan State University

Scholar-in-Residence

Sankar Kumar Pal
National Science Chair,
Distinguished Scientist and Former Director
Indian Statistical Institute
Ph.D. (Radio-Physics): Indian Statistical Institute/Calcutta University;
Ph.D. & DIC (Electrical Engineering): Imperial College of Science and Technology, London

Advisors

The department is honored to have advisors from academia and industry.

Bimal Roy
Professor
ISI Kolkata

Chiranjib Bhattacharya
Professor
IISc Bangalore

Gargi Banerjee Dasgupta
Director
IBM Research India &
CTO, IBM India and
South Asia

Gautam Shroff
Sr. Vice President & Head
of Research
Tata Consultancy
Services

Naveen Garg
Professor
IIT Delhi

Sartaj Sahni
Professor
University of Florida,
USA

Shivkumar Kalyanaraman
CTO
Energy & Mobility,
Microsoft R&D India

Venu Govindaraju
Vice President
Office of Research and
Economic Development,
SUNY
Distinguished Professor
SUNY, University at
Buffalo

Staff

The Department of Computer Science and Engineering has the following technical and administrative staff members.

Technical Staff

Rimpesh Katiyar
Senior Technical Superintendent

Vivek Verma
Technical Assistant

Administrative Staff

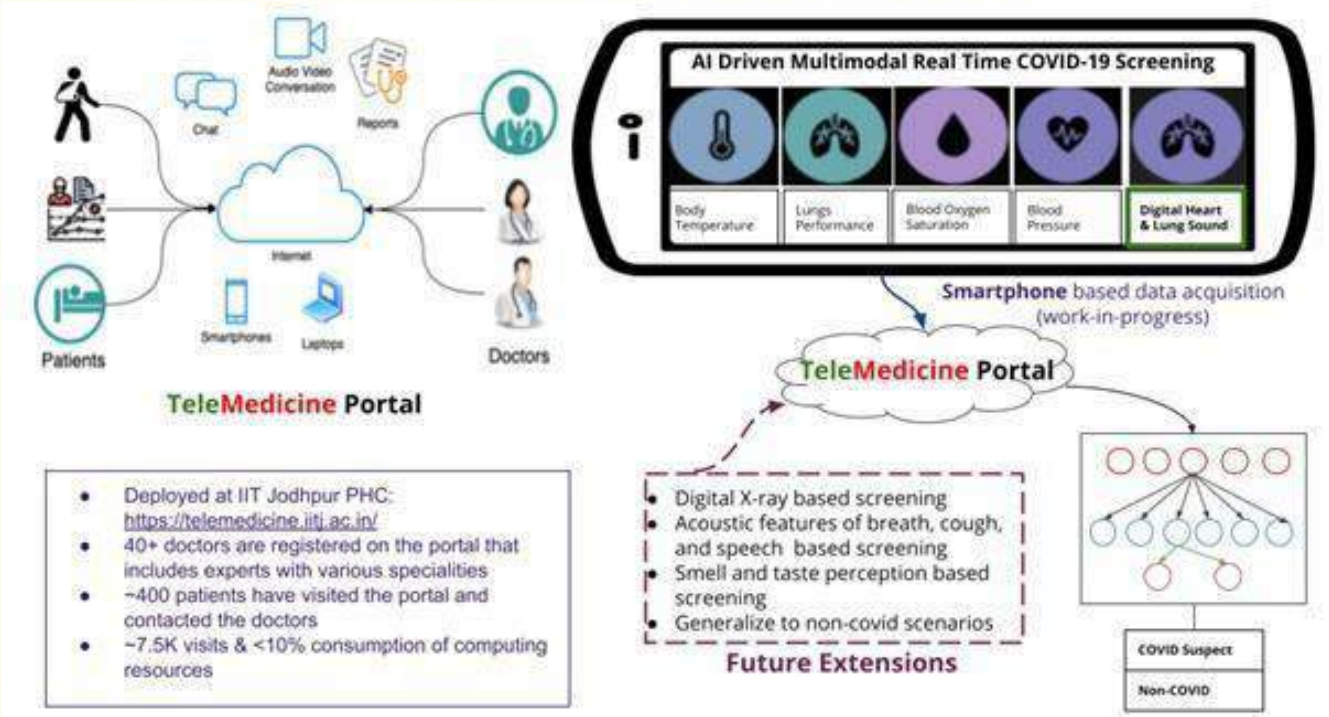
Hanuman Singh
Junior Superintendent

Research Snapshots

Project Title: Smart Health Solution for Rapid Mass Screening using Integrated TeleMedicine

Team Member: Sumit Kalra

Description: The objective of this project is to design and develop tailored telehealth solutions based on existing solutions for screening of covid19 suspects, deployment of multiple kiosks at covid19 hotspot areas, and development of an AI-based model for accurate sensor data analytics for covid19 screening remotely.



Project Title: AIoT based Bed Occupancy

Team Members: Sumit Kalra, Ravi Bhandari, Suchetana, Debasis Das

Description: Automated detection of bed occupancy has been useful to many applications including remote healthcare, elderly monitoring, fall detection, home automation, assisted and ambient living, and so on. The existing IoT based solutions for bed occupancy detection vary with respect to cost, accuracy and scalability. This is an engineering problem having specific focus on the choice of instruments, deployment strategy and approaches used for data collection and occupancy detection. In a typical hospital setup, the problem adds a few additional dimensions in terms of safety, scalability and administrative functionality. In this project, we design a low cost AIOT based solution for the bed occupancy detection problem in a hospital setup and plan to demonstrate the effectiveness of the solution by deploying a small prototype in the local hospitals.

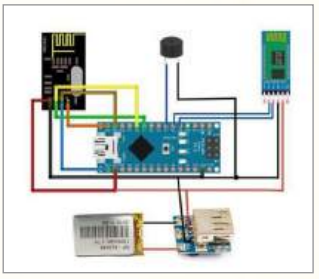
Project Title: Social Distance Alert And Monitoring System Using Smartphone, IoT, And AI

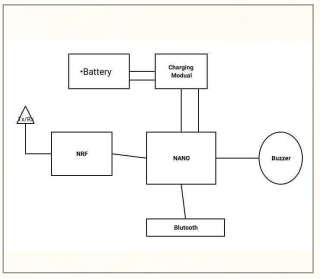
Team Member: Suman Kundu

Description: Controlling the spread of a contagious disease is one of the best preventive measures against it. One such measure is to keep a safe social distance with others around. We developed an alarm system that can warn people when they violate designated social distancing norms. In this research work, we developed a wristband based on 2.4 GHz radio frequency that produces a sound alarm if two such devices come close (within 1 meter) to each other. The wrist band developed currently has three main features,

1. Sound Alarm: Helps to maintain social distance
2. Contact Tracing: Can be used if anyone is found positive and one wishes to trace contacts.
3. Flagging as Positive: Helps tracking the positive cases in the isolation/medical centers.

This device is beneficial for crowd management in controlled environments, like organizing seminars or conferences, maintaining queues at food junctions, and in classrooms.

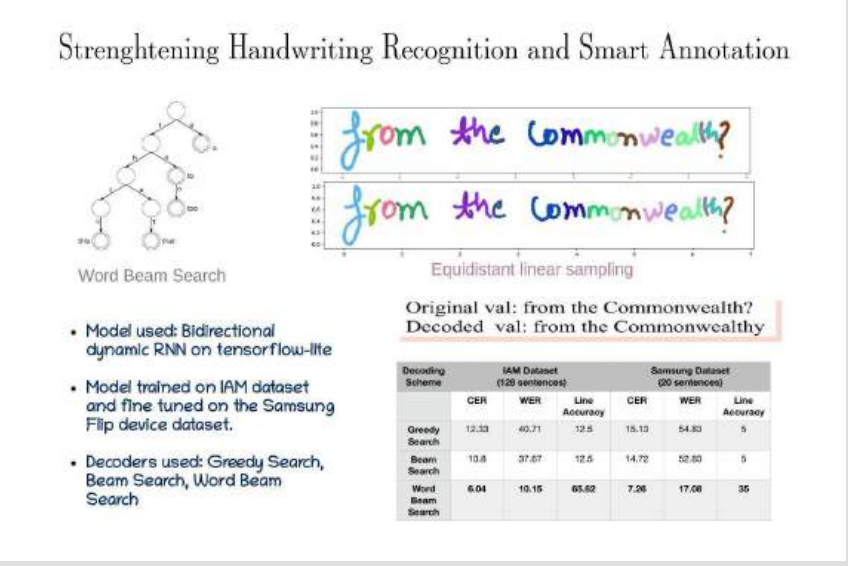




Project Title: Strengthening Handwriting Recognition & Smart Annotation

Team Members: Gaurav Harit, Santanu Chaudhury

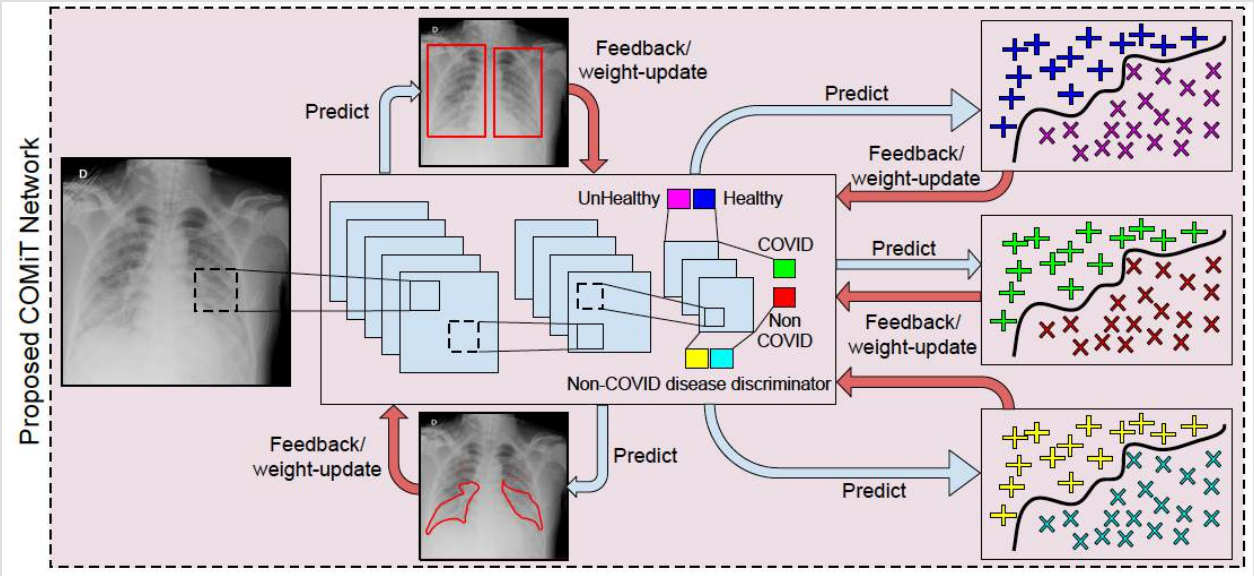
Description: The objective of this project is to develop a recognizer for online handwritten text written on the Samsung Flip Device. A dynamic RNN based encoder with a CTC decoder coupled with beam search decoder was developed using the TensorFlow lite platform. Data scarcity issue was addressed by training the model on the IAM dataset and fine tuning on the Samsung Flip Device examples.



Project Title: AI-driven Screening of COVID-19 using Chest X-ray Images

Team Members: Richa Singh, Mayank Vatsa, Santanu Chaudhury

Description: With the rising number of COVID-19 cases in the country, it is crucial to increase the number of individuals getting tested so that appropriate measures can be taken. Due to the mismatch in the availability of kits and the number of individuals to be tested, it is essential to find additional accurate ways of testing and screening. This project aims to address the problem of COVID-19 detection using cues present in frontal chest X-ray images. Chest X-ray contains vital information such as the presence of opacities, mismatch in lung ratios, and cues from bronchi. We have designed efficient and explainable multi-task machine learning models that not only predict whether the chest X-Ray has symptoms of COVID-19 or not, but it also presents the regions and characteristics based on which the model has given a particular prediction. We are collaborating with medical organizations for large scale testing and implementation of the technology.



Project Title: Development of Multimodal Search Framework for Architectural Floor plan

Team Member: Chiranjoy Chattopadhyay

Description: Floor plans are one of the many types of graphical documents which show structural planning and visually model the structure of a building. In architecture a floor plan is drawn to scale, showing a view from above, of the relationship between rooms, spaces and other features at one level of a structure. The project resulted in the following deliverables:

1. Creation of a large-scale floor plan image dataset.
2. Representation of scanned floor plan in an appropriate feature space for efficient retrieval.
3. Enable multimodal query based floor plan retrieval by means of image, sketch, and a mixture of image and sketch.
4. Development of an interactive floor plan retrieval interface to facilitate multimodal search.

Funded Research and Consultancy Projects

Sl. No.	Project Title	Sponsoring Agency	Principal Investigator	Sanctioned Amount (Rs.)
1.	Knowledge Discovery from Images containing Text and its application to Audio-Visual Dialogue	Accenture	Anand Mishra	14,64,633
2.	Development of Multimodal Search Framework For Architectural Floor Plan	SERB	Chiranjoy Chattopadhayay	24,58,500
3.	Development of computer vision techniques for image content analysis and Retrieval	IIT Jodhpur	Chiranjoy Chattopadhayay	17,80,000
4.	Design and Implementation of Vehicular Network for Future Intelligent Transportation Systems(ITS)	IIT Jodhpur	Debasis Das	15,00,000
5.	Energy Efficient Communication and Data Flow in Smart City using CRN based IoT Framework	DST-Indo-Uzbek	Debasis Das	17,80,200
6.	Lightweight Anonymous Authentication and Communication Protocol for Internet of Vehicles	DST-TWN-MOST	Debasis Das	42,22,000
7.	Development of Application oriented AI Systems	MEITY	Deepak Mishra	39,82,000
8.	A1 Driven Estimation of COVID-19 Prognosis using Multimodal Data	DST-RAKSHAK	Deepak Mishra	10,00,000
9.	A Wellness Device for Real-time Non-contact	Blood Oxygen Saturation Measurements	Deepak Mishra	15,00,000
10.	Information Access from Document Images of Indian Languages	MHRD & Meity	Gaurav Harit	80,00,000
11.	Strengthening Handwriting Recognition & Smart Annotation	Samsung India Electronics Pvt. Ltd.	Gaurav Harit	13,82,800
12.	Text and Image Semantic Graphic	MHRD	Gaurav Harit	44,67,775
13.	Young Faculty Research Fellowship (YFRF) of Visvesvarya PhD Scheme	MEITY	Gaurav Harit	22,20,000
14.	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	Mayank Vatsa	1,97,28,000
15.	Swaranajayanti Fellowship	DST	Mayank Vatsa	63,33,337
16.	Management of TBIOM and Newsletter	IEEE Biometrics Council	Mayank Vatsa	20,38,125
17.	AI-driven diagnosis of COVID-19 using X-ray images	DST-RAKSHAK	Richa Singh	7,00,000
18.	DETECTING SPOOFING AND DIGITAL ATTACKS ON FACE IMAGES	MEITY	Richa Singh	72,15,000
19.	Mitigation Bias in face recognition for vast regional diversity in India	Facebook India Online Services Pvt Ltd	Richa Singh	21,26,191
20.	Non-Invasive Estimation of Care-Body Temperature, Heart-Rate, SPO2 for Classification of subject AS Healthy or Non-Healthy (Symptoms of concern: fever despite ambient temperatures; silent hypoxia-COVID-19)	DST-RAKSHAK	Romi Banerjee	10,00,000
21.	Indian Heritage in Digital Space of Interdisciplinary cyber physical Systems	DST	Santanu Chaudhury	12,75,55,100
22.	Software as a service for OCR system for Odia Documents Images	Meity	Santanu Chaudhury	20,16,000
23.	Digital Representation Generation for Efficient Retrieval of Bangla Document Images in Digital Libraries	IIT K, MHRD	Santanu Chaudhury	76,00,000

Sl. No.	Project Title	Sponsoring Agency	Principal Investigator	Sanctioned Amount (Rs.)
24.	Quantum Cryptanalysis	SERB	Somitra Kumar Sanadhya	6,60,000
25.	Social Distance Alert and Monitoring System Using Smartphone,IOT and AI	DST-RAKSHAK	Suman Kundu	7,50,000
26.	Predictive Maintenance and Quality Control in industries under Industry 4.0	SERB	Sumit Kalra	54,54,065
27.	Smart Health Solutions for Rapid Mass Diagnosis for COVID-19	DST-RAKSHAK	Sumit Kalra	5,00,000
28.	Source code similarity	Growth Pond	Sumit Kalra	1,00,000
29.	Understanding Semantic Association Between Visual and Textual Data: What lies ahead	DST	Yashashwi Verma	35,00,000

Research Labs

The department has seven research labs in the areas of Artificial Intelligence and Machine Learning, Vision and AR & VR, Systems and Software, and Theoretical Computer Science.

Cognitive and Social Analytics (CSA)

The CSA Lab at IIT Jodhpur deals with studies on human behavior from a number of perspectives to understand what it is to be 'intelligent' and how individual action-ensembles lead to collective behavior. Currently the lab comprises of the following two groups:

Cognitive Analytics Group (headed by Romi Banerjee) - where we draw inspiration from the origin, evolution and development of fundamental cognitive abilities (e.g. language acquisition, aesthetic-sense, number-sense, time-space continuum, spontaneous thought & imagination, contemplation) across all living species, towards the design an embodied, social (~empathetic) "thinking machine".

SoNAA: Social Network Analysis and Application Group (headed by Suman Kundu) - where we focus on building applications using social networks and collective behaviors, apart from solving fundamental questions on network analysis and mining. We work with data on relationships and relationships within data. The applications currently under consideration are to build support systems for decision making, accountability, control and behaviour, for governance.

Language Technology and Knowledge Management Lab

Research in this lab is broadly focused on information extraction, information access, and knowledge management. Thanks to 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.

Theoretical Computer Science (TCS)

The research in Theoretical Computer Science includes understanding the complexity of computational problems, and designing and analysing efficient algorithms. We are largely interested in the following areas: Cryptography, Quantum Computation, Computational Social Choice Theory, Parameterized Complexity.

Social Network Analysis and Application Group (headed by Suman Kundu) also focuses on developing algorithms for fundamental Complex Network problems. Current focus includes issues of community structure identification, partitioning and small space data structures of Streaming Graphs, finding structures out of multilayer and heterogeneous networks.

Systems for Intelligence Networking, and Communications (SINC) Lab

The SINC Lab at CSE Department of IIT Jodhpur is pursuing research in the general area of computing systems with specific focus on systems for next generation of machine learning, data analytics, and communications. The group comprising of faculty members Dr. Debasis Das, Dr. Suchetana Chakraborty, Dr. Dip Sankar Banerjee, Dr. Sumit Kalra, and Dr. Ravi Bhandari is broadly engaged in some cutting edge problems related to smart cities, assisted living, low power architectures, and parallel computing.

Vehicular Ad-Hoc Networks (VANETs) Lab

This laboratory is equipped with licensed QualNet Network Emulator Software, Duckiebots Setup, Implementation of Real Time Vehicular Networks Testbed (using OBU & RSU) and open source software such as ns2/ns3 and OmNet++ among many others. The students also get hands-on training through experiments using Network Hardware (i.e., IoT devices, Raspberry Pi, Routers, Switches, Firewalls, PCs, Servers, Laptops, Sensors, and Arduino) which help to monitor network usage, bandwidth, throughput, delay and security attacks.

Samsung AR-VR Innovation Laboratory

The Augmented Reality and Virtual Reality (AR/VR) Innovation lab at IIT Jodhpur was established on November 20, 2020. The lab is a joint initiative between IIT Jodhpur and Samsung R&D Institute India-Delhi (SRI-D). The lab is equipped with state-of-the-art facilities and high-end equipment, allowing the users to create technology solutions and stimulate skilling and re-skilling educational programs in AR-VR, which can have a transformative impact on society and technology. AR and VR are finding applications in diverse fields like education, industrial design, robotics, infrastructure management, and medicine. Students of different programs in the Institute will be able to take advantage of this facility.

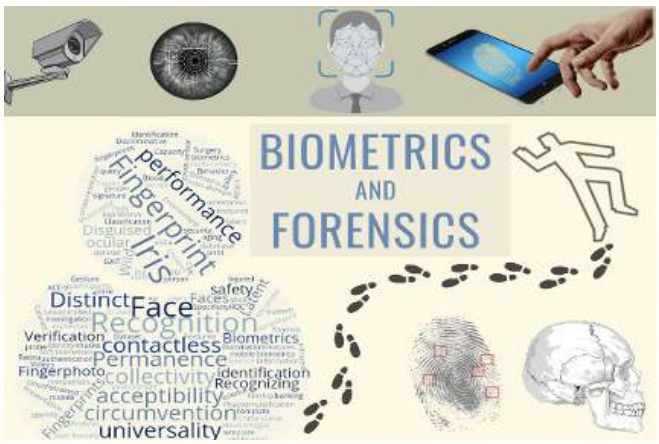
Visual Interaction and Understanding Lab

The focus of this lab is on various problems related to visual understanding. These include recognition (detection, categorisation and retrieval), biometric and behavioural analysis (face, gesture and body pose), low-level vision, image and video synthesis, vision+ language tasks (image captioning, visual question answering and cross-modal retrieval), segmentation, shape analysis, and 3D from multi view and sensors. These problems are addressed in a data-driven manner using various machine learning techniques (both by adapting the existing ones as well as proposing new ones), and are studied in the context of different domains, such as scanned documents, architectural layout plans, natural scenes, activity videos, etc.

Trusted AI 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



Software Innovation Laboratory

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.

Collaborations

The faculty members of the department of Computer Science and Engineering have collaborations with several institutions and industries in India and abroad. Following are the details of the collaborations.

Faculty	Research Area	Organization	Country
Industry Collaborations			
Dip Sankar Banerjee	Digital Devices	Johari Digital	India
Mayank Vatsa	Dependable AI	iHub-Drishti	India
Mayank Vatsa, Richa Singh	Machine Learning	NVIDIA	India
Ravi Bhandari	Mobile Systems	Nvidia	India
Richa Singh	Dependable AI	iHub-Drishti	India
Richa Singh, Mayank Vatsa	Machine Learning, Trustability	Facebook	USA
Richa Singh, Mayank Vatsa, Santanu Chaudhury	Medical Image Analysis	Tele-Radiology Solutions	India
Richa Singh, Mayank Vatsa, Santanu Chaudhury	Medical Image Analysis	CARING, Mahajan Imaging	India
Sumit Kalra	IoT	Uniconverge Technologies Pvt. Ltd.	India
National Collaborations			
Dip Sankar Banerjee	High Performance Computing	IIIT Hyderabad, IIT Tirupati	India
Mayank Vatsa	Medical Image Analysis	PGI Chandigarh	India

Faculty	Research Area	Organization	Country
Richa Singh	Medical Image Analysis	AIIMS Rishikesh	India
Richa Singh	Medical Image Analysis	AIIMS Jodhpur	India
Sumit Kalra	Software Architecture	IIT Dhanbad	India
International Collaborations			
Mayank Vatsa	Biometrics	SUNY, University at Buffalo	USA
Mayank Vatsa	Biometrics	TAMU, Kingsville	USA
Richa Singh	Biometrics	SUNY, University at Buffalo	USA
Richa Singh	Biometrics	TAMU, Kingsville	USA
Sumit Kalra	Telemedicine	Queensland University of Technology	Australia
Sumit Kalra	Software Architecture	University of Sannio	Italy

Outreach Activities

The department of Computer Science and Engineering is actively engaged in a number of outreach activities showcasing state of the art trends and development across numerous areas. Some of these initiatives are described as follows.

Department Webinars

The department of Computer Science and Engineering started a semimonthly webinar series in 2020 comprising talks on various topics in Computer Science & Engineering. We invite eminent speakers from various institutes as well as industries. These talks are open for everybody across the world, and approximately 100 people from outside IITJ have registered for attending the webinars. We organized the following talks in 2020-2021.

Speaker	Affiliation (with country)	Title of the talk
Dr. Heena Rathore	Assistant Professor, University of Texas, SA, USA	Brain Variable Reward Structure for Cooperative Machine Learning in IoT Network
Prof. Sajal K. Das	Professor and Daniel St. Clair Endowed Chair, Missouri University of Science and Technology Rolla, MO	From Smart-Sensing to Smart Living
Dr. Joscha Bach	VP of Research at AI Foundation, San Francisco	What would make an intelligent system generally intelligent?
Dr. Nimrod Talmon	Ben-Gurion University, Israel	Participatory Budgeting - Making Budgeting Great Again
Prof. Nalini K. Ratha	Empire Innovation Professor School of Engineering and Applied Sciences University of Buffalo	Trustworthy AI Systems.
Dr. Ishan Misra	Research Scientist Facebook AI Research (FAIR)	Multi-view invariance and grouping for self-supervised learning
Prof. Saket Saurabh	Professor of Theoretical Computer Science, Institute of Mathematical Sciences, Chennai, India.	Picking Random Vertices
Dr. Anush Sankaran	Senior Research Scientist, DeepLite, Canada	Why do we need to Optimize Deep Learning Models?

Our Faculty Webinars & Events

The faculty members of the department of Computer Science and Engineering were invited to give talks at the following places and events.

Faculty	Venue	Title	Month, Year
Anand Mishra	IIIT Sri City, Chittor (virtual)	Introduction to Neural Networks	February 2021
Anand Mishra	11th Indo German Frontier of Engineering Conference (INDOGFE 2021) IIT Kharagpur (virtual)	Multimodal Machine Learning for Enhanced Image Understanding	February 2021
Debasis Das	IIT (ISM) Dhanbad	Lightweight Secure Communication and Searching Protocol for Vehicular Cloud Computing (VCC)	November 2020
Debasis Das	Indian Institute of Technology (IIT), BHU, Varanasi	5G and Beyond Networks for smart Transportation	January 2021
Mayank Vatsa	National Defense College	AI and Machine Learning: Challenges and Opportunities	March 2021
Mayank Vatsa	BOSCH	Adversarial Perturbations in Deep Learning	March 2021
Mayank Vatsa	RAISE	Decent AI, Role of Data for Responsible AI	2020
Pallavi Jain	IMSc weekly PC seminar	Committee Selection Problem: Recent Advancements	February, 2021
Richa Singh, Mayank Vatsa, Nalini Ratha	8th ACM IKDD CODS and 26th COMAD, India2021	Trustworthy AI	January 2021
Somitra Sanadhya	31st Annual Conference of Rajasthan Ganita Parishad	Foundational Role of Mathematics in Cryptography	13-14th March, 2021
Somitra Sanadhya	Data Security Council of India (DSCI)	Security Research Bottleneck ... Lab, Program Set-up, Problem Statements, Industry Connects, & Data Sets	14-16 December 2020
Somitra Sanadhya, Debasis Das	Cybersecurity: Contemporary Issues, Challenges and Countermeasures	School of Management & Entrepreneurship, IIT Jodhpur,	12-13-15 December 2020
Suman Kundu	Five Day National Police Perspective	Social Media Analytics	February 8, 2021
Suman Kundu	Social Media Analytics	NIFT Jodhpur	October 14, 2021

Department of Electrical Engineering

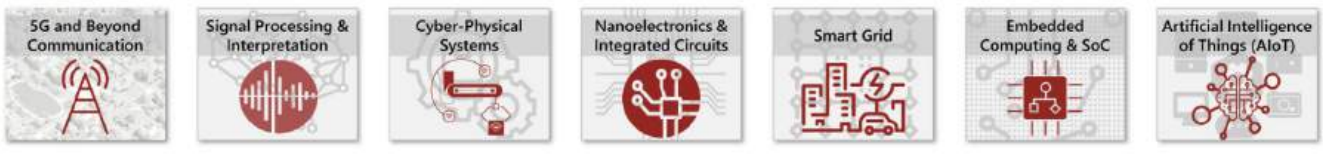
The Department of Electrical Engineering primarily focuses on imparting quality education and preparing students to face the future technological challenges. The Vision of the Department is to generate and disseminate knowledge and develop technologies in emerging domains of Electrical Engineering to meet the national and global needs. The Department is committed to engage in high quality research by Faculty Members and Students, and in the pursuit of excellence in teaching.

The Mission of the Department is

- To impart education with emphasis on fundamental knowledge and its applications through pedagogical innovations including experiential learning, synchronous and asynchronous instructional delivery,
- To make significant contributions in fundamental research and advancing technology in different areas of Electrical Engineering with emphasis on Cyber Physical Systems, Artificial Intelligence of Things, 5G and Beyond Systems, and Smart Grid,
- To contribute towards innovation, technology development, IP generation, and entrepreneurship involving the thrust areas of Electrical Engineering,
- To collaborate with various organizations for research, teaching and technology development, to synchronize and contribute towards the transformational changes in the Electrical Engineering landscape, and
- To enhance the perception of the Department through different avenues and contribute towards continuing education and upskilling programs.

The Department offers B.Tech. in Electrical Engineering and two state-of-the-art M.Tech. programs in Sensors and Internet of Things (SIoT) and Cyber Physical Systems (CPS). The Department also offers M.Tech.- Ph.D. Dual Degree programs in Communication and Signal Processing (CSP), Sensors and Internet of Things (SIoT) and Cyber Physical Systems (CPS). The Ph.D. program of the Department covers a wide range of research areas, such as Microelectronics, VLSI and Computing Systems, Signal Processing, Communication Engineering, RF, Microwave & Photonics, Power Engineering, and Control systems.

Technology Tracks currently pursued by the Department include emerging and challenging fields that culminate at the intersection of several traditional research areas. Department faculty members are also engaged in ground-breaking interdisciplinary research in collaboration with faculty members across various departments through the Institute's Interdisciplinary Research Platforms (IDRPs). xc



Current Technology Tracks

Active collaborations are on-going with organizations like UC Berkeley, Carleton University, TIMA laboratory (Grenoble, France), Technion-Israel Institute of Technology, Norwegian 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.

The Department won many accolades during 2020-21 at the Institute level including 2020 Teaching Excellence Awards, Research Excellence Award, and the Meritorious Staff Award. During the Covid pandemic, the Department adopted innovative teaching initiatives for prompt and smooth transition into online teaching. The Department also formed its Departmental Society that would organize various webinars, events, and workshops for the students throughout the year.

The Faculty Members associated with the Department during 2020-21 are as follows:

Name & Research Areas

Arun Kumar Singh
Head of Department
Communication Theory, Wireless and Mobile Communications, Satellite based Navigation Systems, Spread Spectrum Systems

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

Abdul Gafoor Shaik
Protection of various components of Power Systems, Protection of Distribution Network with DG penetration, Power Quality assessment & mitigation in Distribution Networks with Renewable Energy Source penetration

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

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

Anil Kumar Tiwari
Electrical Engineering: Image Processing, Video Processing, and Signal Processing application in Bio-Medical

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

Arani Ali Khan
Microwave Circuits

Arpit Khandelwal

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

Deepakkumar M. Fulwani

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

Harshit Agarwal

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

Himanshu Kumar

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

Jai Narayan Tripathi

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

Kamaljit Rangra

MEMS, Transducers and Actuators

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, Si and wide band gap semiconductors for MEMS, Micro and Nano device fabrications

Manish Narwaria

Multimedia signal processing

Niladri Sekhar Tripathy

Dynamics and Control, Mechatronics and Cyber Physical Systems

Nitin Bhatia

Fiber Optics and Photonics

Rajendra Nagar

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

Rajlaxmi Chouhan

Image processing, Image enhancement and quality assessment, e-learning tools and pedagogies

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

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

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

Soumava Mukherjee
Microwave Communication

Dr. Dushyant Sharma (Control Systems) served as a Young Faculty Associate in the Department during 2020-21.

The following Faculty Members joined the Department after April 2021.

Name & Research Areas

Ajay Agarwal
Microelectronics; Micro- Nano-technologies; Sensors; Micro-fluidics, Point-of-Care devices and Early diagnostics

Binod Kumar
SoC Design Verification & Testing, Hardware Security & Trust, Hardware Design for AI, VLSI CAD, Computer Architecture

Sai Kiran M. P. R.
Millimeter-wave Communications; Autonomous Vehicular Communications; Internet of Things; Cyber-Physical Systems; Wireless Network Modeling and Analysis

Ravi Yadav
Power system dynamics, Wide area monitoring systems, anomaly detection and characterization, AI/ML applications to power systems, and cyber-attack modelling and diagnosis

Sasi Vinay Pachetti
Physical Layer Security, MIMO, Wireless communication

The Department had the following Adjunct Faculty Members during 2020-21.

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 software. 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 software and tools such as COMSOL Multiphysics modelling software, MATLAB, State flow.

2. Control & Computing Laboratory

This lab provides students with real life experience of 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 rich 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 range 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 controllers, 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

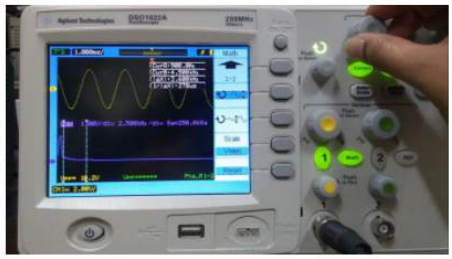
Facilities available in the laboratory:

- Arbitrary Function Generator (Tektronics (AFG3021B - 25MHz)
- Digital storage oscilloscope (Agilent & DSO1022A - 200MHz)
- Digital Multimeter 61/2 Digit (Agilent 34410A)

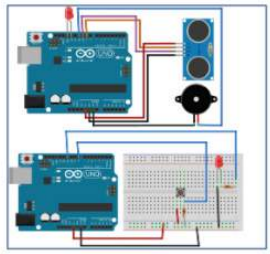
- Programmable DC Power Supply (Scientific PSD9005 -30V/1A, 5V/5A)
- Universal IC Tester (VPL-UICT)
- Soldering Iron Station (Xytronics LF-2000)
- Arduino Uno Microcontroller and Sensors

In 2020, a 3D Virtual Walkthrough of the Electronics Lab was created to allow incoming students to enjoy an immersive experience during their lab sessions. Video demonstrations of lab experiments were also created in this lab during the online classes.

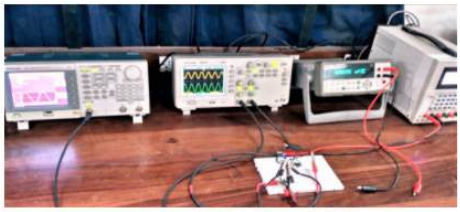
Demonstration on familiarization with lab equipment



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 the 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 Precision 5820 Tower XCTO
- Nikon Camera D5600 with 18-55 mm lens and accessories
- HP 280 G4 MT
- Acer 4K Display
- Netgear Network Attached Storage

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 the 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

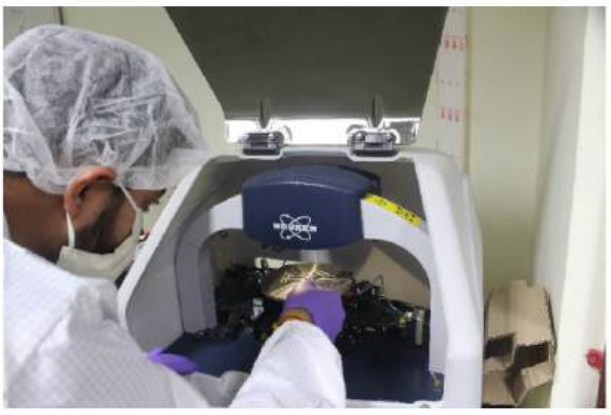
- Characterization: Keithely 4200 SCS, Probe station, Gas Sensing Characterization Setup, Hall Effect Measurement, Profilometer.
- Sensor and Transducer Design and Simulation Tools
    - o CoventorWare® Integrated software suite for designing and simulating MEMS sensors and actuators. A versatile FEM 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 proteins 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 a real-time human Breath Rate Analyzer. In 2020, research conducted successfully in the laboratory yielded many top rated journal articles and conference papers.

Sputtering

I-V Characterization Setup

Thermal Evaporation



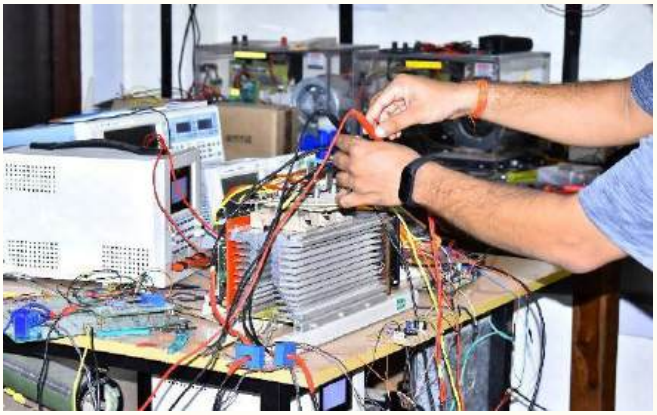
Profilometer

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 research on electric vehicles the laboratory has access 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 a system to mitigate second order harmonics 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, research conducted in the laboratory produced 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 staff 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

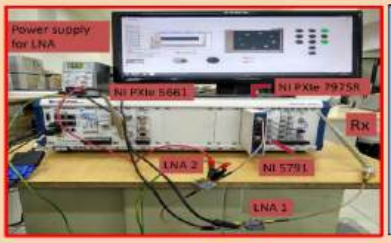
11. Signal Processing Laboratory

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:

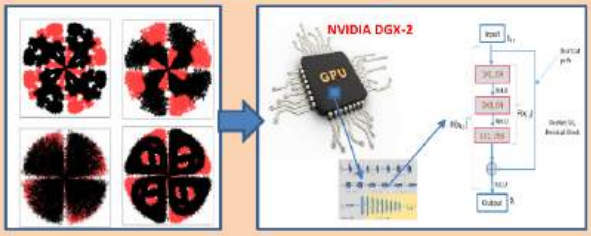
- Automatic Modulation Classification
- Modelling of Complex Networks
- Automatic Fault Diagnosis in distribution Networks

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

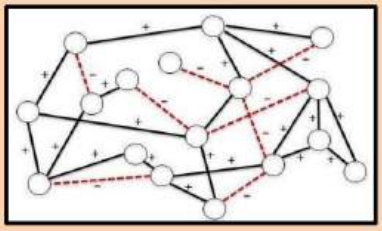


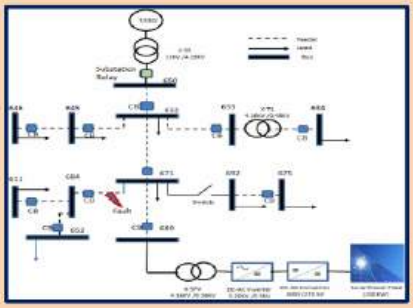
Blind Signal Modulation Identifier detects the type of modulation in unknown RF signal without any prior information of signal parameters. Clustering and regression analysis of the extracted constellation signature is used for recognition of different order of linear digital modulation schemes viz. ASK,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

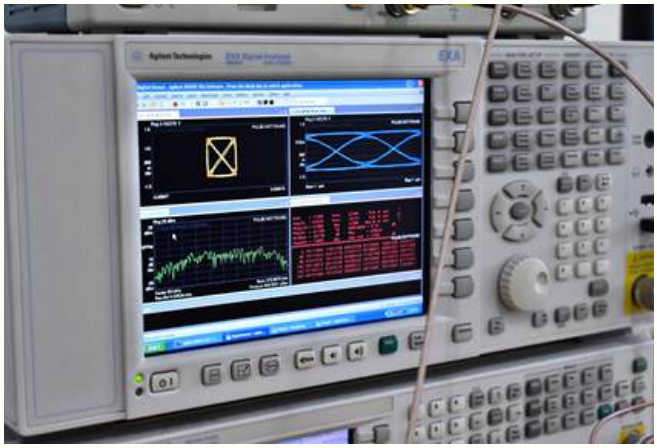
The lab is also conducted for teaching activities which are as follows:

- 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 to 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.



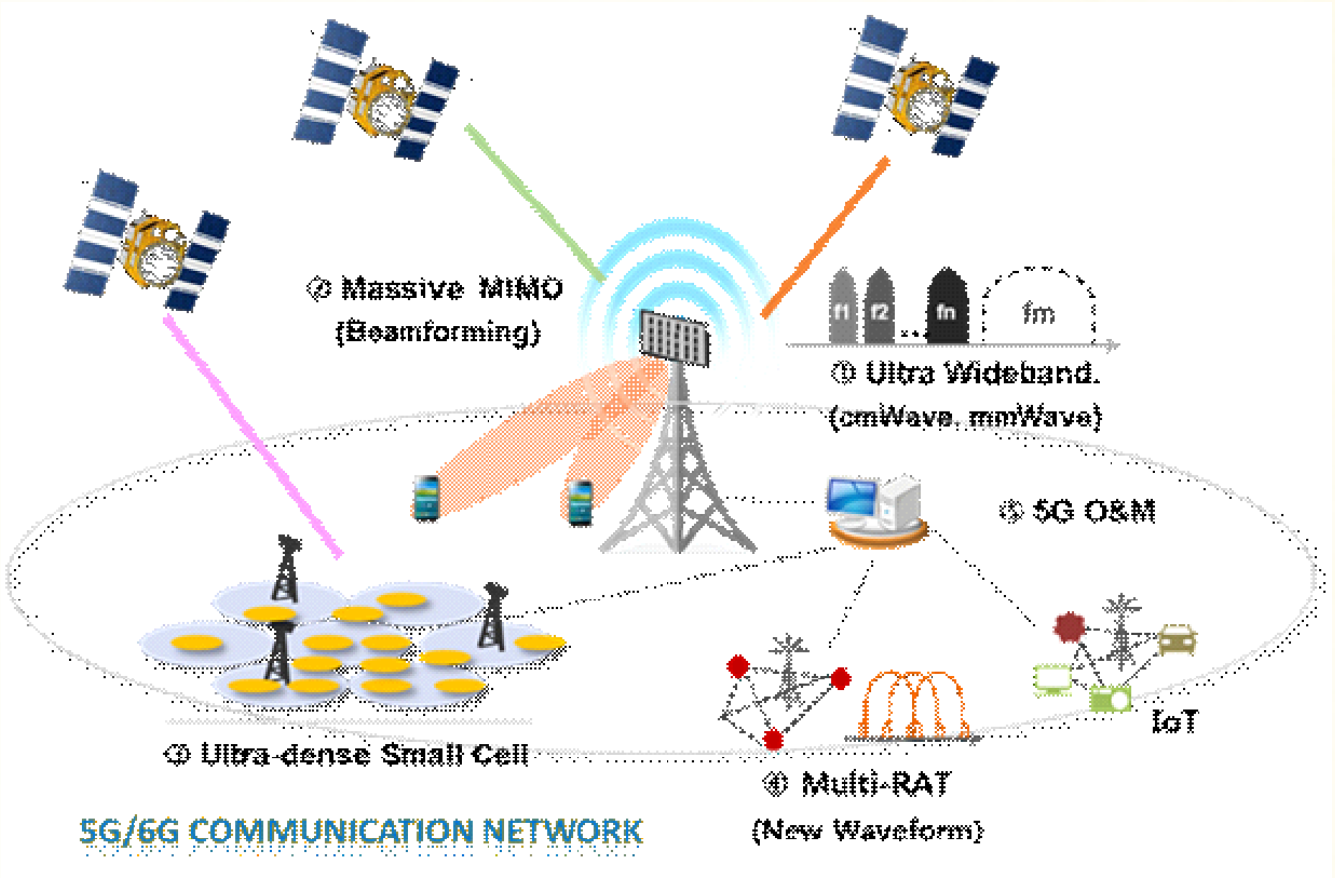
14. Wireless Communications and Navigation Laboratory

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 the 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 receivers 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. Research on wireless sensor networking is ongoing with the introduction of supercapacitors in contrast to ideal batteries. Modelling of the imperfection in such systems, particularly in the 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.

Outreach

1. Soumava Mukherjee delivered the following invited talks:
   i. Designing of Substrate Integrated Waveguide (SIW) Antennas, IEEE MTT-S and AP-S SBC, Department of ECE, Manipal University Jaipur
   ii. Substrate Integrated Circuits – microwave and millimeterwave applications, IEEE Microwave Theory & Techniques Society (MTT-S) Student Branch Chapter (SBC) IIT BHU Varanasi
   iii. Application of Substrate Integrated Circuits in Microwave and Millimeterwave Frequencies, IIT Palakkad & IEEE APS Kerala
   iv. Microwave or Milimetrewave based RFID sensors for IOT, TEQIP-III Sponsored Workshop on "Emerging Trends in Nanotechnology(ETNT-2020)"
   v. 5G millimeterwave antennas and circuits using substrate integrated coaxial line (SICL) technology, Webinar series on Recent trends in Antenna Engg. And Nanotechnology, MIT, Manipal

vi. Slot antennas - theory and recent application, Gauhati University

vii. 5G millimeterwave antennas and circuits using substrate integrated coaxial line (SICL) technology, Workshop on Advanced Design in RF, IEEE HMRITM Student Branch New Delhi

2. Aashish Mathur delivered an expert talk on "Optical Wireless Communication" on 29th July, 2020 for faculties, research scholars, and students of the RGPV affiliated institutions under TEQIP-III, RGPV, Bhopal.

3. Aashish Mathur delivered an invited talk as an eminent speaker at NIT Sikkim on "Free-Space Optical Communications" on 18th March, 2021 in the TEQIP-III sponsored online one week workshop on "Modern Wireless Communication Systems and Antenna Engineering with Experimental Learning" from 15th to 20th of March, 2021.

4. Rajlaxmi Chouhan conducted the following invited talks/workshop sessions/FDP sessions:

   May 2020 The Online Classroom Experience, Faculty Development Program organized by J G College of Commerce Hubballi

   July 2020 Writing a Research Proposal, Faculty Development Program and Webinar Series organized by SJEC Mangalore

   Aug 2020 Technical Writing for Research Proposals, Keynote Speaker at Nadar Saraswathi College of Engineering and Technology, Tamil Nadu

   Sep 2020 Interactive Online Teaching Using Pedagogical Initiatives and Online Tools, Expert Talk at Academy of Maritime Education and Training, Chennai

   Sep 2020 Online Education: Tools and Techniques for Online Teaching, Invited Talk at IETE Student Branch Chapter Webinar, PSNA College of Engineering & Technology, Tamil Nadu

   Sep 2020 Effective Communication through Effective Presentation, Invited Talk in Faculty Development Program on Leadership, Excellence and Soft Skills for Professional Career sponsored by ATAL Academy, AICTE by IIITDM Jabalpur

   Oct 2020 No-reference Image Quality Assessment and Applications, Invited Talk at International Conference on Optical & Wireless Technologies (OWT 2020), MNIT Jaipur

5. Departmental Webinars

   08 Sep 2020 Imaging Radar, Dr. Tapan Misra, Sr. Advisor to Chairman ISRO

   04 Jan 2021 Challenges and Solutions in Massive MIMO Antenna Design, IEEE APS Distinguished Lecture by Prof. Buon Kiong Lau, Lund University, Sweden

   15 Mar 2021 IoT Building blocks, Trends & Security Challenges, Mr. Alok Mittal, ST Microelectronics

   25 Mar 2021 5G Wireless Communication Technologies, Prof. Manav Bhatnagar, Department of Electrical Engineering, IIT Delhi

6. Degree Program-related Events

   09 May 2020 Facebook Live Session on PG Programs at Department of EE

   11 Oct 2020 Webinar on BTech in Electrical Engineering

Departmental Society Events

14 Mar 2021 Soft Skills Workshop by Thinkers and Filler (TnF) (40 participants)

27 Mar 2021 Workshop on Internship Email Writing by Rajlaxmi Chouhan (150+ participants)

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.

Research and Collaboration:

The teaching and research focus of the Department runs along the following disciplinary tracks.

1. Literary and Cultural Studies
2. Philosophy
3. Psychology
4. Sociology

The department is actively involved in both individual and collaborative research projects with other institutions of higher learning. With diverse backgrounds in the department, our department has received funding from different organizations

The Faculty Members associated with the Department during 2020-21 are as follows:

Name & Research Areas

Ankita Sharma
Head of Department
Psychology: Gerontology, Clinical and Positive Psychology

Alok Ranjan
Public Health, Universal Health Coverage, Health Systems, Health Economics, Health Equity, Elderly Health, Non-Communicable Diseases, Disability & Rehabilitation

Dibyadyuti Roy
Digital Humanities; Media, Communication and Cultural Studies; Postcolonial Masculinities; Health Communication; Science and Technology Studies; Science Fiction and Popular Culture

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

K. J. George
Philosophy: Applied Ethics, Ethics of Technology, Bioethics

Ruhi Sonal
Decision theory, social networks, bounded rationality.

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

Natasa Thoudam
Disciplines: Literary Studies, Gender Studies, and Religious Studies. Areas: Postcolonial Studies, South Asian Studies, Migration Studies, and Visual Culture focussed on India's Northeast (Manipur)

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

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

Rima Bhattacharya
Asian American literature; Diasporic literature; Postcolonial literature; Indian English poetry; World literature

Suman Dhaka
Broad: Cognitive Neuroscience, Cognitive Psychology; Decision making; Sleep; Cognition; Affect Regulation

V. Hari Narayanan
Philosophy: Cognitive Studies, Evolutionary Theory, Analytic Philosophy and Mindfulness

Vidya Sarveswaran
Literary Studies, Environmental Humanities, Ecocriticism, Blue Humanities, Creative Nonfiction, Disaster Narratives, Documentary Film Making and Heritage.

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 the 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.




Outreach

Department of Humanities & Social Science

1. Sharma, A.: Delivered a lecture on 'Psychology of Collective Crisis: Facing it & growing through adversity' EBSB Webinar-II on 1 July 2020.
2. Sharma, A.: Delivered expert address in International Webinar on "Cyber Violence and Gender Equality" on the topic, "Digital Vigilantism against Women" on 29 August 2020.
3. P. Patra: Invited talk 'Death, an Imposter, and the Maiden: Pyaasa beyond the Borders' delivered at the webinar 'A Response to Crises: Literature, Film and Culture of the 21st Century', organized by Deshbandhu Mahavidyalay, Kazi Nazrul University, West Bengal, on June 24, 2021.
4. P. Patra: Invited talk 'Cinema O Smriti: Baki Itihas' delivered at the webinar 'Meghe Dhaka Cinema', organized by Banwarilal Bhalotia College, Kazi Nazrul University, West bengal, on October 15, 2020.
5. P. Patra: Invited talk 'Crisis and the Avant-Garde: Cine-Politics in the Long 1970s' presented at 'Theorising Humanities in the Times of Crisis' webinar, Dept. of HSS, IIT Ropar, September 21-23, 2020.
6. Farhat Naz: Invited Speaker in the Webinar on 'Policy Implications - COVID-19 Pandemic Disaster: Water, Agriculture and Environment' held on 12 June 2020, organized by Centre for Emerging Technologies for Sustainable Development, IITJ. As an outreach programme for the 11 districts faculty members of the colleges of Rajasthan, UNNAT Bharat Abhiyan (A flagship program of Ministry of Education, Govt. of India)

Following workshops/seminars have been organized (IW: International Workshop, IS: International Seminar) by Parichay Patra.

Sl. No.	Title	Sponsoring Authority	Type	Organizers	Dates
1.	Memories and Mixed-Media: A Workshop on Curating the Controversial Media Accounts of the 1970s	SPARC, Ministry of Education, GoI	IW	Dr. Parichay Patra (IIT Jodhpur), Dr. Dibyakusum Ray (IIT Ropar)	March 26, 2021
2.	Many Afterlives of the Indian Emergency	SPARC, Ministry of Education, GoI	IS	Dr. Parichay Patra (IIT Jodhpur), Dr. Dibyakusum Ray (IIT Ropar)	March 27, 2021

Conference Presentations

Natasha Thoudam

1. "Sanamahism and Newar Buddhism: Stories of Two Revived Scripts from South Asia"—a paper presented at the International Online Conference on Cultural Identity, Tradition and Belief System: From Discourse to Practice organized by Central Institute of Himalayan Culture Studies (An Autonomous Body of Ministry of Culture, Govt. of India, New Delhi) held on 24 to 26 Mar 2021
2. "From India's Northeast: Utopia in Dystopia in Mutum Devala's 'The Wrong Person'"—a paper presented at the IACLALS ANNUAL CONFERENCE 2021 titled "Utopias and Dystopias in Our Times" organized by IACLALS held on 17 to 20 Mar 2021
3. "'Maternal rage' in 'Complaint' and the Kangla Protest: Stories of Manipur in India's Northeast"—a paper presented online at the Eleventh Annual African, African American, and Diaspora Studies (AAAD) Interdisciplinary Conference titled "Movement(s), Collectives, and Collectivity" organized by the African, African American, and Diaspora Studies program at James Madison University held on 17 to 20 Feb 2021
4. "Transnational Identity: Trauma in Hoihnu Hauzel's Essential North East Cookbook"—a paper presented online at the Thirtieth Annual British Commonwealth and Postcolonial Studies Conference organized by the Journal of Global Postcolonial Studies and Departments of Literature and Philosophy & Religious Studies, Georgia Southern University, held on 15 to 19 Feb 2021
5. "An Imagined Graphic Story of the Meitei Graphic Narrative"—a paper presented online at the Eleventh International Graphic Novel and Comics Conference titled "The Resonance of Comics: Social Impact and Possible Futures" organized by the Comics Research Hub (CoRH!), London School of Communication, University of Arts London, UK; the Journal of Graphic Novels and Comics; and Studies in Comics held on 1 to 3 Jul 2020.

Vidya Sarveswaran

6. Sarveswaran. V. Dying to Live: Solastalgia and Soliphilia as Diptcyhs in Charlotte Mcconaghy's Migrations in Disease and Health Humanities Stream at the ASLE (American Society for Literature and Environment) Virtual Conference titled, Emergence/y on July 26th 2021.

Parichay Patra

7. Paper titled 'When the History Fails: Global South Re-narrated through the Anecdotal', in the seminar 'Eccentric Comparatisms, Worlds Otherwise: South-South Exchanges, Alternative Orientalisms, Strategic Occidentalisms', presented at the American Comparative Literature Association (ACLA) 2021 Annual Meeting, April 8-11, 2021.
8. Paper titled 'The Prominence of History and the Lack of the Global' presented at I World Cinema International Conference, organized by the Universidad Complutense de Madrid, Spain, June 15-16, 2021.
9. Invited talk on 'Solanas and India-Latin America Cinematic Links' in the Panel on Fernando Solanas at the XII Jornadas de Historia, Arte y Política Conference, organized by the Universidad Nacional del Centro de la Provincia de Buenos Aires (UNICEN), Argentina, June 23-25, 2021.
10. Paper titled 'In Defence of a Not-So-Political Cinema' presented at 'Many Afterlives of the Indian Emergency' Seminar, sponsored by SPARC, Ministry of Education, Govt. of India, hosted by IIT Jodhpur, March 27, 2021.

Farhat Naz

11. Presented a paper titled — 'Cross-road of Development: Climate Change, Water-Induced Disasters and the Urgency of Foresighted Policies' (co-author with Prof. K.J. George) at the International Virtual Conference 'Un/Predictable Environments: Politics, Ecology, Agency' held from 20-21 May, 2021, organized by Queen's University Belfast (UK), University of British Columbia (Canada), and University of Allahabad (India).
12. Invited Plenary Speaker in National E-Seminar on Ecological Crises and Climate Change in the Himalayan Region, held from 16-17 Dec. 2020, organised by Society for Himalayan Environment and People's Action (SHERPA) in collaboration with Department of Sociology, University of Lucknow & Ethnographic and Folk Culture Society (EFCS), Lucknow, India

Department of Metallurgical & Materials Engineering

The Department of Metallurgical and Materials Engineering at IIT Jodhpur has 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, Mechanical behavior, Thermoelectric transport, Lattice dynamics, Structural characterization, Li-ion battery materials

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

Saurabh Nene
Alloy Design, Additive Manufacturing, High Entropy Alloys, Friction Stir Welding and Processing

Srijan Sengupta
Lithium ion Batteries, Electrochemistry

Jaiveer Singh
Microstructural/textural characterizations, Microstructure-mechanical property correlation; Thermo-mechanical processing of materials; Alloy design; Mechanical behavior of materials

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. Metallurgical Microscopes with Software
4. Stereo-zoom Microscope
5. Density balance
6. Muffle furnaces
7. Oven
8. Induction Melting Furnace
9. Hot Mounting Press
10. Precision Diamond Cutting Machine
11. Bend-saw Cutting Machine
12. High Speed Grinder
13. Polishing Machines
14. Spin Coater
15. Jominy End-Quench Test
16. Notch-Broaching Machine
17. Charpy Impact Test for Plastics
18. Beam deflection unit
19. Polarimeter
20. FDM 3D printer
21. Stereolithography – 3D printer

Outreach

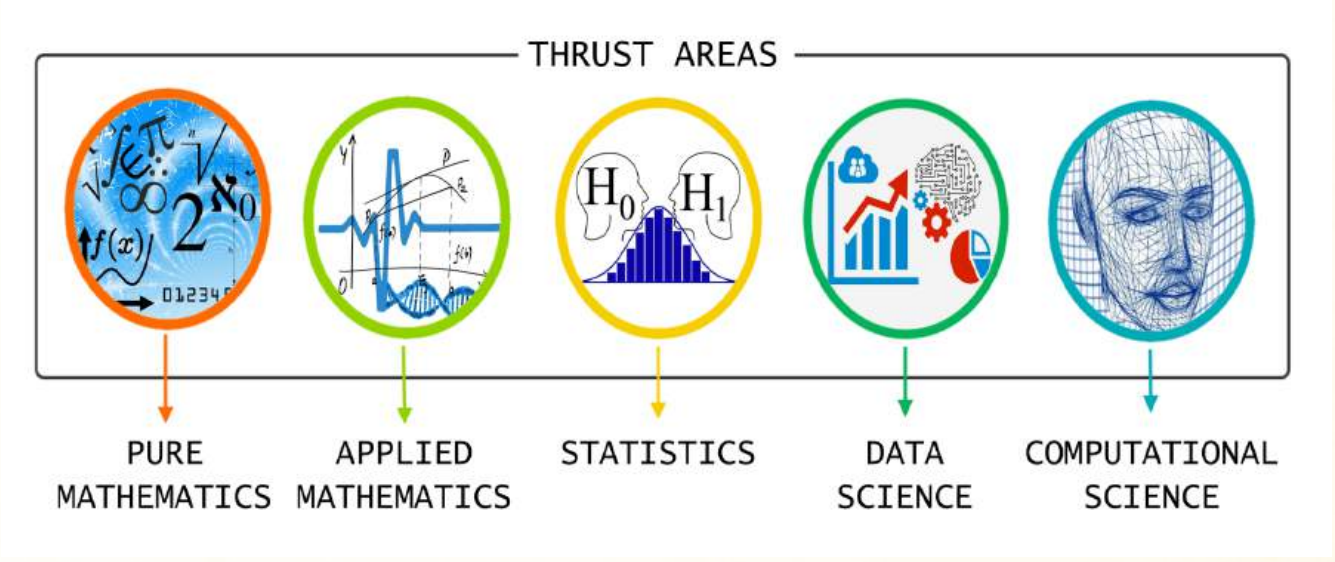
The following Outreach activities have been undertaken by the Faculty Members at IIT Jodhpur During the FY 2019-20.

1. Dr. S.S. Nene started an official collaboration with Prof. M.H. Tsai, Associate Professor, Department of Materials Science and Engineering, National Chung Hsing University (NCHU) Taichung, Taiwan to work in the field of High Entropy Alloy (HEA) Design
2. Dr. S.S. Nene started an official collaboration with Prof. Sheng Guo, Chalmers University of Technology, Sweden to work in the area of defect induced plasticity in HEAs
3. Dr. Abir Bhattacharyya started official collaboration with CSIR-National Metallurgical Laboratory in the area of multiaxial fatigue, and residual stress measurement
4. Dr. Abir Bhattacharyya started official collaboration with Indira Gandhi Centre for Atomic Research (IGCAR), DAE in the area of low cycle fatigue of nuclear steels

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. Our 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. The department has faculty with research interests in the areas of Algebra, Mathematical Physics, Scientific Computation, 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, Applied Probability.

We offer exciting high-quality programs at postgraduate level for students who wish to apply math to the fields of science and 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 following faculty members are associated with the department.

Name & Research Areas

Puneet Sharma
Associate Professor
Head of the Department
Topological Dynamics, Low Dimensional Chaos

Dilpreet Kaur
Assistant Professor
Algebra (Group Theory)

Abhishek Sarkar
Assistant Professor
Elliptic partial differential equations

Kirankumar R. Hiremath
Associate Professor
Theoretical, mathematical and computational aspects of wave-matter interactions

Gaurav Bhatnagar
Associate Professor
Wavelet Analysis, Fractional Transform Theory, Multimedia Security, Image Processing, Information Fusion

Nil Kamal Hazra
Assistant Professor
Reliability Theory, Applied Probability

Moumita Mandal
Assistant Professor
Numerical Functional Analysis

Tuhina Mukherjee
Assistant Professor
Analysis of Partial Differential Equations

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

V. V. M. S. Chandramouli
Assistant Professor
Dynamical Systems, Renormalization in Low-Dim Dynamics

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

Vivek Vijay
Assistant Professor
Financial Risk Analysis, Categorical Data Analysis, Regression

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

Outreach

The following Outreach activities have been undertaken by the Faculty Members of the Department, at IIT Jodhpur during the FY 2020-21.

1. Gaurav Bhatnagar organized the International Workshop on Big Data in Healthcare (BDH) in conjunction with IEEE BigMM 2020, held during September 24-26, 2020 New Delhi.
2. Gaurav Bhatnagar delivered an expert talk in AICTE sponsored QIP-Short Term Course on Data Analytics and Its Application to Industries organised by Indian Institute of Technology (BHU), Varanasi, 21 December 2020.
3. Gaurav Bhatnagar delivered an expert talk in FDP on Multimedia and Security organised by National Institute of Technology Patna, 19 December 2020.
4. Gaurav Bhatnagar delivered a lecture series on the Application of Linear Algebra in Teachers Enrichment Workshop (TEW) - Linear Algebra and its applications organised by Indian Institute of Technology Jodhpur, 10-13 December 2020. Click here for further details on the TEW.
5. Gaurav Bhatnagar delivered an invited talk in FDP on Mathematics: A Practical Approach in Science and Technology organised by Deogiri Institute of Engineering and Management Studies, June 2020.
6. Talk: Hiremath, K. R., Applications of mathematics in engineering: Stability analysis, at Jodhpur Institute of Engineering and Technology, Jodhpur, June 9, 2020 (online mode)
7. Expert talk: Hiremath, K. R., Numerical methods for differential equations, in Short term course on 'Computational methods in engineering science', Organized by Department of Mathematics at Women Engineering College, Ajmer (Rajasthan) along with NIT Jalandhar (Punjab), October 26, 2020 (online mode)
8. Dr. Puneet Sharma: QIP Lectures on "Mathematical Optimization and Applications", Organized by Indian Institute of Technology Indore, March 2021.

Awards and Recognitions

1. Ms. Sushmita Chandel, Ph.D. Student, has been selected for ACM India Anveshan Setu Fellowship 2021.
2. Mr. Parkala Vishnu Bayari, Ph.D. Student, has been selected for ACM India Anveshan Setu Fellowship 2021.

Conference presentations

1) Dr. Dilpreet Kaur

Sl. No.	Title	Sponsoring Authority	Type	Organizers	Dates
1	Teacher's Enrichment Workshop in Linear Algebra and its applications	National Centre of Mathematics, DAE, India	NW	Dilpreet Kaur and Prof. I. K. Rana	November 17-December 13, 2020
2	Online SageMath Workshop	Department of Mathematics, IITJ	NW	Dilpreet Kaur	Feb 15-18, 2021

2) Dr. Sukhendu Ghosh

Title	Organization	Type	Dates	Role	Dates
Present Scenario of Technology and Sciences (PSTS-2020)	Payam Scientific Publishing	International Conference	August 8-9, 2020	Keynote Speaker	November 17-December 13, 2020
Recent Advances in Mathematical Sciences and its Applications	Indas Mahavidyalaya	National Webinar	September 16, 2020	Invited Lecture	Feb 15-18, 2021
TEQIP-III, MMM-2020	IIT Indore	Faculty development program	November 23-28, 2020	Invited Lecture	

Department of Mechanical Engineering

The Department of Mechanical Engineering at IIT Jodhpur is devoted to impart quality engineering education and pursue excellence in research. It is dedicated to preparing 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.O, 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

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

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

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

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

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

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

Arun Kumar, R.
Experimental Aerodynamics - Confined Jets, Shock Wave Reflection and Transitions, Ejector Flows

Shrutidhara Sarma
Thin film nanocomposite temperature sensors, nanocomposite materials, flexible sensors

Ankur Gupta
Microsystems Fabrication

The following Faculty Members joined the department during this year.

Name & Research Areas

Ashish Pathak
Fluid-Structure Interaction; Ocean Energy; Phase-Change Problems; Multiphase flows; High Performance Computing

Jayant Kumar Mohanta
Planar Parallel manipulators; Lower limb rehabilitation robots; Medical robotics; Robot manipulator kinematic and dynamic control, Mechanism design and Analysis

Prof. C. S. Upadhyay
Department of Aerospace Engineering, IIT Kanpur is spending his sabbatical at the Department of Mechanical Engineering, IIT Jodhpur
Solid Mechanics, Adaptive Finite Element Methods, Structural Optimization

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 have 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 the 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 utilizing the facilities for fabrication purposes 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. Portable Tool Grinder.





3. Industrial Engineering Laboratory

The industrial engineering lab in the department of mechanical engineering consists of several experimental set ups 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 the 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 systems 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

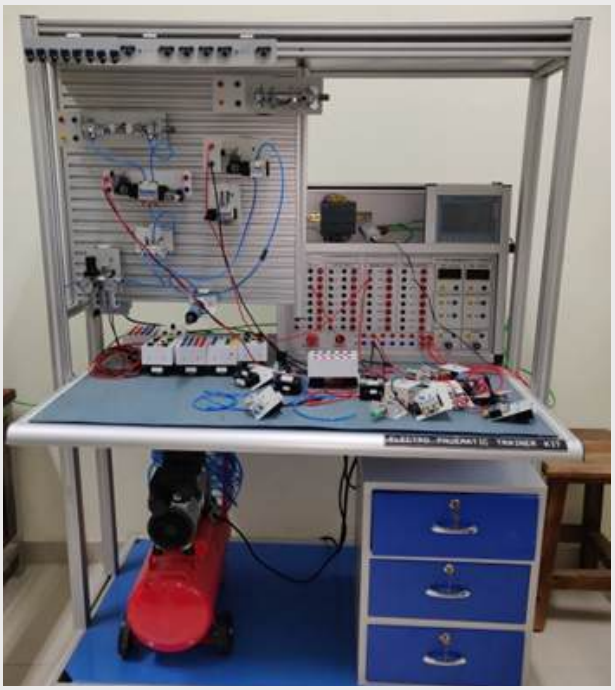



7. Mechatronics laboratory

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 the 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

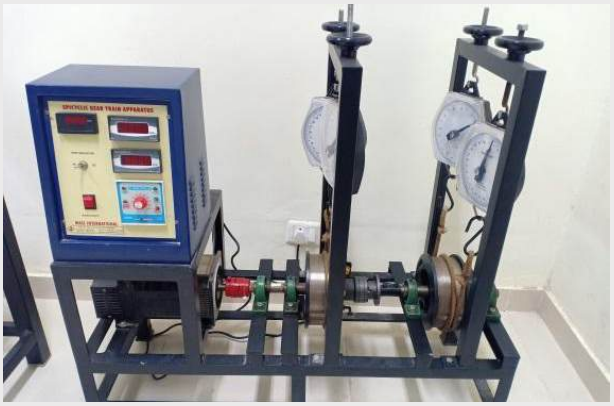
Fluid mechanics lab aims to provide hands-on exposure to students on various experimental flow measurement techniques. Students are introduced with the experimental flow prediction of a wide range of practical problems such as frictional flow through pipes, prediction of various aerodynamic coefficients 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.

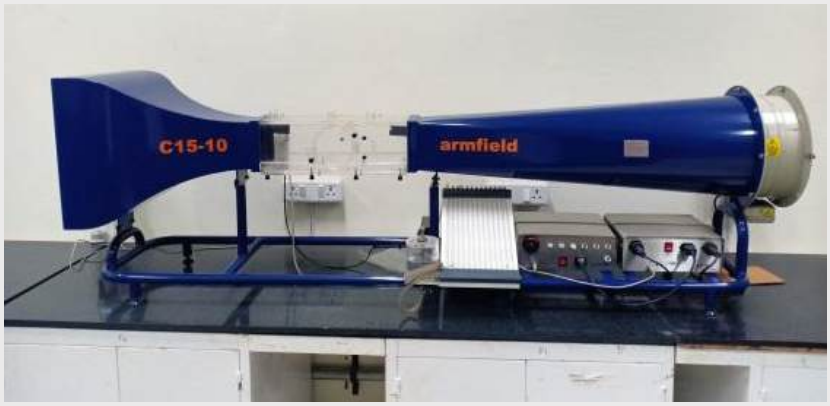
The various facilities available at the institute Fluid Mechanics lab are as follows:

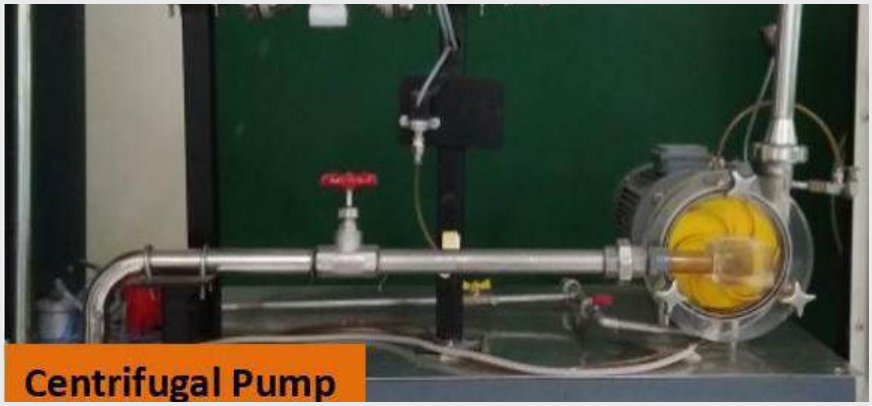
- Subsonic Wind Tunnel
- Pipe Friction Apparatus
- Reynolds Apparatus
- PIV simulator
- Various Flow Measurement devices

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 pumps. The miniature turbomachine units are mounted on a test bench with a 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

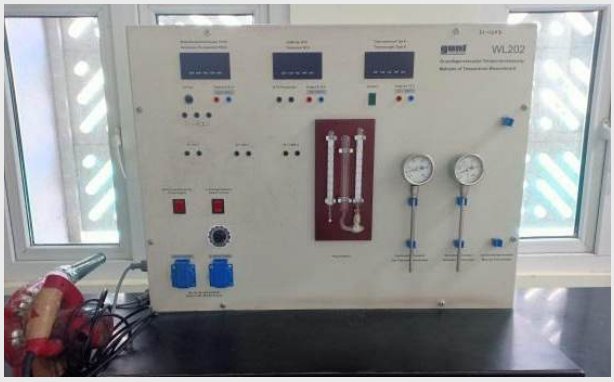


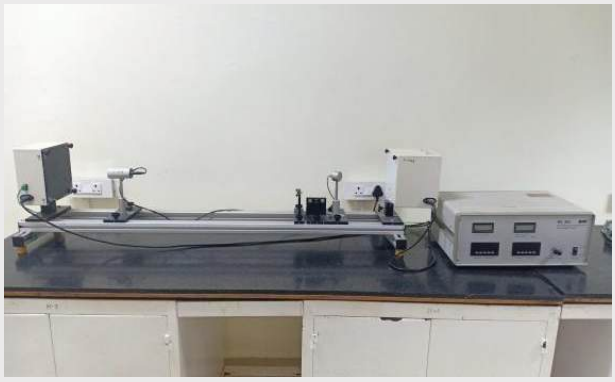




11. Heat Transfer Laboratory

The objectives of Heat Transfer Lab is to provide practical knowledge with regard to the determination of the rate of heat exchange in various modes of heat transfer and to provide practical exposure 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, and 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 plants, automobile engines as well as refrigeration devices. Knowledge of heat transfer is the key to this goal.

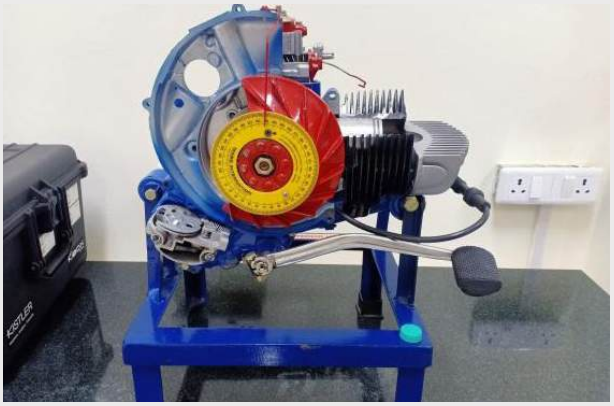
In recent times, research in this field has become more toward industrial applications and includes fields that are at the borderline of Physics. As manufacturing has become miniaturized, the study of heat transfer at the micro and nanoscale has become extremely important. The miniaturization of components provides an 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




15. Gas Dynamics Laboratory

The Gas Dynamics Laboratory introduces students with various high-speed flow scenarios and experimental measurement techniques. This lab intends to provide students with the fundamental knowledge of supersonic flows through various devices like, nozzles, diffusers, compression and expansion corners etc. The students are also exposed to the fundamentals of aerodynamic shock waves and its reflection characteristics. The fluid dynamics at high-speed flows are particularly important in the aerospace propulsion and defense sector and this lab aims to give a flavor of various high speed flow applications in these sectors. The various teaching lab experiments conducted at this lab are as follows:

1. Nozzle flow experiments using a blow-down open jet tunnel.
2. Mowing shock wave experiment using Shock Tube
3. Shock Wave reflection studies using a supersonic wind tunnel.
4. Underexpanded and Overexpanded jets in supersonic nozzles
5. Schlieren and Shadowgraph Visualization for High-Speed Flows
6. Computational Gas Dynamics

Outreach

1. Shobhana Singh did the following:
   (i) 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)
   (ii) Member of Advisory Committee, International Symposium on Fluids and Thermal Engineering (FLUTE - 2021).
   (iii) Delivered an invited Lecture in Faculty Development Program (FDP) at MIT Ujjain, India, 04-08 August 2020.
2. Hardik Kothadia, delivered the following invited talks:
   (i) Keynote Speaker, 4th International Conference on Advanced Research in Mechanical, Materials and Manufacturing Engineering, REVA University, Bangalore, 11 July 2020
   (ii) Expert Lecture, FDP on Advancement in Thermal Systems and Their Designs, Mahakal Institute of Technology, RGPV, Bhopal, 08 August 2020.
3. Atul Kumar Sharma delivered an invited talk on "Wave propagation in soft electro-active polymer composites" as a part of the AICTE–Training and Learning (ATAL) Academy Sponsored 5 Days Training Programme on Mechanics of Composite Materials and Structures, M.B.M. Engineering College, Jodhpur, during September 07-11, 2020.
4. Atul Kumar Sharma delivered an invited talk on "Modelling of Soft Active Smart Materials" as a part of the AICTE-AQIS sponsored Online Six Days Short Term Training Programme (STTP) on Eclectic Research Trends in Manufacturing (Part-3), Poornima College of Engineering, Jaipur, during March 15-20, 2021.
5. A. Plappally, Truncated Unglazed Percolative Clay Ceramic Ware as a Modified Pitcher Irrigation System RuTAG IITD News, Vol. 8, No. 2, pg 2 July 2020
6. A. Plappally, Mound Based Sub-Surface Irrigation, Rajasthan RuTAG IITD News, Vol. 9, No. 1, pg. 3, January 2021
7. R K Satankar, A K Nighojkar, S Gupta, A. Plappally, Manufacturing and Sintering of G filter: A Indigenous Clay Ceramic Water Filter- Patent Application: 202111005827
8. A. Plappally, Talk titled, Water Technology- G Filters, at International Seminar on Safeguarding Intangible Cultural Heritage Webinar by UNESCO, Lok Samvad Sansthan and Anant University, on 9th and 10th Aug 2020
9. A. Plappally, Taught Water Quality and Energy use, at Jal Pathshala, at the Indian International Science Fest, 2020, Dec 02-05 2020.
10. A. Plappally is presently incharge of CETSD and UBA-RCI coordinator at IIT Jodhpur from 2019- till date.
11. Research collaboration with Department of Chemicals and Materials Engineering, University of Alberta, through SERB-Overseas Visiting Doctoral Fellowship granted to Ph.D. scholar from Rahul Chhibber's research group. (Result declared: August 2020, Collaborative work start: February 2021)
12. Rahul Chhibber participated as speaker in invited lecture organized by Indian Institute of Welding- Jamshedpur branch on 31st December 2020.
14. Rahul Chhibber participated as Speaker in FDP organized Department of Mechanical Engineering, DAVIET, Jalandhar, Punjab, sponsored by AICTE-ISTE on 26th December 2020.
15. 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 2020.
16. Prodyut Ranjan Chakraborty delivered an invited talk on "Solar Thermal energy storage" as a part of the one week Faculty Development Program at Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur (SKIT) during August 24 -28, 2020.
17. Nipun Arora delivered an invited lecture on "AI based tools in teaching and scientific research" as a part of the Faculty development program organized in Kirori Mal College, Delhi University in October, 2020.

Department of Physics

A visible research in fundamental Physics along with its applications is the major theme of the 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).

The following faculty members are 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

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 following DST Inspire Faculty Members joined the Department during 2020-2021.

1. Dr. Lakshya Daukia
2. Dr. Vijay Kumar Singh

The following laboratories are functional in the Department of Physics.

Experiential learning is an integral part of the various programs offered by the physics department at IIT Jodhpur. The students grasp the theoretical concepts much better and quickly through 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 of the 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 needs of the Faculty members, PhD students and Research staff. 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

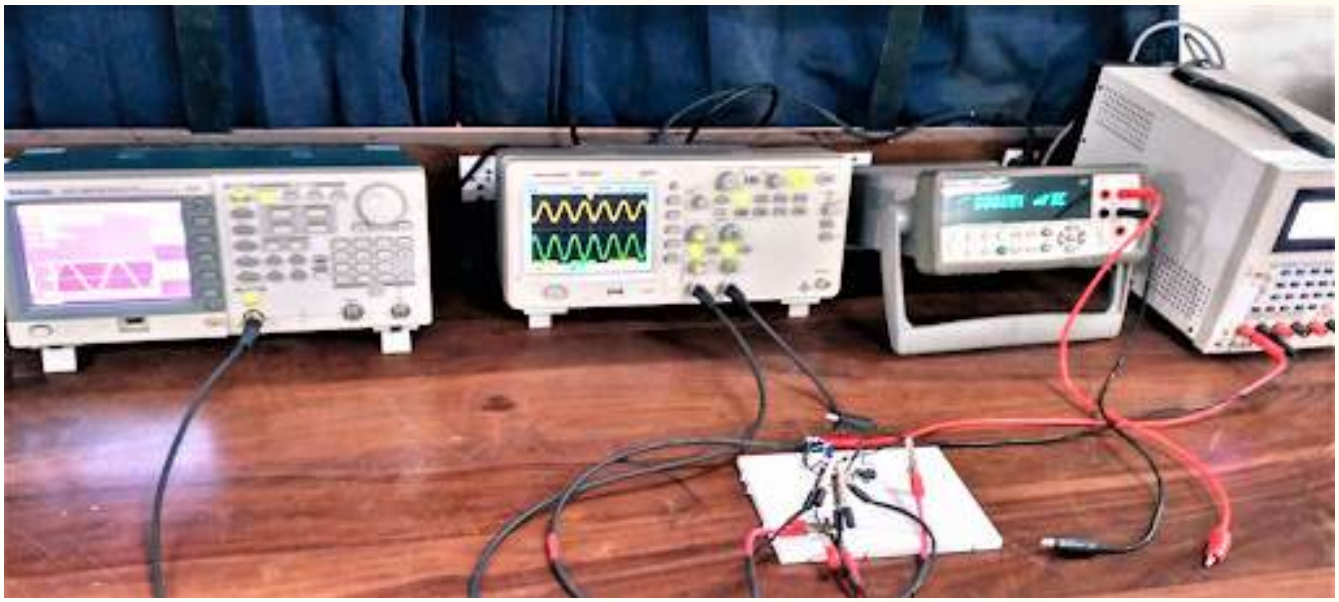
Typical experiments in the lab covers Electromagnetism (Hall effect, B-H curve tracing), Optics (Newton's Rings, Refractive index of prism, Diffraction of light, Faraday effect), Mechanics (Stationary waves in strings, Flywheels) and Electrodynamics (e/m-ratio with Helmholtz's coil, Basic current balance).

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. The following new equipment have been acquired in the Electronics Laboratory:

1. New source meter, oscilloscopes, function generators were added.
2. To perform Arduino based experiments new microcontrollers were added.

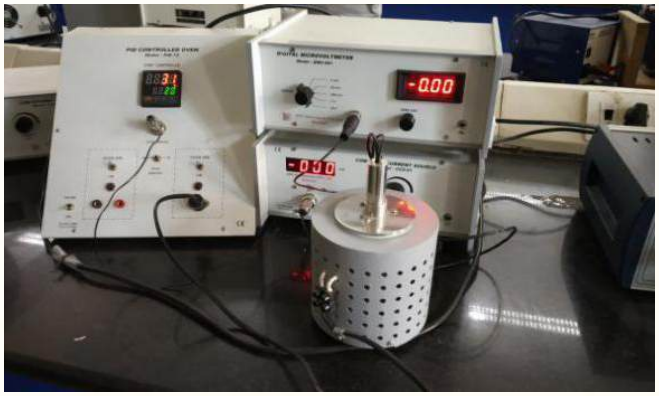


Electronics Lab

3. Condensed Matter Physics Lab

The lab is equipped with a 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. The following new experiments have been added to Condensed Matter Physics Laboratory:

1. Vibrational spectrometer for Raman analysis
2. Temperature dependent resistivity and Hall measurements

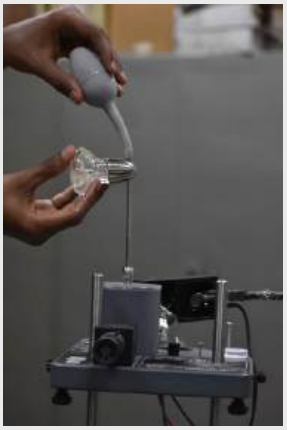


Four-probe set up

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

The following new experiments have been installed in Atomic and Nuclear Physics laboratory

1. Gamma Ray Spectrometer (Energy resolved)
2. Alpha spectrometer (Energy resolved)
3. Radiation Counter for Alpha and Beta Particle
4. Radiation Counter for Gamma and Beta Particle
5. Millikan Oil-drop experiment

5. Optics and Laser Lab

The experiments in the lab provide the conceptual understanding of geometrical & wave optics, and Lasers. It has several Interferometers (Michelson. Fabry Perot, Mach Zehnder), optical fibers, laser diodes, Goniometers, prisms, polarizers to cater to the experiments. New experiments such as refractor meter, characteristic study of diode laser and Polarization studies by wave plates are introduced in this academic year of 20-21.

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 algorithms; write code; execute the job on a computer; visualize and analyse obtained data; and finally, correlate/verify the results with the observed phenomena.

A. Research Laboratories

1. Basic Physics 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, Multiferroic measurement systems, etc. The department also has 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

An inert atmosphere filled Glove box system is procured from DST funded research grant to facilitate the fabrication of Li-ion batteries and other types of energy storage devices at the Department of Physics.

Three-port Glove Box system for the fabrication of Li-ion batteries

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. New High End Workstations have been acquired in the Computational Physics Laboratory.

8. Thematic Laboratory: Cold Plasma Lab

Developed Electrical Characterization Set-up for the testing of Dielectric Barrier Discharge Systems

Fig. Electrical Characterization set-up for the testing of DBD systems

New projects in the Department of Physics

1. Electronic and thermoelectric properties of Bi2Te3-xSx and Sb2Te3-xSx: A density functional theory approach and Scanning tunnelling microscopy study of surface states for the enhancement of thermoelectric efficiency, PI: Satyajit Sahu
2. Cold Plasma Detergent in the Environment to fight COVID-19, Industry-sponsored project, Approved in June 2020. PI: Dr. Ram Prakash
3. Design and Development of Dielectric Barrier Discharge Based Flat VUV/UV Excimer Light Sources for Advanced Applications in Health and Medicine, DST-SERB, Approved in December 2020. PI: Dr. Ram Prakash
4. Design and development of small-scale milk disinfection system using mercury-free plasma (MFP) UV Lamp technology, DC, MSME, Govt. of India, Approved in January 2021. PI: Dr. Ram Prakash
5. Uniquely identifying Lorentz structure of new physics in semi-leptonic B decays SERB (Core Research Grant) Approved in Dec 2020. PI: Ashutosh Kumar Alok
6. High voltage (~5V) ultrafast charging/ discharging cathode materials in bulk and nano geometries for high power Li ion rechargeable batteries, DST-SERB, Approved in December 2020. PI: Dr.

Outreach

1. Satyajit Sahu delivered an invited talk at the BRICS conclave, Chelyabinsk, Russia virtually.
2. Prabhat K. Jaiswal delivered a Guest Lecture on "Quantum and Statistical Mechanics: Foundation of Statistical Mechanics" at Amity Institute of Applied Sciences, Amity University, Noida on 24th March 2021.
3. Prabhat K. Jaiswal delivered an Invited Talk on "Phase-separation Kinetics of Binary Mixtures" in a Webinar on 'Challenges Involved in Simulating the Complex Systems' at the Department of Physics, Birla Institute of Technology Mesra, Ranchi on 25th July 2020.
4. Ram Prakash organized a product exhibition of the Institute during the 6th Convocation of the Institute in the Main Lecture Hall of the Institute on 6th December 2020.

5. Ram Prakash delivered an invited lecture in the 6th India International Science Festival (IISF-2020) at the Water Conclave under the theme: Jal Vimarsh: Scientific Innovations in Society Session that was organized in the online mode during 22nd-25th, December 2020 at Delhi.
6. Ram Prakash co-coordinated the first Entrepreneurship/ Faculty Development Program organized in the Domain of Medium Small and Micro Enterprises in online mode during 15th February – 27th February 2021 at IITJ TISC and delivered a talk on "TISC Activities at IIT Jodhpur" and motivated the participants. The program was conducted in collaboration with the DST Rajasthan and was supported by National Science & Technology Entrepreneurship Development Board, Department of Science and Technology, Government of India.
7. Ram Prakash delivered two lectures on "Technology Sourcing: Support available from R&D Institutions" in the Entrepreneurship/Faculty Development Program organized in the Domain of Medium Small and Micro Enterprises in an online mode and was conducted twice during 15th February – 27th February 2021 and during 1st March – 13th March 2021 at IITJ TISC.
8. Ambesh Dixit delivered a popular lecture organized by Marudhara Vigyana Bharati.
9. Ambesh Dixit delivered an invited talk at Indian Planetary Science Conferences during February 2021.
10. Ambesh Dixit delivered an invited talk at Russian – Indian Network for Institutions of Higher Education (RIN), organized at IIT Bombay.
11. Ambesh Dixit delivered several invited talks at different Indian Universities under Faculty Development Programs.
12. B M Krishna Mariserla delivered a lecture as an invited speaker for a Faculty Development Program (FDP) on Nanomaterials: Experimental design & Theoretical Modeling, 13-20 Feb 2021, Organizers: NIT Warangal and NITDM Kurnool.
13. Shahab Ahmad delivered an invited talk on "Advanced Materials for New Generation Energy Storage Devices" at the 2nd International Conference on Graphene and Novel Nanomaterials (GNN 2020) held at Beijing, China on 01-04 Nov 2020 (Online).
14. Shahab Ahmad delivered an invited talk on "New Generation Energy Storage Devices" at The Online Symposium (Nano materials) - Russian-Indian Network of Institution of Higher Education (RIN), jointly organized by IIT Bombay, India and Tomsk State University, Russia on 03-05th Nov 2020 (Online).

New high end research instrumentation through project in the Department of Physics

1. A 50 kV (peak to peak) variable bi-polar pulse power supply with frequency range 5kHz-50kHz
2. Tektronix High-Voltage Passive Probe 40 kV
3. Rogowski-type Pearson current monitor Output resistance 50 Ohms, Maximum peak current ~5000 A Maximum rms current 65 A.
4. Air Ion Counter Range: 2 million and 200 million
5. Computational workstations
6. Glove-Box for energy storage applications
7. High-energy Ball-Mill for energy storage applications

New Technologies developed in the Department of Physics

1. Developed an Advanced Photocatalytic Oxidation Sterilization System based on UV-light and metal oxide nanoparticles catalyst to treat N95 Filtering Face-mask Respirators for reuse in the year 2020 and the developed system was tested by AIIMS, Jodhpur. This system can easily disinfect around two hundred N95 FFR in a single day. The technical know-how was transferred to eight industries and one NGO during May-June, 2020. The project was led by Ram Prakash with other significant contributions from Deepak Fulwani, Ambesh Dixit, Ankur Gupta and Shankar Manoharan and their associated students.

Fig.2 IITJ's APCO Sterilization System for FFRs

2. Developed an Advanced Photocatalytic Oxidation Conveyor System named as 'APCOC' for sterilization of surfaces, such as food packets, books, mobile phones, laptops, carry bags, courier bundles, etc. This technology can also be used on some of the thick peel food items, leather items, during the packaging of herbs and seeds, etc. and may reduce the number of complete washdowns required during processing, thereby saving resources, such as water, chemicals, and energy costs. The developed sterilization method is a substitute for traditional chemicals and scrubbing agents, which will be highly useful for the general public during the pandemic particularly at public places, such as airports, railways, healthcare facilities, college and university libraries, shopping malls, commercial buildings, public buildings, etc. This APCOC system mitigates cross-contamination concerns and is able to sterilize items via a dry process even in the shadow regions. The technical know-how of this technology was transferred to M/s Potre Automation Pvt. Ltd. Noida on 27th January, 2021 for its mass production. The project was led by Ram Prakash with other significant contributions from Deepak Fulwani, Ambesh Dixit, Ankur Gupta, Neha Jain and their associated students.

Fig. 3. APCOC system; Technology know-how transferred successfully

School of Management & Entrepreneurship (SME)

The School of Management & Entrepreneurship (SME) is a forward-looking bold experiment to create and deliver a novel value proposition in the management and entrepreneurship education sector in India. Underlying this experiment is the stark realization that on account of fast-paced technological changes, the era of stable paradigms in the industry which could be exploited through traditional business models, has come to an end. The future will belong to those who are comfortable with technologically-dynamic business models, derived from continual expression of entrepreneurial energy exhibited by organizational members. To this end, SME has created a program which integrates technology, management and entrepreneurship through an institutional framework which leverages various engineering disciplines, interdisciplinary programs, its own innovation and incubation centre, humanities department apart from management faculties.

The following faculty members were associated with the School during 2020-21.

Sl. No.	Faculty Name	Post	Research Areas
1	Abhishek Narain Singh	Assistant Professor	Information security management, Cybersecurity, E-Governance, ICT for Development
2	Akanksha Choudhary	YFA	Development economics, education and health economics, public policy and gender studies
3	Anuj Pal Kapoor	Assistant Professor	Consumer Behaviour, Consumer Anthropology, Multi-Sensory Marketing, Visual Aesthetics
4	Devi Prasad Dash	Assistant Professor	Economics: Energy Economics, Urban Economics, Economics of Crime
5	Gaurav Kumar	Assistant Professor	Finance: Digital Finance, Stock Markets, Corporate Finance
6	Krishna Kumar Balaraman	Head, Associate Professor	Strategic Management, Business Models, Strategic Foresight, Micro foundations of Strategy and Capabilities, Behavioural Strategy, Entrepreneurship, Strategic Decision Making, Strategic Alliances, International Business, Organizational Learning, and Corporate Governance
7	Manish Aggarwal	Associate Professor	Computational Intelligence
8	Mayank Kumar	Assistant Professor	Healthcare IT, Technology Adoption, Public health, Smart health, Social Media
9	Mithu Rani Kuiti	YFA	Operations: Green Supply Chain Management & Reliability Theory
10	Preeti Tiwari	Assistant Professor	Social Entrepreneurship/Entrepreneurship/Sustainability
11	Ram Krishna Mitra	Professor of Practice	Strategy, Public Policy, e-Governance
12	Sankalp Pratap	Associate Professor	Entrepreneurship-as-Practice; Strategy-as-Practice
13	Venkat Ram Reddy	Assistant Professor	Judgment and Decision Making; Behaviour Change
14	Venkatesha Murthy	Assistant Professor	Start-ups, and Micro-Small-Medium Scale Enterprises
15	Yerasani Sinjana	Assistant Professor	Operations: Social Networking, Supply Chain Management

Message from Prof. Krishna Kumar Balaraman, Head, SME

Dr. Krishna Kumar
Balaraman, Head, SME

We live in challenging yet exciting times. The next few years will be challenging for the world as it figures out how business is conducted in the new reality. At the same time, it is also a period showcasing the resilience of the human spirit and how we constantly adapt to emerge stronger. Technology is playing a major part in this resurgence of the human spirit, and is repositioning business management and education.

The School of Management and Entrepreneurship (SME) at IIT Jodhpur was born during this transitional cusp and has found immediate relevance to its vision of technology-focused management education and research. SME's Tech-MBA is a sought-after program, and has generated great interest among students and the industry. SME, as an entrepreneurial venture by itself, is beginning to make a mark for itself among management schools in a short time of just over a year – full winter (social sector) and summer internship placement for its pioneering MBA batch, a doctoral program completing its first year, popular minor programs in management and entrepreneurship as part of IIT Jodhpur's flagship program, multiple student-driven events, and evolving industry collaboration, to name a few. We are now moving successfully into inducting the next batch of MBA and PhD students with international students applying for its doctoral program. Many MBA students have been selected for studying with partner Universities abroad, as part of the dual degree program, to pursue various degree programs in technology and management. The faculty have been publishing in top journals and are involved in IIT Jodhpur's inter-disciplinary research programs. It is truly an exciting time to be part of SME, IIT Jodhpur as a faculty and as a student!

As SME marches ahead with its mission to enable a new generation of managers, entrepreneurs and leaders with foresight and humanistic values, it seeks able partners across the world, both in the academia and in the industry. Being part of the IIT ecosystem, we have a lot to offer and look forward to working together in offering a futuristic experience to all its stakeholders.

The details of various activities undertaken by SME are as follows:

The School of Management and Entrepreneurship has started operating from a new building which is equipped with modern infrastructure from 4 Jan 2021 onwards.

For all the applications received between 22 April 2020 to 23 June 2021, the process for Stage 1 and Stage 2 of the faculty recruitment is going on. The Stage 3 process is under consideration.

SME received approx. 2,500 registrations on MBA admission 2021 portal. Out of which, a total 820 candidates have paid the application fee and completed the application form. Out of these 820 candidates, 728 candidates were initially shortlisted. These shortlisted candidates were asked to submit a recorded video introduction of themselves, for the final round of selection and preparation of composite merit score. Out of the 728 candidates, 677 candidates submitted the video introduction, and were considered for preparing the merit list. Based on the decided cut-off, 512 candidates qualified for the final merit list. From these 512 candidates, admission offers have been released in various rounds. As on July 16, 2021, SME has 82 candidates who have paid the fee (after withdrawals). The induction program for the incoming MBA batch of 2021-23 was scheduled during July 15-19, 2021.

SME initiated its doctoral program in the year 2020. Doctoral candidates can be admitted to the school across the eight functional areas (viz. Digital Transformation and Business Intelligence, Economics, Finance and Accounting, Human Capital and Organizational Dynamics, Innovation and

Entrepreneurship, Marketing, Strategy and Public Policy, Operations). The first cohort comprised a total of 9 students including 6 full–time regular students and 3 part-time online students. Part-time online students are working executives from the corporate world who are simultaneously carrying out their regular duties in their respective organizations and have obtained the concurrence of their organizations to pursue the doctoral program. Given the nature of the profession of management, the part-time online program is expected to bring in invaluable scholarship to this practice-oriented field of education.

In the first year, students undergo meaningful training in the form of a curated doctoral coursework which exposes them to various domains of management science, the underlying social science fundamentals and contemporary research methodologies. Apart from area specific fundamental courses, students would undergo courses on Literature Review and Theory building, Philosophy of Science and introductory courses on Sociology, Psychology and Economics. Methodology courses exposing students to Quantitative techniques and Qualitative techniques would conclude with skill building lab courses. Finally, students would undertake area specific electives. Along the coursework, students would also get exposure to inputs around academic writing and case writing, both in workshop mode. The first batch initiated its coursework in the online mode on account of the Covid restrictions, and subsequently after a few months, with due care and precautions, the students came to the campus. In the upcoming second year, the inaugural batch would appear for the qualifier examinations and would defend the respective research proposals. SME envisions that its students would carry out practice oriented fundamental research which caters to the relevant contemporary national and global issues.

Student activities are an integral part of the management education for MBA students. These activities help students to develop problem-solving, reasoning, critical thinking, creative thinking, communication, and collaborative abilities. Co-curricular activities emphasize that in the 21st Century, education and learning must surpass the four walls of a classroom. The core aim of education and learning should be to foster holistic development. The importance of co-curricular activities cannot be overlooked in fostering holistic development. On the same front SME has been striving and excelling in organizing various student activities in spite of pandemic and operating digitally. We started with our 1-week long packed online induction program in July 2020. It was a grand success as the first online event which involved people from leadership positions around the world and students across IIT Jodhpur. Thereafter, there were a vast range of events and activities which were organised by various clubs and committees of the school for the students of SME as well as for the larger student community of IIT Jodhpur. The list of the prime activities conducted during AY 2020-21 are listed in the sheet. Besides, students of the School, under the guidance of the School faculty, worked tirelessly to come up with a revamped website for the school.

The Placement Committee vanguards the on-campus recruitment process for both Summer Internships and Final Placements. It is also responsible for building long standing corporate relationships through Industry Engagement in the form of Guest Lectures, Industry Interaction Series and numerous other confluences. The School of Management and Entrepreneurship (SME), IIT Jodhpur, has in its very first year made a modest beginning as a B-school which despite starting in the most trying of circumstances, amidst a pandemic has come out with flying colours in various academic parameters, one of those being the Summer Placements with 100% of the batch placed. SME IIT Jodhpur was founded in the year 2019 with a mission to embrace the digital revolution and produce managers who possess sound business acumen along with a sagacity for technology. The internship placement process, which was conducted virtually, witnessed 78 offers for its 68 students. A total of 44 firms participated in the placement drive with the highest, median and average stipends being 1.05 lacs, 60k and 51.5k respectively for the internship duration. The recruiters for summer placement came from diverse sectors such as manufacturing, IT, e-commerce and PSUs. The roles offered belong to the domain of AI Consulting, Value Analysis, Market Research and Product Launch among others.

Social Sector Attachment (SSA) is a Non-Graded compulsory course that is entirely live project-based. As a part of this initiative, SSA introduces students to the 'Third Sector Organisations,' which creates or attempts to develop superior societal/environmental value. The students will be exposed to these organizations during their winter break. SME at IIT Jodhpur focuses on creating socially responsible managers. The student has to complete an SSA course through a winter internship in a socially inclined organization to achieve this. This year our students worked in the 11 organizations viz. Right Walk Foundation, Adhyayan Foundation, Soch, Cry, Mind foundation, People's Vigilance Committee on Human Rights (PVCHR) etc.

The School has tie-ups with some of the leading business schools in the world. Specific arrangements have been made to offer SME IITJ students dual degree options. The SME students would do their MBA core courses in the first-year at SME, IIT Jodhpur, and thereon would study specialized courses in the second year at a partner institution abroad. The students in this program would earn MBA degree from IIT Jodhpur and a specialized Master's degree from the partner B-School. SME IITJ has partnerships with George Washington University, Business

School, SUNY Albany, and Brandeis International Business School, in the USA. In the very first year of SME, the students have shown a great interest and a good number of them are going to begin their studies at the partner institutions towards earning double degrees.

The School has organized two MDPs- one on 'Foreign Trade: Advantage India' and other on 'Cyber Security' on 09–10 October 2020 and 12–13 December 2020, respectively. Eminent industry professionals and experts and faculty of the School shared their insights with the participants. The programmes were appreciated by the participants.

Student Activities

Club/ Committee	Event/ Activity	Description
Mint Money - The Finance Club	Session on Personal Finance	A session on personal finance by CFA Gajendra Kothari with discussion on SIPs, investments, etc.
	TradeXia	Simulated trading game on various platforms organized for the batch
	Finance Quiz	Finance quiz organized for the batch
	Square Off - D2C	A national level quiz competition on finance organized on D2C
	Alpha - D2C	A national level Equity research challenge organized on D2C
	Financial Analysis	Informative content pieces and analyses shared with the batch
Sanskriti - The Cultural Committee	Dumb Charades	The classic game of charades with the batch
	Diwali Night	Celebrating Diwali with the batch with performances by our talented batchmates
	SME Awards	A fun award nights where various aspects of the batchmates were addressed
	Unusual Suspects	A murder-mystery treasure hunt organized with Ethiros theatre group, sponsored by Fatafat.
	O.W.L.s or N.E.W.T.s?	A Harry Potter theme quiz organized for the students of IITJ
	Topsy Turvy	A game where participants had to guess Bollywood songs from their english translated lyrics
	Interactions	Get-togethers and fun games organized over the last year
Toastmasters Club	Roleplay	Participants were asked to re-enact scenes from popular shows to improve interpersonal skills
	Extempore	Participants were given topics on the spot and asked to speak for two minutes
	Guest Session	A guest session by distinguished Toastmaster Ms Rita Sandhu
	Guest Session	A guest session by the President of the Jodhpur club of Toastmaster, Mr. Avin Chhangani
Voice - The Media Committee	SME Magazine	Published the SME magazine, 2020, Sandarsh Issue 1
	Social Media	Updates and maintaining social media channels
	Live streams	Live streaming events prganized by other clubs/ committees on YouTube
	Content Creation	Certificates, Flyers, and Videos created for brochures, and social media
	Promotions	Promotion, and sponsorship through The Hawk, Dainik Bhaskar, and 94.3 MyFM

Club/ Committee	Event/ Activity	Description
TechCom	Geek of SME	A year long-running programming and quizzing competition
	Le Concour de Quiz Technologique	A national event that tested participants based on their knowledge of Amalgamation of general expertise in technology
MarkTech	Group Discussion	Group discussions for students of IITJ on various topics to pick the 'Marketeer of the week'
	Quiz-a-thon	Quiz for students of IITJ on various topics to pick the 'Marketeer of the week'
	MarkTalks	A talk-series encompassing various themes under which prominent speakers from the industry shared their experience and insights
	Markitude	A national level marketing competition which involved preparation of ads and a case study
	Webinar	A webinar on product marketing by Mr. Ankit Goswami, Airtel
Vcare - Social Sector Connect	Kartavyam	A national level case study competition organized on D2C
	Winter Internships	Reached out to organizations for Winter Internships
I-Rise - Analytics Club	Analytics Conclave	Prominent speakers from the field of Business Technology, and Data analytics were invited to share their expertise on various topics.
	Sports analytics	National Level Data Analytics competition hosted on D2C platform in association with Sports committee
	Workshop	Workshop on data analytics tools in association with Havish M Consulting
	Sessions	Sessions on data analytics tools by club members covering python, Tableau, PowerBI, Excel
	Info Series	Brief series on LinkedIn capturing the facts based on topics like Product management, Data analytics etc.
	Guest session	Session on "KPIs used by startups to assess themselves based on data" with Mr. Akshay Kapoor, Founder Yammlabs
Khelo - Sports Committee	Chess competition	An online chess competition for the batch
	Fantasy League	A fantasy league for cricket lovers was organized for the duration of IPL
	Squat Challenge	Squat challenge was organized for fitness lovers
	Blaze	Online sports and eSports fest for students of SME
	Exuberance	Organized for the prospective MBA candidates
	Exousia	A week-long national level online sports fest
SME Connect	Guest Sessions	30 guest sessions organized over the year
	National Science Day	Science day competitions organized for the IITJ students which included 4 events: - Panel Discussion - Pitch competition - Theory Crafting - Sci-fi Content Creation
Startups Club	Bootstrappers Guild	SME's first-ever newsletter
	Guest session	Organised a session on BIG Scheme by Mr. K.K. Roy (COO, FITT, IITD)
	Entrepreneurial Experience	Setting up a Maggi stall during a cricket match to get hands-on entrepreneurial experience
	EDP session	Collaborated with TISC, IIT Jodhpur in their Entrepreneurship Development Program
	Guest Session	Spent a day with Mr. Vikas Jain (Director at Nanobot) and discussed his entrepreneurial journey. Mr. Jain gave a tour of Nanobot's manufacturing factory and interacted with participants in a webinar.

Club/ Committee	Event/ Activity	Description
Biz Fest Committee	SMEraQi	A mini business festival with two events under its belt – SME Shutter '21 (A photography competition) and Square Off '21 (A finance quiz competition).
	Campus Ambassador Program	Campus Ambassador Program for our Business fest - उद्योग FEST
	उद्योग FEST	The flagship business festival with 7 competitions under its banner
Placement Committee	Sandstone Summit	Industry conclave with 4 events under its banner: - HR Shastra: Organized panel discussions and standalone talks with senior human resource executives from reputed organizations - Impresario: This consisted of standalone sessions with senior executives across diverse range of companies and popular startups. - Presedium: This series of standalone guest lecture series featured eminent personalities from the industry holding positions like Managing Directors and CXOs from reputed organizations. - In conversation: A fire side chat with eminent industry personalities and startup founders moderated by either a student or a faculty
	Sessions	Guest sessions under the banner of Industry Interaction series
Embrace - Admission Committee	Two cents from top CAT percentilers	A write-up from the CAT toppers was published.
	Month in a Minute	A few short videos (<2mins) of the events (month wise) were published.
	100 Days @ SME	Short videos depicting Campus life were published.
	From the Faculty's Desk	Interactions with faculty as a write-up was published.
	Experience @ SME	Short videos (<5 mins) explaining the experience at school thus far
	Exordium	Webinar series encompassing the unique features of the school explained by our faculty
	Symposium	An interactive webinar series hosting the current clubs and committees
	Master Class	Series of sessions led by the faculty to provide students the flavour of our curriculum here at SME
	Dual Degree	Webinar sessions hosting the students from the current batch (going for Dual Degree)
	Adhyapan	Video showcasing the values of SME, narrated by the Director of our school

Awards and Recognitions

Sl. No.	Description of Awards and Recognitions	Faculty members
1	Gaurav Kumar, Cal Muckley, Linh Pham, Darragh Ryan, Runners-up in the 2020 Research Impact Case Study Competition organised by UCD Dublin, Ireland, 2021	Gaurav Kumar
2	UNESCO Fellow	Anuj Kapoor
3	RDW Fellowship award by ILO	Akanksha Choudhary
4	Excellence in research/Best Thesis award by IIT Bombay	Akanksha Choudhary

Conference Presentations

Sl. No.	Description of Conference Presentations	Faculty members
1	Devi Prasad Dash presented a paper on "Examining impact of COVID-19 on Domestic Violence: Evidence from India" at International Conference on Reviving Global Economy in New Normal in Virtual Mode at Dept of Economics, Birla Global University on 26-27 Feb, 2021.	Devi Prasad Dash
2	Learning of Preference Zones with evolutionary approach in IIT Russian Symposium, Sep. 28-Oct. 1, 2020.	Manish Aggarwal
3	Re-Imagining Diffusion and Adoption of Information Technology and Systems: A Continuing Conversation (IFIP WG 8.6 Working Conference)- Session Chair	Mayank Kumar
4	IIM Lucknow - IIM Trichy - INAIS Joint Paper Development Workshop for ICIS 2021 Role: Co-author for paper: Towards Adopting Quantum Computing for Healthcare: A Grounded Theory Approach (Co-Author: Sudeept Maharana)	Mayank Kumar
5	IIM Lucknow - IIM Trichy - INAIS Joint Paper Development Workshop for ICIS 2021 Role: Co-author for paper: Theorizing Gender in Status (re)production through care work on Digital Platforms: An Empirical examination with Female care workers (Co-Author: Arunima Iyer)	Mayank Kumar
6	IIM Lucknow - IIM Trichy - INAIS Joint Paper Development Workshop for ICIS 2021 Role: (Live Reviewer) for paper: Smart contracts – A systematic literature review	Mayank Kumar
7	International Conference of Finance and Business Analytics (ICFBA 2021) Role: Advisory Committee Member	Mayank Kumar

Outreach Activities

1.	▪ Co-Chair and Organizer - Sandstone Summit as part of Corporate Interaction. Four (4) Line-ups Launched: HR Shastra, Praesidium, Impressario and InConversation ▪ Launched first-of-its-kind (In India) candid B-School Corporate talk show (InConversation)	Anuj Kapoor
2.	▪ Resource person for session on 'Entrepreneurial Decision Making' as part of Entrepreneurship Development Program, at SME IIT Jodhpur 2021 ▪ Delivered Master Class on Use of Algorithms to Design Internal Labor Markets to prospective MBA aspirants at SME IIT Jodhpur 2021 ▪ Resource person for training (Staff Officers Course, Senior Level, CRPF) 2020 ▪ Resource person for training (Newly Promoted Assistant Commandant Course, CRPF) 2020 ▪ Designed and Developed Cognitive Skills Module for Trainers of Internal Security Academy Mount Abu 2020 ▪ Mentored two student startups pertaining to gamified learning and computer vision leading to successful onboarding by incubators ▪ Delivered Invited Lecture on "Why human intelligence is not what IQ tests measure?" at Ashoka University 2020 ▪ Conceptualized and initiated SME Connect Program - Platform that enables SME interact with eminent personalities from all walks of life	Venkat Ram

3.	▪ As part of MBA Admission 2020, I led various outreach activities that together contributed to a successful completion of the admission. Some of these major activities included: The digital campaign; Delivering multiple webinars at various coaching institutes with the MBA participants and counsellors, MBA Admissions 2020 ▪ Co-led the Embrace (students-run admission committee of the school) for promoting (including digital marketing) the school and its flagship offerings, MBA Admission 2021 ▪ Led the digital campaign for Ph.D. admission of SME, April-June 2021 ▪ Delivered a session on "writing literature review" as part of research seminar series at the Indian Institute of Management Tiruchirappalli (IIM Trichy), 19th March 2021 ▪ Delivered a Webinar on "Social Media Analytics" at Christ University-Lavasa Campus as part of their guest lecture series, Date: 16th April 2021 ▪ Delivered a session on IoT as per the EDP organized by TISC, 8th March 2021 ▪ Co-chaired the analytics conclave organized by i-rise and SME_connect	Mayank Kumar
4.	▪ Delivered a session in an international workshop titled, "The Dynamics of Socio-Cultural Polarization: Role of Information & Communication Technologies", organised IIM Ahmedabad & SPARC delivered on 08 May 2021 ▪ Delivered a session in a National level workshop, titled, "Entrepreneurship Development Programme" organised jointly by TISC, IITJ & DST Rajasthan between 16 Feb 2021 and 2 March 2021 ▪ Delivered a session online on Strategic and Innovation Management for students of Master of Fashion Management, National Institute of Fashion Technology-Jodhpur on 09 September 2021	Venkatesha Murthy
	▪ Delivered a session on "Big Data Analytics & its Applications" on June 28, 2021 in online high end workshops organized by IIT-ISM Dhanbad on Data Science and Analytical Tools and Techniques (28 June - 2 July, 2021) ▪ Organized a 1.5 days (Dec 12-13, 2020) Management Development Program (MDP) on "Cybersecurity: Contemporary Issues, Challenges and Countermeasures" for security forces and police personnel a) As Chairperson - MBA Admission 2021, coordinated and took part in following activities: Coordination with joint admission team of pan-IIT B-Schools for MBA admission advertisement, promotions, CAT score verification, etc. b) Preparation of MBA Admissions 2021 brochure c) Making of SME IIT Jodhpur's promotional video for MBA admissions d) Revamping of MBA admissions portal e) Coordination with Embrace (current MBA students team) for various promotional activities, designing of collaterals, social media promotions, etc. f) Regular monitoring of PagalGuy, Quora and similar platforms to address admission-related queries g) Master Class Series by SME faculty for prospective students	Abhishek Narain Singh

5.	▪ Other promotional activities include: i) Webinars and Open Houses for prospective candidates with SME faculty and current MBA students ii) Exclusive webinars with Global dual-degree partners iii) Collaboration with MBA coaching institutes e.g. IMS and TIME for counsellor webinar, webinar with students, digital banner on their platform, email and SMS to their registered students iv) Online campaign with third party platform PagalGuy v) Online presence on MBA information related websites (aggregators) e.g. CollegeDunia, Career360, MBA Universe, Shiksha, Inside IIM etc. vi) Digital marketing campaigns, both paid as well as unpaid, on social media platforms such as Facebook, LinkedIn, YouTube, Instagram and Twitter and through Google AdWords vii) Promotional videos of School, faculty and current students highlighting various facets of the SME viii) Head SME's article published on InsideIIM	Abhishek Narain Singh
6.	Organised "Master Class" on contemporary TechMBA modules for the MBA aspirants	Anuj Kapoor and Gaurav Kumar
7.	Invited Panelist in the conference Vidhyanidhi - "Sustainable Business Management Practice and Social Innovation (ICSBMPSI – 2021)" January 30, 2021	Krishna Kumar Balaraman
8.	Invited Speaker by Learning matters on "Artificial Intelligence & Machine Learning: Foundation Masterclass" on March 9, 2021 - Participants- select students across 32 colleges in Karnataka and Maharashtra	Krishna Kumar Balaraman
9.	Promotion of Tech MBA for prospective/incoming students in June-July 2020	Manish Aggarwal
10.	Promotional sessions on Dual-degree and Tech MBA propositions for prospective/incoming students in Mar - May 2021	Manish Aggarwal

Induction Program of the first MBA batch (2020-2023)

School of Artificial Intelligence and Data Science (AIDE)

In December 2020, Prof. Geoffrey Hinton, Turing Award Winner, inaugurated the School of Artificial Intelligence and Data Science (aka AIDE School) at IIT Jodhpur. Currently, the following faculty members are associated with the school.

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Activities under School of AIDE

School Faculty Board: The First Meeting of School Faculty Board held on 02 Dec 2020 to discuss the vision and mission of the School. The following faculty members are assigned to various committees.

- Dr. Richa Singh: Chair, Faculty Search Committee
- Dr. Mayank Vatsa: Chairman, School Research Committee
- Dr. Sankalp Pratap: Chair, Innovation and Entrepreneurship Committee
- Dr. Ranju Mohan: Convener, School Faculty Board
- Dr. Mayank Vatsa: AI Standards Group, Convener
- Dr. Anil Kumar Tiwari AI & IP, Convener
- Dr. Sumit Kalra: Website in-charge
- Social Media Coordinators
  Dr. Anirban Ghosh (LinkedIn and Facebook)
  Dr. Sankalp Pratap (Instagram)
  Dr. Mayank Vatsa (Twitter)

Collaboration with Prithvi-AI: On 22 Dec 2020, Mr. Nandan Mishra, Founder and Chief Strategy Officer, Prithvi.AI gave a short presentation on Prithvi.AI's vision, current projects, ventures, opportunities and possibilities. Areas of possible collaboration with School of AIDE include AI in process control, IoT-based sensing, Geospatial technology, Computer Vision, and National language processing.

PhD Admission: The School of AIDE has commenced the PhD program for the AY 2021-22.

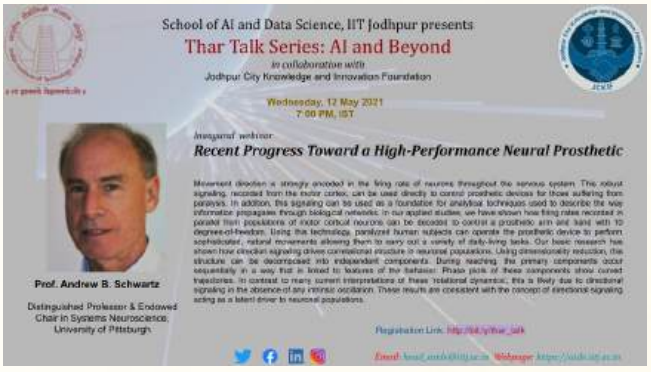
Faculty recruitment: Scrutiny committee for faculty application screening met in the month of March 2021. The final selection committee meeting is planned for the month of May 2021.

TIHs/ MoU with Companies: A draft framework is prepared for MoU signing with companies and industries (Coordinators: Dr. Sankalp Pratap and Dr. Krishna Balaraman)

Centre of Excellence: Operational model of Centre of Excellences under the school is presented in the month of March. The School has currently two Centres of Excellences:

- Brain Science and Applications
- Mathematical and Computational Economics

Thar Talk Series: AI & Beyond The School's webinar series is named as Thar Talk Series (Coordinators: Dr. Rajendra Nagar and Dr. Manish Narwaria) and is planned to start from May 2021 AIDE School - Thar Talk Series (iitj.ac.in)



Summer Internship Program: The first summer internship program offered by the School is planned to start from 15 June 2021 (Coordinator: Dr. Ranju Mohan)

IDRP - Digital Humanities (DH)

The Indian Institute of Technology Jodhpur started the Interdisciplinary Research Platform on Digital Humanities (IDRP-DH) in 2019, making the Institute a pioneer in launching an exemplar platform for Digital Humanities in India. IDRP-DH offers unique state of the art curricula for M.Sc. and Ph.D. programs. With the launching of the platform, the Institute also joined hands nationally and globally with a new field of organized academic research, Digital Humanities, that emerged at the beginning of the 2000s examining the use and application of digital technologies in humanities, the liberal arts, social science scholarship, and beyond. The premise of IDRP-DH at IIT Jodhpur is on two aspects: (1) Digital Humanities is interdisciplinary, and therefore IDRP-DH focuses on integrating knowledge and methods from different disciplines using a real synthesis of approaches; and (2) the Digital Humanities platform investigates the unique relationship that technology has with the humanities, social sciences and similar other areas. Specifically, the DH platform examines questions that primarily arise out of the humanities, social sciences, and allied disciplines and those that necessitate answering with the use of technology, and also questions about humanities and social sciences that are enabled because of the presence of technology. This, of course, opens up a much larger discussion about the evolving nature of technology in society, a symbiotic one, that IDRP-DH also actively explores.

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

Department of Humanities and Social Sciences

1. Dr. Mayurakshi Chaudhuri, (Coordinator)
2. Dr. Kaamya Sharma
3. Dr. Natasa Thoudam
4. Dr. Parichay Patra
5. Dr. Prasenjeet Tribhuvan
6. Dr. Vidya Sarveswaran

Department of Computer Science and Engineering

7. Dr. Chiranjoy Chattopadhyay
8. Dr. Santanu Chaudhury
9. Dr. Suman Kundu

School of Management and Entrepreneurship

10. Dr. Mayank Kumar

Department of Mathematics

11. Dr. Gaurav Bhatnagar

From outside IIT Jodhpur

1. Dr. Arjun Ghosh, IIT Delhi
2. Dr. Dibyadyuti Roy, formerly affiliated with IIM Indore
3. Dr. Ganesh Thottempudi, SRH University, Berlin and University of Heidelberg
4. Dr. Nirmala Menon, IIT Indore
5. Dr. Padmini Ray Murray, Design Beku, Bangalore
6. Prof. Prabuddha Ganguli, Vision-IPR
7. Dr. Vinayak Das Gupt, Shiv Nadar University

Conferences, Workshops, Seminars Organized

- Dr. Mayurakshi Chaudhuri and Dr. Chiranjoy Chattopadhyay presented their research paper titled "Do Postcolonial Intersections Matter? Critical Epistemological Approaches to Digital Humanities and Mobility Studies in India" at the Digital Humanities 2020 Conference (Ottawa, July 2020, Virtual due to Covid-19). Other panelists included: Dr. Arjun Ghosh, Dr. Dibyadyuti Roy, and Dr. Nirmala Menon. The

panel discussion is available online at: Towards an Indian Decolonial/Postcolonial Digital Humanities: Panel for DH2020

- DH@IIT Jodhpur at the Sixth IEEE International Conference on Multimedia Big Data (September 2020): Dr. Mayurakshi Chaudhuri was a core committee member (as Workshop Co-Chair) at the IEEE International Conference on Multimedia Big Data, July 2020. Dr. Suman Kundu participated as an invited panelist at the Workshop titled "Digital Humanities into the Palm of Your Hand", Dr. Prasenjeet Tribhuvan and Dr. Gaurav Bhatnagar organized two Workshops, respectively titled "Dwelling in the Intersections of State, Markets, and Big Data", and "Big Data in Healthcare".
- Dr. Mayurakshi Chaudhuri delivered the Inaugural Address at the International Webinar on Digital Humanities organized by Sheshadripuram Evening Degree College in collaboration with Durham University, England, and Edith Cowan University, Australia, on 5th October, 2020. Dr. Chaudhuri's talk was titled "Digital Humanities: Innovating Contours of Pedagogy in India", and can be accessed online.
- Dr. Parichay Patra organized a workshop and a seminar as some of the major deliverables in his existing SPARC project titled "'Offering Provocations, Surfacing Evidence": The Archiving of Cine-Politics under the Indian National Emergency through Digital Humanities 2.0'. Funded by SPARC, Ministry of Education, Govt. of India, the project involves researchers from IIT Ropar, Royal Holloway, University of London, UK, and Wesleyan University, USA. March 2021.

Ongoing Projects

Project Title: Indian Heritage in Digital Space (IHDS) of Interdisciplinary Cyber Physical Systems

PI: Professor Santanu Chaudhury

Department of Science & Technology, Government of India

Project Title: Offering Provocations, Surfacing Evidence" : The Archiving of Cine-Politics under the Indian National Emergency through Digital Humanities 2.0 Project

Dibyakusum Ray (Indian PI, IIT Ropar), Parichay Patra (Co-PI, IIT Jodhpur), Manishita Dass (Foreign PI, Royal Holloway, University of London, UK), Anuja Jain (Foreign Co-PI, Wesleyan University, USA), SPARC, Ministry of Human Resource Development, Government of India

Project Title: CRAFT: Collaborative Rejuvenation of Art, Furniture, and Textile Collaborative project with NIFT, JNVU, FDDI

(As part of the JCKIC project with PI Professor Santanu Chaudhury and Co-PI Professor Sampat Raj Vadera), Government of India.

Guest Lecture Series – varDHa

Digital Humanities IDRP started a Lecture Series, 'varDHa' (Sanskrit: to prosper), in AY 2020-2021 to facilitate intellectual and scholarly exchange and also for helping students to be familiar with opportunities related to Digital Humanities. The following eminent scholars were invited:

Speaker 1: Dr. Bryan Carter, Associate Professor of Africana Studies and the Director of the Centre for Digital Humanities at the University of Arizona; Wednesday, January 6, 2021. 7:30PM IST

Title of the talk: Through the Looking Glass of Digital Humanities - Engaging The Next Generation

Speaker 2: Prof. Partha Pratim Das, Professor at the Department of Computer Science and Engineering, IIT Kharagpur, and Joint Principal Investigator of National Digital Library of India project of MHRD, Govt. of India; Monday, January 25, 2021

Topic: The National Digital Library of India

Speaker 3: Ms. Richa Sharma, Multi-genre musician, performing artist and music composer; Saturday, February 06, 2021

Topic: Making Music in the Digital Era: A Conversation with Richa Sharma of Muktiverse

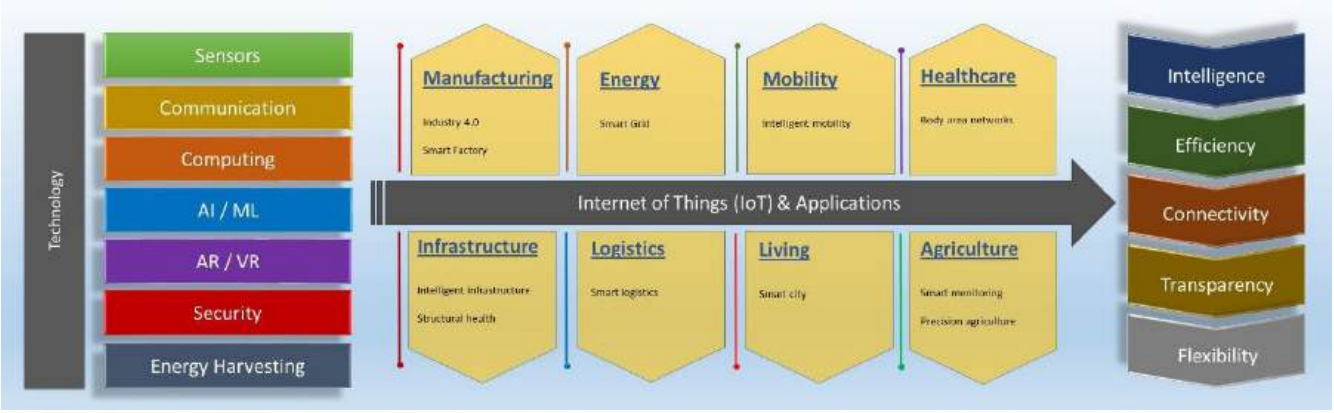
Speaker 4: Mr. Siddhant Mohan, Journalist; Monday, March 15, 2021

Topic: Digital Journalism

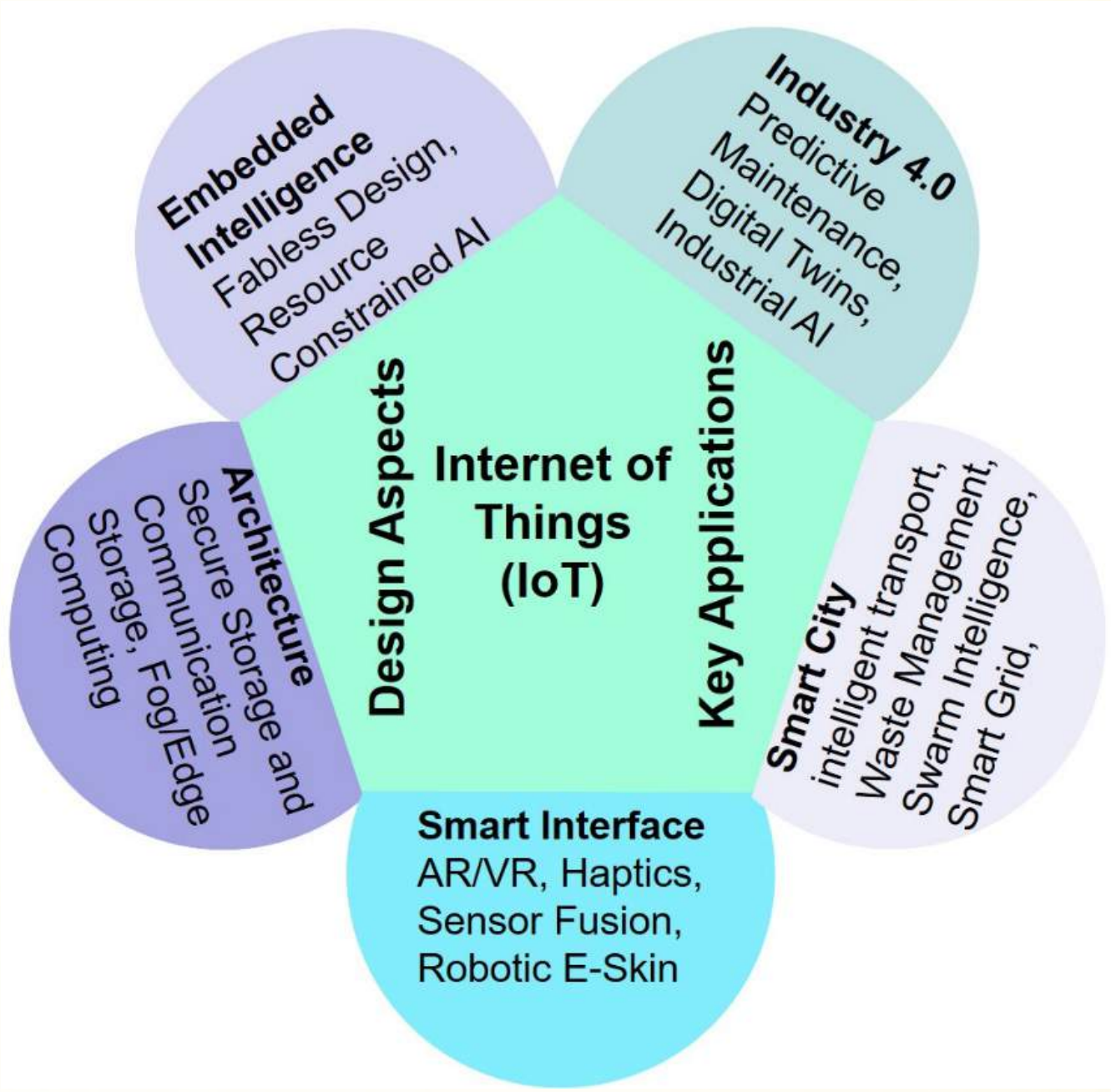
varDHa: A DH Seminar Series at IIT Jodhpur

IDRP - 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 was created to work with a holistic approach for seamless integration of technologies.



The IDRP on IoT & Applications will facilitate research and development in multiple areas including Industry 4.0, Health, Agriculture, Infrastructure, Transportation, Environmental Monitoring, and Infrastructure Safety encompassing a 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.

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. Dr. Kamaljit Rangra, Coordinator
2. Dr. Aashish Mathur, Convenor
3. Dr. Abdul Gafoor Shaik
4. Dr. Ajay Agarwal
5. Dr. Amandeep Kaur
6. Dr. Anil Kumar Tiwari
7. Dr. Arpit Khandelwal
8. Dr. Arun Kumar Singh
9. Dr. Harshit Agarwal
10. Dr. Himanshu Kumar
11. Dr. Mahesh Kumar
12. Dr. Malyala Pavana Ravi Sai Kiran
13. Dr. Nitin Bhatia
14. Dr. Saakshi Dhanekar
15. Dr. Sandeep Kumar Yadav
16. Dr. Shree Prakash Tiwari
17. Dr. Soumava Mukherjee

Department of Computer Science & Engineering

18. Dr. Debasis Das
19. Dr. Deepak Mishra
20. Dr. Dip Sankar Banerjee
21. Dr. Ravi Bhandari
22. Dr. Suchetana Chakraborty
23. Dr. Sumit Kalra

Department of Civil & Infrastructure Engineering

24. Dr. Ranju Mohan

Department of Mechanical Engineering

25. Dr. Amrita Puri
26. Dr. Anand Krishnan Plappally
27. Dr. Ankur Gupta
28. Dr. Barun Pratiher
29. Dr. Hardik Kothadia
30. Dr. Shrutidhara Sarma

Department of Bioscience & Bioengineering

31. Dr. Meenu Chhabra

Department of Metallurgical and Materials Engineering

32. Dr. Anirban Ghosh

Department of Physics

33. Dr. Ambesh Dixit

Department of Chemistry

34. Dr. Ritu Gupta

School of Management and Entrepreneurship

35. Dr. Yerasani Sinjana

Project Proposals Approved

1. Inventorization of the wildlife towards a sustainable campus

   Point of Contact: Suchetana Chakraborty

   Team Members: Arun Kumar Singh, Aashish Mathur, Malyala Pavana Ravi Sai Kiran, Debasis Das, Rajendra Nagar, Pradeep K. Tewari, Preeti Tiwari , Anand K Plappally

   Approximate Budget: 2 Lakhs

   Collaborating Organizations: ZSI and BSI

   Funding Agency: CETSD, IIT Jodhpur

2. An endoscopic camera system

   Point of Contact: Amandeep

   Team Members: Amandeep, Deepak

   Approximate Budget: 50 Lakhs

   Funding Agency: BIRAC

3. Human Perception driven on-chip compression for power efficient CMOS image sensors

   Point of Contact: Amandeep

   Team Members: Amandeep, Deepak

   Approved Budget: 15 Lakhs

   Funding Agency: MSME

Project Proposals Submitted

1. Point-of-use and in-line water quality sensors for smart water management: Detection of coliforms, fluoride and Biochemical Oxygen Demand (BOD)

   Point of Contact: Meenu Chhabra

   Team Members: Meenu Chhabra, Raviraj Vankayala, Arpit Khandelwal, Ravi Bhandari, Saakshi Dhanekar, Kamaljit Rangra

   Approximate Budget: 197.96 Lakhs

   Funding Agency: Jal Jeevan Mission

2. Artificial Intelligence Of Things (AIOT) Based Monitoring of Wild-life (AIM Wild-life) for Sustainability Acceleration in Desert Areas

   Point of Contact: Suchetana Chakraborty

   Team Members: Arun Kumar Singh, Aashish Mathur,Malyala Pavana Ravi Sai Kiran, Debasis Das, Rajendra Nagar, Pradeep K. Tewari, Preeti Tiwari , Anand K Plappally

   Approximate Budget: 318.4515 Lakhs

   Collaborating Organizations: ZSI and BSI

   Funding Agency: IBM Sustainability Accelerator Program

3. Non-invasive monitoring devices

   Point of Contact: Dip Sankar

   Team Members: Dip Sankar, Anil Tiwari

   Approximate Budget: 84 Lakhs

   Funding Agency: SERB CRG

4. Developing an AI based model for predicting a patient's risk propensity for moving towards cytokine storm and develop a nanotechnology-based patch for homebound patients that provide early warning for cytokine storm

   Point of Contact: Ajay Agarwal

   Team Members: Sumit Kalra, Saakshi Dhanekar, Dr. Ravindra Shukla (AIIMS Jodhpur), Dr. Avik Ghose & Sh. Sanjay Kimbahune (both from TCS).

   Approximate Budget: 107.856 Lakhs

   Funding Agency: TCS

Other Activities

The following technology nodes have been procured to initiate fabless design activity as per one of the goals under mission 1 of the IoT-IDRP vision document.

UMC 65nm, UMC 40 nm and UMC 28nm.

List of Webinars Conducted

Sl. No.	Title	Speaker	Date
1	Netradyne - AI and IoT	Mr. Teja Gudena, Senior Vice President, Netradyne	28.5.2021
2	Cellular Internet of Things	Dr. Abhinav Kumar, IIT Hyderabad	3.7.2021
	Allied		
3	5G Wireless Communication & Technologies	Prof. Manav Bhatnagar, IIT Delhi	25.3.2021
4	VLSI Webinar on SoC Design & Verification by Maven Silicon	Mr. Sivakumar P R, Founder and CEO, Marvel Silicon	25.4.2021
5	Industry Webinar on Semiconductor Technologies – Enabling the Connected World	Dr. Usha Gogineni, Director for EDA (Electronic Design Automation) in AMS Semiconductors, Hyderabad	6.5.2021

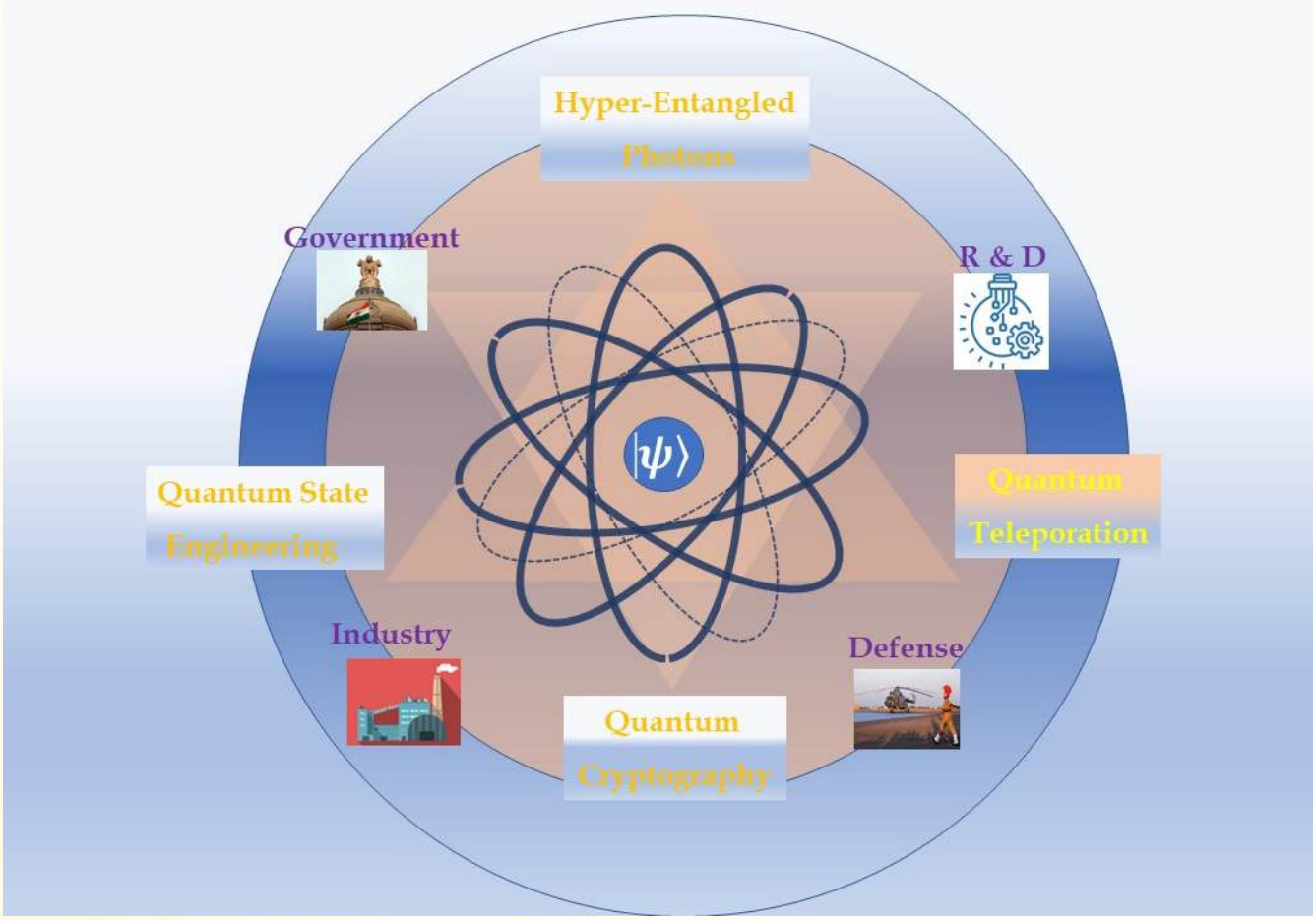
List of Students

The following is the list of PhD students admitted to the IDRP:

Sl. No.	Name of the Student	Supervisors
1.	Sneha Prasad	Dr. Sumit Kalra and Dr. Arpit Khandelwal
2.	Preeti Jain	Dr. Debasis Das and Dr. Arpit Khandelwal
3.	Manpreet Singh	Dr. Saakshi Dhanekar and Dr. Sinjana Yerasani
4.	Amritesh Kumar	Dr. Debasis Das and Dr. Nitin Bhatia
5.	Chetali Yadav	Dr. Dip Sankar Banerjee and Dr. Kamaljit Rangra

IDRP - Quantum Information and Computation (QIC)

The Quantum Information and Computation - Interdisciplinary research platform (IDRP) 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. Dr. Subhashish Banerjee, Coordinator
2. Dr. V. Narayanan

Department of Chemistry

3. Dr. Atul Kumar

Department of Mathematics

4. Dr. Kiran K. Hiremath
5. Dr. Vivek Vijay

Department of Mechanical Engineering

6. Dr. B. Ravindra

Department of Electrical Engineering

7. Dr. Harshit Agarwal

Department of Computer Science & Electrical Engineering

8. Dr. Suman Kundu
9. Dr. Debasis Das
10. Dr. Somitra Kumar

Department of Humanities & Social Sciences

11. Dr. K. J. George

Over the last century, Quantum Mechanics has emerged as a fundamental ingredient for understanding various facets of nature such as atomic and subatomic 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 convergence between diverse academic spaces. In this interdisciplinary 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 networks 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.

IDRP - Robotics & Mobility Systems (RMS)

The Inter-Disciplinary Research Platform (IDRP) 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:

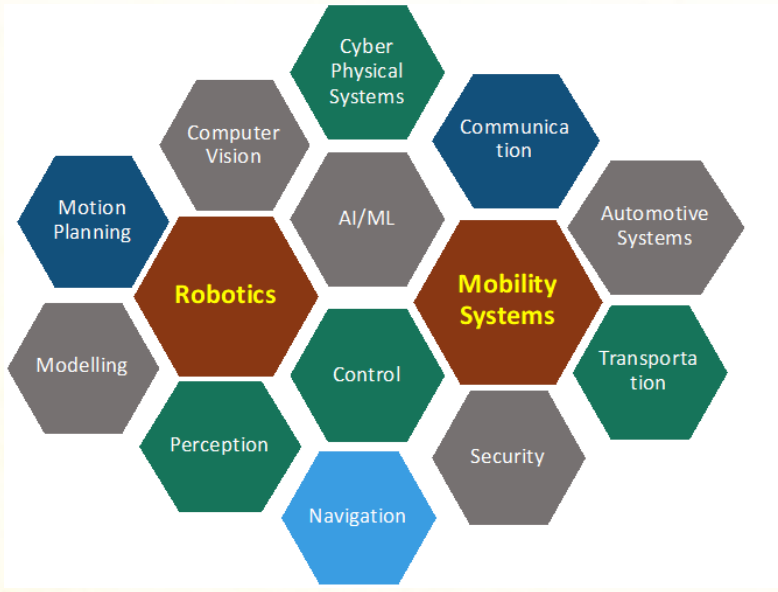
Advance the Interdisciplinary fields of robotics and mobility systems through development in modelling, control, multimodal perception, communication, AI/ML, and energy management systems to solve technological challenges in civil and military sectors to develop state-of-the-art applications.

The missions of IDRP on RMS are:

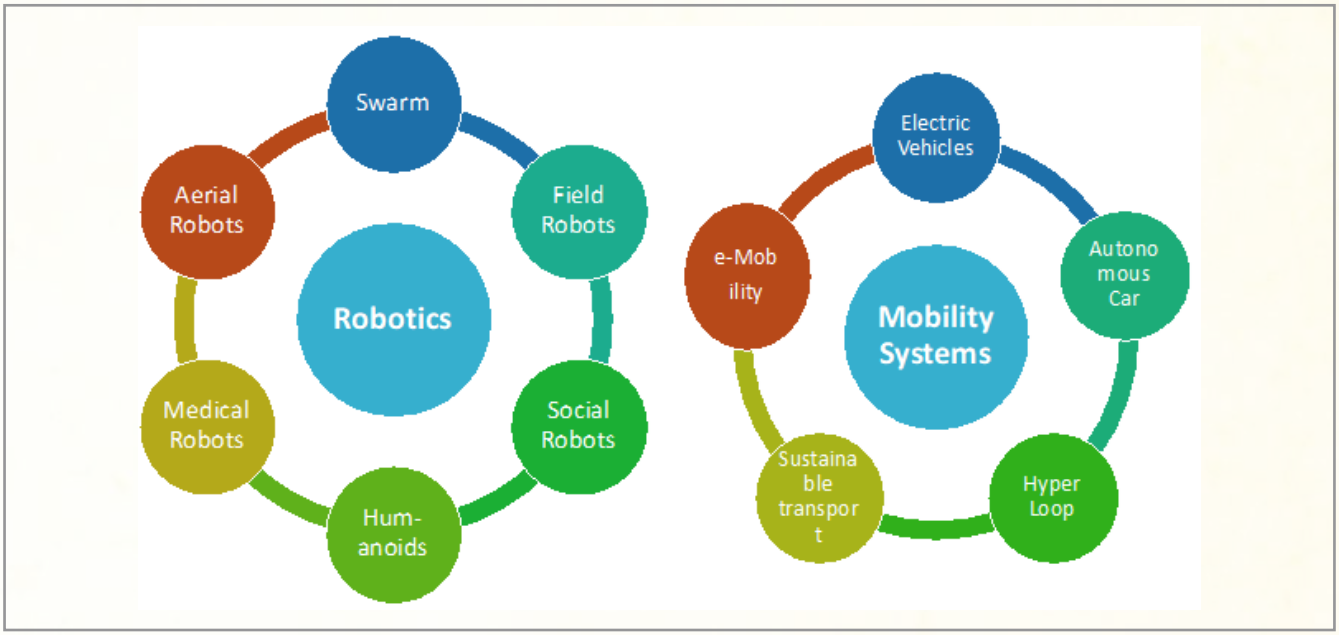
- Develop an ecosystem to promote research and technology development in ground-, air- and water-based mobile robots, and collaborative robots for defence and civilian applications.
- To pursue indigenous research to cultivate technological solutions addressing growing demands in electric vehicles, autonomous vehicles, and drones.
- To produce professionals with in-depth knowledge and analytical and experimental research skills to handle Robotics and Mobility Systems problems.
- To generate adequate financial resources by establishing collaboration with industries, R & D organisations, and the government.

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

Scope of RMS-IDRP



Application Areas



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. Dr. Anand Mishra
2. Dr. Santanu Chaudhury

Department of Electrical Engineering

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

Robotics and Control

Department of Mechanical Engineering

7. Dr. Jayant Kumar Mohanta
8. Dr. Suril V. Shah, Coordinator

Department of Electrical Engineering

9. Dr. Anoop Jain
10. Dr. Deepakkumar M. Fulwani
11. Dr. Niladri Sekhar Tripathy

Dynamics, Design and Manufacturing

Department of Mechanical Engineering

12. Dr. C.Venkatesan
13. Dr. Kaushal A. Desai
14. Dr. Nipun Arora

Communication

Department of Electrical Engineering

15. Dr. Aashish Mathur
16. Dr. 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 universities.

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 systems.

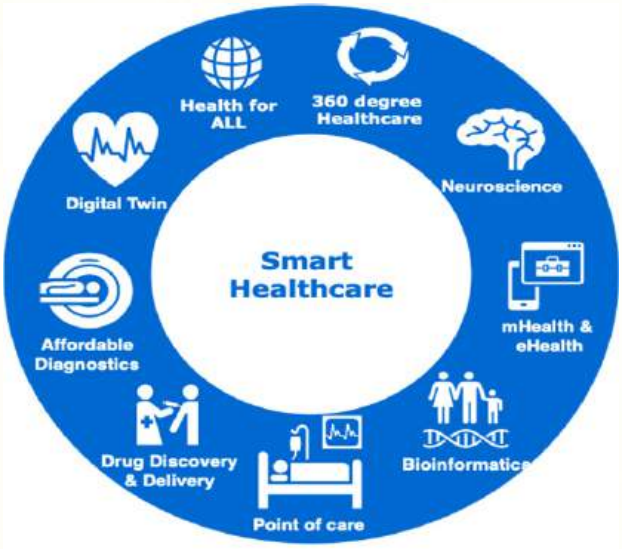
IDRP - Smart Health Care (SHC)

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, biocompatible 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 therapeutics.
- Creating a platform to use various electronic, mechanical, and biosensors for improving the remote health care facilities.
- Implementing translational outcome oriented various academic and research programs such as Biodesign, Medical Technology (Masters, PhD, and Master-PhD Jointly with AIIMS), AI and Ayush, PhD in Smart healthcare, and UG minor in Smart Healthcare.
- Establishing start-ups and supporting entrepreneurs in the domain of smart healthcare through Bionest, Med Tech Park, Jodhpur City Knowledge and Innovation cluster (JCKIC).
- Initiating a comprehensive research program to harvest the true potential of desert ecosystems.

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



Key focus areas for Smart

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

Department of Bioscience & Bioengineering

1. Dr. Meenu Chhabra, Coordinator
2. Dr. Indranil Banerjee
3. Dr. Neeraj Jain
4. Dr. Pankaj Yadav
5. Dr. Raviraj Vankayala
6. Dr. Sudipta Bhattacharyya
7. Dr. Surajit Ghosh
8. Dr. Sushmita Jha
9. Dr. Sushmita Paul

Department of Computer Science & Engineering

10. Dr. Deepak Mishra
11. Dr. Dip Sankar Banerji
12. Dr. Santanu Chaudhury
13. Dr. Suchetna Chakraborty
14. Dr. Sumit Kalra

Department of Electrical Engineering

15. Dr. Anil Kumar Tiwari
16. Dr. Kamaljit Rangra
17. Dr. Saakshi Dhanekar

Department of Mechanical Engineering

18. Dr. Kaushalkumar A. Desai
19. Dr. Suril Vijaykumar Shah

Department of Metallurgical & Materials Engineering

20. Dr. Abir Bhattacharya
21. Dr. Anirban Ghosh
22. Dr. BP Kashyap
23. Dr. Jaiveer Singh
24. Dr. Ravi, K. R.

Department of Physics

25. Dr. Ram Prakash
26. Dr. Sampat Raj Vadera
27. Dr. Somnath Ghosh

Department of Chemical Engineering

28. Dr. Prasenjit Sarkar

School of Management and Entrepreneurship

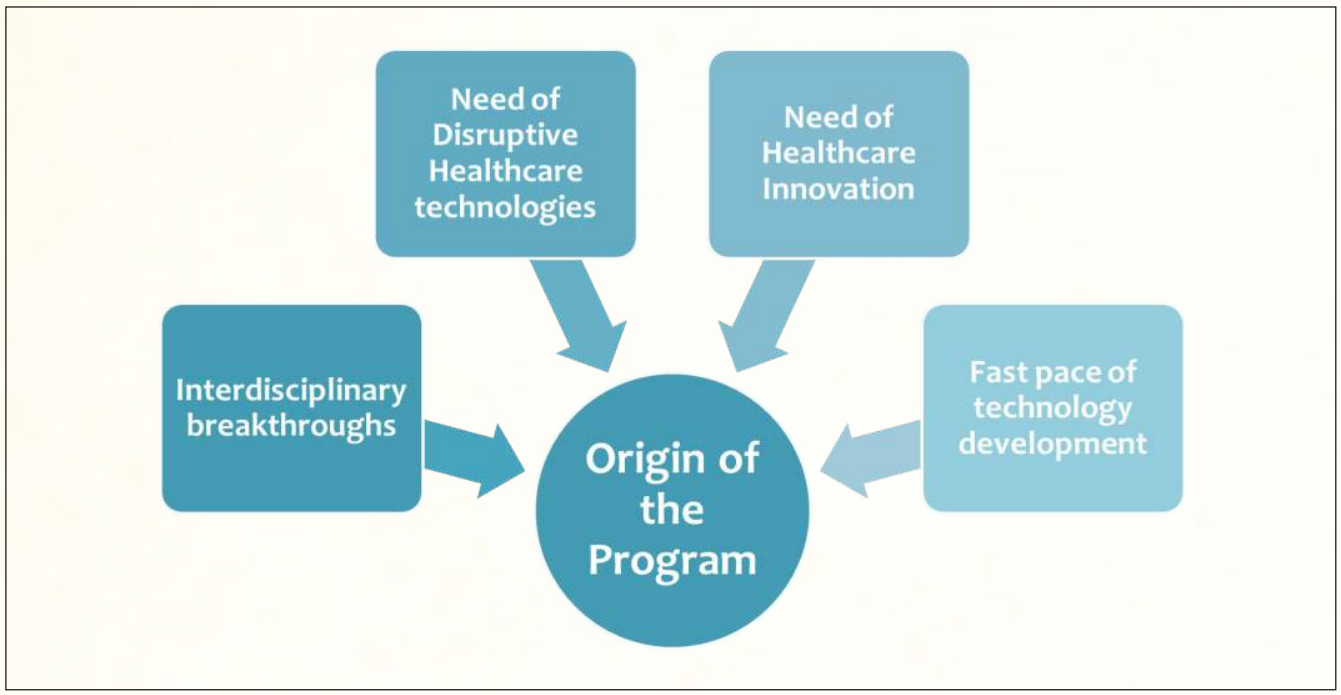
29. Dr. Mayank Kumar
30. Dr. Sankalp Pratap Singh

Medical Technologies Program

IDRP Smart Healthcare in collaboration with AIIMS Jodhpur has launched a joint academic program in Medical Technologies. The mission of this multi-disciplinary program is to produce deep-tech innovators in the field of Medical Technologies

Origin of the program

The program was envisioned to address the growing Need for innovations to meet growing challenges in healthcare and to keep abreast of the Fast pace of growth in healthcare technologies.

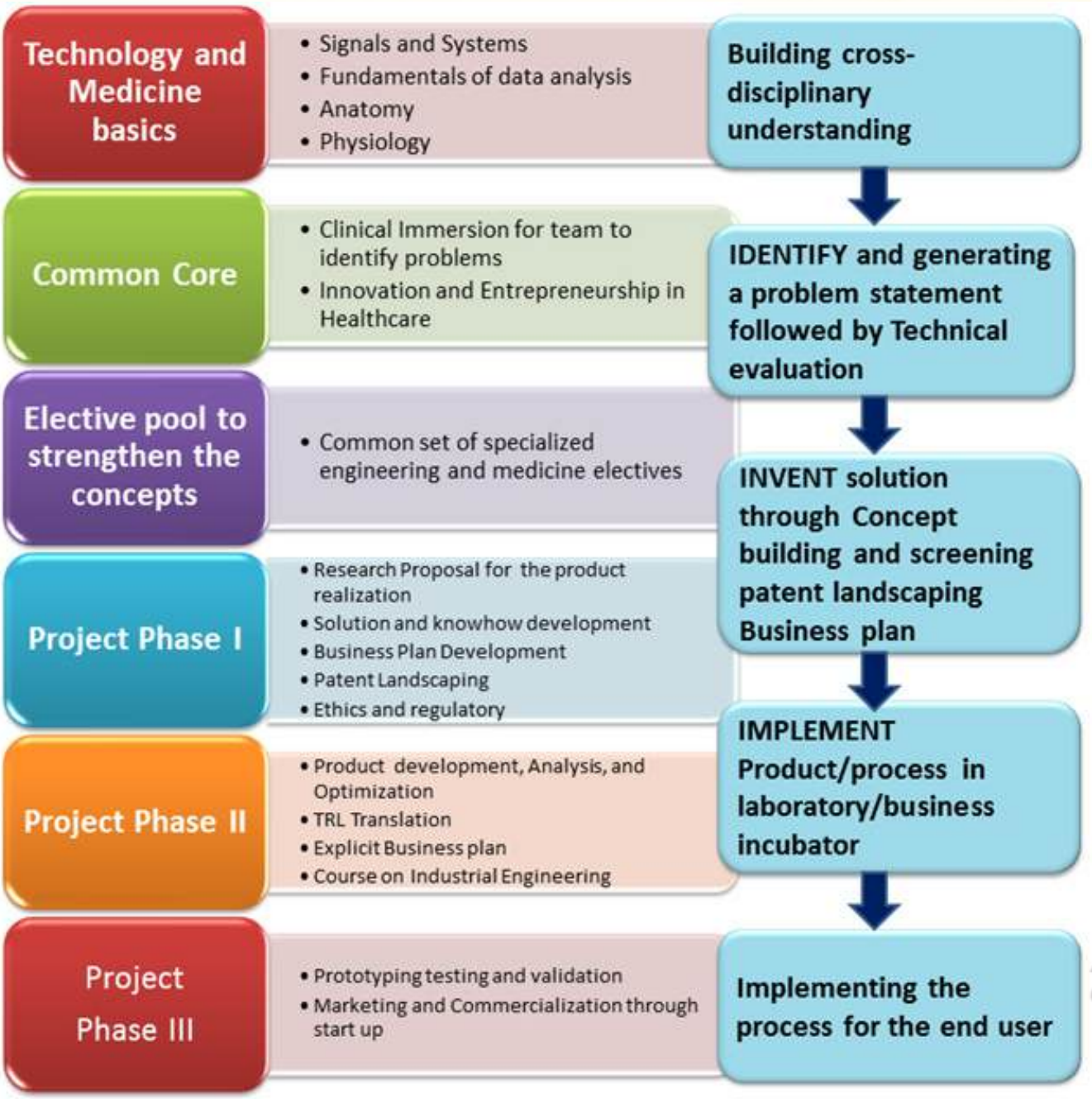


The key areas that have been identified by AIIMS Jodhpur and IIT Jodhpur include:

- Diagnostics
- Therapeutics
- Artificial implants and Medical devices
- AI for Healthcare

Salient features of the program

1. First program in India that provides an opportunity to the medical professionals and engineers to learn and share knowledge under a trans-disciplinary academic umbrella.
2. The program is designed to cater to the emerging needs of innovation and improvisation in the field of healthcare technologies.
3. Unique opportunity for the students to work under the joint guidance of a faculty member of AIIMS, Jodhpur and IIT Jodhpur in the emerging areas of healthcare technologies.
4. State of the art research infrastructure of AIIMS, Jodhpur and IIT Jodhpur for research and innovation.
5. The program offers unique combinations of core subjects, flexible electives and a year and half long innovation and entrepreneurship oriented research project. Students will have the flexibility to pursue academic and research interests.
6. The students will be encouraged to compete for different fellowships and grants offered by the institute and other extramural funding agencies.
7. The program aims to nurture entrepreneurship skills leading to the acquisition/generation of Intellectual Property by providing business incubation facilities along with seed-finance to students on a competitive basis.



Technology development and transfers

1. Dr Ram Prakash led a project for development of an Advanced Photocatalytic Oxidation Sterilization System based on UV-light and metal oxide nanoparticles catalyst to treat N95 Filtering Face-mask Respirators for reuse. The project had significant contributions from Dr Deepak Fulwani, Dr Ambesh Dixit, Dr Ankur Gupta and Dr Shankar Manoharan and their associated students.The developed system was tested by AIIMS, Jodhpur and can easily disinfect around two hundred N95 FFR in a single day. The technical know-how was transferred to eight industries and one NGO during May-June, 2020.

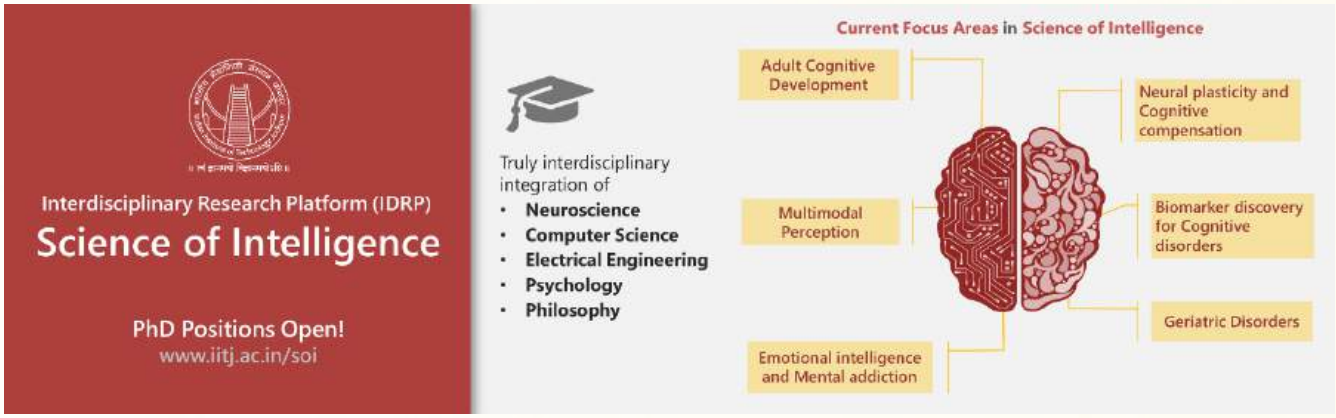
Fig.3 IITJ's APCO Sterilization System for FFRs

2. Dr Ram Prakash led a project for development of an Advanced Photocatalytic Oxidation Conveyor System named as 'APCOC' for sterilization of surfaces, such as food packets, books, mobile phones, laptops, carry bags, courier bundles, etc. This technology can also be used on some of the thick peel food items, leather items, during the packaging of herbs and seeds, etc. and may reduce the number of complete washdowns required during processing, thereby saving resources, such as water, chemicals, and energy costs.

Fig. 4. APCOC system; Technology know-how transferred successfully

This APCOC system mitigates cross-contamination concerns and is able to sterilize items via a dry process even in the shadow regions. The technical know-how of this technology was transferred to M/s Potre Automation Pvt. Ltd. Noida on 27th January, 2021 for its mass production. The project had significant contributions from Dr Deepak Fulwani, Dr Ambesh Dixit, Dr Ankur Gupta, Dr Neha Jain and their associated students.

IDRP - Science of Intelligence (SoI)



It is the age of the Artificial Intelligence (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. Professor Santanu Chaudhury, Mentor

Department of Humanities and Social Sciences

2. Dr. Ankita Sharma, Coordinator
3. Dr. Hari Narayanan

Department of Computer Science & Engineering

4. Dr. Mayank Vatsa
5. Dr. Richa Singh
6. Dr. Romi Banerjee
7. Dr. Sumit Kalra

Department of Electrical Engineering

8. Dr. Anil Kumar Tiwari
9. Dr. Rajlaxmi Chouhan

Department of Bioscience & Bioengineering

10. Prof. Neeraj Jain
11. Dr. Sushmita Jha
12. Dr. Sushmita Paul

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 webinar was organized by IDRP Science of Intelligence during the FY 2020-21.

- Webinar on 'Investigating the role of low-level visual features in behaviourally-relevant face categorization' by Dr. Bhuvanesh Awasthi, Cognitive Scientist, Senior Research Fellow, Faculty of Health and Medical Science, University of Copenhagen, Denmark. Webinar was conducted on 26 May 2020.

The following project proposals are submitted for external funding by SOI faculty members during the FY 2020-21.

1. A few group members have submitted a multi-centric proposal to Cognitive Science Research Initiative (DST). The project is titled, "Development of multiple cues driven model of healthy cognitive aging and its application for adaptive user interface design". The Project group includes Prof. Neeraj Jain (project coordinator), Prof. Santanu Chaudhury (Project PI), Dr. Ankita Sharma, Dr. Suman Dhaka, Dr. Sumit Kalra, Dr. Romi Banerjee (Project Co-PI) from IIT Jodhpur; Dr. Dipanjan Roy (Project PI from NBRC), Dr. Tapan Gandhi (Project PI from IIT Delhi), and Dr. Amrita Basu (Project PI from Jadavpur University).
2. A group project was Submitted to DST CSRI by Dr. Hari Narayanan V., Dr. Suman Dhaka, Dr. Romi Banerjee. Project Title: A study on the neurophysiological correlates of habituation and induced curiosity.
3. A multicentric project entitled, "AI-based tools for early diagnosis, classification, and prognosis of Dementia utilizing EEG and Mu-social cognition hypothesis" is submitted to DBT. The research group includes Prof. Neeraj Jain (project coordinator), Prof. Santanu Chaudhury, Dr. Ankita Sharma (Project PI), Dr. Suman Dhaka, Dr. Sumit Kalra (Project Co-PI) from IIT Jodhpur; Dr. Dipanjan Roy (Project PI from NBRC), Prof. Samhita Panda (Project PI from AIIMS Jodhpur), Dr. Sarbesh Tiwari and Dr. Tanu Gupta (Project Co-PI from AIIMS Jodhpur).

IDRP - Space Science & Technologies (SST)

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 both the science as well as engineering/technology components and offers an opportunity to explore careers 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, the program provides opportunity towards technological developments realizing the transition of basic research into Space related technologies.

Salient features of the program

IIT Jodhpur has highly qualified and experienced faculty with a 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 an almost infinite number of stellar objects and perhaps more unknown than known, offers huge opportunities to carry out fundamental research so as to develop a better understanding of the Universe. Further, space also offers a 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 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.

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

Department of Physics

1. Dr. Sampat Raj Vadera, Coordinator
2. Dr. Reetanjali Moharana

Department of Chemical Engineering

3. Dr. Angan Sengupta
4. Dr. Prashant Kumar Gupta
5. Dr. Nirmalya Bachhar

Department of Electrical Engineering

6. Dr. Anoop Jain
7. Dr. Arun Kumar Singh
8. Dr. Mahesh Kumar

Department of Mechanical Engineering

9. Dr. Anand Krishnan Plappally
10. Dr. Ankur Gupta
11. Dr. Arun Kumar, R.
12. Dr. Ashish Pathak
13. Dr. Barun Pratiher
14. Dr. Jayant Kumar Mohanta
15. Dr. Nipun Arora
16. Dr. Rahul Chhibber
17. Dr. Sudipto Mukhopadhyay

School of Management and Entrepreneurship

18. Dr. Gaurav Kumar

Activities

Dr. Arun Kumar, R. held technical discussions with ISRO Propulsion Research Laboratory (IPRC) on joint research on electrostatic spray propulsion for micro satellites. It was decided to carry out joint research on fuel storage and handling systems for electrostatic spray thrusters.

Centre 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 development goals on sustainability using 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 provide a platform for non-governmental and governmental collaborators to work together to apply emerging technologies for finding and implementing solutions towards achieving SDG targets.
- To help develop scientific temper societies to understand technologies that are sustainable or technologies that are using sustainability aspects.
- To innovate solutions towards challenges in location specific problems related to energy use, education, water management, infrastructure, traditional livelihood skills, and health.
- To perform applied research in areas such as agriculture, environment, healthcare, waste management, pollution, livelihood and rural development.
- To make synergistic policy suggestions to handle issues in energy use, agriculture, water management, local pollution in a region and its influences on health.

Activities

Collaborations

1. MOU was signed between IITJ and NIRD&PR, Hyderabad
2. MOA was signed between IITJ and KVIC, Government of India. (27 Nov 2020)
3. MOA was signed with cGanga, IIT Kanpur (29-01-2021)

External Major Projects

1. HEFA CSR – Project titled " UF Membrane Assisted Sorption Based Water Purification Systems in Rural Village Schools of Jodhpur District, Rajasthan" with almost Rs. 40 Lakh in funding is provisionally approved by HEFA.
2. 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 the region is the aim. The project aims at 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.
3. UBA- RCI- IIT Jodhpur is one of the regional coordinating institutes of the MHRD flagship program of Unnat Bharat Abhiyan. The Abhiyan is coordinated by IIT Delhi. Presently IIT Jodhpur is mentoring 41 institutions in 11 districts across Rajasthan.

Scientific Social Responsibility Projects

1. Helped in G Filter manufacturing facility development in Kerala by Velar Association Kattachira Unit and School of Environmental Studies Cochin University, Cochin, Kerala – December 2020-March 2021.
2. 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.
3. Installation of Ultra filtration for Reuse 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.
4. Survey of the Jojari River by students on March 18-21, 2021 towards JCKIC water work.

Sirohi Project Updates

1. On Feb 10 2021, CETSD was able to collect 144 Silicosis patient records from Government Hospital, Sirohi and hand it over to Dr Sumit Kalra of CSE department for digital archiving and data collection.

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 solutions 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 ◦ Session 1 ◦ Session 2	June 2020
2. Series 2: Industrial Development and Operational processes ◦ Session 1 ◦ Session 2	July 2020
3. Series 3: Emerging Engineering Horizons- Indian Defense Sector ◦ Session 1 Challenges and Opportunities in Aerospace Industry in India - Dated 5th Oct 2020 ◦ Session 2 : Introduction to Guided Weapon systems – Air , land & underwater systems & operational methods - Dated 7th Oct 2020	August – October 2020
4. Series 4: Livelihood Skills and related Government Schemes ◦ Talk 1- Dr. S Greep on SFURTI Scheme, KVIC ◦ Talk 2- Coir Vikas Yojana, Coir Board by Dr A Radhakrishnan, Coir Board, MSME	Feb – March 2020

Technical Agency of KVIC

Nodal Office of the Technical agency: Prof Kaamya Sharma, Humanities and Social Sciences

Elements	Number of Proposals
Total Pre-Approved Stage Implementation Agencies	3
Total Implementation Agencies in Mentoring Stage	3

Financial Support

- The Institute had allocated Rs. 5 Lakhs for its working 2020-2021.
- A CSR HEFA proposal was submitted in March 2021 towards ultrafiltration projects in rural schools of Jodhpur is provisionally approved towards 2021-2023.
- UBA-RCI funding has been extended till 2026.

Affiliated Faculty and Staff Members

- The CETSD has the following faculty members and staff members affiliated with the centre.

Mentor

- Prof. Santanu Chaudhury, Director

Affiliated Faculty

1. Krishna Kumar Balaraman
2. Pradip K Tewari
3. Arun Kumar Singh
4. Pradeep Kumar Dammala
5. Preeti Tiwari
6. Sudipta Das (Joining Date Jan 06 2021)
7. Farhat Naz
8. K J George
9. Anand Plappally
10. Vivek Vijay
11. Bhanu Prasad (Joining Date Feb 05 2021)
12. Shobhana Singh
13. Sandeep Yadav
14. Ambesh Dixit
15. Gaurav Kumar
16. Alok Ranjan
17. Prashant Kumar Gupta
18. Ankita Sharma
19. Rajlaxmi Chouhan
20. Nitin Bhatia

Staff Colleagues in CETSD UBA Office

- Bharat Singh Rathore, (on Contract)- CETSD Office Staff
- Nirmal Gehlot – Project Staff – UBA-RCI
- Hanwant Singh Rathore- Project Staff- UBA-RCI

Staff Members Associated with UBA RCI work in Different Districts

- Dheerendra
- Poonamchand Shankla
- Amit Sharma
- Rimpesh Katiyar
- Shashank Chaudhary
- Narendra Singh
- Vivek Verma
- Ishmeet Singh
- Sandeep Singh

Details of Activities of Faculty Members Activities Connected to CETSD (UBA, RuTAG)

1. Dr Mahesh Kumar from Electrical Engineering was inducted into the Unnat Bharat Abhiyan Subject Expert Group Core Committee to help in the implementation process of the National Education Policy 2020.
2. Dr Anand Krishnan Plappally from Mechanical Engineering started his second RuTAG project with IIT Delhi on Mound Based Sub-surface Irrigation in 2020
3. Dr Sumit Kalra presented the IIT Jodhpur Telemedicine Portal in March 2021 to the UBA RCI Meeting as a special invitee.

UBA SEG Projects Completed and Ongoing

Under UBAPI- Prof Ananya Debnath, Department of Chemistry

Sl. No.	Title	UBA PIs	Financial Support (in Lakh)	Completed or Ongoing/ Timelines
1	Personal Use facial fit trails of reusable ceramic respirators being manufactured at Bhopalgarh for use towards preventing spread of air borne diseases	Anand Plappally, Dr Ravi K R, Dr. Narayanan V, Dr Kuldeep Singh (AIIMS Jodhpur)and Dr Rajendra Nagar	o.895	Completed, October 2020
2	Development of low-cost portable ventilator for COVID 19 patients	Dr Mahesh Kumar	1	On-going, 2020-2021

Schemes to which Proposals Submitted in 2020-2021

Sl. No.	Scheme/ Program	Submission Date	Initiator	Title
1	Coir Vikas Yojana- ASPIRE Scheme of MSME	April 24 2020	CETSD	Proposal towards setting a training center for rope and Geo- textile mat manufacturing at IIT Jodhpur
2	Khadi Village Industries Commission (KVIC)	Nov 26 2020	CETSD	IITJ is a Technical Agency, SFURTI Scheme. MOA executed
3	Key Resource Centers to Jal Shakti Ministry	Dec 16 2020	CETSD	EOI for the Empanelment of IITJ at the Jal Shakti Ministry
4	Centre for Rural Development and Technology at IITs	Dec 27 2020	CETSD	Submission of Report of 2020
5	MOA with cGanga	Jan 29, 2021	CETSD	MOA executed
Jal Jeevan Mission Project Submissions				
6	Smart Graded-Water Supply Grid	23 Jan 2021	Dr Shobhana Singh and Team	Submitted
7	Point-of-use and in-line water quality sensors for smart water management. Detection of coliforms, fluoride and Biochemical Oxygen Demand (BOD)	16 Jan 2021	Prof Meenu Chhabra and Team	Submitted
8	Techno-Managerial Action Research in Rural Drinking Water: Effectuating Behaviour	22 Jan 2021	Prof Preeti Tiwari and Team	Submitted
9.	Pilots and Survey Based Assessment of G filter in 5 states	14 October 2020	Prof Anand Plappally and Team	Submitted
10.	Novel drainage management structures using sub-surface porous vessels made of Vindhyan Era rocks and other ceramic ware	21 Jan 2021	Prof Debanjan Guha Roy and team	Submitted
HEFA CSR				
11	UF Membrane Assisted Sorption Based Water Purification Systems in Rural Village Schools of Jodhpur District, Rajasthan	17 Feb 2021	Prof Anand Plappally and Prof Pradip Tewari	Submitted

Programs and Collaboration

Sl. No.	Program/ Request for Collaboration	Date of Initiation	Initiator	Remarks
1.	Constitution of National Subject Advisory Committee (NSEAC) for Unnat Bharat Abhiyan	26, October 2020	UBA NCI, IITD	Head CETSD, A member of NSEAC
2.	ESRI	Nov 18 2020	Head, CETSD	Contacted Tanuj Arora, ESRI to start off discussions
3.	India International Science Fest 2020	22ndto 25th December, 2020	Anand Plappally	Taught in Jal Pathshala, Water Use, Quality and Energy for Water
4	ICICI RSETI Team visit	4 Jan 2021	Director/ Office of Infrastructure	Possible Collaboration Thoughts were exchanges in skill development and entrepreneurship
5	BRICS Consortium for Geography and Geodesy	12 Jan 2021	Director, IITJ	Expression of Interest towards joining BRICs consortium
6.	Jodhpur Industry Association Visit	25 Jan 2021	Prof Pradip Tewari	Meeting of the JCKIC water Team with JIA members at Basni Industrial Area
7.	Letter from Gov. Sen Sec. School, Rudiya for UF installation	9 March 2021	Prof Pradip Tewari	The installation of the UF filter was completed in March 2021.
8.	Letter from Semra Bujurg Village, Uttar Pradesh	15 March 2021	Director, IITJ	Requesting restoration of water wheel at Sajnam River, in Semra Bujurg village, Bar block, Lalitpur Uttar Pradesh.

Centre for Technology Foresight and Policy

The Center for Technology Foresight and Policy (CTFP) came into existence on 14 January 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 IIT Jodhpur: A Strategic Futures View by Mr. Randeep Sudan of Founder and CEO Multiverz Pte. Ltd., and Ex-IAS.

The center also submitted a joint proposal with the School of Management and Entrepreneurship, to the Haryana Government for revamping their Science and Technology department.

Technology Innovation and Start-up Centre (TISC)

Inauguration of IIT Jodhpur's Incubation and Innovation Centre:

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, and to have startup policies, equities and investments, networks with other incubators, investors, angels and entrepreneurs. Accordingly, IIT Jodhpur has established a few dedicated section-8 companies in the campus including IITJ Technology Innovation and Start-up Center (TISC), IIT Jodhpur Technology Park (Tech Park), IITJ Technology Innovation Hub iHub Drishti, and Jodhpur City Knowledge Innovation Cluster (JCKIC) for this purpose. Exclusive entrepreneurship programs and the School of Management & Entrepreneurship (SME) are part of this ecosystem. Among many initiatives to promote entrepreneurship leveraging the academic knowledge/resources, during the current financial year, IITJ's Incubation and Innovation Centre became functional in the campus. The Centre was inaugurated online on the 16th October 2020 by the Chief Guest, Dr. Ramesh Pokhriyal 'Nishank', Hon'ble Union Shiksha Mantri, Government of India, in the august presence of Shri Gajendra Singh Shekhawat, Hon'ble Union Jal Shakti Mantri, Shri. Sanjay Dhotre, Hon'ble Minister of State for Education, Government of India, and Prof. Santanu Chaudhury, Director, IIT Jodhpur.

Online inauguration of the Incubation and Innovation Centre

Distinguished dignitaries present during the inauguration

The current focus is on 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 through transformative technologies. The Deep Tech domains include: New materials, especially Materials of 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. The Centre nurtures incubation projects supported by the BIRAC, Ministry of MSME and MeitY, Government of India, besides administering a number of entrepreneurship related activities encompassing a multitude programs/stakeholders in the neighborhood.

Main Building of Incubation & Innovation Centre, IIT Jodhpur

TISC, IIT Jodhpur Bioincubator

IIT Jodhpur has received financial support of Rs. 4.45 crores for the first BioNEST Bioincubator in Rajasthan on 8th February, 2021, and accordingly a TISC, IIT Jodhpur Bioincubator setup is initiated. This incubator will primarily focus on healthcare technologies. It will support team formation and generation of technologies that can reduce dependence on the import of medical devices, and for the development of smart sensors point-of-care diagnostic devices, implants, therapeutic devices, imaging protocols to name a few. It will primarily promote/ support entrepreneurship in the healthcare/ MedTech/ Agrotech/Pharma segment and allied areas. Further, it will augment the translational research capacity leading to (few cases):

- Smart Sensors for early disease diagnosis based on the knowledge of existing biomarkers/newly discovered biomarkers.
- Bio-imaging (including smartphone-based imaging) and AI-based analysis for early disease diagnosis
- Miniaturized medical instruments for household use particularly for remote/rural population (Eg. Spirometer, continuous blood pressure monitoring, etc.)
- Integrated AI-driven Healthcare Platforms including Telemedicine Platform
- Medical Implants and Surgical Devices
- Cold Plasma and UV-based appliances for medical applications
- Electronic Nose & Appliances for Breathomics
- Smart Miniaturized Improved Camera System for Medical Applications including endoscopy
- NIR/Multispectral Imaging-based diagnostic devices

Incubatees Status at IITJ TISC

Sr. No.	Name	Email/Company Name	Student/MSME/ Faculty	Project/Product title	Status
1.	Dr. Suresh Dahiya	PG201282009@iitj.ac.in Metergy Pvt. Ltd.	Student-led startup	Generic IOT Infrastructure (GIOTI)	Feb 2020 to April 2021
2.	Dr. Saakshi Dhanekar	saakshi@iitj.ac.in	Faculty under BIRAC BIG project	Indigenous alcohol breath analyzer for prevention of drink and driving case	Incubating since Feb 2020
3.	Prof. Mayank Vatsa	mvatsa@iitj.ac.in DependableVision.AI	Student- and Faculty-led startup	DependableVision.AI	Incubating since May 2020
4.	Dr. Neelam Rathore	neelam19rathore@gmail.com Greenoearth Pvt. Ltd.	IIT Alumni	Safe Sanitization: Easy production of different concentrations of hypochlorous acid from the home-based ingredients, water, and electricity	Incubating since May 2021
5.	Dr. Amandeep Kaur	amandeepkaur@iitj.ac.in	Faculty under BIRAC BIG project	An endoscopic camera system	Approved by BIRAC
6.	Mr. Vigyan Gadodia	gvigyan@gmail.com	Student along with faculty advisor Dr. Ram Prakash	Design and development of small-scale milk disinfection system using mercury-free plasma (MFP) UV Lamp technology	Incubating since April 2021
7.	Mr. S. Subburayalu	subburayalu@iitj.ac.in	Student along with faculty advisor Dr Ravi K.R.	Development of Transparent, Durable superhydrophobic-coating for self-cleaning of Endoscope	Incubating since April 2021
8.	Mr. Bibhudutta Satapathy	satapathy.1@iitj.ac.in	Student along with faculty advisor Dr Deepak Mishra	A Wellness Device for Real-time Non-contact Blood Oxygen Saturation Measurements	Incubating since April 2021
9.	Mr. Varun Kumar	kumar.129@iitj.ac.in	Student along with faculty advisor Dr Amandeep Kaur	Human perception driven on-chip compression for power-efficient CMOS image sensors	Incubating since April 2021

Companies in Tech-Park at IIC:

1. **Pingala AI Pvt. Ltd. (Prithvi.AI)**, a provider of seed-stage acceleration program designed for budding start-ups in the Artificial Intelligence and machine learning arena, signed an agreement with IIT Jodhpur Technology Park on the 5th October 2020 and is setting up AIoT and Industry 4.0 support system 'HEEEAL' (Healthcare, Education, Energy, Environment, Agriculture and Livelihood) at the Innovation Centre in the unit.

2. **Johari Digital Healthcare Limited (JDHL)**, Jodhpur, one of the first MDSAP and US FDA certified GMP audited manufacturing company in India working on design, development, engineering and production of electronic healthcare devices to be distributed worldwide, signed an agreement with IIT Jodhpur Technology Park on the 11th November 2020, and is also setting up a Centre of Excellence for Medical Technologies at the Innovation Centre in the unit powered by JDHL.

MoU exchanged between IIT Jodhpur Technology Park and Johari Digital Healthcare Limited (JDHL), Jodhpur for a Centre of Excellence in Medical Technologies

3. **WhizHack Technologies Private Limited** signed an MoU with IITJ Tech Park and IITJ TISC on the 10th December 2020 for establishing a Centre of Excellence (CoE) for new innovations in Cyber Security, AI, and to encourage and promote cooperation for developing jointly branded Advocacy, Training programs and Product Development in the mentioned areas. WhizHack Technologies is the first Indian product engineering and human capital development company for managing complete value chain of secured cyber environment. It was planned to start an Advanced Certificate Bootcamp on Cyber Defense immediately at IITJ TISC in collaboration with WhizHack Technologies Private Limited.

MoU Exchanged between IIT Jodhpur and WhizHack Technologies Private Limited for a Centre of Excellence in Cyber Security and AI

Other MoU Signed

1. An MoU was signed between IIT Jodhpur and MSME Technology Centre Bhiwadi on the 24th December 2020, which became effective after a program organized in an online mode on 28th December 2020 at 11:00 am in the Board Room, IIT Jodhpur. The aim is to support students with projects/fellowships and Industrial visits at MSME Technology Centre Bhiwadi, support R&D projects which may be carried out at IIT Jodhpur or at premises of MSME Technology Centre Bhiwadi or partly at IIT Jodhpur and partly at MSME Technology Centre Bhiwadi, Joint EDP workshop/seminar/trainings periodically, supporting startup, students, upcoming entrepreneurs with incubation and technological support, etc.
2. An MoU was signed between IITJ TISC and Department of Information Technology & Communication (DoIT&C), Govt. of Rajasthan on 4th February 2021 to support/ guide/stimulate/promote Entrepreneurial and Management Development of Startups by providing an integrated platform and by policy formulation, planning, implementation and monitoring of Startup Promotions.

MoU exchanged between IIT Jodhpur and DoIT&C, Govt. of Rajasthan

Activities undertaken at IITJ TISC (during 2020-2021)

1. A webinar was organized on "Business opportunities in Structural Health Monitoring and Predictive Maintenance" in joint collaboration of IITJ, CII and TISC on 8 August 2020, which was attended by around 305 participants in an online mode. This webinar created a good scope for cooperation between CSIR-NML, GE Research, NTPC-NETRA and generated similar interest from other agencies as well. On the day before (07.08.2020) the Webinar, a virtual Industrial Meet was conducted among CII, CSIR-NML, NTPC-NETRA, GE Research and IITJ. Prof. Santanu Chaudhary, Chairman TISC, chaired this meeting. Besides the speakers of the Webinar, the meeting was attended by Dr. Indranil Chattoraj, Director, CSIR-NML, Mr. AK Das, AGM NTPC, Mr. Anjan Das, Executive Director, CII, Ms. Rachna Jindal, Director – Emerging Technologies, CII.
2. IITJ TISC coordinated start-up idea presentations of the institute to the Ministry of MSME, Govt. of India under the Scheme "Support for Entrepreneurial and Management Development of MSMEs through Incubator" during 7–11 September 2020.
3. Dr. Ram Prakash, Faculty-in-charge, IITJ TISC, participated as an expert member in the Ideathon program of DST Rajasthan during 8–9 September 2020.
4. IITJ TISC offered an online classroom-based professional development program entitled 'Entrepreneurship Development Program (EDP)' in collaboration with the Department of Science and Technology, Govt. of Rajasthan (DST) for various stakeholders (Faculty members, budding entrepreneurs, trainers, policy makers, students etc.) in the Medium Small and Micro Enterprises domain (MSME). The program was offered twice, once in the month of February (15–27 February) and once in the month of March 2021 (1–13 March). This two-week online program covered topics related to: Personality traits of entrepreneurs, Identification and training of entrepreneurs, Entrepreneurship Ecosystem, Entrepreneurship Development Process, Opportunity identification and ideation, Legal aspects and regulations, Marketing and Finance management, IPR, Patent, copyrights and Trademark, Technology sourcing, Role of Incubators and Business Plan development. A total of 173 candidates (48 Female, 125 Male) registered for the program while a total of 104 candidates (22 Female, 82 Male) attended the program in online mode. Inputs were provided in form of online lectures, panel discussions and field visits to select MSMEs which were broadcasted digitally.
5. IIT Jodhpur organized a roadshow at IITJ Technology Innovation and Startup Center (TISC) on 22 February 2021 and the First BioNEST Bioincubator in Rajasthan was announced at the eve of Global Bio-India 2021 on Digital Platform. The following speakers delivered talks on various aspects of entrepreneurship and innovation in the Bioscience/MedTech space: Prof. Santanu Chaudhury, Director, IIT Jodhpur, Prof. Sampat Raj Vadera, HoD, Department of Physics, IIT Jodhpur, Prof. Vijay Chandru, Co-founder and Director at Stand Life Sciences & Adjunct faculty at IISc Bangalore, Dr. Chandra Madhavi, Sr. Manager (Programmes) BIRAC, DBT, Prof. Kuldip Singh, Dean, AIIMS Jodhpur, Mr. Satyendra Johari, Founder and Chairman at Johari Digital Healthcare Ltd. A larger community across India got benefited.

Collaborative Activities of TISC with JCKIC

Jodhpur City Knowledge and Innovation Cluster (JCKIC)

Jodhpur City Knowledge and Innovation Cluster project has been sanctioned by the Office of the Principal Scientific Adviser to the Government of India. This is one of the six clusters approved by the Government. The initiative has been taken on the recommendation of the Prime Minister's Science, Technology and Innovation Advisory Council (PM-STIAC). The objective is to create strong linkages among academic institutions, R&D Institutes, National and State research laboratories, Government Agencies and Industries of the city of Jodhpur. The project was sanctioned on 29 July 2020 with a cost of Rs. 949.70 lakhs for a duration of three years.

The main focus of the cluster is to provide a necessary platform to create synergy among all the stakeholders to make use of available knowledge as well as to develop advanced technologies, creative skills, state-of-the-art infrastructure and innovative environment in an organized manner so as to ensure sustainable and systematic development of city of Jodhpur. The cluster will also provide a platform to the young entrepreneurs to work on their new and innovative ideas. In the long run, the cluster will be a self-sustaining unit. The initial focus of the cluster is in the following areas:

(i) To provide innovation-driven impetus to healthcare and medical technology industry in the city

(ii) To design and implement digital technologies for value addition to local handicrafts and handlooms

(iii) To develop and implement a prototype waste water management system dealing with pollutions from the textile industry

(iv) To roll out an AI-driven initiative for increasing the efficiency of traffic and crime management system of the city of Jodhpur

(v) To design and develop an integrated real-time data management system for the city of Jodhpur, on top of forthcoming 5G network.

Progress Achieved: Under Med Tech Vertical, a joint MMT program was initiated between IIT and AIIMS Jodhpur, for ensuring supply of requisite manpower for innovations and entrepreneurship in this area. More than 600 applications were received for the Master's, PhD and Master's-PhD Dual Degree program, and 26 students (from both medical and engineering backgrounds) are currently pursuing their studies.

A multi-disciplinary **Deep-Tech Biodesign Centre** to train, nurture and transform clinicians and engineers into the Deep-Tech innovators in the field of Medical/Health Technology has been established. Bio-incubators Nurturing Entrepreneurship for Scaling Technologies (BioNEST) has also been established as an incubating center to promote India centric affordable intelligent healthcare technologies. Under the **Craft Vertical**, a Need Assessment Workshop series, "Crafts, Tourism and the Pandemic - Gauging the Current Status" was initiated with active participation of NIFT and IIT Jodhpur. The objective was to interact with the various Craft Clusters in order to understand the challenges being faced by CRAFT industries mainly during COVID-19 and especially by unorganized sectors to identify local needs and resources that can help understand how to improve these communities in the most logical and efficient ways possible. Participants included members from various agencies (Govt/Private/NGO) like District Industries Center, Panipuri Soft, Rupayan Sansthan and handicraft industries & local artisans. The following research areas were also identified:

a) Livelihood Business Incubators

b) Enable e-commerce opportunities for craft clusters

c) Digital Craft - A Platform for Archiving, Immersive Exploration & Experiential Commerce for Crafts of Jodhpur.

Under Waste Water and Environmental Pollution Management (WEPM) Vertical, a number of brainstorming sessions and webinars were organized which led to the development of the following research projects:

(i) Establishing a Common Facilities Center for analysis and treatment of waste and usage of water

(ii) Smart Graded-Water Supply Grid

(iii) Novel Drainage Management Structures using Sub-Surface Porous Vessels made of Vindhyan Era Rocks and other Ceramicware

(iv) Point-of-Use and Inline Water Quality Sensors for Smart Water management.

(v) Detection of Coliforms, Fluoride, Biochemical Oxygen Demand (BOD)

(vi) Techno-Managerial Action Research in Rural Drinking Water: Effectuating Behaviour

(vii) Pilots and Survey-based Assessment of G-Filter in 5 States

These projects have been submitted to the funding agencies.

Some of the activities under the project WEPM included the installation of a grey water purification unit in the school of Jheepasani village with the participation from stakeholders, a 'proof of concept' subsurface porous vessel drainage management experimental unit in Rudiya village, and coordination with industries, particularly with reference to industry-specific waste and environmental pollution issues.

Under I-Governance Vertical, to improve public service utilities in the area of Traffic Management using Video feeds, Social Media Analytics for Crime, Transportation planning for Jodhpur City and Cyber Crime, the following projects are likely to be undertaken in near future:

a) Development of a Traffic Modelling and Travel Demand Management Framework for Jodhpur City, Rajasthan

b) Joint training program on cyber security for the police department of Rajasthan with IITJ & Police University

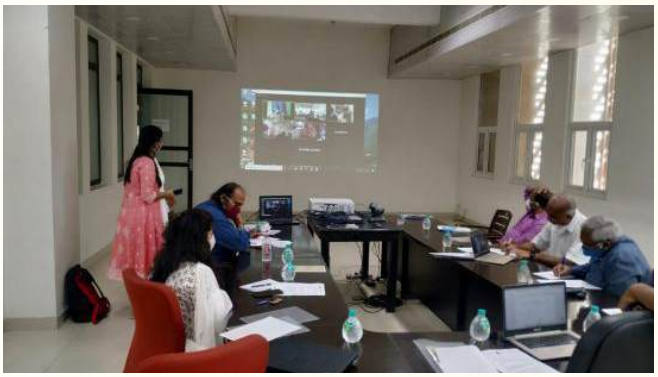
c) Cyber Crime Helpline

Jodhpur City Knowledge and Innovation Cluster (JCKIC)

Jodhpur City Knowledge and Innovation Foundation (JCKIF) a Section 8 company has been established to sustain activities undertaken by Jodhpur Cluster.

Cluster Events

First Workshop in Need Assessment Workshop Series titled "Crafts, Tourism and the Pandemic - Gauging the Current Status" on 16th Mar 2021 for Handicrafts (Bone and Horn) and Handlooms (Tie and Dye), Jodhpur by Jodhpur City Knowledge and Innovation Cluster (JCKIC) in collaboration with NIFT Jodhpur and IIT Jodhpur



Webinar on Water Management Technologies "Robotics and Wastewater- Based Epidemiology (WBE) for monitoring disease outbreaks in Communities" by Mr. Asim Bhalerao, CEO, Fluid Robotics, Pune on 4th March 2021 (Jointly by JCKIC & IIT Jodhpur)

Jodhpur City Knowledge and Innovation Cluster (JCKIC) organized a meeting on 27th Feb 2020 with Jodhpur Collector and other government officials of the city of Jodhpur to deliberate on steps to be taken for rebuilding Jodhpur City through collective efforts, with participation of more than 50 delegates from Government organizations, research institutes and industries.

Brainstorming Session on "Diagnostic Devices Domain" held on 16th February 2021 (Jointly by JCKIC and Johari Digital Healthcare Technologies, Jodhpur in collaboration with IIT Jodhpur)

Seminar on "Environment Control and Waste Water Management of Jodhpur" on Saturday, 30th January 2021 (Jointly by Jodhpur Industries Association and JCKIC)

Webinar on "Waste to Wealth" by Prof. Guruswamy, IIT Bombay (Former Senior Scientist, NCL, Pune) on 20 Jan 2021 (Participation of more than 50 delegates from Educational Institutes and Industries)

First Webinar in the series of "National Education Policy 2020" on 11 Nov 2020 by Jodhpur City Knowledge and Innovation Cluster (JCKIC)

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	Joint Registrar
Ashok Kumar Khanduri	Deputy Registrar
Naresh Joshi	Deputy Registrar
Jayita Sarkar	Scientific Officer
Anand Padegaonkar	Assistant Executive Engineer (Civil)
Gaurav Bhansali	Assistant Executive Engineer (Electrical)
Shakti Ranjan Patra	Assistant Registrar
Himmat Singh	Assistant Registrar
Baikuntha Nath Sahu	Assistant Registrar
Prashant Bhardwaj	Assistant Registrar
T. Malati	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
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
Amit Kumar Soni	Assistant Library & Information Officer
Kamleshkumar J. Patel	Assistant Library & Information Officer
Vinay Kumar	Assistant Engineer (Electrical)
Ashish Kumar	Junior Engineer (Civil)
Amit Kumar	Junior Engineer (Electrical)
Laxman Singh	Junior Superintendent
Darsh Kumar Khatwani	Junior Superintendent
Ashok Gehlot	Junior Superintendent
Hanuman Singh	Junior Superintendent
Arjun Das	Physical Training Instructor
Ram	Senior Assistant

Kaur Virdi	Senior Assistant
Srivastava	Senior Assistant
. Madhavi Lata	Senior Assistant
Singh Ratnu	Senior Technical Assistant
Sharma	Technical Assistant
Choudhary	Technical Assistant
Suthar	Technical Assistant
Pandey	Technical Assistant
Kushwaha	Assistant
Kumar	Assistant
Rashmi Dhyani	Assistant
Vivek Verma	Technical Assistant
Kailash Chander	Technical Assistant
Dhavalbhai M. Raiyani	Junior Technical Assistant
Naveen Kumar	Junior Technical Assistant
Poonam	Junior Technical Assistant
Ravi Jangid	Junior Technical Assistant
Sampatlal N. Suthar	Junior Technical 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
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
Robin Singh Kaintura	Junior Assistant
Sambaji	Junior Assistant
Sunil Kumar	Junior Assistant
Deepika Sharma	Junior Assistant
Mahendra Singh Meena	Junior Assistant
Kalpana Deep	Junior Assistant
Staff Members (Standing Committee)	
S. C. Bose	Advisor (Academics)
P. G. Basak	Advisor (Administration)
S. D. Jatav	Audit Officer
Kirity Kumar Roy	Advisor (Industry-Academia Interface)
Bhagya Rajeswari S.	English Language Instructor
Nivedita Verma	English Language Instructor
Divya Kalavala	English Language Instructor
Mohit Mathur	Manager (Facilities)
Ronika Yadav	Medical Officer
Captain Iman	Security Officer

New Initiatives

Vision & Strategic Plan

The Institute has completed more than a decade in its journey in nurturing talent and achieving excellence. The institute has experienced a significant growth in recent times and by 2025 the student strength will reach to close to 5000 from the current strength of 3255. It is important for a technology institute to assess the changing landscape of the technology and other relevant factors to shape and tune its strategy to contribute significantly and meaningfully. There were several factors including New Education Policy, Exponential change in technology, changing nature of Work and Job, New Financial Model, Expectations from the Society, and, the need for virtual mode of education along with the traditional brick and mortar model which necessitate the need to expand the current Vision and Mission of the institute. Furthermore, high-quality education acquires unprecedented importance in improving the lives and future of the people on the planet. The arena and scope of technological education also have to expand far beyond the 20th-century concepts. Technology institutes have to increasingly become more and more multi-disciplinary, and also contribute more directly to the applications of emerging technologies for responding effectively to ever-changing challenges/opportunities. With this backdrop, the institute has crafted its Vision for 2025. Institute vision reflects the proposed nature of the institute; it is envisaged as a future driven knowledge institute, with emphasis on the use of Transformational Technologies/ Interventions with a multidisciplinary approach. All Departments, Schools, Interdisciplinary Research Platforms (IDRPs) and Centres have created their respective vision documents. Vision, mission and goals of all these academic units are broadly aligned to the Institute Vision. Different academic units of the institute also have their respective specific missions and goals based on the path they have charted for their future. The comprehensive document consisting of the vision of all academic units and different sections was approved by BoG in March 2021. An of Office of Planning & Resource Generation has also been setup to facilitate the implementation of this vision through a dedicated Vision Coordination Committee. Thus, the institute is working in a coordinated and a planned way to realize the Vision on all fronts.

The new vision statement of IIT Jodhpur is

"A future-driven institute for nurturing excellence of thought; generating, preserving and imparting knowledge; and using transformational technologies/interventions with multidisciplinary approach for responding to societal challenges and aspirations."

It has adopted the following as the key mission

(i) Move towards a high quality, futuristic educational and research ecosystem.

(ii) Develop socially responsible faculty, students and future leaders, committed to create a self-reliant India.

IIT Jodhpur has set up goals in the following areas with a target to achieve them by 2025: curriculum, pedagogy, research, outreach, collaboration, industry connect, financial plan, infrastructure, student lifecycle and agile organization.

Aligned with the mission and goals a number of Academic initiatives have been implemented

(i) The new UG curriculum provides opportunity for the students to tailor their programme based upon their interest and capability while remaining anchored in their core branch.

(ii) IIT Jodhpur has designed a curriculum to enable students to pursue these emerging areas in the broad context of their parent disciplines through specialisation or minor area certification. A student can also opt for a 5-year B.Tech.-M.

Tech./MBA Dual degree at the end of 7th semester. This year for the first time B,Tech's have graduated with minor/ specialization area certificates.

(iii) To strengthen research and innovation ecosystem a new Innovation oriented programes - Master's & PhD in MedTech has been initiated

(iv) IIT J has started online PG programme with well defined campus immersions for facilitating lifelong learning for professionals.

To take forward its agenda of innovation driven education and exploring newer avenues of fund generation, IIT Jodhpur is pursuing several initiatives through newly set up section 8 companies.

(A) Establishment of IIT Jodhpur Marudhara Foundation, a Section 8 Company

The Institute has established IIT Jodhpur Marudhara Foundation, a Section 8 Company of the Institute to:

i. encourage, promote and facilitate education and research and other activities of the Indian Institute of Technology Jodhpur (Institute).

ii. encourage dialogue with industries for research and consulting projects.

iii. promote interaction amongst the PAN IIT Alumni members and the Institute for facilitating academic, industrial and entrepreneurial support and services.

iv. establish, construct, equip and maintain or contribute towards establishment, equipment and maintenance of libraries, laboratories and facilities in the Institute and other allied organizations for the promotion and furtherance of its objectives.

v. subscribe and to become a member of other institutions in any part of world having objectives similar to the objectives of the Company.

vi. enter into any arrangements/agreements with the Government of India or with any State Government or other authorities, local municipal, IIT Jodhpur or otherwise in pursuance of the objects of this Company and to obtain from any such Government or authority all rights, concessions and privileges that maybe conducive to the objects of the Company.

vii. apply to the Government, public bodies, urban, local, municipal, district and other bodies, corporations, companies or other persons for and to accept grants or money, equipment, land, buildings, donations, gifts, subscriptions and other assistance with a view to promote and further the objects of the Company.

IIT Jodhpur Marudhara Foundation is taking shape and a task force comprising of senior strategists of National level were constituted to frame the charter of activities towards the set goals of the company. The efforts towards crowdfunding and CSR Funds from the Industries were also initiated to mobilise funds toward developmental activities of the Institute.

(B) Work of the Jodhpur City Knowledge and Innovation Cluster (JCKIC)

The Jodhpur City Knowledge and Innovation Cluster (JCKIC) has been established under the aegis of the Office of the Principal Scientific Adviser, Government of India. The main focus of the cluster is to provide a necessary platform to create synergy between all the stakeholders to make use of available knowledge as well as to develop advanced technologies, creative skills, state of the art infrastructure, and innovative environment in an organized manner so as to ensure sustainable and systematic development of the city of Jodhpur. The cluster will work towards the effective intervention of knowledge, technology, and innovation for the society at large and industry and governance in particular. Further, the cluster will provide a platform for young entrepreneurs to work on their new and innovative ideas. The cluster at present is looking at the following domains: (1) Medical Technologies, (2) Water and Environment, (3) I-Governance, (4) CRAFT, (5) Thar DESIGNS ((Desert EcoSystem Innovations Guided by Nature & Selection), and (6) AIoT Fab.

The main focus of the cluster is to provide a necessary platform to create synergy between all the stakeholders to make use of available knowledge as well as to develop advanced technologies, creative skills, state of the art infrastructure and innovative environment in an organized manner so as to ensure sustainable and systematic development of city of Jodhpur. The cluster will work towards effective intervention of knowledge, technology and innovation 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 their new and innovative ideas. In the long run the cluster is going to be a self-sustaining unit. The initial focus of the cluster will be in the following areas:

To provide Innovation-driven impetus to Healthcare and Medical Technology industry in the city

- To design and implement digital technologies for value addition to local handicrafts and handlooms
- To develop and implement a prototype wastewater management system dealing with pollutions from the

textile industry

- To roll out an AI driven initiative for increasing efficiency of traffic and crime management system of the city of Jodhpur
- To design and develop an integrated real time data management system for the city of Jodhpur, on top of forthcoming 5G network

The cluster is a collaborative network of a large pool of institutes dealing with academics (covering different domains including science & technology, healthcare, fashion design, footwear design, law, police, ayurveda, agriculture, fine arts, engineering, social science, humanities, etc.), R&D institutes affiliated to all major organizations of the country including DRDO, ICAR, ISRO, ISRO, ICMR, Forest Research, etc., and highly skill oriented MSMEs having strong elements of innovation and entrepreneurship. The Jodhpur region is very rich in handicrafts, handloom and traditional art. A large number of industries and artisans are engaged in these activities. The cluster will work towards exploiting the rich traditional heritage and art existing in the city of Jodhpur and around for the betterment of the artisans and help them in improving the financial condition. Further, the cluster will also aim to preserve the city's heritage and traditional art and take it forward to coming generations, however, with value addition. All these features make Jodhpur as one of the ideal cities to host a multi-institute platform viz. Jodhpur City Knowledge and Innovation Cluster (JCKIC).

The cluster has already started work on different projects that hope to directly improve living and working conditions of villagers, artisans and craftsmen in Rajasthan through technical interventions in medicine, governance, arts and crafts and other livelihood projects. On behalf of the cluster, four Need Assessment Workshops were conducted with different craft clusters to understand and analyze the current condition of crafts and livelihood in the region. Workshops were conducted with the craftsmen involved in Durry manufacturing and printing, Block Printing, Leather Mojari producers and handicrafts and handloom producers. Initial connections were built with the craftsmen and a road map for further interventions was discussed and laid out.

(c) Technology Innovation & Start-up Centre

IITJ TISC, the umbrella incubation center of IITJ has also been incorporated as Section-8 Company, with a mandate to incubate Deep-Tech startups along with the aim of developing a vibrant entrepreneurship ecosystem in the institute and the larger region in the state of Rajasthan.

IITJ TISC launched its preliminary webpage http://tisc.iitj.ac.in in the month of February 2021, with an aim to attract potential incubates and launch new programs.

IITJ TISC received the coveted BioNEST grant from Biotechnology Industry Research Assistant Council (BIRAC) to set up a Bio Incubator which gained the distinction of becoming the first instance of a Bio Incubator in the state of Rajasthan.

IITJ TISC has hired its full time CEO and Manager and resumed its offline operations with appropriate CoVID-19 protocol in the month of October 2021. Furthermore, in the month of December 2021, TISC hired a consultant towards managing the Corporate Relation/Endowment and Corporate Affairs function, with a special focus on reaching out to corporates for CSR funds that can be employed towards various activities related to promotion of innovation and entrepreneurship

A total of 4 proposals from IIT J received Ministry of Micro, Small and Medium Enterprises (MSME) grant during the year and one proposal from IIT J received Biotechnology Ignition Grant (BIG) during the year. The following resultant projects were incubated at TISC:

- Power efficient CMOS image sensors (MSME Grant)
- Blood Oxygen Saturation Measurements (MSME Grant)
- Self-cleaning of Endoscope (MSME Grant)
- Small-scale Milk Disinfection System (MSME Grant)
- Endoscopic camera system (BIG Grant)

Among others, the following notable programs related to outreach and training aimed at entrepreneurship ecosystem development were conducted by TISC:

1. In collaboration with the Department of Science and Technology, Govt. of Rajasthan TISC offered an online classroom based professional development program titled 'Entrepreneurship Development Program' (EDP) for various stakeholders (Faculty members, budding entrepreneurs, trainers, policy makers, and students etc.) in the Medium Small and Micro Enterprises domain (MSME). This two-week online program was offered twice, once in the month of February (15 – 27 February) and once in the month of March 2021 (1st – 13th March). A total of 173 candidates (48 Female, 125 Male) registered for the program while a total of 104 candidates (22 Female, 82 Male) attended the program.
2. IITJ TISC started Advanced Certificate Program on Cyber Defense with Whizhack. A total of 95 students have registered under the ongoing program.
3. To commemorate the build up to India @ 75 celebrations, BioNEST at IIT J TISC organized a series of talks under the Vigyan se Vikas umbrella to Showcase Potential, Journey and Impact of Biotechnology on the Society on the 28th of June 2021. The following eminent Bioscience researchers delivered their talks on this occasion:

- Prof Raghavan Varadarajan, Professor at the Molecular Biophysics Unit at IISc Bangalore
- Prof Dulal Panda, Chair Professor, Department of Biosciences and Bioengineering at IIT Bombay
- Prof Ashok Kumar, Department of Biological Sciences and Bioengineering at IIT Kanpur
- Prof Suman Kumar Dhar, Professor at the Special Centre for Molecular Medicine of Jawaharlal Nehru University.
- Prof Souvik Maiti, Senior Principal Scientist at Institute of Genomics and Integrative Biology

4. IITJ TISC organized a Roadshow webinar on 22nd February, 2021 on various aspects of entrepreneurship and innovation in the Bioscience / MedTech space. The following speakers delivered expert talks on the subject:
   - Prof Santanu Chaudhury, Director IIT Jodhpur
   - Prof Sampat Raj Vadera, HoD Department of Physics, IIT Jodhpur
   - Prof. Vijay Chandru, Co-founder and Director at Stand Life Sciences & Adjunct faculty at IISc Bangalore
   - Dr. Chandra Madhavi, Senior Manager (Programmes) BIRAC, DBT
   - Prof. Kuldip Singh, Dean, AIIMS Jodhpur
   - Mr. Satyendra Johari, Founder and chairman at Johari Digital Healthcare Ltd.
5. IITJ TISC welcomed Dr. Nilotpal Ghosh from SERB in the month of November 2021. An interaction with our incubates and students was held wherein Dr. Ghosh gave insights on various funding as well as technical matters.

   A webinar was delivered by Dr. P K Dan of IIT Kharagpur in the month of December 2021 on "Frugal Engineering: An Emerging Paradigm for Innovation and Startups" which was attended by incubates and students.

(d) IIT Jodhpur Technology Park

IIT Jodhpur promotes and supports the technology thoughts and actions towards the societal outreach. In fulfilment of the above, IIT Jodhpur has established the IIT Jodhpur Technology Park in the sprawling campus of IITJ having advanced facilities for industry engagement and scale-up of innovation capacity by leveraging the available intellectual capital at IIT Jodhpur. This has been created with the sole objective of providing technology innovations as a force to as many industries as possible for the economic value creation. We are working towards diffusion of the fruits of cutting-edge R&D from IITJ by setting up state-of-art infrastructure having facilities for design and development of advanced technologies. Pending the construction and set-up of a fully functional Technology Park with all add-on facilities, a mini version has already been established at the Innovation Centre in the Pocket-B of the main campus. With a few Centres of Excellence in the contemporary technology verticals, this mini version of the Technology Park at the Innovation Centre is envisaged for the creation of a thriving techno-entrepreneurial ecosystem. This is expected to boost the creation of new age technology ventures and directly contribute to the capacity building for emerging industries. In this line Institute has already signed three MoUs for the new centres of excellence in the IIT Jodhpur Technology Park.

These include:

- Pingala AI Pvt. Ltd. (Prithvi.AI) –a provider of seed-stage acceleration program designed for budding start-ups in the Artificial Intelligence and machine learning arena to set-up AIOT and Industry 4.0 support system 'HEEEAL' (Healthcare, Education, Energy, Environment, Agriculture and Livelihood) at the Innovation Centre in the unit.
- Johari Digital Healthcare Limited (JDHL), Jodhpur –one of the first MDSAP and US FDA certified GMP audited manufacturing company in India working on design, development, engineering and production of electronic healthcare devices to be distributed worldwide to set up a Centre of Excellence for Medical Technologies at the Innovation Centre in the unit powered by JDHL.
- WhizHack Technologies Private Limited – signed an MoU with IITJ Tech Park on the 10th December 2020 for establishing a Centre of Excellence (CoE) for new innovations in Cyber Security, AI, and to encourage and promote cooperation for developing jointly branded Advocacy, Training programs and Product Development in the mentioned areas. WhizHack Technologies is the first Indian product engineering and human capital development company for managing complete value chain of secured cyber environment.

The IIT Jodhpur technology park has also signed an MoU with MSME Technology Centre Bhiwadi on 24th December 2020. The aim here is to support students with projects / fellowships and Industrial hands-on at MSME Technology Centre Bhiwadi, support R&D projects, Joint EDP workshop/seminar /training, supporting start-ups, students, upcoming entrepreneurs with incubation and technological support, etc. Some of the industries linked with MSME Technology Centre Bhiwadi will be engaged virtually at the IIT Jodhpur Technology Park in the initial phase for a larger industrial ecosystem in the state of Rajasthan.

(e) iHub Drishti, the Technology Innovation Hub (TIH)

iHub Drishti, the Technology Innovation Hub (TIH) at IIT Jodhpur, is a section 8 company, established under National Mission on Interdisciplinary Cyber-Physical System (NM-ICPS) in 2020. iHub Drishti is the point of convergence between industry and academic community in the country for computer vision (CV), augmented reality (AR) and virtual reality (VR). Its mandate includes research activities, training and capacity building, and technology generation to ensure self-sustainability. NM-ICPS agreed to support the Hub with the Grant-In-Aid up to Rs. 115 crore to be released to the Hub over a period of 5 years. The hub has already received the initial grant of Rs. 19.25 crore, and within a year of operation, it has partnered with top academicians, researchers and industry players from India and abroad. The hub endeavours to ramp up its activities encompassing development of technology and products, setting up state-of-the-art labs, generation of intellectual properties, increasing CPS research base, development of entrepreneurial ecosystem, job creation, human resource development and international collaboration.

1. Technology Development: The hub focuses on four core scientific horizontals: (i) Seeing and Sensing, (ii) Dependability, (iii) Realtime Computer Vision Systems, (iv) Data Collection, Curation and Annotation for developing technologies in the following application verticals:
    - Computer Vision for Autonomous Systems
    - Computer Vision for Better Living: Healthcare and Biosphere
    - Imaging for Document Analysis
    - CV and VR for Industry 4.0
    - AR-VR for X
    - RAKSHAK (AI and Data Science for COVID)
2. Productization & Commercialization: Monitoring the ecosystem to facilitate new research, ideas, research translation to business creation. The RAKSHAK vertical has projects leading to products:
    - Campus RAKSHAK - A decision support framework for Campus Safety - a collaborative work: Contact tracing app, Agent based simulators, Badging. Commercializing this as product through Direct Executives, Marketing Partners and Testing Labs.
    - Tapestry pooling - Combinatorial pooled testing technique developed by IIT Bombay team leading to a startup.
    - SMART HEALTH solutions for Rapid Mass Diagnosis for COVID: A telemedicine platform developed by IIT Jodhpur leading to a startup.
3. Research Publications and Patent: There have been several publications from different projects supported, and few technologies are in the advanced stage of patent filing.
4. Hackathon and International Conference: Increasing the visibility and outreach of the hub with an enriched network of stakeholders. The hub has co-organized, in collaboration with IIT Jodhpur, '16th International Conference on Automatic Face and Gesture Recognition (FG 2021)' via virtual mode.
5. Skill Development: 200+ executives trained in Computer Vision, Autonomous Systems, NLP in collaboration with IIT Jodhpur. PG & MTech program in ARVR framework in collaboration with Pan IIT faculties & Industries is being finalized.
6. Fostering industry connections: Twelve companies including Samsung Research India Bangalore (SRIB) are onboarded as Industry Partners. Collaborative research started with the Defence Research & Development Organization (DRDO) Centre for Artificial Intelligence & Robotics (CAIR).
7. Calls for Proposal: Fostering culture of Industry-academia collaboration through Open calls: (i) Creation of Digital Museums for the Rajasthan government with Alwar Museum as the starting point, (ii) Content creation solutions for ARVR, (iii) India Anatomy Project, (iv) Improving doctor-patient communication using VR, (v) Haptics based medical simulators for palpation and tele-diagnosis.
8. US-India Collaborative Research: Discussion is in advanced stage with the National Science Foundation's (NSF) Directorate for Computer and Information Science and Engineering (CISE) and Directorate for Engineering (ENG) to conduct US-India Collaborative Research.

Academics

Academics Programs

Currently, the Institute offers the following Academic Programs.

1. Bachelor of Technology Programs

1. B.Tech. (Bioengineering)
2. B.Tech. (Computer Science and Engineering)
3. B.Tech. (Electrical Engineering)
4. B.Tech. (Mechanical Engineering)
5. B.Tech. (Materials Engineering)
6. B.Tech. (Chemical Engineering)
7. B.Tech. (Civil and Infrastructure Engineering)
8. B.Tech. (Artificial Intelligence and Data Science)

2. Master of Science Programs

1. M.Sc. (Chemistry)
2. M.Sc. (Mathematics)
3. M.Sc. (Physics)
4. M.Sc. (Digital Humanities)

3. Master of Technology Programs

1. M.Tech. (Bioscience & Bioengineering)
2. M.Tech. (Computer Science & Engineering)
3. M.Tech. (AI)
4. M.Tech. (Cyber Physical System)
5. M.Tech. (Sensors and Internet of Things)
6. M.Tech. (Advanced Manufacturing and Design)
7. M.Tech. (Data and Computational Sciences)
8. M.Tech. (Thermofluids Engineering)
9. M.Tech. (Metallurgical & Materials Engineering)
10. M.Tech. (Executive AI)
11. M.Tech. (Chemical Engineering)
12. M.Tech. (Civil and Infrastructure Engineering with specialization in Environmental Engineering)
13. M.Tech. (Civil and Infrastructure Engineering with specialization in Energy)
14. M.Tech. (Three Year)
15. M.Tech. Executive - Cyber Physical Systems
16. M.Tech. Executive - Data & Computational Sciences

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
10. Ph.D. with specialization in Chemical Engineering
11. Ph.D. with specialization in Civil and Infrastructure Engineering

12. Ph.D. with specialization in Medical Technologies
13. Ph.D. with specialization in Management and Entrepreneurship
14. Ph.D. with specialization in Artificial and Data Science

5. Master of Science - Master of Technology Programs

1. Data and Computational Sciences
2. M.Sc. in Physics and M.Tech. in Materials Engineering

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 and Signal Processing)
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 (Materials Engineering)
9. M.Tech.-Ph.D. Dual Degree (Mechanical Design)
10. M.Tech.-Ph.D. Dual Degree (Advanced Manufacturing)
11. M.Tech.-Ph.D. Dual Degree (Thermofluids Engineering)
12. M.Tech.-Ph.D. Dual Degree (Civil and Infrastructure Engineering with specialization in Environmental Engineering)
13. M.Tech.-Ph.D. Dual Degree (Civil and Infrastructure Engineering with specialization in Energy)
14. M.Tech.-Ph.D. Dual Degree (Chemical Engineering)

7. Doctor of Philosophy Program in Inter-disciplinary Areas

1. Ph.D. (Robotics and Mobility Systems Technologies)
2. Ph.D. (Science of Intelligence)
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 Science & Technology)

8. MBA

1. MBA

9. Masters and Ph.D. Dual Degree

1. Medical Technology

10. Masters Programs

1. Medical Technologies

Ph.D. Theses Defense

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

Sl. No.	Roll No.	Name	Thesis Title	Supervisor	Dept.	Date of Defense
1	P14BS005	Ms. Shivanjali Saxena	The Role of NLRs in Glioma Microenvironment	Dr. Sushmita Jha	Bioscience and Bioengineering	28-Apr-20
2	PG201384008	Ms. Megha Singh	Fault diagnosis of a three-phase induction motor using Stockwell transform and machine learning techniques	Dr. Abdul Gafoor Shaik	Electrical Engineering	05-May-20
3	PG201383504	Mr. Satendra Pal Singh	Novel and Robust Methodologies for Image Security	Dr. Gaurav Bhatnagar	Mathematics	11-May-20
4	PG201181004	Mr. Vikas Pratap Singh	Solar Power Generation Forecasting using Neural Network Based Approach	Dr.B.Ravindra and Dr.Vivek Vijay	Mechanical Engineering	29-May-20
5	PG201283007	Mr. Rakesh Kumar	Short-term Solar Irradiance Forecasting and Performance Analysis of Solar PV Systems	Dr.Vivek Vijay	Focus Group-System Science	13-Jun-20
6	P15VSS003	Mr. Tushar Shankar Shinde	Efficient Motion Estimation and Predictive Coding Methods for Compression of Spatio-temporal Sequences	Dr. Anil Kumar Tiwari	Electrical Engineering	17-Jun-20
7	PG201384013	Ms Shalini Singh	Investigation of Cellular and Molecular Pathways of Innate Immunity in Context of Glioma Pathophysiology and Cellular Inflammation	Dr. Sushmita Jha	Bioscience and Bioengineering	19-Jun-20
8	P15CY002	Ms. Hargeet Kaur	A game-theoretic perspective of Quantum Information Processing	Dr. Atul Kumar	Chemistry	26-Jun-20
9	P14ME008	Mr. Phdatare Hanmant Pandurang	Assessment of nonlinear responses and bifurcation analysis of light-weight shaft disk system with different loading configurations	Dr. Barun Pratiher	Mechanical Engineering	29-Jun-20

Sl. No.	Roll No.	Name	Thesis Title	Supervisor	Dept.	Date of Defense
10	P15ME003	Mr. Pravesh Kumar	Modal analysis and nonlinear dynamics of multi-link flexible manipulator with generic payload mounted on a moving base	Dr. Barun Pratiher	Mechanical Engineering	03-Jul-20
11	P14PH003	Mr. Javid Ahmad Naikoo	A study of nonclassicality in (Open) Quantum Systems	Dr. Subhashish Banerjee	Physics	06-Jul-20
12	PG201383006	Ms Shraddha Choudhary	Scattering of Electromagnetic Waves in Disordered Metamaterials and Metasurfaces	Dr. Kiran Kumar Hiremath	Focus Group-System Science	08-Jul-20
13	P14CS001	Ms. Hiteshi Jain	Assessment of Human Actions in Videos	Dr. Gaurav Harit	Computer Science and Engineering	10-Jul-20
14	P14PH001	Mr. Rajesh Kumar	Oxide and Metal rich-Oxide Based Spectrally Selective Absorber Coatings for Solar Thermal Applications	Dr. Ambesh Dixit	Physics	28-Jul-20
15	P14BL002	Mr. Sachinkumar Rajendrakumar Vyas	Isolation, Identification, and Characterization of Oleaginous Yeast Capable of Growing and Producing Lipids on Agro-industrial Waste	Dr. Meenu Chhabra	Bioscience and Bioengineering	09-Sep-20
16	P14PH004	Mr. Vijendra Singh Bhati	Metal Oxide Semiconductor based Gas Sensors	Dr. Mahesh Kumar	Physics	15-Sep-20
17	P14CHM002	Mr. Abhinav Srivastava	Slow Relaxations of Hydration Water near a Lipid Membrane: a Molecular Dynamics Study	Dr. Ananya Debnath	Chemistry	28-Sep-20
18	P15EE203	Mr. Rahul Kumar	Chemical Vapor Deposition Grown MoS2 for Sensing Applications	Dr. Mahesh Kumar	Electrical Engineering	08-Oct-20
19	P14EN001	Ms. Priya Malpani	An investigation on the nonclassical and quantum phase properties of a family of engineered quantum states	Dr. V. Narayanan	Physics	30-Oct-20
20	P15VSS202	Mr. Neeraj Goel	Design and fabrication of AlGaN/GaN Transistors for Heavy Metal Ion Sensors	Dr. Mahesh Kumar	Electrical Engineering	13-Nov-20
21	P14VSS001	Mr. Adarsh Nigam	A Solution state NMR Account of Organophosphate Pesticides-Protein Interaction	Dr. Mahesh Kumar	Electrical Engineering	14-Nov-20
22	P14BS006	Ms. Vandana	High performance optical and gas sensors based on 2D/3D heterostructures	Dr. Samanwita Pal	Chemistry	16-Nov-20
23	P15ME002	Mr. Lochan Sharma	Development of Submerged arc welding fluxes for welding of Linepipe steel	Dr Rahul Chhibber	Mechanical Engineering	23-Nov-20

Sl. No.	Roll No.	Name	Thesis Title	Supervisor	Dept.	Date of Defense
24	P16PH001	Mr. Rajneesh Chaurasiya	Low Dimensional Transition Metal Dichalcogenides for Nano Device applications	Dr. Ambesh Dixit	Physics	28-Nov-20
25	P15CY006	Ms. Arpita Srivastava	Self-assembly of Surfactants and Bio-inspired Soft Materials for Desired Macroaggregates using Multiscale Simulations	Dr. Ananya Debnath	Chemistry	14-Jan-21
26	P15CY007	Ms. Sumitra Godara	Unimolecular Reaction Dynamics: Mechanisms and Pathways via Chemical Dynamics Simulations	Dr. Manikandan Paranjothy	Chemistry	15-Jan-21
27	P16VSS003	Mr. Vivek Raghuwanshi	Operationally Stable Flexible Organic Field Effect Transistors on Unconventional Substrates	Dr. Shree Prakash Tiwari	Electrical Engineering	01-Feb-21
28	P14VSS006	Mr. Parveen	A Scanning Tunnelling Microscopic Study of Single Organic Molecular Device	Dr. Satyajit Sahu	Electrical Engineering	05-Feb-21
29	P15CY001	Ms. Devika Laishram	Advanced Functional Nanomaterials for Energy and Environmental Applications	Dr. Rakesh Kumar Sharma Co-Supervisor: Dr. Ritu Gupta	Chemistry	10-Feb-21
30	P15CY004	Ms. Anchal Gahlaut	Theoretical Investigations of Unimolecular Reaction Dynamics in the Gas Phase	Dr. Manikandan Paranjothy	Chemistry	12-Feb-21
31	P14VSS003	Mr. Ishan Varun	Fabrication and Characterization of Flexible Hybrid Resistive Random Access Memory Devices	Dr. Shree Prakash Tiwari	Electrical Engineering	05-Mar-21
32	P14SS001	Mr. Brajesh Kumar Shukla	Development of an Instrument of Sit-to-Stand for measurement of Sarcopenia in older Indians	Dr. Vivek Vijay	Focus Group-System Science,	08-Mar-21
33	P15ME203	Mr. Ankit Agarwal	Modeling and Control of Geometric Tolerances in End-Milling of Thin-walled Components	Dr. Kaushal Desai	Mechanical Engineering	10-Mar-21
34	P16CS002	Ms. Pratibha Choudhary	Parameterized Complexity of Tracking Paths	Dr. Aritra Banik and Dr. Venkatesh Raman	Computer Science and Engineering	18-Mar-21
35	P15EE004	Mr. Shivam Chaturvedi	Robust Control Techniques for Virtual Impedance Shaping to Mitigate and Share the Double Line Frequency Ripple in Microgrids	Dr. Deepak Fulwani	Electrical Engineering	18-Mar-21
36	PG201281001	Mr. Ajay Jain	Thermal IR signature study and analysis of exhaust emission of diesel engine vehicles	Dr. B. Ravindra	Mechanical Engineering	25-Mar-21
37	P15CY005	Ms. Bhawna Chaubey	Solution State 19F Magnetic Resonance (MR) Account of Molecular Interactions in Solutions	Dr. Samanwita Pal	Chemistry	27-Mar-21

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:

Sl. No.	MoU/Agreement signed between	Date of signing	Objective
1.	MoU between Dr. Sarvepalli Radhakrishan Rajasthan Ayurved University, Jodhpur & IIT Jodhpur	24.02.2021	The Parties are interested in exploring the possibility of establishing a collaborative relationship, to conduct relevant activities aligned to their respective research interests and expertise.
2.	Tata Consultancy Services Ltd. And IIT Jodhpur	18.02.2021	To promote cooperation in areas of mutual interest for the benefit of both institutions.
3.	IIT JODHPUR AND IIT KHARAGPUR for Installation and Support of ERP System	04.02.2021	To install the ERP software developed by Indian Institute of Technology Kharagpur into server/system of IIT Jodhpur and make necessary customization by localized team of First Party for day-to-day use of the institute.
4.	Universite Polytechnique Hauts-de-France, UPHF and IIT Jodhpur	28.01.2021	To collaborate in the fields of research and enhancement of its results, education and training and to thus contribute to disseminate knowledge and culture.
5.	Scholar Lab Foundation and IIT Jodhpur	06.01.2021	MoU is based on the principle of reciprocity & mutual benefit and expresses the interest of both parties in advancing scientific and technological knowledge in the area of Energy, Water Management, Healthcare, IT, Environment, New Technologies and other areas where the work will be carried out.
6.	License Agreement between Confederation Of Indian Industry and IIT Jodhpur	06.01.2021	A. The Parties are desirous of working together to create, publish and provide online courses on diverse subjects for enhancing employability to the Subscribers/Authorised Users i.e. students professionals.
7.	IIT Jodhpur and MSME Technology Centre Bhiwadi	24.12.2020	To provide a formal basis for interaction between IIT Jodhpur and MSME Technology Centre Bhiwadi to enhance collaboration in Engineering, production and research areas for Micro, Small and Medium Enterprises (MSMEs).
8.	EPITA, School of Engineering & Computer Science, France and IIT Jodhpur	12.12.2020	Academic Collaboration, to establish a cooperative relationship with the aim of developing and fostering academic links between both Institutes.
9.	EPITA and IIT Jodhpur	12.12.2020	Student Exchange Agreement
10.	WhizHack Technologies Private Limited and IIT Jodhpur	09.12.2020	To encourage and promote cooperation in the fields of Cyber Security and IoT (Internet of Things) for developing jointly branded Advocacy, Training programs and Product Development in the areas of mutual interest.

Sl. No.	MoU/Agreement signed between	Date of signing	Objective
11.	Department of Information Technology & Communication, Govt. of Raj. AND IIT Jodhpur	04.12.2020	To promote the Startup ecosystem in the State of Rajasthan by partnering with DoIT&C by leveraging its extensive experience and resources for the promotion of startups.
12.	LA Trobe University and IIT Jodhpur	02.12.2020	To engage with each other in a program of co-operation to explore potential collaborations such as staff and student exchanges, projects or programs.
13.	Johari Digital Healthcare Ltd.(JDHL) and IITJ Technology Park Jodhpur	11.11.2020	To cooperate for the purpose of (i) practicing and encouraging technology transfer and commercialization of innovations to increase research related economic growth in regions country and the overseas, (ii) identify and seek out joint business opportunities through national and international networking, and (iii) work out a common yearly planning for activities and Match Making events to be shared also with local economic promotion agencies, start-ups (iv) Leverage the expertise of Knowledge Partners in Healthcare, Environment and Livelihood.
14.	Johari Digital Healthcare Ltd. and Indian Institute of Technology Jodhpur	10.11.2020	To promote and facilitate Innovation, Commercialization and Mentorship of the Projects undertaken the aegis of JCoE and find solutions to specific problems in the area of Medical Devices and Technologies, wherein each Project undertaken shall be preceded with a Definitive Agreement recording the terms and conditions governing the Project.
15.	IIT Jodhpur and National Research Lobachevsky State University of Nizhny Novgoraod , Russia	9.11.2020	Implementation of cooperation in teaching, academic, student exchange and research, academic exchange of students (PhD Students)
16.	IIT Jodhpur and JNVU	05.11.2020	To share the facility and expertise related to Bioscience and to explore, extend and strengthen the functional collaboration between the two Institutes in the areas of Bioscience related research.
17.	MoU reg. Scheme of Fund for Regeneration of Traditional Industries (SFURTI)-between IITJ as Technical Agency and Khadi & Village Industries Commission (KVIC) as Nodal Agency	27.10.2020	signed to implement Scheme of Fund for Regeneration of Traditional Industries (SFURTI)-between IITJ as Technical Agency and Khadi & Village Industries Commission (KVIC) as Nodal Agency.
18.	Deakin University, Victoria and IIT Jodhpur	21.10.2020	Academic Staff collaboration in Research, Teaching and learning in areas of common interest, International Transfer programs, Joint Academic programs for working professionals, International mobility programs – Student and Faculty, Jointly supervised Ph.D. and M.Tech. Programs.
19.	Indian Institute of Technology Jodhpur and Hearthealth Technologies Private Limited (HTPL) Bengaluru	20.10.2020	Collaboration between the parties for Use of Technologies in Medical Image Analysis, Diagnosis and Prognosis.

Sl. No.	MoU/Agreement signed between	Date of signing	Objective
20.	Multi Institutional MoU between (Meity) IIT Bombay and IIT Jodhpur & other IITs	12.10.2020	To provide a state of the art experimental research faculty to all the program participants (as well as participants from other academic institutes and the industry) to carry out experimentation of their research ideas, and trials of the subsystems they are building as part of the program. * To provide a common platform for exchange of ideas, knowledge sharing etc. by organizing workshops, conclaves and training sessions for participants of the programs and also from other educational institutes in the country. * To serve as a resource center for coordination of all the activities with the stakeholders of the multi-institutional project. * To monitor progress towards completion of the deliverables proposed by the collaborations in their respective institute's proposals and achievement of the overall project objectives.
21.	General Memorandum of Understating between The University of Western Australia and The Indian Institute of Technology Jodhpur	17.09.2020	Objectives are below: * exchange of staff * Joint research activities *Joint conferences and other academic meetings *exchange of academic materials and information *exchange of students.
22.	IITJ and NIRDPR	15.09.2020	Based on the principle of reciprocity and expresses the interest of collaboration among both Institutions in 1. Technology Development & Translation 2. Exchange of academic information and materials 3. Faculty and Student exchange and 4. Infrastructure sharing
23.	(Non Disclosure Agreement) Department of Information Technology, Jodhpur and Police Commissionerate, Jodhpur and Indian Institute of Technology Jodhpur	04.09.2020	To set up a City Knowledge and Innovation cluster in Jodhpur to achieve the objective of effective and efficient governance.
24.	NTPC Vidyut Vyapar Nigam Limited and Indian Institute of Technology Jodhpur	03.09.2020	To Own, Acquire, Establish, Operate and Maintain Generating Stations, Transmission Systems and Distribution Systems.
25.	(Non Disclosure Agreement) M/s Watsan Envirotech Private Limited (CIN U29253TN2013PTC091052) and Indian Institute of Technology Jodhpur	01.09.2020	For Improvement of formulations and performance based on various types of water alleviations, using different models of G filters across India.
26.	All India Institute of Medical Sciences Nagpur and Indian Institute of Technology Jodhpur	20.08.2020	Promote relations that mutually benefit each Institute, this being the primary aim of a true academic collaboration; and S&T cooperation towards developing devices for diagnostics and treatment towards providing improved quality of healthcare.
27.	Indian Institute of Technology Jodhpur and Brandeis International Business School, Brandeis University, Waltham, Massachusetts	08.08.2020	The principle of reciprocity and expression of interest for collaboration among both institution in teaching learning and research and to explore the promotion of academic cooperation and exchange might include.

Sl. No.	MoU/Agreement signed between	Date of signing	Objective
28.	IIT Jodhpur and Pingala AI Pvt, Ltd. Noida UP	12.7.2020	To help incubate & accelerate novel technologies and business ideas by IITJ startups into viable commercial products.
29.	IIT Jodhpur and NACL Industries Limited	10.06.2020	Wheras Licensor has developed an advanced Photocatalytic Oxidation Sterilization System based on UV-light and metal oxide Nanoparticles Catalyst to treat N95 Filtering Face-mask Respirators and other accessories for reuse (Technology) bu healthcare workers for protection from air born transmissions as in diseases such as, COVID-19, SARS CoV and other Influenzas.
30.	IIT Jodhpur and Pyrotech Electronics Pvt. Ltd. (Unit-1)	10.06.2020	Transfer of technology titled "An Advanced Photocatalytic Oxidation Sterilization System Based on UV-Light and Metal Oxide Nanoparticles Catalyst to treat N95 Filtering Face-Mask Respirators for reuse" developed by IIT Jodhpur
31.	IIT Jodhpur and Porte Automations Private Ltd.	29.05.2020	Collaboration Project to design, develop and characterize a non-equilibrium cold plasma system and optimize it for negative and positive ion concentration generation and others objectives.
32.	IIT Jodhpur and ZINTEX BLUE OCEAN PVT. LTD., Jaipur	16.05.2020	Transfer of technology titled "An Advanced Photocatalytic Oxidation Sterilization System Based on UV-Light and Metal Oxide Nanoparticles Catalyst to treat N-95 Filtering Face-Mask Respirators for reuse" developed by IIT Jodhpur.
33.	IIT Jodhpur and Mai Bharat	16.05.2020	Transfer of technology titled "An Advanced Photocatalytic Oxidation Sterilization System Based on UV-Light and Metal Oxide Nanoparticles Catalyst to treat N-95 Filtering Face-Mask Respirators for reuse" developed by IIT Jodhpur.
34.	Samsung India Electronics Private Ltd. and IIT Jodhpur	15.05.2020	Carrying out Research & Development including but not limited to reports, updates, commentaries, outputs, other written documents etc.
35.	IIT Jodhpur and Johari Digital Healthcare Limited	07.05.2020	Transfer of technology titled "An Advanced Photocatalytic Oxidation Sterilization System Based on UV-Light and Metal Oxide Nanoparticles Catalyst to treat N-95 Filtering Face-Mask Respirators for reuse" developed by IIT Jodhpur.
36.	IIT Jodhpur and ISCON Surgicals Ltd. Jodhpur	05.05.2020	Transfer of technology titled "An Advanced Photocatalytic Oxidation Sterilization System Based on UV-Light and Metal Oxide Nanoparticles Catalyst to treat N-95 Filtering Face-Mask Respirators for reuse" developed by IIT Jodhpur.
37.	IIT Jodhpur and Kamtech Associates Private Limited	05.05.2020	Transfer of technology titled "An Advanced Photocatalytic Oxidation Sterilization System Based on UV-Light and Metal Oxide Nanoparticles Catalyst to treat N-95 Filtering Face-Mask Respirators for reuse" developed by IIT Jodhpur.
38.	IIT Jodhpur and Chempharm Industries India Pvt. Ltd.	05.05.2020	Transfer of technology titled "An Advanced Photocatalytic Oxidation Sterilization System Based on UV-Light and Metal Oxide Nanoparticles Catalyst to treat N-95 Filtering Face-Mask Respirators for reuse" developed by IIT Jodhpur.
39.	IIT Jodhpur and Parappadi Technology Private Limited	05.05.2020	Transfer of technology titled "An Advanced Photocatalytic Oxidation Sterilization System Based on UV-Light and Metal Oxide Nanoparticles Catalyst to treat N-95 Filtering Face-Mask Respirators for reuse" developed by IIT Jodhpur.
40.	TRS Solutions LLP and IIT Jodhpur	10.04.2020	Collaborative research in the area of Artificial Intelligence in Medical imaging to advance Radiology Diagnostic Capabilities.
41.	Centre for Advanced Research in Imaging Neuroscience & Genomics, New Delhi and Indian Institute of Technology Jodhpur, Rajasthan	07.04.2020	CARING and IITJ 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.

Research

R&D Projects

Sponsored Research Projects

Department of Bioscience and Bioengineering

1.	Development of low cost Microbial Carbon capture (MCC) cells for algae cultivation and powers generation				
	PI: Meenu Chhabra	DBT	Rs. 77.59 Lakhs	Start Date: 24-Dec-14	End Date: 31-Mar-21
2.	Integrative Approach for Identification of Disease Genes of Type II Diabetes				
	PI: Sushmita Paul	SERB	Rs. 26.76 Lakhs	Start Date: 30-Mar-17	End Date: 29-Mar-20 Closure in-Progress
3.	Expression analysis of inflammasome-forming NLRs in gliomas for identification of novel therapeutic interventions				
	PI: Sushmita Jha	DBT	Rs.42.15 Lakhs	Start Date: 06-Sep-17	End Date: 05-Sep-20 Closure in-Progress
4.	Hospital-associated ESKAPE pathogens: Unraveling novel regulatory layers controlling virulence and persistence.				
	PI: Shankar Manoharan	The Wellcome Trust, DBT India Alliance	Rs. 164.88 Lakhs	Start Date: 17-Jan-18	End Date: 31-Aug22
5.	Role of Centriole Protein, CPAP in neurodevelopmental disorder				
	PI: Priyanka SIngh	SERB	Rs. 38.74Lakhs	Start Date: 28-Nov-18	End Date: 27-Nov-21
6.	Modulation of a-Synuclein Amyloid Assembly by Human Chaperone-like Proteins				
	PI: Neha Jain	SERB	Rs.41.00 Lakhs	Start Date: 22-May-19	End Date: 21-May-22
7.	GenomeIndia: Cataloguing the Genetic Variation in Indians				
	PI: Sushmita Paul Co-PI: Sushmita Jha	DBT	Rs. 115.00 Lakhs	Start Date: 28-Feb-20	End Date: 22-Feb-23
8.	Elucidating the role of centrosome protein CEP152 in primary microcephaly				
	PI: Priyanka Singh	DBT	Rs. 59.50 Lakhs	Start Date: 27-Feb-20	End Date: 26-Feb-23
9.	Multimodal Approach for Repairing of Brain Damage: Small Molecule Mediated Neurogenesis from Stem Cells and Transplantation of Regenerated Neurons through Novel Scaffolds				
	PI: Surajit Ghosh	SERB	Rs. 279.57 Lakhs	Start Date: 30-Mar-20	End Date: 29-Mar-23
10.	Multimodal Approaches to Develop Potential Therapeutic Leads Targeting Molecular Hot Spots of Duchenne Muscular Dystrophy for Clinical Trial				
	PI: Surajit Ghosh Co-PI: Nirmal K Rana, Dibyendu Sasmal, Sudipta Bhattacharyya	SERB	Rs.389.00 Lakhs	Start Date: 23-Jan-20	End Date: 22-Jan-25

11.	Systems Biology and Network Analysis for Enabling Research in Personalized Genomics				
	PI: Sushmita Paul	MHRD (GIAN)	Rs 05.68 Lakhs	Start Date: 20-Mar-20	End Date: N/A
12.	Understanding the Molecular Specific Scales of Tumor Suppressor Gene 101 (tsg101) enclosed LRSAM1 E3 Ubiquitin Ligase in the Elimination of Polyglutamine Proteins				
	PI: Amit Mishra	BRNS	Rs. 26.34 Lakhs	Start Date: 19-Oct-20	End Date: 18-Oct-23
13.	Deciphering Molecular Mechanism of Action and Electron Acceptor Specificity Through structure based functional characterization of staphylococcal glutathione peroxidase enzymes				
	PI: Sudipta Bhattacharyya	SERB	Rs. 30.78 Lakhs	Start Date: 07-Dec-20	End Date: 06-Dec-22
14.	Reconstitution of Microenvironment of Brain using Advanced Prototype-based Microfluidic System for Neuro-organoid Culture and Monitoring the Synapse Formation				
	PI: Surajit Ghosh	SERB	Rs. 38.50 Lakhs	Start Date: 22-Dec-20	End Date: 21-Dec-23
15.	Wastewater treatment and Electricity generation using Microbial Fuel Cell and Simultaneous production of Beta carotene from genetically engineered Chlamydomonas sp.				
	PI: Meenu Chhabra	DST	Rs. 22.57 Lakhs	Start Date: 12-Aug-20	End Date: 11-Aug-25
16.	Palladium-catalyzed synthesis of novel heterocycles for the development of potent tubulin polymerization inhibitors.				
	PI: Surajit Ghosh	SERB	Rs. 20.25 Lakhs	Start Date: 03-Dec-20	End Date: 02-Dec-22
17.	Role of functional amyloid genic protein Tly A in biofilm formation and severity of diseases caused by H.pylori				
	PI: Ambar Ish Mentor: Neha Jain	DST	Rs. 4.51 Lakhs	Start Date: 30-Oct-20	End Date: 29-Oct-25

Department of Chemical Engineering

18.	Controlled morphologies via phase-separation in epoxy blends for electronic sensor & device packaging				
	PI: Deepak Arora	SERB	Rs. 31.39 Lakhs	Start Date: 03-Dec-20	End Date: 02-Dec-22
19.	Designing of Potential Adsorbents via Molecular Modelling and Simulations for the High Temperature Carbon Dioxide Capture				
	PI: Angan Sengupta	SERB	Rs. 21.95 Lakhs	Start Date: 04-Dec-20	End Date: 03-Dec-21
20.	Design of Zn Anode and Non-native Structured MnO2 Cathode for Stationary Grid Energy Storage Devices				
	PI: Prashant K. Gupta	DST	Rs. 35.00 Lakhs	Start Date: 17-Feb-21	End Date: 16-Feb-26

Department of Chemistry

21.	Catalytic Upgrading of Bio-Oil to Transport Fuel				
	PI: Rakesh K. Sharma	DBT	Rs. 94.79 Lakhs	Start Date: 24-Dec-14	End Date: 31-Mar-21
22.	Solid state Nuclear Magnetic Resonance (NMR) assessment of zinc oxide (ZnO) nanomaterial based drug delivery systems				
	PI: Samanwita Pal Co-PI : Ambesh Dixit	SERB	Rs. 34.45 Lakhs	Start Date: 28-Aug-17	End Date: 27-Aug-20
23.	New Single Source Precursors for Potential Nanostructured Bi2Te3/sb2Te3 System Based Thermoelectric Materials				
	PI: Ramesh K. Metre	SERB	Rs. 32.12 Lakhs	Start Date: 05-Oct-17	End Date: 04-Oct-20

24.	Impact of Rainwater Harvesting on Groundwater Quality in India with Specific Reference to Fluoride and Mircropollutants				
	PI: Rakesh K. Sharma	DST	Rs. 75.27 Lakhs	Start Date: 10-May-18	End Date: 16-Feb-22
25.	Tandem Annulations Involving Metallocarbenes: Towards Diverse Molecular Architectures				
	PI: Sandip Murarka	SERB	Rs. 33.00 Lakhs	Start Date: 10-July-18	End Date: 09-July-21
26.	Development of Catalytic Diastereo and Enantiodivergent Tandem Reactions				
	PI: Nirmal Kumar Rana	DST	Rs. 35.00 Lakhs	Start Date: 02-July-18	End Date: 01-Nov-21
27.	Multiparticle Entanglement, Nonlocality and Quantum Information processing- Analysing the role and applications of statistical correlations				
	PI: Atul Kumar	SERB	Rs. 19.50 Lakhs	Start Date: 18-Mar-19	End Date: 17-Mar-22
28.	Chiral Calix-crowns for asymmetric phase transfer catalyst				
	PI: Pragati R Sharma	DST	Rs. 34.68 Lakhs	Start Date: 01-Oct-19	End Date: 30-Sep-22
29.	Investigating asymmetric mixed surfactant bilayers using dual-scale simulations to correlate bilayer properties with thermodynamics of asymmetry				
	PI: Ananaya Debnath Co-PI: Santosh Mogurampelly	SERB	Rs. 44.36 Lakhs	Start Date: 07-Feb-20	End Date: 06-Feb-23
30.	Modeling Organic and Biochemical phenomena via direct chemical dynamics simulations				
	PI: Manikandan, P.	SERB	Rs. 51.88 Lakhs	Start Date: 06-Feb-20	End Date: 05-Feb-23
31.	FIST Project				
	PI: Rohan D. Erande Co-PI: R. K. Sharma, Ramesh K. Metre, Sandip Murarka	DST-FIST	Rs. 216.00 Lakhs	Start Date: 18-Sep-20	End Date: 17-Sep-25
32.	Capturing and Real-Time Monitoring of Dynamic Instability of TCR-PMHC Bond for Probing Serial Engagement Using Single-Molecule FRET and Biomembrane Force Probe in Live T Cell				
	PI: Dibeyendu K. Sasmal	SERB	Rs. 28.05 Lakhs	Start Date: 12-Nov-20	End Date: 11-Nov-22
33.	Sustainable Non-Noble Transition Metal Based Pincer Catalytic Design for High-Value Chemical Transformations				
	PI: Subrata Chakraborty	SERB	Rs. 29.26 Lakhs	Start Date: 17-Dec-20	End Date: 16-Dec-22
34.	Tandem Reactions Utilizing Nitrogen Ylides: Unified Approach for Asymmetric Synthesis of Diverse Heterocycles				
	PI: Nirmal Kumar Rana	SERB	Rs. 58.48 Lakhs	Start Date: 17-Dec-20	End Date: 16-Dec-23
35.	Main-Group Organornetallic complexes Based Molecular Materials For Applications in Molecular Electronics				
	PI: Ramesh K. Metre	SERB	Rs. 36.82 Lakhs	Start Date: 05-Dec-20	End Date: 04-Dec-23
36.	Development of Functionalized Metal Oxides and Layered Materials for Environmental Sensors				
	PI: Ritu Gupta	SERB	Rs. 73.45 Lakhs	Start Date: 22-Dec-20	End Date: 21-Dec-23
37.	Natural clay-plasma catalysed hydrogenation of carbon-dioxide for methanol production under ambient conditions				
	PI: Rakesh K. Sharma	SERB	Rs. 28.73 Lakhs	Start Date: 22-Dec-20	End Date: 21-Dec-23
38.	Development of Microelectrode Array for Real-Time Electrochemical Sensing				
	PI: Ritu Gupta	SERB	Rs. 18 Lakhs	Start Date: 23-Mar-21	End Date: 22-Mar-24

Department of Civil and Infrastructure Engineering

39.	Mechanical response of sedimentary rocks under extreme conditions:implications for cryogenic fracking				
	PI: Debanjan Guha Roy	DST	Rs. 35.00 Lakhs	Start Date: 28-June-19	End Date: 27-Jun-24
40.	Utilization of the Inferior Quality Aggregate in Hot, Warm and Cold Mix Asphalt				
	PI: Bhupendra Singh	NHAI	Rs.20.76 Lakhs	Start Date: 04-Nov-20	End Date: 03-Nov-23

Department of Computer Science and Engineering

41.	Development of Multimodal Search Framework for Architectural Floor Plan				
	PI: Chiranjoy Chattopadhyay	SERB	Rs. 24.58 Lakhs	Start Date: 30-Mar-17	End Date: 29-Oct-20
42.	Information Access from Document Images of Indian Languages				
	PI: Gaurav Harit(as Co-PI)	MHRD-MeitY	Rs. 80 Lakhs	Start Date: 25-Oct-17	End Date: 31-Mar-21
43.	Indian Heritage in Digital Space of Interdisciplinary Cyber Physical Systems				
	PI: Santanu Chaudhury	DST	Rs. 1275.55 Lakhs	Start Date: 25-Mar-19	End Date: 24-Mar-22
44.	Software as a service for OCR system for Odia Documents Images				
	PI: Santanu Chaudhury Co-PI Gaurav Harit	MeitY	Rs.20.16 Lakhs	Start Date: 26-Mar-19	End Date: 12-Feb-21
45.	Digital Representation Generation for Efficient Retrieval of Bangla Document Images in Digital Libraries				
	PI: Santanu Chaudhury Co-PI Gaurav Harit	MHRD	Rs. 76 Lakhs	Start Date: 01-Mar-19	End Date: 31-Jan-20 Closure in-Progress
46.	Predictive Maintenance and Quality Control in industries under Industry 4.0				
	PI: Sumit Kalra Co-PI Santanu Chaudhury, Chiranjoy Chattopadhyay	SERB	Rs. 54.54 Lakhs	Start Date: 24-Oct-19	End Date: 23-Oct-22
47.	Understanding Semantic Association Between Visual and Textual Data: What lies ahead				
	PI: Yashashwi Verma	DST	Rs. 35 Lakhs	Start Date: 29-Nov-19	End Date: 15-Oct-22
48.	Detecting Spoofing and Digital Attacks on Face Images				
	PI: Richa Singh Co PI: Mayank Vatsa	MeitY	Rs. 72.15 Lakhs	Start Date: 01-Oct-19	End Date: 31-Aug-21
49.	Text and Image Semantic Graphic				
	PI: Gaurav Harit	MHRD	Rs.44.67 Lakhs	Start Date 13-May-19	End Date 12-May-21
50.	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)				
	PI: Mayank Vatsa Co-PI: Richa Singh	MHA	Rs. 197.28 Lakhs	Start Date: 01-May-20	End Date: 31-Aug-21
51.	iHub Drishti				
	PI: Mayank Vatsa	DST	Rs. 725 Lakhs	Start Date:01-Apr-20	End Date:31-Mar-25
52.	Development of Application oriented AI Systems				
	PI: Deepak Mishra Co-PI: Amandeep Kaur	MeitY	Rs. 39.82 Lakhs	Start Date: 28-Feb-20	End Date: 27-Feb-23
53.	Management of TBIOM and Newsletter				
	PI: Mayank Vatsa Co-PI Richa Singh	IEEE	Rs. 20.38 Lakhs	Start Date: 01-Jan-19	End Date: 31-Dec-21

54.	Knowledge Discovery from Images containing Text and its application to Audio-Visual Dialogue				
	PI: Anand Mishra	Accenture	Rs. 14.64 Lakhs	Start Date 01-Jun-20	End Date: 31-May-21
55.	Rakshak Project				
	PI: Santanu Chaudhury	iHub Drishti	Rs. 100 Lakhs	Start Date 04-Aug-20	End Date: 03-Aug-21
56.	Smart Health Solutions for Rapid Mass Diagnosis for COVID-19				
	PI: Sumit Kalra Co-PI: Rajendra Nagar, Anil Kumar Tiwari	DST-RAKSHAK	Rs. 5 Lakhs	Start Date 10-Sep-20	End Date: 09-Sep-21
57.	Social Distance Alert and Monitoring System Using Smartphone,IOT and AI				
	PI: Suman Kundu Co-PI: Deepak Mishra, Sumit Kalra, Amandeep Kaur	DST-RAKSHAK	Rs. 7.50 Lakhs	Start Date 05-Oct-20	End Date: 04-Oct-21
58.	AI Driven Estimation of COVID-19 Prognosis using Multimodal Data				
	PI: Deepak Mishra Co-PI: Rajendra Nagar	DST-RAKSHAK	Rs. 10 Lakhs	Start Date 17-Sep-20	End Date: 16-Sep-21
59.	Non-Invasive Estimation of Care-Body Temperature, Heart-Rate, SPO2 for Classification of subject AS Healthy or Non-Healthy (Symptoms of concern: fever despite ambient temperatures; silent hypoxia-COVID-19)				
	PI: Romi Banerjee Co-PI: Mayank Vatsa, Richa Singh, Debarati Bhunia Chakraborty	DST-RAKSHAK	Rs. 10 Lakhs	Start Date 17-Sep-20	End Date: 16-Sep-21
60.	AI-driven diagnosis of COVID-19 using X-ray images				
	PI: Richa Singh Co-PI: Mayank Vatsa	DST-RAKSHAK	Rs. 7 Lakhs	Start Date 06-Nov-20	End Date: 05-Nov-21
61.	Mitigation Bias in face recognition for vast regional diversity in India				
	PI: Richa Singh	Facebook India Online Services Pvt. Ltd.	Rs. 21.26 Lakhs	Start Date: 17-Dec-20	End Date: 31-Dec-21
62.	Quantum Cryptanalysis				
	PI: Somitra K. Sanadhya	SERB	Rs. 6.60 Lakhs	Start Date: 04-Feb-20	End Date: 03-Feb-23
63.	Energy Efficient Communication and Data Flow in Smart City using CRN based IoT Framework				
	PI: Debasis Das	DST-Indo-Uzbek	Rs. 17.80 Lakhs	Start Date: 18-Feb-21	End Date: 17-Feb-24

Department of Electrical Engineering

64.	Special Manpower development Program for Chips to System Design (SMDP-C2SD)/ Design of a Sensor Signal Conditioning System (I) & Multiprocessor Scheduling Alogrithms using Control Theoretic Approach (II)				
	PI: Shree Prakash Tiwari Co-PI: D. M. Fulwani	MeitY	Rs.60.38 Lakhs	Start Date: 11-Aug-15	End Date: 30-Nov-21
65.	Design and development of NavIC Receiver				
	PI: Arun Kumar Singh	MeitY	Rs. 64.55 Lakhs	Start Date: 18-Oct-17	End Date: 25-Jan-21
66.	Design and Fabrication of Germanium on Silicon near infrared photodetectors				
	PI: Saravanan Rajamani	DST	Rs. 19.20 Lakhs	Start Date: 9-Aug-17	End Date: 08-Aug-19
67.	Substrate Integrated Coaxial Line (SICL) based Circuits and Systems for millimeter wave application				
	PI: Soumava Mukherjee	DST	Rs. 35.00 Lakhs	Start Date: 20-Sep-17	End Date: 19-Sep-22
68.	High Performance Low Voltage Flexible Organic Field-Effect Transistors for Circuit and Sensing Applications				
	PI: Shree Prakash Tiwari	SERB	Rs. 51.70 Lakhs	Start Date: 15-Sep-18	End Date: 14-Sep-21

69.	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				
	PI: D. M. Fulwani	Department of Heavy Industry (NFTDC)	Rs. 24.40 Lakhs	Start Date: 31-Aug-18	End Date: 31-Dec-20
70.	Experimental Investigation and Performance Evaluation of HARQ Technique for Free-Space Optical Communication Systems				
	PI: Aashish Mathur	SERB	Rs. 42.84 Lakhs	Start Date: 24-May-19	End Date: 23-May-22
71.	Development of low cost sensors for monitoring of odours in ambient air				
	PI: Mahesh Kumar	SERB	Rs. 107.75 Lakhs	Start Date: 14-Nov-19	End Date: 13-Nov-22
72.	Development of low cost sensors for monitoring of odours in ambient air				
	PI: Mahesh Kumar	Envirotech Instruments Pvt. Ltd.	Rs. 13 Lakhs	Start Date: 14-Nov-19	End Date: 13-Nov-22
73.	Large area synthesis of 2DMoS2structures for low power and fast NO2 Gas Sensor				
	PI: Mahesh Kumar	SERB	Rs. 40.81 Lakhs	Start Date: 30-Dec-19	End Date: 29-Dec-22
74.	Design And analysis of multi-channel incoherent beam combination system				
	PI: Arpit Khandelwal	DRDO	Rs. 9.60 Lakhs	Start Date: 21-Jan-20	End Date: 20-Jan-21
75.	Design and Development of Substrate Integrated Waveguide (SIW) and Empty SIW (ESIW) Based RF-Microwave Components				
	PI: Arani Ali Khan	SERB	Rs. 25.43 Lakhs	Start Date: 26-Dec-19	End Date: 25-Dec-21
76.	Development of System to Mitigate Second Order Harmonic Ripple in AC/DC Microgrid using Advanced Control Techniques				
	PI: Deepak M Fulwani	SERB	Rs. 41.47 Lakhs	Start Date: 11-Feb-20	End Date: 10-Feb-23
77.	Fundamentals of Photovoltaics				
	PI: Mahesh Kumar	MHRD	Rs. 5.68 Lakhs	Start Date: 23-May-20	End Date: 28-Jun-20
78.	Establishment of A1-Based Platform to Monitor and Identify Smell,Taste and Key COVID 19 Therapeutic Hotspots				
	PI: Amandeep Kaur Co-PI: Dr. K. A. Desai, Deepak Mishra	DST-RAKSHAK	Rs. 10 Lakhs	Start Date: 17-Sep-20	End Date: 16-Sep-21
79.	Functional Materials				
	PI: Mahesh Kumar	MHRD	Rs. 5.68 Lakhs	Start Date: 02-Nov-20	End Date: 11-Dec-20
80.	Angel-resolved photoelectron (ARPES) studies of doped 2DMoS2				
	PI: Mahesh Kumar	UGC-DAE	Rs. 1.35 Lakhs	Start Date: 05-Mar-20	End Date: 04-Mar-23
81.	A Programmable CMOS image sensor for high speed, low power and low noise applications				
	PI: Amandeep Kaur	SERB	Rs. 27.22 Lakhs	Start Date: 19-Dec-20	End Date: 18-Dec-22
82.	Nanostructured Metal Oxides for Efficient Detection of Breast Cancer				
	PI: Saakshi Dhanekar	SERB	Rs. 10.60 Lakhs	Start Date: 15-Sep-20	End Date: 10-Aug-21
83.	Secure and Robust Coordination and Control of Autonomous Multi-Vehicle Systems with Desired Constraints				
	PI: Anoop Jain	SERB	Rs. 29.84 Lakhs	Start Date: 25-Dec-20	End Date: 24-Dec-22
84.	Object Based Spatial 3D Audio Rendering for Augmented and Virtual Reality Applications				
	PI: Manish Narwaria	SERB	Rs. 25.84 Lakhs	Start Date: 22-Dec-20	End Date: 21-Dec-22

85.	Design, fabrication and characterization of all-fiber Multimode Interference (MMI) device for generating highly pure Laguerre-Gaussian (LG) mode in free-space				
	PI: Nitin Bhatia	SERB	Rs. 28.72 Lakhs	Start Date: 25-Dec-20	End Date: 24-Dec-22
86.	Data-driven Haptic Modeling and Rendering of Normal Interaction on Inhomogeneous Viscoelastic Deformable Objects				
	PI: Amit Bhardwaj	SERB	Rs. 33 Lakhs	Start Date: 23-Dec-20	End Date: 22-Dec-22
87.	Perception-Theoretic Approach for Quantifying Robustness of Machine Learning Models				
	PI: Manish Narwaria	SERB	Rs. 6.60 Lakhs	Start Date: 11-Jan-20	End Date: 10-Jan-24
88.	A Robust Visual Positioning System				
	PI: Himanshu Kumar	SERB	Rs. 25.80 Lakhs	Start Date: 27-Jan-21	End Date: 26-Jan-23
89.	Ga2O3-based nanomaterials with controlled defect and impurity composition for advanced electronic devices				
	PI: Mahesh Kumar	DST-BRICS	Rs. 41.98 Lakhs	Start Date: 14-Oct-20	End Date: 13-Oct-23
90.	Development of low-cost portable vent				
	PI: Mahesh Kumar	MHRD	Rs. 1 Lakh	Start Date: 31-Mar-21	End Date: 14-Oct-21

Department of Humanities & Social Sciences

91.	Wisdom as Cognitive and motivational-emotional heuristics in ecologically rational decision making				
	PI: Ankita Sharma	SERB	Rs. 22.30 Lakhs	Start Date: 29-Apr-15	End Date: 28-Apr-18 Closure in-Progress Institute Projects
92.	Jodhpur City Knowledge and Innovation Cluster (JCKIC)				
	PI: Santanu Chaudhury Co-PI: S. R. Vadera	Office of PSA	Rs. 949.70 Lakhs	Start Date: 29-Jul-20	End Date: 28-July-23

Department of Mathematics

93.	Validation of Jodhpur Instrumented Kursi Against Dual Energy X-Ray Absorptiometry to Diagnose Sarcopenia in Older Indians				
	PI: Vivek Vijay Co-PI: Sandeep K. Yadav	ICMR	Rs. 11.01 Lakhs	Start Date: 01-Oct-19	End Date: 30-Sep-20
94.	Eigenvalue type problems related to linear and quasi-linear operators				
	PI: Abhishek Sarkar	DST	Rs. 35 Lakhs	Start Date: 01-Apr-19	End Date: 31-Mar-24
95.	On Graph Induced Symbolic Dynamics				
	PI: Puneet Sharma	DST/SERB	Rs. 6.60 Lakhs	Start Date: 21-Feb-20	End Date: 20-Feb-23
96.	DST-Inspire Faculty Fellowship Project				
	PI: Deepak Kumar Mahanta Mentor: Abhishek Sarkar	DST	Rs. 4.51 Lakhs	Start Date: 11-Jan-21	End Date: 10-Jan-26

Department of Metallurgical and Materials Engineering

97.	Thermoelectric Performance Study Using First-Principles Calculations Based Methods				
	PI: Appala Naidu Gandi	SERB	Rs. 22.59 Lakhs	Start Date: 02-Apr-19	End Date: 01-Apr-22
98.	Design and Fabrication of Indigenous Powder Fed Metal Additive Manufacturing Machine				
	PI: Ravi, K. R.	DST	Rs. 215.50 Lakhs	Start Date: 01-Aug-19	End Date: 31-Jul-22

99.	Quantitative assessment of Hot tearing characteristics of Aerospace Magnesium Alloys				
	PI: Ravi, K. R.	ARDB	Rs. 5.77 Lakhs	Start Date: 05-Aug-19	End Date: 31-Dec-20
100.	Chemical Reactions and Energy Transfer in Atmospheric N2/O2/Ar-Boron Nitride Surface Collisions: Applications in Modelling Spacecraft Materials				
	PI: Moumita Majumdar Mentor: B. P. Kashyap	DST	Rs. 33.63 Lakhs	Start Date: 30-Nov-19	End Date: 29-Nov-22
101.	Study of the Effects of Stress-State and Strain-Rate on Constitutive Response of Polymer Gels via Experiments and Continuum Mechanics Modeling				
	PI: Abir Bhattacharya	SERB	Rs. 30.60 Lakhs	Start Date: 21-Dec-19	End Date: 20-Dec-21
102.	Novel in-situ volume contractible metal halide negative electrodes for high performance lithium-ion batteries				
	PI: Srijan Sengupta	SERB	Rs. 31.07 Lakhs	Start Date: 17-Oct-20	End Date: 04-Mar-23

Department of Smart Health Care (IDRP)

103.	Development of an AI platform for Human Health				
	PI: Santanu Chaudhury Co-PI Sushmita Jha, Sushmita Paul, Sumit Kalra, K. A. Desai	MeitY	Rs. 386.54 Lakhs	Start Date: 02-Mar-20	End Date: 01-Mar-23

Department of Physics

104.	Investigation of magnetoelectric coupling in CiI-xTMxO Multiferroic System				
	PI: Ambesh Dixit	BRNS (DAE)	Rs. 23.42 Lakhs	Start Date: 27-Mar-14	End Date: 26-Mar-17 Project extension is in-progress
105.	Probing Magnetic Structures and Spin Flop transition in bulk and nanostructured FeVo4 Multoferroic System				
	PI: Ambesh Dixit	DST	Rs. 6.60 Lakhs	Start Date: 13-Jan-16	End Date: 31-Dec-19 Project extension is in-progress
106.	Magnetars with superfluid core				
	PI: Monika Sinha	SERB	Rs. 20.60 Lakhs	Start Date: 21-Mar-18	End Date: 20-Mar-21
107.	Possibilities and Device Applications of Degenerate Optical Microcavities				
	PI: Somnath Ghosh	SERB	Rs. 34.89 Lakhs	Start Date: 09-May-18	End Date: 08-Sep-21
108.	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				
	PI: Ambesh Dixit	DST	Rs. 23.31 Lakhs	Start Date: 22-Nov-18	End Date: 07-May-21
109.	Generation of Entangled Photons and its application to Quantum Computation and Information Processing				
	PI: V Narayanan Co-PI: Subhashish Banerjee	DST	Rs. 208.92 Lakhs	Start Date: 24-Apr-19	End Date: 23-Apr-22
110.	Sulphur nanoparticles Reinforced Hierarchical Assemblies of Carbon nanotubes for Efficient Lithium-Sulphur Batteries				
	PI: Shahab Ahmad	DST	Rs. 86.86 Lakhs	Start Date: 9-Oct-19	End Date: 8-Oct-22
111.	Photo-Rechargeable Organo-Halide Perovskite-Transition Metal Dichalcogenide Batteries				
	PI: Shahab Ahmad	SERB	Rs. 48.98 Lakhs	Start Date: 22-Mar-19	End Date: 21-Mar-22

112.	Electronic and thermoelectric properties of Bi2Te3-XSX and Sb2Te3-xSX: A density functional theory approach and scanning tunneling microscopy study of surface states for enhancement of thermoelectric efficiency				
	PI: Satyajit Sahu	DRDO	Rs. 9.80 Lakhs	Start Date: 9-Jul-20	End Date: 8-Jul-21
113.	Photo-Rechargeable Rechargeable Perovskite Batteries for Future Mobility.				
	PI: Shahab Ahmad	DST	Rs. 27.65 Lakhs	Start Date: 3-Oct-18	End Date: 2-Oct-20
114.	Cold Plasma Detergent in the environment to fight COVID-19				
	PI: Ram Prakash	Porte Automations Pvt. Ltd.	Rs. 23.60 Lakhs	Start Date: 4-Jun-20	End Date: 20-Jun-21
115.	Uniquely Identifying Lorentz Structure of New Physics in Semi-Leptonic B-Decays				
	PI: Ashutosh K Alok	SERB	Rs. 22.18 Lakhs	Start Date: 28-Dec-20	End Date: 27-Dec-23
116.	Study of Very High Energy Gamma-Rays from Galactic sources by Grapes-3 observatory				
	PI: Reetanjali Mohrana	SERB	Rs. 26.07 Lakhs	Start Date: 26-Nov-20	End Date: 25-Nov-22
117.	Design and Development of Dielectric Barrier Discharge Based Flat VUV/UV Excimer Light Sources for Advanced Applications in Health and Medicine				
	PI: Ram Prakash Co-PI: Ambesh Dixit & Neha Jain	SERB	Rs. 62.13 Lakhs	Start Date: 30-Dec-20	End Date: 29-Dec-23
118.	High voltage(~5V) ultrafast charging/discharging cathode materials in bulk and nano geometries for high power Li-Ion rechargeable batteries				
	PI: Ambesh Dixit CO-PI: Ram Prakash	SERB	Rs. 40.26 Lakhs	Start Date: 28-Dec-20	End Date: 27-Dec-23
119.	Engineering the interface of perovskites and 2D materials				
	PI: Lakshya Daukiya Mentor: S. R.Vadera	DST	Rs. 110.00 Lakhs	Start Date: 2-Nov-20	End Date: 1-Nov-25
120.	Fabrication of Atomically Thin, Ultrafast and Ultrasensitive Photodetectors Based on 2D-2D van der Waals (vdW) Heterostructures of Graphene with W Based TMDs				
	PI: Vijay Kumar Singh : Ambesh Dixit	DST	Rs. 110.00 Lakhs	Start Date: 1-Jan-21	End Date: 31-Dec-26
121.	Design and Development of Multiferroic Materials for Photovoltaic and Energy Harvesting Application.				
	PI: Priyambada Sahoo Mentor: Ambesh Dixit	DST	Rs. 4.52 Lakhs	Start Date: 06-Nov-20	End Date: 05-Nov-25
122.	Lead free perovskite based semiconducting materials and devices for photovoltaic and photodetector applications				
	PI: Surbhi Ramawat Mentor: Ambesh Dixit	DST	Rs. 4.52 Lakhs	Start Date: 07-Nov-20	End Date: 06-Nov-25
123.	Two-dimensional TMDC and QD based hybrid phototransistor with high sensitivity and mobility				
	PI: Chayan Das Mentor: Satyajit Sahu	DST	Rs. 4.52 Lakhs	Start Date: 21-Oct-20	End Date: 20-Oct-25
124.	Development of Transparent, Durable superhydrophobic-coating for self cleaning of endoscope				
	PI: Ram Prakash	MSME	Rs. 10.50 Lakhs	Start Date: 31-Mar-21	End Date: 30-Mar-22

Department of Mechanical Engineering

125.	Hybrid reactionless manipulation and visual serving of a satellite mounted robot for autonomous on orbit services				
	PI: Suril V. Shah	DST	Rs. 35 Lakhs	Start Date: 27-Jan-16	End Date: 28-Nov-18 Project extension is in-progress
126.	Development of Highly Efficient Low Cost Insulation for power plants				
	PI: S. Mukhopadhyay	MHRD	Rs. 93.47 Lakhs	Start Date: 7-May-18	End Date: 6-May-21

127.	Cascaded Latent Heat Storage (CLHS) for high temperature CSP applications material development and characterization to lab-scale setup				
	PI: P. R. Chakraborty Co-PI: Laltu Chandra, Ambesh Dixit, Saptarshi Basu	DST	Rs. 58.44 Lakhs	Start Date: 3-Aug-18	End Date: 2-Aug-21
128.	Performance Testing of ACC Tube Bundles Along with Establishing Their Theoretical Correlation				
	PI: Hardik Kothadia	Thermax SPX Energy Technologies Limited	Rs. 29.15 Lakhs	Start Date: 27-Mar-19	End Date: 31-Mar-20 Project extension is in-progress
129.	Development of lead free piezoelectric based Nano-generator: Modeling, Simulator and Experimental Realization				
	PI: Barun Pratiher Co-PI: Ambesh Dixit	SERB	Rs. 53.54 Lakhs	Start Date: 23-May-19	End Date: 22-May-22
130.	Development of Paired Neck Chamber Device for Assessment of Baroreflex Sensitivity				
	PI: K. A. Desai Co-PI: Suril V. Shah	DST	Rs. 26.32 Lakhs	Start Date: 1-Aug-19	End Date: 31-Jul-21
131.	Design and Analysis of Indigenous Autopilot System for Quadrotor				
	PI: C. Venkatesan Co-PI: Arpit Khandelwal, Suril V. Shah	DRDO	Rs. 9.96 Lakhs	Start Date: 1-Dec-19	End Date: 26-Feb-21
132.	Development of Light-weight and Flexible Multi-link Robotic Manipulator Mounted on Mobile Platform: Modelling, Simulation and Physical Realization				
	PI: Barun Pratiher	SERB	Rs. 39.64 Lakhs	Start Date: 21-Nov-19	End Date: 20-Nov-22
133.	Mitigation of weldability issues and residual stresses in dissimilar welded joints of ultra-supercritical power plants				
	PI: Chandan Pandey	SERB	Rs. 25.27 Lakhs	Start Date: 1-Jan-20	End Date: 31-Dec-21
134.	Shock Wave Interaction with Various Interfaces				
	PI: Arun Kumar, R.	DST	Rs. 35 Lakhs	Start Date: 3-Oct-18	End Date: 2-Oct-23
135.	Reactionless Maneuvering and Visual Servoing for Space Flying Robot and Half Humanoid				
	PI: Suril V. Shah Co-PI: K. A. Desai & C. Venkatesan	ISRO	Rs. 43.86 Lakhs	Start Date: 1-Jun-20	End Date: 31-May-22
136.	Dynamic Studies for Half-humanoid and Spaceflying Robot				
	PI: Suril V. Shah Co-PI: C. Venkatesan	ISRO	Rs. 16.84 Lakhs	Start Date: 1-Jun-20	End Date: 31-May-22
137.	Multiphysics Modeling & Analysis of Energy Technologies & Systems.				
	PI: Shobhana Singh	MHRD	Rs. 05.68 Lakhs	Start Date: 14-Mar-20	End Date: 14-Aug-20
138.	Design and Development of Indigenous On-board Autopilot and Vision-based Navigation Systems for Autonomous Flight of Hover Capable Rotary-wing Vehicles				
	PI: Suril V. Shah Co-PI: D. M. Fulwani, Arpit Khandelwal, K. A. Desai, C. Chattopadhyay, C. Venkatesan	SERB	Rs. 46.22 Lakhs	Start Date: 20-Mar-20	End Date: 19-Mar-23
139.	Personal Use facial fit trails of reusable ceramic respirators being manufactured at Bhopalgarh for use towards preventing spread of air borne diseases				
	PI: Anand K. Plappally Co-PI: Ravi K. R., Rajendra Nagar, and V. Narayanan	MHRD	Rs. 0.89 Lakhs	Start Date: 3-Jul-20	End Date: 2-Jan-21
140.	Design of ice freezing type heat exchanger and optimization of size, weight and power of heat exchanger				
	PI: Hardik Kothadia Co-PI: P. R. Chakraborty, Shobhana Singh	DRDO	Rs. 9.88 Lakhs	Start Date: 1-Aug-20	End Date: 31-Jul-21

141.	Cross Flows Flapping Jets for Supersonic Mixing Enhancement				
	PI: Arun Kumar, R. Co-PI: Hardik Kothadia	ARDB	Rs. 24.89 Lakhs	Start Date: 30-Sep-20	End Date: 29-Sep-23
142.	Understanding The Deformation Mechanisms Under In-Plane Shear and Role of Pre-Twining on Formability Behavior of AZ31-Xca Mg Alloy Sheets				
	PI: Jaiveer Singh	SERB	Rs. 32.99 Lakhs	Start Date: 24-Nov-20	End Date: 23-Nov-22
143.	Owl-inspired aerodynamic noise reduction of a flapping wing unmanned aerial vehicle				
	PI: Nipun Arora	SERB	Rs. 29.48 Lakhs	Start Date: 3-Dec-20	End Date: 2-Dec-22
144.	Input Shaping Control Strategies for Mitigating Residual Vibrations and Viscoelastic Creep in Electrically Driven Dielectric Elastomer Actuators				
	PI: Atul Kumar Sharma	DST	Rs. 35 Lakhs	Start Date 1-Dec-20	End Date: 30-Nov-25
145.	Highly conductive nanocomposite fibers for flexible temperature sensors (Flextem)				
	PI: Shrutidhara Sarma	SERB	Rs. 27.60 Lakhs	Start Date: 3-Dec-20	End Date: 2-Dec-22
146.	Lab-On-Paper for inexpensive point of care diagnostics				
	PI: Ankur Gupta	SERB	Rs. 32.38 Lakhs	Start Date: 19-Dec-20	End Date: 18-Dec-22
147.	Film cooling for Ejector diffuser system in High Altitude Testing Facility				
	PI: Arun Kumar, R. Co PI: Hardik Kothdia	ISRO	Rs. 27.34 Lakhs	Start Date: 29-Mar-21	End Date: 28-Mar-23

Consultancy Projects

Department of Chemical Engineering

1.	Separation of fine iron particles from organic powders to less than 10 ppm				
	PI: Pradip Kumar Tiwari	Uma Laxmi Organics Pvt. Ltd.	Rs. 0.33 Lakhs	Start Date: 01-Feb-20	End Date: N/A
2.	Vetting of hydraulic designs related to Rajeev Gandhi Lift Canal (RGLC) System				
	PI: Pradip Kumar Tiwari	PHED-Rajasthan	Rs. 0.50 Lakhs	Start Date: 01-Jul-20	End Date: N/A

Department of Chemistry

3.	Towards the development of low-cost water quality sensors				
	PI: Rakesh Kumar Sharma	Panasonic R&D Center of India	Rs. 02.35 Lakhs	Start Date: 01-Oct-14	End Date: N/A
4.	Towards the development of low-cost water quality sensors				
	PI: Rakesh Kumar Sharma	Panasonic R&D Center of India	Rs. 64.37 Lakhs	Start Date: 16-Feb-15	End Date: N/A
5.	Utilization of hydrogen as fuel in cement production				
	PI: Rakesh Kumar Sharma	Ultratech Cement	Rs. 10 Lakhs	Start Date: 01-Oct-19	End Date: N/A

Department of Computer Science and Engineering

6.	Strengthening Handwriting Recognition & Smart Annotation				
	PI: Gaurav Harit Co-PI Santanu Chaudhury	Samsung India Electronics Pvt. Ltd.	Rs. 13.82 Lakhs	Start Date: 03-July-19	End Date: N/A
7.	Source code similarity				
	PI: Sumit Kalra	Growth Pond	Rs. 1 Lakh	Start Date: 12-Oct-20	End Date: N/A

Department of Electrical Engineering

8.	Voice and Video Analytics				
	PI: Himanshu Kumar	Phimetrics Telecom VAS Pvt. Ltd.	Rs. 02.00 Lakhs	Start Date: 30-Jan-20	End Date: N/A
9.	Research Advisory				
	PI: Sandeep K. Yadav	Spanidea Systems Pvt. Ltd.	Rs. 11.04 Lakhs	Start Date: 01-Feb-21	End Date: N/A

Department of Mechanical Engineering

10.	Short term course on Helicopter dynamics and handling qualities				
	PI: Suril V. Shah Co-PI C. Venkatesan	DRDO	Rs. 03.72 Lakhs	Start Date: 15-Feb-17	End Date: N/A
11.	Visual Servoing of Mobile Manipulator with application to smart warehouse and smart factory				
	PI: Suril V. Shah	Tata Consultancy Limited	Rs. 10.12 Lakhs	Start Date: 01-Jul-17	End Date: N/A
12.	Helicopter Dynamics and Handling Quality				
	PI: C. Venkatesan	ASTE Bangalore	Rs. 03.42 Lakhs	Start Date: 10-Dec-18	End Date: N/A
13.	01 mw Microgrid based solar power plant at Military Station Brichgunj (Port Blair) under Military engineering services Port Blair				
	PI: Barun Pratiher	RAMA Reflection Pvt. Ltd.	Rs. 0.70 Lakhs	Start Date: 10-Sep-19	End Date: N/A
14.	Modeling of Laser Ignition of Coal				
	PI: S. Mukhopadhyay	GE India Industrial Pvt. Ltd.	Rs. 1.53 Lakhs	Start Date: 02-Jul-20	End Date: N/A

Department of School of Management & Entrepreneurship

15.	Visioning for Imagining the future of DSM in post pandemic world				
	PI: Sanklap Pratap	Park Life Invocations	Rs. 4.50 Lakhs	Start Date: 26-Nov-20	End Date: N/A

Department of Civil & Infrastructure Engineering

16.	Analysis of Fiberglass Mast Tower due to Wind Load				
	PI: Amit Kumar Rathi	Ercon Composites Jodhpur	Rs. 1.65 Lakhs	Start Date: 15-Mar-21	End Date: N/A

Sponsored Fellowship Projects

Department of Bioscience and Bioengineering

1.	Biomimetic Nanoscale Metal-Organic Frameworks for Targeted Near-Infrared Fluorescence Imaging and Phototherapeutic Destruction of Intraperitoneal Tumors				
	PI: Raviraj Vankayala	DBT - Ramalingaswami Fellowship	Rs. 42.50 Lakhs	Start Date: 11-Feb-20	End Date: 10-Feb-25

Department of Computer Science and Engineering

2.	Young Faculty Research Fellowship (YFRF) of Visvesvaraya PhD Scheme				
	PI: Gaurav Harit	MeitY	Rs. 22.20 Lakhs	Start Date: 22-Jan-18	End Date:30-Sep-20
3.	Swarnajayanti Fellowship				
	PI: Mayank Vatsa	DST	Rs. 63.33 Lakhs	Start Date: 01-Apr-19	End Date: 31-Mar-24

Department of Electrical Engineering

4.	Visvesvaraya PhD Scholarship scheme for Electronics & IT(Part-1) Media Lab Asia				
	PI: A. K. Tiwari		Rs. 216.34 Lakhs	Start Date: 01-Jan-14	End Date:31-03-20
5.	Visvesvaraya PhD Scholarship scheme for Electronics & IT(Part-2)				
	PI: A. K. Tiwari	Media Lab Asia	Rs. 151.71 Lakhs	Start Date: 21-Oct-14	End Date: 31-Mar-21
6.	Young Faculty Research Fellowship (YFRF) of Visvesvaraya PhD Scheme				
	PI: Shree Prakash Tiwari	MeitY	Rs. 37 Lakhs	Start Date: 24-Jan-18	End Date:23-Apr-21
7.	Young Faculty Research Fellowship (YFRF) of Visvesvaraya PhD Scheme				
	PI: D. M. Fulwani	MeitY	Rs. 37 Lakhs	Start Date: 01-Feb-18	End Date:23-Jul-21

Department of Physics

8.	Design and Development of Metal Oxide Hole Transporting Material (HTM) based Inverted Perovskite Solar Cell (iPSC) Under Ambient Conditions				
	PI: Ambesh Dixit	DST	Rs. 21.18 Lakhs	Start Date: 26-Sep-18	End Date:25-Sep-23

Other Projects

Department of Bioscience and Bioengineering					
1.	Workshop on Computational Biology and Bioinformatics				
	PI: Sushmita Paul	SERB - IITJ	Rs. 2.70 Lakhs	Start Date: 26-Jun-19	End Date: 25-Dec-19 Closure in-Progress
2.	Bioengineering Solution for healthcare, food, energy				
	PI: Meenu Chabbra	Registration Fees	Rs. 00.75 Lakhs	Start Date: 31-Mar-21	End Date: 10-Apr-21
Department of Computer Science and Engineering					
3.	ICVGIP 2020 Conference				
	PI: Gaurav Harit	Registration Fees	Rs. 0.30 Lakhs	Start Date: 19-Dec-20	End Date: 21-Dec-20
Department of Chemistry					
4.	Unnat Bhart Abhiyan				
	PI: Ananya Debnath	MHRD	Rs. 03.77 Lakhs	Start Date: 06-Mar-17	End Date: 05-Mar-20
Department of Electrical Engineering					
5.	64th DAE Solid State Physics Symposium				
	PI: Mahesh Kumar	DAE	Rs 20 Lakhs	Start Date: 16-Jul-19	End Date: 22-Dec-19 Closure Pending
Department of Human Studies and Science					
6.	IITJ-SICI Golden Jubilee conference and lecture series grant (GJCLSG)				
	PI: Farhat Naz	Shastri Indo Canadian Institute (SICI)	Rs. 0.20 Lakhs	Start Date: 26-Feb-21	End Date: 26-Feb-21
Department of Mathematics					
7.	TEW on Linear Algebra & Its Application				
	PI: Dilpreet kaur	National Center of Mathematics	Rs. 01.45 Lakhs	Start Date: 19-Nov-20	End Date: 13-Dec-20
8.	Popular Talk on Bernstein Polynomials, Computer-Aided Geometric Design and Real Algebraic Applications				
	PI: Dilpreet Kaur	National Center of Mathematics	Rs. 0.09 Lakhs	Start Date: 12-Feb-20	End Date: 12-Feb-20
Department of Mechanical Engineering					
9.	Ishaan Vikas Program 2016				
	PI: Barun Pratiher Co-PI K. A. Desai	MHRD	Rs. 02.57 Lakhs	Start Date: 04-Jul-16	End Date:16-Jul-16 Project extension in progress

10.	ICSSP Conference				
	PI: Ravi, K. R.	ICSSP	Rs. 03.19 Lakhs	Start Date: 06-Aug-19	End Date: 31-Dec-21
11.	Unnat Bhart Abhiyan (RCI)				
	PI: Anand K. Plappally	IIT Delhi	Rs. 5 Lakhs	Start Date: 31-Mar-19	End Date: 31-Mar-20

Department of Physics

12.	Faculty Development Program on Quantum Science and Technology				
	PI: Subhashish Banerjee	DST	Rs. 01.80 Lakhs	Start Date: 18-Aug-19	End Date: 30-Aug-19
13.	Quantum Information and Computation 2019				
	PI: Subhashish Banerjee	Multiple Agencies (DRDO and other Pvt. Agency)	Rs 01.45 Lakh	Start date: 08-Dec-19	End Date: 11-Dec-19

Completed Projects

Department of Bioscience & Bioengineering

1.	Muc-1 receptor targeted nano-liposome containing peptide-drug-nanocage for breast cancer and cancer stem cell				
	PI: Surajit Ghosh	DBT	Rs 17.54 Lakhs	Start date: 22-Oct-19	End Date: 31-Mar-20
	Outcome: Many tubulin targeted anticancer drugs used as chemotherapy. However, clinical success rate is limited in respect to the multidrug resistance and patient survival due to their poor bloavailability and non-specificity towards cancer cell. Further, single-drug therapies for the treatment of cancers are ineffective over a long period of time. To address these issues, we have designed combination therapeutic approach using breast cancer specific liposome as delivery vehicle. In brief, first, we planned to fabricate a peptide-docetaxel-RADOO1 nano-conjugate, which will enhance bioavailability of drugs, second we intend to target Mud receptor of breast cancer through an aptamer conjugated liposome which will loaded with peptide-docetaxel-RADOO1 nano-conjugate. Our novel nano formulation of two crucial drugs will simultaneously target microtubule, mTOR pathway, which will inhibit both breast cancer cell and CSC proliferation.				
2.	Development of anti-alzheimer peptide from taxol pocket of β-tubulin				
	PI: Surajit Ghosh	SERB	Rs. 57.24 Lakhs	Start Date: 22-Oct-19	End Date: 31-Dec-19
	Outcome: We considered the 4.5 A cut-off distance around the taxol binding pocket of B-tubulin and applied alanine scanning mutagenesis technique (using ABS-scan web server) for characterization of the entire ligand binding site, where each residue in a given cut off distance is mutated with the alanine and evaluated for its effect on the function. Using this strategy, we designed a peptide sequence and constructed a small peptide library from this designed sequence by using the concept of most interacting amino acid partners. We came out with an octapeptide, which shows very good binding energy in taxol binding site of, B-tubulin and 17-21 region of amyloid-B. Schematic representation of the aforesaid concept is shown in the project.				
3.	Deposition of Particulate matter in Lungs				

	PI: Sushmita Jha	BRNS	Rs. 26.78 Lakhs	Start Date: 12-Mar-14	End Date: 31-Mar-19
	Outcome: Nanoparticles are emerging as important platforms for manipulation of biological responses in the context of vaccines, cancer therapeutics, modulation of autoimmune diseases and targeted drug delivery. Considering their widespread applications and increased human exposure it is critical to understand the interaction of these with the human immune system. Our study analyzes size, concentration and exposure time~depefldent effects of amorphous nanosilica on human bronchoalveOlar epithelial, endothelial, fibroblast, monocytic and microglial cell lines. In addition, innate immune regulators associated with nanosilica internalization and subsequent inflammatory pathways are explored. Results reveal distinct pathways for nanosilica-induced cytotoxicity in each cell type. While 22nm nanosilica induces apoptotic cell death I2nm nanosilica induces necrotic cell death. Moreover, 1 2nm nanosilica mediated cytotoxicity is caspase-l activity and NLRP3 independent. NanosiliCa uptake is actin cytoskeleton dependent in 22nm and independent for l 2nm size particles. Apoptosis~assOciated speck-like protein (ASC) expression and specks formation increases in response to 1 2nm nanosilica. Moreover, lL-6 and IL-l ~3 release also increases on exposure to both 12 and 22nm nanosilica while there is no difference in TNF-a. Our results highlight possible temporal regulation of nanosilica uptake mediated cellular and molecular mechanisms of inflammation and cell death in bronchoalVeola epithelial, endothelial, fibroblast and microglial cell lines. These studies suggest that while 22nm Nano silica shows less toxicity as compared to l 2nm nanosilica, which causes widespread toxicity and cell death, amorphous Nano silica of both these sizes may be unsuitable for biological systems requiring detailed mechanistic investigations. Insert two photographs representing outcome of the project.				
4.	DST Subject Expert Committee (SEC)- Life Science Meeting				
	PI: Priyanka Singh	DST	Rs. 12.30 Lakhs	Start Date: 06-Feb-19	End Date: 31-Mar-20
	Outcome: The 16th Subject Expert Committee-Life Science meeting under the Women Scientist Scheme (WOS-A) of DST, Government of India, was organized at IIT Jodhpur during 14-16 February 2019. Twelve Committee Members and around 100 participants attended this event, which was coordinated by Dr. Priyanka Singh, Assistant Professor, Department of Bioscience & Bioengineering, IIT Jodhpur. The Women Scientists Scheme aims to encourage women scientists to pursue research in frontier areas of science and engineering, on problems of societal relevance and to take up S&T-based internship followed by self-employment.				

Department of Mathematics

5.	Automorphism Groups of Induced Symbolic Systems				
	PI: Puneet Sharma	NBHM	Rs. 03.32 Lakhs	Start date 31-Mar-17	End date 30-Mar-20
	Outcome: As a part of studies carried out under this project, we have investigated the non-emptiness problem and the problem of existence of periodic points for a multidimensional shift space. In particular, we have characterized the elements of the multidimensional shift spaces using an infinite square matrix M. We proved that the matrix obtained generates precisely the elements of the given multidimensional shift space and hence characterizes the shift space completely. We proved that any submatrix of the matrix obtained yields a sub shift of the given shift and hence the matrix M is the minimal matrix characterizing the elements of the given multidimensional shift of finite type. We introduced the concept of complementary set to investigate the non-emptiness problem for a given multidimensional shift of finite 4- type. We proved that any multidimensional shift of finite type is non-empty if and only if it exhibits a nonempty complementary set. We also investigated existence of periodic points for a multidimensional shift space. We derived a sufficient condition for a multidimensional shift space to possess a non-empty set of periodic points. During this project, we have also characterized a given two dimensional shift space using a sequence of finite matrices (of increasing size). In particular, given a two dimensional shift space characterized by a finite set of forbidden blocks (of finite size), we provide an algorithm for characterizing the elements of the shift space X using a sequence of finite matrices. The algorithm generates all the possible elements of the shift space using the matrices generated and hence determines the shift space completely. We extend our result to a general d dimensional shift of finite type. We also address some of the questions related to structural and existential properties of a periodic point in a multidimensional shift space. We prove that any periodic point in a d dimensional shift space has a finite orbit if and only if its lattice of periods is of full dimension. We prove that in a multidimensional shift space, any periodic point with infinite orbit can be represented as a repetitive arrangement of shifts of lower dimensional strips (of infinite length). We also derive the relation between the dimension of lattice of periods of periodic points and the lower dimensional infinite strip. We derive necessary and sufficient conditions for a periodic point of the full shift to belong to a given multidimensional shift space. We extend our result to a general point of the multidimensional full shift.				

Department of Mechanical Engineering

6.	Thermal Design of PCM Cool and Warm Vest				
	PI: P. R. Chakraborty Co-PI: Akshay Prakash	DRDO, Jodhpur	Rs. 09.96 Lakhs	Start Date: 02-Dec-15	End Date: 30-Sep-19

	Outcome: a) The conjugate heat transfer model for PCM cool packs is successfully developed and validated with preliminary experimental studies. (b) The convection model is found out to be redundant and diffusion cased model is found out to capture the transport mechanism adequately. (c) Five PCM namely Ice, savE 0M21, Coconut oil, C18 Paraffin, and Octadecane has been studied for desired cooling effect and duration. (d) savE 0M21 is found out to be optimal from the point of view of melting temperature 21 °C, however the density the thermal conductivity needs to be enhanced toward 1.0 W/rnK, as compared to its original thermal conductivity of 0.14-0.21 W/mK. Also the density of savE 0M21 is 924 kg/rn3 which is quite close to ice or water. (e) In terms of mass C18 paraffin (Tmeit = 27.5 °C) and Octadecane (Tmeit = 28.1 °C) with densities of 800 kg/rn3 and 776 kg/rn3 are found out to be suitable, however thermal conductivities of both the material needs to be enhanced to a range of 1 1.0 W/mK.				

Department of Electrical Engineering

7.	Transforming Healthcare Through Tech-dinor				
	PI: Sandeep K. Yadav	IBM	Rs. 14.25 Lakhs	Start Date: 02-Dec-14	End Date: 01-Dec-16
	Outcome: e-ASHA is a technology for improving survival rates of children prior to birth and mothers. It offers pre-natal care to rural population in India, who generally do not have access to facilities that are taken for granted in urban areas. The project team has developed an Android platform-based system as well as platform independent system, which can provide solutions and can help in improving quality of home based pre-natal counseling, postnatal Care, and childhood care by integrating measurements of key physiological parameters into one device. This device is easy to care, weighing less than 400gms, is easy to use, and is highly affordable. It is envisaged that this system will be developed in such a way that the pre- and post-natal care modules are integrated and that data can be transferred automatically to a centralized server. A text message can then be delivered from this server to the patient and frontline functionaries two days prior to the next scheduled visit. Prototype versions of this product have been developed and given to e-Asha nurses in Jasol, Balotra District of Rajasthan. Early results and feedback has revealed that the quality of counseling has significantly improved after using the system. Direct server digitization has eliminated human errors and reduced overall man hours needed for data entry. Finally, recall of messages by beneficiaries has increased by more than 80% from baseline. Overall, this project has shown that use of simpler low cost technology has improved the quality of counseling, early identification of high-risk pregnancies and detection of diseases in new-borns. This endeavor uses state of the art information and communication technology to provide critical care to whom its needed the most, in a timely manner.				
8.	Computationally efficient fixed complexity sphere decodes for multiuser MIMO communications				
	PI: Arun Kumar Singh	SERB	Rs. 22.82 Lakhs	Start Date: 13-Jan-16	End Date: 12-Jan-19
	Outcome: The project provided analytical insights into the computational reserves required to achieve a vanishing gap to ML in multiuser communications, the role of feedback in reducing decoding complexity, policies that regulate complexity at a limited performance loss and optimal user behaviour in the presence of complexity constraints for multiuser communications. The proposed fixed complexity algorithm was implemented on FPGA based SDR.				
9.	Noise-enhanced Edge-preserving Image Denoising using Stochastic Resonance				
	PI: Rajalaxmi Chouhan	SERB	Rs. 26.64 Lakhs	Start Date: 17-Mar-17	End Date: 16-Sep-20
	Outcome: Image generation and transmission is largely affected by presence of electronic and environmental noise. This project addresses the challenging problem of denoising digital images corrupted by additive Gaussian noise. The primary objective of this proposal was to develop a scientific framework of image denoising using the counter-intuitive phenomenon called 'stochastic resonance'. Stochastic resonance (SR) is a concept of physics that utilizes the presence (or addition) of controlled amounts of noise to enhance the performance of a non-linear system. Our analysis has developed an analogy between the physical bistable system that exhibits SR (in the presence of controlled amounts of noise to enhance the sensitivity of a non-linear system towards a weak signal) and an image denoising framework that utilized internal noise present in a noisy image. The proposed work includes a noise-enhanced edge-preserving algorithm using non-local means. The approach is extended to an enhanced patch-based implementation that is also observed to exhibit SR. While image denoising is a crucial part of image processing, preserving the edges while denoising is a challenging necessity. In this contribution, we proposed a noise-aided edge-preserving denoising algorithm by modifying the 'patch-based Non Local Means' algorithm and iteratively enhancing the crucial factors -- the similarity weights -- using dynamic stochastic resonance. Since the input image is already noisy, we do not add any noise externally but use the internal noise to `enhance' the similarity weights. The proposed algorithm handles the spurious artifacts near the edges more effectively, and the edges are sharper and better preserved even at a high levels of noise, which would be useful in mobile and DSLR consumer cameras software. The significance of the proposed algorithm is demonstrated by presenting the comparative results (quantitative and qualitative) for a variety of images corrupted by a wide range of AWGN noise.				

	The work also includes interpretation of how the Sobel and Canny edge detector (CED) represent manifestation of noise-induced resonance. An enhanced edge detector using the Canny operator is proposed to outperform other algorithms especially in noisy images. As the CED continues to be one of the most popular edge detection operators, the second major contribution of this project is an enhanced CED, which takes the same input parameter set as that of the conventional Canny but produces the edge map with better-connected edges and reduced noise. The concept of stochastic resonance (SR) drives the core of the algorithm. We also propose a new measure for efficient edge detection, a unique efficient way of edge content extraction and its combination for various channels, and a framework to handle repercussions of the randomness of the noise. Since the proposed solution come in the form of a modular patch-based framework, they can be easily incorporated in other algorithm developments. Qualitative and quantitative results are presented along with the BSDS500 benchmarking to showcase the proposed algorithm's effectiveness.				
10.	Design and Development of Midrange (≥10 km) RF Transceiver system to transmit Nuclear Radiation Sensor Data				
	PI: Arpit Khandelwal	DRDO	Rs. 9.60 Lakhs	Start Date: 20-Dec-18	End Date: 16-Feb-20
	Outcome: (1) Technology Development in association with a user agency to design and implement mid-range (10 km) transceiver capable of LoS communication with data rate of 5 kbps using low power wide area network (LPWAN) techniques. (2) Development of secure communication link in unlicensed frequency spectrum (865- 867 MHz) while achieving maximum possible data rate with transmitted power less than 1 W. (3) Design and optimization of an interfacing circuit to transmit data from on board nuclear sensor, over a range of 10 km to the base station, using novel modulation techniques, directional antenna etc. A transceiver module capable of transmitting nuclear sensor data upto 10 km on a robust bidirectional link, with possible flexibility in network coverage and data rate. Process documents for programming and interfacing the transceiver module with nuclear sensor to be submitted to DLJ.				

Key of sponsoring agencies

1. ADRB - Aeronautical Research & Development Board
2. BRNS - Board of Research in Nuclear Sciences
3. DBT - Department of Biotechnology
4. Department of Heavy Industry (NFTDC) - Nonferrous Materials Technology Development Centre (NFTDC), Hyderabad
5. DRDO - Defense Research & Development Organisation
6. DST-BRICS - Department of Science & Technology (Brazil, Russia, India, China, and South Africa)
7. DST-FIST - Department of Science & Technology - Fund for Improvement of S&T Infrastructure
8. ICMR - Indian Council of Medical Research
9. IEEE - Institute of Electrical and Electronics Engineers
10. ISRO - Indian Space Research Organisation
11. MeitY - Ministry of Electronics and Information Technology
12. MHA - Ministry of Home Affairs
13. MHRD (GIAN) - Ministry of Human Resources Development (Global Initiative for Academic Networks)
14. MSME - Ministry of Micro, Small & Medium Enterprises
15. NHAI - National Highways Authority of India
16. PSA - Principal Scientific Advisor
17. SERB - Science & Engineering Research Board
18. UGC-DAE - University Grants Commission - Department of Atomic Energy

Patents & Publications

Patents

Department of Chemistry

1. **Title of Patent:** Sunlight driven H2 production by water splitting from nanocomposite heterostructure and preparation method thereof
   Inventors: Kiran Shejale, Devika Laishram, Arun Kumar, Rakesh K.Sharma
   Date of Publication: 18-Sep-2020
   Patent application no. : 201911008783

2. **Title of Patent:** Metal nanoparticles doped hollow carbon nanobubbles and preparation method thereof
   Inventors: Kiran Shejale, Devika Laishram, Rakesh K. Sharma
   Date of Publication: 06-Nov-2020
   Patent application no. : 201911017622

Department of Electrical Engineering

3. **Title of Patent:** Image Compression for Transmission
   Inventors: Anil K Tiwari, Kumar Rahul
   Date of Publication: 09-Oct-2020
   Patent application no. : 201911014120

Publications

Department of Bioscience and Bioengineering

Journal Papers

1. 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

2. Agrawal, I., & Jha, S. (2020). 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

3. Agrawal, I., & Jha, S. (2020). Mitochondrial Dysfunction and Alzheimer's Disease: Role of Microglia. Frontiers in Aging Neuroscience, 12, 252. ISSN: 1663-4365. https://doi.org/10.3389/fnagi.2020.00252

4. Agrawal, I., Saxena, S., Nair, P., Jha, D., & Jha, S. (2020). Obtaining Human Microglia from Adult Human Brain Tissue. Journal of Visualized Experiments, (162), 61438. ISSN: 1940-087X. https://doi.org/10.3791/61438

5. Agrawal, I., Sharma, N., Saxena, S., Arvind, S., Chakraborty, D., Chakraborty, D. B., Jha, D., Ghatak, S., Epari, S., Gupta, T., & Jha, S. (2021). Dopamine induces functional extracellular traps in microglia. IScience, 24(1), 101968. ISSN: 2589-0042. https://doi.org/10.1016/j.isci.2020.101968

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9. Das, G., Mukherjee, N., & Ghosh, S. (2020). Neurological Insights of COVID-19 Pandemic. ACS Chemical Neuroscience, 11(9), 1206–1209. ISSN: 1948-7193. https://doi.org/10.1021/acschemneuro.0c00201

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Conference Papers

1. Bhattacherjee, S., & Ghosh, S. (2020). Transverse Localization of light: Towards a paradigm shift from trivial to non-trivial

lattice. 14th Pacific Rim Conference on Lasers and Electro-Optics (CLEO PR 2020), C1H_4. Sydney: OSA. ISBN: 978-0-646-82504-5. https://doi.org/10.1364/CLEOPR.2020.C1H_4

2. Biswas, P., & Ghosh, S. (2020). A Specialty Endless-Core Photonic Bandgap Fiber with Ultra-wide Bandwidth for Short Pulse Propagation. Frontiers in Optics / Laser Science, JTu1A.29. Washington, DC: OSA. ISBN: 978-1-943580-80-4. https://doi.org/10.1364/FIO.2020.JTu1A.29

3. Dey, S., Laha, A., & Ghosh, S. (2020). Modal dynamics around a fourth-order exceptional point in a planar optical waveguide. Frontiers in Optics / Laser Science, JTu1B.5. Washington, DC: OSA. ISBN: 978-1-943580-80-4. https://doi.org/10.1364/FIO.2020.JTu1B.5

4. Gandhi, H. K., & Ghosh, S. (2020). Ultra-high sensitivity near multiple bound states in the continuum in microcavity resonators. 14th Pacific Rim Conference on Lasers and Electro-Optics (CLEO PR 2020), P4_7. Sydney: OSA. ISBN: 978-0-646-82504-5. https://doi.org/10.1364/CLEOPR.2020.P4_7

5. Kumbhakar, S., Alok, A. K., & Uma Sankar, S. (2021). Discriminating New Physics in $b \to s\mu^+\mu^-$ via Transverse Polarization Asymmetry of $K \to$ Meson. Proceedings of 40th International Conference on High Energy Physics — PoS(ICHEP2020), 390, 446. Prague, Czech Republic: SISSA Medialab. https://doi.org/10.22323/1.390.0446

6. Laha, A., Dey, S., Gandhi, H. K., & Ghosh, S. (2020). Complementary Optical Systems to Host Conjugate Exceptional Points. Frontiers in Optics / Laser Science, FTu8E.5. Washington, DC: OSA. ISBN: 978-1-943580-80-4. https://doi.org/10.1364/FIO.2020.FTu8E.5

7. Madéo, J., Man, M. K. L., Sahoo, C., Campbell, M., Pareek, V., Wong, E. L., Mahboob, A. A., Chan, N. S., Karmakar, A., Mariserla, B. M. K., Li, X., Heinz, T. F., Cao, T., & Dani, K. M. (2020). Time-resolved ARPES of excitons in an atomically thin semiconductor. The 22nd International Conference on Ultrafast Phenomena 2020, M3A.3. Washington, D.C.: OSA. ISBN: 978-1-943580-83-5. https://doi.org/10.1364/UP.2020.M3A.3

8. Sadhukhan, S., Laha, A., Biswas, A., & Ghosh, S. (2020). Photonic Crystal Based Ultra-Sensitive Interferometric Nanometer Displacement Sensor. Frontiers in Optics / Laser Science, JTu1A.3. Washington, DC: OSA. ISBN: 978-1-943580-80-4. https://doi.org/10.1364/FIO.2020.JTu1A.3

Book Chapters

1. Singh, P., Sahoo, P., Saxena, K., Ghosh, S., Sahu, S., Ray, K., Fujita, D., & Bandyopadhyay, A. (2021). A Space-Time-Topology-Prime, stTS Metric for a Self-operating Mathematical Universe Uses Dodecanion Geometric Algebra of 2-20 D Complex Vectors. In K. Ray, K. C. Roy, S. K. Toshniwal, H. Sharma, & A. Bandyopadhyay (Eds.), Proceedings of International Conference on Data Science and Applications (pp. 1–31). Singapore: Springer. ISBN: 9789811575617. https://doi.org/10.1007/978-981-15-7561-7_1

2. Singh, P., Sahoo, P., Saxena, K., Ghosh, S., Sahu, S., Ray, K., Fujita, D., & Bandyopadhyay, A. (2021). Quaternion, Octonion to Dodecanion Manifold: Stereographic Projections from Infinity Lead to a Self-operating Mathematical Universe. In Phool Singh, R. K. Gupta, K. Ray, & A. Bandyopadhyay (Eds.), Proceedings of International Conference on Trends in Computational and Cognitive Engineering (pp. 55–77). Singapore: Springer. ISBN: 9789811554148. https://doi.org/10.1007/978-981-15-5414-8_5

School of Management & Entrepreneurship

Journal Papers

1. Aggarwal, M. (2020). Representing uncertainty about fuzzy membership grade. Soft Computing, 24(17), 12691–12707. ISSN: 1432-7643, 1433-7479. https://doi.org/10.1007/s00500-020-05050-z

2. Aggarwal, M. (2021). Redefining fuzzy entropy with a general framework. Expert Systems with Applications, 164, 113671. ISSN: 0957-4174. https://doi.org/10.1016/j.eswa.2020.113671

3. Ahmed, M., & Pratap, S. (2021). Constraint absorption in emerging economies: the role of business groups. International Journal of Organizational Analysis, ahead-of-print(ahead-of-print). ISSN: 1934-8835, 1934-8835. https://doi.org/10.1108/IJOA-11-2019-1927

4. Ghosh, D., Sant, T. G., Kuiti, M. R., Swami, S., & Shankar, R. (2020). Strategic decisions, competition and cost-sharing contract under industry 4.0 and environmental considerations. Resources, Conservation and Recycling, 162, 105057. ISSN: 0921-3449. https://doi.org/10.1016/j.resconrec.2020.105057

5. Krishankumar, R., Rani, P., Ravichandran, K. S., Aggarwal, M., & Peng, X. (2021). An integrated and discriminative approach for group decision-making with probabilistic linguistic information. Soft Computing, 25(4), 3043–3057. ISSN: 1432-7643, 1433-7479. https://doi.org/10.1007/s00500-020-05361-1

6. Kuiti, M. R., Ghosh, D., Basu, P., & Bisi, A. (2020). Do cap-and-trade policies drive environmental and social goals in supply chains: Strategic decisions, collaboration, and contract choices. International Journal of Production Economics, 223, 107537. ISSN: 0925-5273. https://doi.org/10.1016/j.ijpe.2019.107537

7. Kumar, Anil, Prakash, G., & Kumar, G. (2021). Does environmentally responsible purchase intention matter for consumers? A predictive sustainable model developed through an empirical study. Journal of Retailing and Consumer Services, 58, 102270. ISSN: 0969-6989. https://doi.org/10.1016/j.jretconser.2020.102270

Awards & Recognitions

Department of Bioscience & Bioengineering

Faculty Members

Amit Mishra, Associate Professor, received the following:

(i) Life Membership of Society of Biological Chemists of India, IISc Bangalore

(ii) IIT Jodhpur Research Excellence Award

(iii) Life Membership of Translational Biomedical Research Society India

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-July 2019.

(iii) Early career research award (ECRA) by Science and Engineering Research Board (SERB) from 2019 to 2022.

(iv) Invitation as "Young Investigator Speaker" in Fluorescence and Raman Spectroscopy (FCS) workshop held at Tata Institute of Fundamental Research (TIFR), Hyderabad, during December 2019.

Priyanka Singh, Assistant Professor, Department of Bioscience and Bioengineering, is the recipient of the "Young Scientist Research Award" from the Board of Research in Nuclear Sciences (BRNS), Department of Atomic Energy (DAE), Government of India.

Surajit Ghosh, Professor, received the following:

(i) Expert Membership on Neuroscience in BRICS Meeting, 25-26 May 2021

(ii) SERB STAR award for 2020

(iii) Special invitation as PAC member for SERB

(iv) CDRI Award 2020 for Excellence in Drug Research in the chemical sciences category

Sushmita Jha, Associate Professor, received the Kusum Sharma Award for Young Woman Scientist from the Indian Academy of Biomedical Sciences, 2021.

Indranil Banerjee, Associate Professor, became Associate Editor for the Journal of Frontiers in Medical Technology.

Raviraj Vankayala, Assistant Professor, became Review Editor for Frontiers in Bioengineering and Biotechnology and Frontiers in Molecular Biosciences journals. Also, he became Topic Editor for Frontiers in Nanotechnology journal for a special issue "Multifunctional Nanomaterials for Biosensors and Therapeutics".

Sucharita Dey, Assistant Professor, received the Ramalingaswami re-entry Fellowship (2020-21) from the Department of Biotechnology, Government of India.

Department of Chemistry

Faculty Members

1. Sandip Murarka, Assistant Professor, has been elected as a Fellow of the Indian Chemical Society (FICS).
2. Rakesh K. Sharma, Associate Professor, has been elected as the Fellow of the Royal Society of Chemistry, (RSC), London.
3. Ritu Gupta, Assistant Professor, has been selected for INSA Young Scientist Medal 2020.
4. Ritu Gupta, Assistant Professor, has been inducted as an Associate of the Indian Academy of Sciences (IAS), Bangalore.

Department of Chemical Engineering

Faculty Members

1. Angan Sengupta, Assistant Professor, received Young Scientist Award on International Scientist Awards on Engineering, Science and Medicine, 2021.

Department of Civil & Infrastructure Engineering

Faculty Members

1. Deepika Bhattu, Assistant Professor, has been appointed as the Nodal Officer by Rajasthan State Pollution Control Board as the Institute was empanelled as Environmental Auditor.
2. Deepika Bhattu, Assistant Professor, and Ranju Mohan, Assistant Professor, have been selected as the representatives of the Institute of Repute, for the National Knowledge Network (NKN) under the National Clean Air Program (NCAP).
3. P. Ravi Prakash, Assistant Professor, has joined the editorial board of the "Frontiers in Built Environment (Sustainable Design and Construction).

Department of Computer Science & Engineering

Faculty Members

1. Anand Mishra
   - Honoured with the IIT Jodhpur Teaching Excellence Award 2020
2. Debasis Das
   - IEEE Senior Membership
3. Richa Singh
   - Elected as IEEE Fellow

National/International Committees

1. Debasis Das
   - Subject Expert, Student Learning Assessment (SLA) Project, 2021, AICTE (National level initiative to understand the Level and Gains of students studying in Technical Institutions of India).
   - Young Researcher Symposium program committee Member, CODS-COMAD 2022
   - Poster Chair in the ACM 23rd International Conference on Distributed Computing and Networking (ICDCN 2022)
2. Mayank Vatsa
   - Member, NITI Aayog and World Economic Forum Committee for Responsible AI
   - Member, Confederation of Indian Industry, 2018 - 2020
   - Expert Committee Member for DIGIYatra, NITI Aayog and AAI, 2021
3. Somitra Sanadhya
   - Jury committee member, Cybersecurity Grand Challenge, Ministry of Electronics and Information Technology (MEITY)

Journal Editorship

1. Mayank Vatsa
   - Associate Editor, Pattern Recognition, Elsevier
   - Area Editor, Journal of Information Fusion, Elsevier

2. Richa Singh
    - Associate Editor, Computer Vision and Image Understanding, Elsevier
    - Associate Editor-in-Chief, Pattern Recognition, Elsevier

Conference Organizing Committee Member

1. Dip Sankar Banerjee
    - Co-Chair, Student Research Symposium, IEEE HiPC Conference, 2021
2. Mayank Vatsa
    - General Co-Chair, CVPR Second Workshop on Fair, Data Efficient, and Trusted Computer Vision, to be held in June 2021
    - General Co-Chair, Meta Learning for Computer Vision Workshop @ AAAI 2021, Virtual, February 2021
    - General Co-Chair, IEEE International Joint Conference on Biometrics, Virtual, September 2020
    - General Co-Chair, CVPR Workshop on Fair, Data Efficient, and Trusted Computer Vision, Virtual, June 2020
    - Program Co-Chair, IEEE International Conference on Face and Gesture Recognition, India, to be held in December 2021
    - Program Co-Chair, IEEE International Conference on Advanced Video and Signal based Surveillance, USA, to be held in September 2021
    - Area Chair, IEEE International Conference on Computer Vision, to be held in 2021
    - Area Chair, Conference on Computer Vision and Pattern Recognition, to be held in 2022
    - Senior Program Committee Member, AAAI Conference on Artificial Intelligence, January 2021
3. Richa Singh
    - Area Chair, IAPR International Conference on Pattern Recognition, Italy, January 2021
    - Area Chair, IEEE International Conference on Automatic Face and Gesture Recognition, Argentina, 2020
    - Meta Reviewer, International Conference on Computer Vision
    - Finance Chair, International Conference on Multimodal Interaction, Montreal, Canada, 2021
    - PC Co-Chair, IEEE International Joint Conference on Biometrics, Houston, USA, September 2020
    - General Co-Chair, IEEE International Conference on Face and Gesture Recognition, India, 2021
    - Associate Editor, EURASIP International Journal of Image and Video Processing, SpringerOpen
    - Vice President, IEEE Biometrics Committee
    - AAAI 2021 Workshop on Meta-Learning for Computer Vision, 2021
    - IEEE CVPR Workshop on Fair, Data Efficient and Trusted Computer Vision, 2021
4. Somitra Sanadhya
    - Chair, 18th IFIP WG 11.9 international conference on digital forensics 2022.
5. Suchetana Chakraborty
    - Tutorial Co-chair, IEEE ANTS 2021

Conference Program Committee Members

1. Anand Mishra
    - International Conference on Computer Vision 2021
    - Conference on Computer Vision and Pattern Recognition, 2021
    - Association for the Advancement of Artificial Intelligence 2021
    - IEEE Transactions on Pattern Analysis and Machine Intelligence
    - International Journal on Computer Vision
    - ACM India Joint International Conference on Data Science and Management of Data 2021
2. Debasis Das
    - European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases 2021
    - FTNCT-2021
3. Dip Sankar Banerjee
    - IEEE International Conference on High Performance Computing, Data, and Analytics 2021
4. Mayank Vatsa
    - Computer Vision and Pattern Recognition, 2020
    - AAAI Conference on Artificial Intelligence, 2020
5. Richa Singh
    - Conference on Computer Vision and Pattern Recognition 2020
    - IEEE International Conference on Image Processing2020
    - European Conference on Computer Vision 2020
    - AAAI Conference on Artificial Intelligence , 2020
6. Suchetana Chakraborty
    - IEEE Conference on Local Computer Networks 2021
    - International Conference on COMmunication Systems & NETworks (COMSNETS) 2022

7. Pallavi Jain
    - 31st International Joint Conference on Artificial Intelligence (IJCAI-22)
    - European Conference on Multi-Agent Systems 2021
    - Senior Program Committee Member of 30th International Joint Conference on Artificial Intelligence (IJCAI-21)
    - Thirty-Fifth AAAI Conference on Artificial Intelligence (AAAI-21)
8. Romi Banerjee
    - 6th Annual Meeting of the Society for the Neuroscience of Creativity (SfNC) - 2020
9. Somitra Sanadhya
    - International Conference on Security, Privacy and Applied Cryptographic Engineering (Indocrypt), 2021
    - International Conference on Cryptology in India 2021
10. Yashaswi Verma
    - Winter Conference on Applications of Computer Vision 2020
    - Pacific-Asia Conference on Knowledge Discovery and Data Mining 2021
    - Association for the Advancement of Artificial Intelligence 2021
    - International Conference on Computer Vision 2021

Niveditta

- Won the Carolyn Leighton Scholarship to attend WITI's 27th Annual Global Summit, 2021.

Shreyansh Sharma

- Awarded the Linux Foundation Training (LiFT) Scholarship, 2021.

Kartik Vyas

- Summer intern at Morgan Stanley - was featured on the 'Morgan Stanley's Headquarters signage' in Times Square, New York.

Bharat Biradar, Dhruv Patel, and Gagandeep Singh

- Selected for the Google Summer of Code 2021.

Bhumika, Jayant, Lokendra, Shreyansh and Ankur

- Won the Student's Pitch Competition, organized as part of Industry Day 2021.

Ankur Nahar

- Received the USENIX Annual Technical Conference (ATC) 2021 Student Grant.

Lokendra Vishwakarma, Jayant Vyas, and Ankur Nahar

- Received the ACM SIGMATRICS 2021 Student Grant.

Jayant Vyas

- Selected for the ACM India 2021 Anveshan Setu Fellowship, 2021.

Shashwat Kathuria

- Selected for the Google Summer of Code 2020.

Ankur Nahar

- Received the ACM India Travel Award for presenting his research at IFIP Networking 2020, Paris, France.

Department of Electrical Engineering

Faculty Members

1. Sandeep Yadav and Deepak Fulwani received the 2020 Teaching Excellence Award (IIT Jodhpur).
2. Mahesh Kumar received the following awards and recognitions:
    - Research Excellence Award 2020 from IIT Jodhpur
    - Fulbright-Nehru Academic and Professional Excellence Fellowships to work at MIT, USA
    - DUO-India Fellowship to work at University of Stuttgart, Germany

Also, Mahesh Kumar received the following positions/ editorial appointments:

- Membership of Subject Expert Group (SEG): Participation in School Education, Unnat Bharat Abhiyan
- Core Membership of the SERB Expert Committee-Engineering Sciences (SRG, NPDF and ECRA schemes)
- Membership of Programme Advisory Committee (PAC) of SERB-POWER (Promoting Opportunities for Women in Exploratory Research)

- Membership of SERB Review/Monitoring meeting of Engineering Science scheme (Electrical & Electronics Engineering)
- Membership of SERB SUPRA Screening Committee
- Membership of Programme Advisory Committee on Technology Development Programme under Technology Development & Transfer Division, Department of Science and Technology.
- Associate Editorship, IEEE Sensors Journal, IEEE Publisher
- Executive Editorial Board Membership of Nano Express, IOP Publisher
- Associate Editorship for Frontiers in Sensors, Frontiers Publisher

3. Jai Narayan Tripathi received the following editorial appointments:
   - Guest Editorship on the Editorial Board of IEEE Transactions on Components, Packaging and Manufacturing Technology, for 2 years (w.e.f. Oct 2020).
   - Membership of the Editorial Board of IEEE Open Journal of Circuits and Systems.
4. Harshit Agarwal was selected for the prestigious 2020 IEEE Electron Device Society Early Career Award. Also, Harshit Agarwal has been appointed as a member of the IEEE EDS Compact Modeling Committee for two years.
5. Saakshi Dhanekar was inducted as the Associate Editor of IEEE Sensors Letters (Sep 2020).
6. Amandeep Kaur received the BIRAC-BIG Project for designing a high-resolution endoscopic camera system.
7. The following papers became one of the Popular Documents/50-Most Accessed Documents on IEEE Xplore platform.
   (i) Aashish Mathur, IEEE Communications Letters, February 2021. Reconfigurable Intelligent Surface for Mixed FSO-RF Systems with Co-Channel Interference.
   (ii) Soumava Mukherjee, Electronic Letters, September 2020. Dual-mode SICL bandpass filter with via based perturbation technique for Ku-band.

Staff Member(s)

Gajraj Sharma, Technical Assistant, received the 2020 Meritorious Staff Award.

Students

1. Rahul Kumar received the C. V. Raman Gold Medal 2020 for Best Thesis among students of all PhD Programs during the 6th Convocation.
2. Ashok Kumar received the Prime Minister's Research Fellowship (PMRF)
3. Idury Satya Krishna received the following:
   - European Microwave Conference Student Grant Award for EuMC, Paris, France, 28 September - 4 October 2020.
   - European Microwave Association (EuMA) Internship award.

Department of Humanities & Social Science

Faculty Members

1. Alok Ranjan, Assistant Professor, received the Fulbright-Nehru Postdoctoral Fellowship, 2020-2021.
2. Farhat Naz, Assistant Professor, was awarded the Shastri Indo-Canadian Institute, Golden Jubilee Conference and Lecture Series Grant, in January 2021.

Department of Mechanical Engineering

Students

1. Sushmita Chandel has been selected for ACM India Anveshan Setu Fellowship 2021.
2. Parakala Vishnu Bayari has been selected for ACM India Anveshan Setu Fellowship 2021.

Department of Mechanical Engineering

Faculty Members

1. 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.
2. Shobhana Singh received the Best paper presentation award in the 2nd International Conference on Future Learning Aspects of Mechanical Engineering (FLAME - 2020), 5th - 7th August 2020.
3. Anand Plappally received First prize in short invited lecture at the Fifth International Online Conference in Reuse and Recycling of Materials (Polymers, Wood, Paper, Leather, Glass, Metals, Ceramics, Semi-Conductors, Water etc.) and their products (ICRM-2020), 11-13 December 2020, Kottayam, Kerala, jointly organized by Mahatma Gandhi University, Kottayam, Kerala, India and Wroclaw University of Technology, Wroclaw, Poland

Students

1. Shubhanshu Rai has been awarded an honorarium on the selection of his project titled "Natural Convection in an Enclosure Heated From Bottom using OpenFOAM" for the case studied under the Free/Libre and Open Source Software for Education (FOSSEE) program by IIT Bombay.
2. Best Paper Presentation Award: Bikash Pattanayak, Harsh Deswal, Vivek Saxena, Hardik Kothadia, "Effect of strip orientations and geometry on the critical heat flux in pool boiling", 2nd International Conference on Future Learning Aspects of Mechanical Engineering (FLAME) Amity University Uttar Pradesh, 2020
3. Pankaj Jakhar, IAIN Fellowship 2020-2021, SIIC, IIT Kanpur with a company spin-off named Unnada Pvt Ltd.

Department of Physics

Faculty Members

1. Subhashish Banerjee, Associate Professor, has been elected as the Fellow of the National Academy of Sciences, India (NASI).
2. Shahab Ahmad's (Assistant Professor) collaborative research work on Lanthanide-doped Nanocrystals for Bright Triplet Excitons is highlighted in Phys.org https://phys.org/news/2020-11-lanthanide-nanocrystals-brighten-molecular-triplet.html
3. Somnath Ghosh, Assistant Professor, received the Research Excellence Award from IIT Jodhpur 2020.
4. Subhashish Banerjee, Associate Professor, received the Research Excellence Award from IIT Jodhpur 2020.

Students

1. Khusbhoo Dixit joined as a postdoctoral fellow at the Department of Physics, IIT Bombay.
2. Shweta Yadav was selected for PhD at the University of Texas Arlington, USA.
3. Manisha was selected for PhD at the Technical University of Darmstadt, Germany.

School of Management & Entrepreneurship

Faculty

1. Gaurav Kumar, along with Cal Muckley, Linh Pham, Darragh Ryan, became Runners Up in the 2020 Research Impact Case Study Competition organised by UCD Dublin, Ireland, 2021.
2. Anuj Pal Kapoor became UNESCO Fellow
3. Akanksha Choudhary received the RDW Fellowship award from International Labour Organization (ILO)
4. Akanksha Choudhary received Excellence in research/Best Thesis award from IIT Bombay

Events

Events

Celebration of National Festivals & Observance of Days of National Importance

Dr. B. R. Ambedkar Jayanti, 14 April 2020

Dr. Ambedkar is known as the principal architect of the Constitution of India and has been bestowed with the country's highest civilian honor – the Bharat Ratna. On Ambedkar Jayanti, also known as Bhim Jayanti, the Committee for Celebration of Commemorative Days (CCCD) organized an Essay Contest and an **Art Competition** (painting/sketch/collage/poster/video) open to all students, faculty, staff and family members. The themes revolved around the values of social equality, social justice, law and Constitution as embodied by Dr. Ambedkar.

National Technology Day, 11 May 2020

IIT Jodhpur celebrated National Technology Day on May 11, 2020 with a **Webinar Panel on Technological Innovations at IIT Jodhpur in the fight against Covid-19 Pandemic**. National Technology Day marks the anniversary of this day in 1998 when India achieved a major technological breakthrough by successfully carrying out nuclear tests at Pokhran, Rajasthan. In today's difficult times, this day has a special significance as it celebrates everyone who is leveraging technology to bring a positive difference in the lives of others. The fraternity of IIT Jodhpur has taken remarkable initiatives during these trying times of the Covid-19 global pandemic. IIT Jodhpur applauded all the teams (such as those of Prof. Nirmal Rana and Prof. Kaushal Desai), who have successfully delivered hand sanitisers and face shields, and other teams who had been working tirelessly on developing systems to decontaminate N95 masks, (iii) AI-driven diagnostics using X-ray and CT-images of lungs, and (iii) a Hindi chatbot to provide diagnostic guidance.

The webinar included talks by four faculty members who presented the contributions made by their respective teams, and was live-streamed on Google Meet for the students at home. The panelists included **Prof. P. K. Tewari** (Visiting Professor and Head of Department of Chemical Engineering) who talked about the water-related issues during and after COVID-19 pandemic, particularly the challenges and opportunities; **Prof. Ram Prakash** (Department of Physics) who presented his team's work on Photocatalytic Oxidation Sterilization System for treating the N95 Facemask Respirators used by healthcare workers so that they may be reused. **Dr. Sumit Kalra** (Department of Computer Science and Engineering) presented NextGen Smart Telemedicine Portal for scalable and contactless healthcare services, and **Prof. Mayank Vatsa** (Department of Computer Science and Engineering) talked about the AI-based technology intervention from his team during this pandemic. The webinars were followed by remarks by the Director, **Prof. Santanu Chaudhury**, who highlighted the value of science and technology being realized around the world during this pandemic, and congratulated all the students who worked remotely and contributed to the innovations despite the lockdown.

International Day of Yoga, 21 June 2020

IIT Jodhpur celebrated International Day of Yoga on 21 June 2020 with warm and enthusiastic participation from students, faculty and staff members and their families. The event was coordinated by the Committee for Celebration of Commemorative Days (CCCD) and the Student Sports and Games Society. In adherence to the Ministry's office memorandum dated 16 June 2020 in view of the pandemic, the IITJ fraternity practised Yoga-at-home. On 21 June 2020 at 7 am, the entire IITJ fraternity wholeheartedly watched the Live Telecast of the Common Yoga Protocol (CYP) Session and practised yoga-at-home. Many members also joined the virtual meeting event to watch and practice yoga together while at their respective homes. Following the live CYP session, an online talk on mental health and stress relief titled 'How Yoga can open up doors of positive living for us' was delivered by Mr. Prasad Gadkari (Student Counselor and Consultant Psychologist, IIT Jodhpur). Another talk by Mr. Prasad Gadkari on 'COVID-19 Stress and Coping' was later premiered on the Institute's YouTube Channel.

Before the event, the Student Sports and Games Society organized a **Yoga Photo and Video Challenge** open to all members, including an inter-hostel contest on the basis of difficulty of the asanas presented. The event was widely promoted on the Society's and the Institute's social media in the form of a video trailer. The challenge received about 39 entries from 28 participants.

Event highlights at https://youtu.be/sQ1ZKrb1cN4

Independence Day, 15 August 2020

IIT Jodhpur celebrated the 74th Independence Day with a grand celebration both in-person and on virtual platform with activities ranging from rich cultural performances and felicitation of Covid warriors to premier screening of a documentary film and a tree plantation drive. The event started with the **hoisting of the national flag** by the Director, Prof. Santanu Chaudhury. The flag hoisting was attended by Heads and Deans while maintaining social distancing, and was livestreamed to the entire IITJ fraternity on the online platform. After the flag hoisting, the **Independence Day Address by the Director** was delivered live from the Boardroom on the virtual platform. This was followed by wonderful **cultural performances by students of IIT Jodhpur and children from Kendriya Vidyalaya IIT Jodhpur**. The program also included the **film premier** of another story of self-reliance, sustainability, gender and ecological equity - the documentary film Under Another Sky. This film, directed by Maverick Prem and Dr. Vidya Sarveswaran (Department of HSS, IIT Jodhpur), is a story about the village of Piplantri that celebrates the birth of every girl child by planting 111 trees. The film is situated at the intersections of environment, gender, mining, education and atmanirbhar or self-reliance as its themes.

Watch Under Another Sky online at: https://youtu.be/OQZdDmC_W5w.

The virtual program concluded with a Vote of Thanks by Chairman, Committee for Celebration of Commemorative Days (CCCD), Prof. Kamajit Rangra, and was immediately followed by

a **Tree Plantation Drive** in the campus. The Evening Session of the program presented a **Panel Discussion on Firsthand experience of Covid-19**. The panelists shared insightful and moving experiences of their experience of fighting Covid-19 as medical professionals, security personnel and as patients.




Teacher's Day, 05 September 2020

Teachers Day Celebrations 2020 at IIT Jodhpur were held online with a colorful gamut of performances by students and faculty members. The event was organized by students, and was coordinated by students, Sonal Jaiswal and Gaurav Sen.

The event started with an address by the Director, Prof. Santanu Chaudhury, where he read Rabindranath Tagore's allegory on education, The Parrot's Tale, the English translation of original Bengali short story *Totaakaahini*. This was followed by an address by the invited speaker of the day, veteran teacher, Professor C Venkatesan (Visiting Professor, Department of Mechanical Engineering, IIT Jodhpur) who shared his insightful experiences. The 2019-20 Teaching Excellence Awards, announced during the Institute's Foundation Day Celebrations on 02 August this year, were presented to Dr. Deepak Fulwani (EE), Dr. Sandeep Yadav (EE), and Dr. Anand Mishra (CSE) by the Director.

The event also included cultural performances including speeches, dance, music, stories, skits and poems performed by students as well as faculty members to pay tribute to all the teachers on the occasion. This included classical Odissi dance performance by Bikash Pattnayak, speech by Sanjana Gajbhiye, musical performances by Piyush Gangwar, Rittwika Pan, and Sagar Munjal. The program also included a showcase of paintings by Dr Dilpreet Kaur, a poetry recitation by Dr Prasenjit Thribuvan (The Teacher I want to be), classical Kathak performance by Dr. Rajlaxmi Chouhan, and musical performances by Dr. Shrutidhara Sarma and Dr. Prodyut Ranjan Chakraborty. A comedy-drama skit on online classes was performed by Ek Bharat Shreshtha Bharat (EBSB) Team.

Event highlights at https://youtu.be/sCFrTiqWlIY

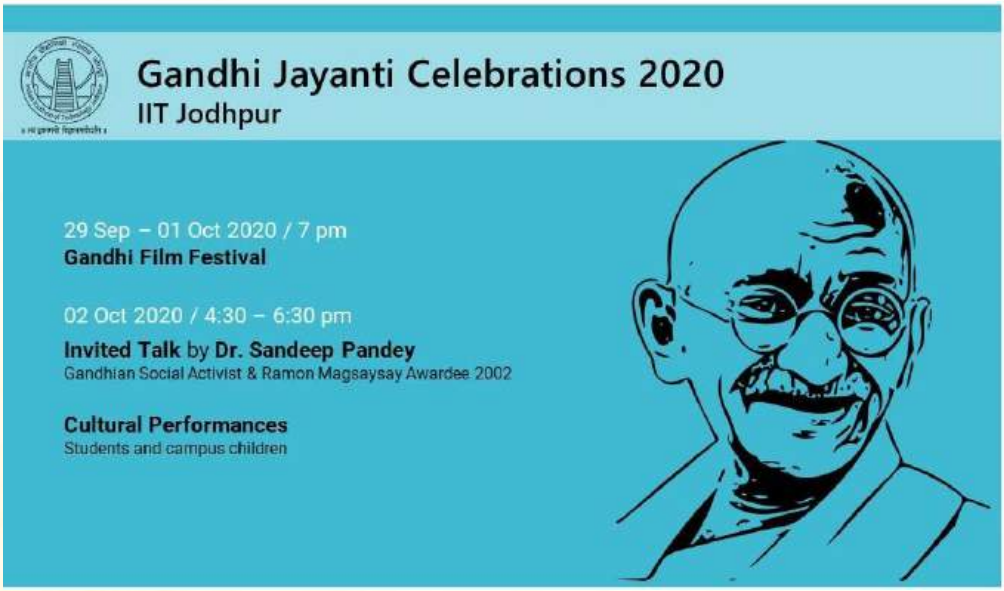
Engineer's Day, 15 September 2020

Every year, the country celebrates September 15 as National Engineer's Day to appreciate the contributions of Bharat Ratna M. Visvesvaraya. On the occasion of 2020 Engineer's Day, the Institute organized an **Invited Talk by Prof. D P Kothari**, a renowned educationist and professor, a **showcase of a few engineering design projects** made by first-year students last year, and an **essay writing competition.**

Gandhi Jayanti, 02 October 2020

On the occasion of Gandhi Jayanti 2020 and **150 Years of Mahatama Celebrations**, the Institute organized a 3-day **Gandhi Film Festival** on days leading up to October 02. On October 02, an invited talk by **Raman Magsaysay Awardee, Dr. Sandeep Pandey**, was organized along with some cultural performances by our students, a tree plantation drive and presentation by the Campus Green Committee.

Event highlights at https://youtu.be/Tw6yVUULMnA



Constitution Day, 29 November 2020

Constitution Day, also known as Samvidhan Diwas, is celebrated on **26 November** every year to commemorate the adoption of the Constitution of India. The celebrations of **2020 Constitution Day** at IIT Jodhpur included **Reading the Preamble of the Constitution** of India, followed by an invited talk on constitutional principles by **Advocate Shri V S Jayakumar (Chennai).**

Republic Day, 26 January 2021

IIT Jodhpur celebrated the 72nd Republic Day on 26 January 2020 with a grand celebration both in-person and on virtual platform with rich cultural performances from students, staff, faculty and campus children. The event started with the **hoisting of the national flag** by the Director, Prof. Santanu Chaudhury, followed by the **National Anthem**. The flag hoisting ceremony was attended by Heads and Deans while maintaining social distancing, and was livestreamed to the entire IITJ fraternity on the online platform. Sweets were distributed at the Institute's main gate for all security personnel, housekeeping staff, and staff of the Primary Health Centre.

After the national anthem, the **Republic Day Address by the Director** was delivered live from the Boardroom on the virtual platform. Anmol Gupta, General Secretary, Board of Literary Affairs, also delivered a speech. On this occasion, the Institute also announced the **2020 Meritorious Staff Awards**. These awards were presented by the Director to Mr. Gajraj Sharma, Mr. Laxman Singh, Mr. Shakti Ranjan Patra, and Mr. Anand Padegaonkar.

This was followed by **cultural performances by students, faculty and staff members of IIT Jodhpur** and children from Kendriya Vidyalaya IIT Jodhpur. The event also included special performance by the Ek Bharat Shresth Bharat Team of the Institute. Before the event, the **Office of Students** had organized **Drawing, Singing, Poetry Recitation, and Dance competitions** for children on campus in different age groups, while the **Student Activity Council** had organized Debate, India Quiz, **Article Writing, Art, Photography and Poster Design competitions** for the students. The results of these competitions were also announced during the program by Dr. Preeti Tiwari.

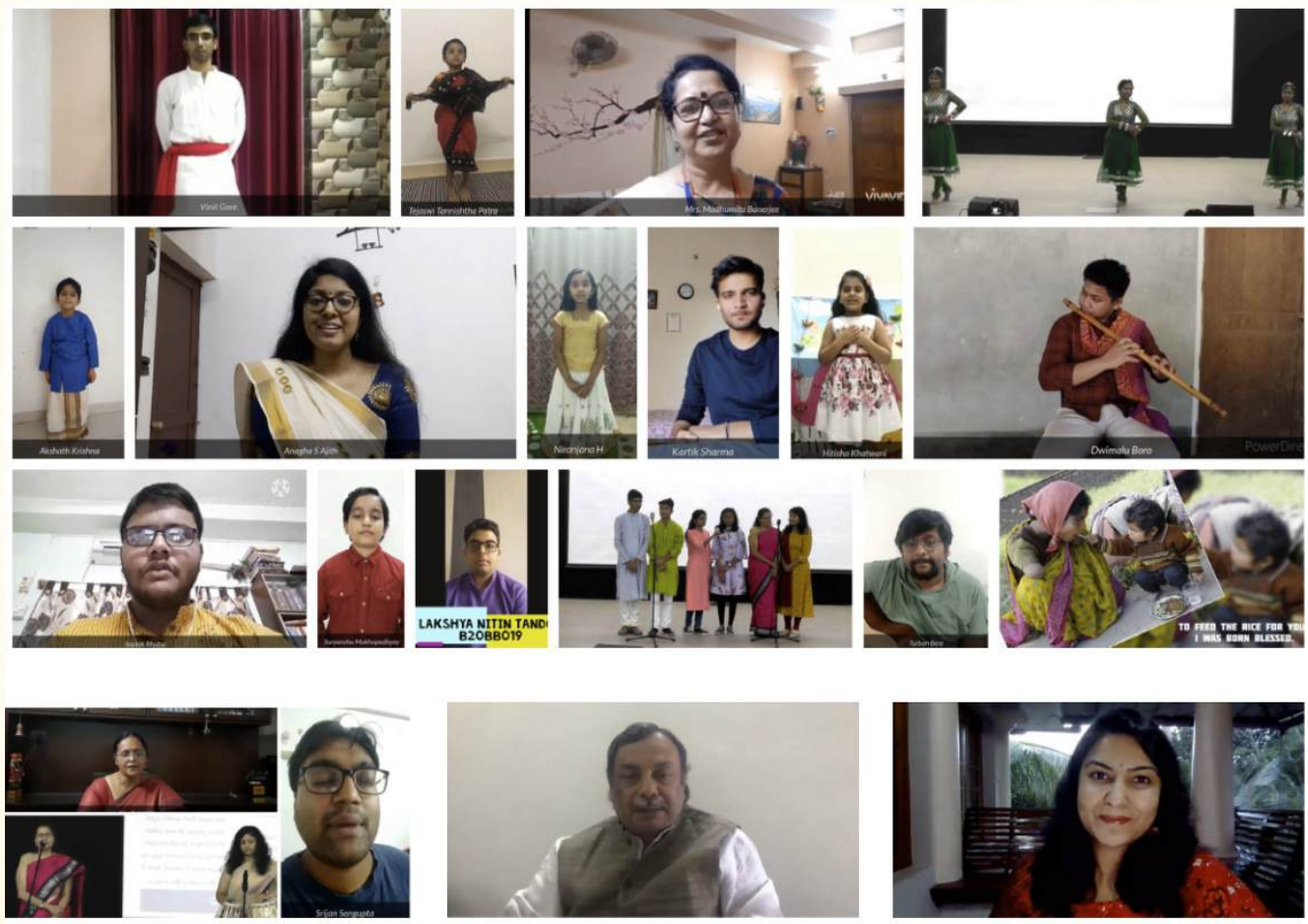
Event Highlights at https://youtu.be/8UV17Uah0KQ

International Day of Women & Girls in Science, 11 February 2021

According to UNESCO, at present less than 30% of researchers worldwide are women, and only about 30% of female students actually select STEM-related fields in higher education. In order to celebrate women and girls who are leading innovation in science and technology, and to promote their participation towards achieving gender equality, the UN General Assembly adopted a resolution in December 2015 and declared **February 11** as the International Day of Women and Girls in Science. IIT Jodhpur organized a talk by Dr. Suchetana Chakraborty, Assistant Professor in the Department of Computer Science & Engineering on the occasion where she shared her journey and research highlights.

International Mother Language Day (अन्तर्राष्ट्रीय मातृभाषा दिवस), 21 February 2021

IIT Jodhpur celebrated **International Mother Language Day** (अन्तर्राष्ट्रीय मातृभाषा दिवस) on 21 February 2021 with colorful cultural performances by the students, staff, and faculty members in online mode. 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 theme of the 2021 International Mother Language Day was 'Fostering multilingualism for inclusion in education and society' with focus on inclusion and leaving no one behind. Celebrating the linguistic diversity of our country where (as per 2011 census), there are more than 120 languages and 270 mother tongues, IIT Jodhpur also created an overall Language Diversity Map of the IIT Jodhpur campus.



National Science Day, 28 February 2021

IIT Jodhpur celebrated National Science Day on 28 February 2021 with a grand online celebration with a panel discussion and technical quiz contests for students. The event started with Panel Discussion on 'Future of Science technology and innovation: impact on education, skill and work' with eminent panelists including Mr. Alyappan Ramamurthi, Director of Digital Manufacturing, Asia Pacific at Siemens PLM Software, Prof. Sampat Raj Vadera, Head of Department of Physics, IIT Jodhpur, and Mr. Anurag Choudhary, Head of Digital Learning Stockholm International School.

CCCD and SME Connect organized various events for the students, such as a science and technology quiz, pitch contest, sci-fi content creation and theory crafting.

International Women's Day, 08 March 2021

International Women's Day Celebrations 2021 at IIT Jodhpur included an invited talk by Ms. Archana Kapoor, a Delhi-based filmmaker and community media specialist. The Photography Club of IIT Jodhpur, Shutterbugs, also organized an inter-college Photography Contest AINDRI - IN FRAMES on this occasion, whose results were announced during the event.

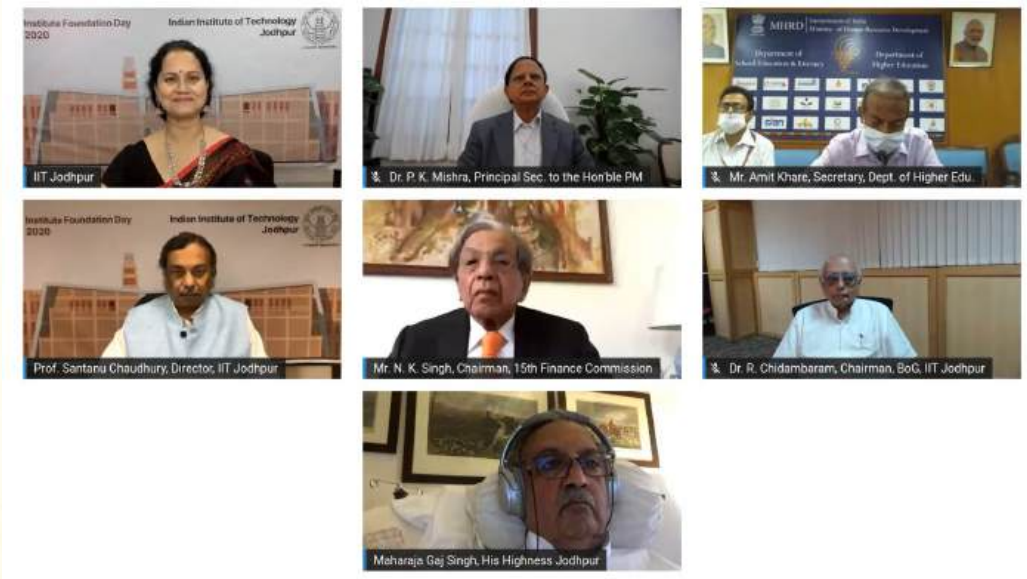
Institute Events

Foundation Day

Institute's 13th Foundation Day was celebrated on 2 August 2020. Dr. P. K. Mishra, Principal Secretary to the Hon'ble Prime Minister of India was the Guest Speaker, Shri N. K. Singh, Chairman, 15th Finance Commission, Government of India, was the Chief Guest, Shri Amit Khare, Secretary, Department of Higher Education, MHRD, Government of India was the Guest of Honour for the occasion. Dr. R. Chidambaram, Chairman, Board of Governors, IIT Jodhpur presided over the ceremony. The event started with a Welcome Address by Prof. Santanu Chaudhury, Director, IIT Jodhpur, followed by screening of the institute film "IIT Jodhpur: A Pearl in the Desert", and addressed by Shri Amit Khare and Shri N. K. Singh.

Thereafter, the Foundation Day Issue of "TechScape", the research bulletin of IIT Jodhpur, was released. This bulletin chronicles the ongoing research activities at the Institute, the campus news and highlights, opinion pieces on recent developments in science, technology and education, besides featuring invited contributions from luminaries and alumni, in various fields. Also, it features the latest developments in research and pedagogy at IIT Jodhpur, views and commentaries on science and technology in the world at large and having connection with the Institute, in-focus features and research snippets, outreach, and campus highlights. It has articles for serious readers, understandable without specialized knowledge. The content is curated to be of general interest, in particular to the IIT Jodhpur community, and to all stakeholders at large.

Then Dr. P. K. Mishra delivered the Foundation Day Lecture on "Role of Technology in Shaping Education - The Future Vistas", followed by a bried Q&A session and Presidential address by Dr. R. Chidambaram.



6th Convocation

The 6th Convocation ceremony of the Institute was held on 6 December 2020 in an immersive 360-degree mixed-reality environment streamed. Chief Guest for the ceremony was Professor Geoffrey E. Hinton, Turing Award Winner, popularly known as the 'Godfather of Deep Learning', Emeritus Distinguished Professor, Department of Computer Science, University of Toronto, Canada. 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 graduates of the Institute followed by oath taking by the graduates and presentation of prizes. Convocation address was delivered by the Chief Guest Professor Geoffrey E. Hinton, followed by Chairman's address by Dr. R. Chidambaram. The Institute awarded degrees in virtual mode via augmented reality (AR) to 117 B.Tech. students, 51 M.Sc. students, 33 M.Tech. students, and 31 Ph.D. students. Medals and certificates were awarded to the students through their computer-generated 3D Virtual Avatars. The students also took their graduation oath via their virtual avatars augmented in the Lecture Hall. Professor Hinton also inaugurated IIT Jodhpur's newly-established School of AI & Data Science and wished success to the School which is set to play a major role in research and applications of AI & Data Science both in India and on the global stage.

Facilities

Our Campus

IIT Jodhpur moved to its Permanent Campus during May-June 2017, which is 25 kms away from the heart of Jodhpur city. Sprawling over three land parcels (Pocket A, Pocket B and Pocket C) on NH-62, Jodhpur-Nagaur Highway, IIT Jodhpur campus has ~ 842 acres of land for construction purposes. 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) Walk to work concept – the campus 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 and hybrid classrooms);

(3) Smart infrastructure with GRIHA 4/5 star compliant buildings and GRIHA LD benchmark campus (incorporating centralized chiller plant for air conditioning, a utility tunnel housing all the MEP services, 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.

Faculty and Staff Members are residing on campus. Total 132 Type B Houses and 84 Type C houses have been constructed along with 12 new hostel buildings. The salient feature of these hostels is Single Occupancy Air Conditioned Room accommodation in all hostel buildings. Two dedicated dining hall buildings catering to the needs of students and other residents with a mess and a canteen in each, that serves hygienic and nutritious food. Essential services and amenities have been established to facilitate residents in their day-to-day needs. There is a Primary Health Center (PHC) being 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 parlor and salon) are operational in the Community Center towards southern side of the Campus. Kendriya Vidyalaya is also functional in the campus which is housed in Pocket B of IIT Jodhpur campus. There is a dedicated bus service for commuting from the Campus to and from the city of Jodhpur.

The photographs shown below give a glimpse of the campus of IIT Jodhpur -

Birds Eye View – IIT Jodhpur Campus

Hostel Block

Utility Tunnel - MEP services

Library Building: The Learning Hub

Housing Society

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 two Dining Hall Buildings has a Mess and a Restaurant in each that caters to the need of all 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 caroms).

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

(f) Shopping Center: Various shops catering to the primary needs of students and residents, like grocery, dairy products, stationery, grooming services; All 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, Vasan Eye Care Hospital, Vasundhra Hospital and other hospitals.

(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 ~25 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 while second phase is on the verge of completion. Buildings that are being used for its academic, research and administrative activities are:

1. Main Building, housing the administrative offices of the Institute;
2. The Learning Hub, housing the Library of the Institute
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. Chemistry Building housing the Department of Chemistry;
7. Electrical Building housing the Department of Electrical Engineering ;
8. Mechanical Building housing the Department of Mechanical Engineering ;
9. Duchenne Muscular Dystrophy (DMD) Centre is established in a part of Primary Health Centre building;
10. Kendriya Vidyalaya runs is the First Building of IIT Jodhpur in Pocket B. ;
11. Physics Building housing the Department of Physics;
12. Metallurgical and Materials Building housing the Department of Metallurgical & Materials Engineering and Department of Chemical Engineering;
13. Bioscience & Bioengineering building housing the Department of Bioscience & Bioengineering;
14. Incubation & Innovation Centre Building housing the Technology Innovation and Startup Centre for nurturing innovation and entrepreneurship in various domains;
15. Semi-Permanent Building for Animal House and School of Management & Entrepreneurship;

The other buildings which are under construction are:

(1) School of Artificial Intelligence and Data Science;

(2) Central Instrumentation facility Building;

(3) Workshop Building which also houses Department of Civil and Infrastructure Engineering;

(4) Berms: Eastern (23 nos.) and Western (28 nos.) - Each berm comprise of 5 bays and provides ample of space for housing Laboratories for the Departments of Civil & Infrastructure Engineering, Chemical Engineering, Research Labs on Inter Disciplinary Research, Gymkhana, commercial establishments etc;

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

Aerial view of the IIT Jodhpur Campus

UG Workshop Building

Physics Building

Metallurgy and Material Engineering Building

Type C: Staff Housing

Park Area – Type C Housing

Hostel Building

Student Hostels

Jodhpur Club – For Faculty and Staff

Utility Tunnel - Entrance Ramp

New Dining Hall Building

Primary Health Centre

Berms

Lecture Hall Complex

Type - B Housing

Computer Centre

The Institute has a modern Computer Center to cater the computation and network requirements of the institute. The Computer Center is powered by a 10 G backbone. Presently the institute's internet requirements are met by 4 Gbps Internet lease line out of which 3 Gbps ILL (2 Gbps from PowerGrid and 1 Gbps from BSNL) have been added in 2020-21. The second phase of the network has been established by the Computer Center in 2020-2021. 802.11/b/g/n Wi-Fi service is enabled in the academic and hostel areas. A new Wireless Controller has been added to the appliances of the Computer Center in the year 2020-2021. Computer Center also upgraded its network security appliance by adding a new UTM from Fortinet. It can provide seamless protection from any cyber threats. It provides secure VPN connectivity to IIT Jodhpur fraternities while they are not inside the campus. Computer Center is the nucleus of major computing activities for students, staff members and faculty members. The Computer Center of IIT Jodhpur is the proud host of the first DGX A100 AI Supercomputer of India. Two DGX A100 AI Supercomputers are added in the academic year 2020-2021. The center established a new data center with a precision cooling system which hosts several computing servers, mini HPCs and mentioned two NVIDIA DGX A100 AI servers. Six license servers of various operating systems from Windows and GNU/ Linux family are used to hosting various licensed software like MatLab, Mathematica, Cadence, Mentor Graphic, Ansys, PSCAD, Solidworks and many more from different departments. Jira Service Desk based ticketing system has been introduced during 2020-21 for better support management.

NVIDIA DGX A100 Supercomputer

New Data Center (Established: 2020)

Facilities

The Computer Center provides facilities of internet, email, IP telephone, cloud storage, WiFi, computing, VPN, LDAP, license server, online classrooms (such as moodle), FTP, and on premise web hosting to IIT Jodhpur fraternities. Computer Center also provides SSL certificates for all the iitj.ac.in domains and subdomains.

Resources

The Institute has several key resources at the Computer Center which includes softwares, hardwares, operating systems and laboratories with modern computers. At present two computer laboratories, one with 80 terminals and another with 60 terminals are operated by the Computer Center. Computer Center has licenses of Microsoft Windows Operating Systems, Microsoft Office, RHEL, RHVM and Matlab. Details of the resources are provided below.

Hardware Infrastructure

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

- 2 NVIDIA DGX A100 AI Supercomputer
- NAS storage with 250 TB usable space
- SAN storage with 30 TB usable space
- Cisco WebEx room 70 duals currently installed at the Board Room
- WebEx room 55 single currently installed at CDC Room
- WebEx board 85 and Room Kit Pro Precision 60 currently available at LHB
- Cluster of 11 Servers consisting of 3 Cisco, 4 Dell and 4 Fujitsu Servers
- Fortinet UTM and FortiAnalyzer
- Cisco Communication System which includes CUCM, Voice Gateway and CMS in HA for IP Phones
- IP Phone (330 phone installed till date)
- Network equipment of Cisco consisting of (468 no. installed till date) WiFi AP with License, L2 (310 installed unit) and L3 (25 installed units) Switches, 2 Core Switches, and 2 Wireless Controllers in HA.

Software Licenses

- Red Hat Enterprise Linux
- Standard License: 26 Licenses
- HPC: 56 Licenses
- RHVM: 40 Licenses
- Microsoft Windows
- Server 2012, 2016, 2019: 5 Licenses
- Desktop Education Academic Enterprise: 100 Licenses
- MS SQL Server: 2 Licenses
- MS Project suit: 10 Licenses
- Google
- Google Workspace for Education: Unlimited
- Google Workspace Education Plus: 200 Faculty Licenses and 2000 Student Licenses
- MATLAB License: Unlimited Institute Wide Access
- WebEx
- Meeting: 100 Licenses
- Events: 5 Licenses
- Device: 5 Licenses

Centre for Advanced Scientific Equipment (CASE)

Center for Advanced Scientific Equipment (CASE) at the IIT Jodhpur has been established in the year 2018. The CASE has an endeavor to provide a state-of-the-art instrumentation facility in the multidisciplinary field of research to the undergraduate, graduate, Ph.D. students and the faculties of this esteemed institute as well as researcher from other institutes across the country.

Main Objectives of CASE facility:

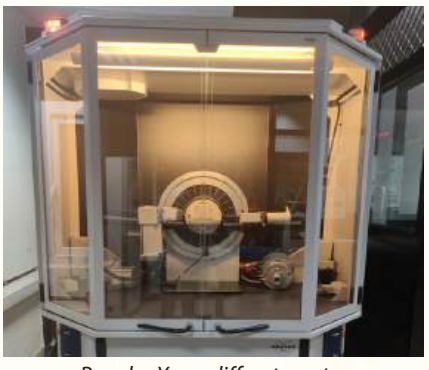
- To offer students and faculties of IITJ for smooth accessing high end instruments for their research need.
- To provide smooth access of this facility to the external academic institutes as well as R & D organizations.
- To offer hands-on training for students of IITJ through training programs/workshops on various sophisticated equipment for their professional growth.

At present a total number of 93 high end instruments are under CASE facility. Currently, the space allotted for CASE facility (Room No. 111 & 112, ground floor, Chemistry building) houses 22 equipment including various sophisticated instruments such as 500 MHz NMR, Single Crystal XRD, Powder XRD, AFM, SEM, PPMS Dynacool, SQUID, Surface area analyzer, DSC, TGA etc.

Rest of the equipment under CASE facility are located at various departments of the institute. The overall day to day activities and the policy of the center is determined by a committee of faculty of this institute. The CASE committee appointed a faculty in charge for each of the instruments under CASE for smooth running and maintenance the equipment. Further, CASE facility at IIT Jodhpur imparts an opportunity towards its users for accessing various latest and advanced instruments persuasively via a transparent online booking portal. Thus, CASE facility contributes its users significantly to publish their research findings in internationally peer reviewed journals. IITJ CASE facility is also extended to external users from all national institutes and R & D organizations for accessing this facility on a minimal chargeable basis.

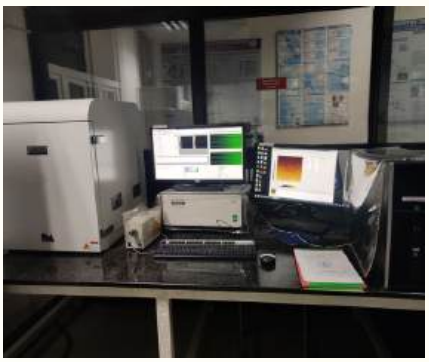
Differential Scanning Calorimeter

Simultaneous Thermal Analyzer



Powder X-ray diffractometer

Single crystal X-ray diffractometer



Atomic Force Microscope

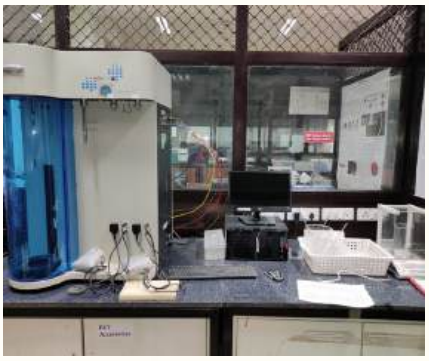
Scanning Electron Microscope and EDS

NMR Spectrometer (500 MHz)

UV-VIS spectrometers

FTIR

Fluorescence spectrometer



Surface area analyzer

Fuel cell

PPMS DynaCool

SQUID

Raman spectrometer

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.

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

Collection

The Library has a rich and growing collection of 14,000 volumes of books and e-books approximately, which include textbooks, and books of general and reference nature. A wide range of scholarly journals, databases and research support tools 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 Biometric enabled 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.

A resource 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.

RFID Gate & Drop-Box

Stacks & General Section

The vital statistics of Library for FY 2020-21, are as follow:

Sl. No.	Description	Statistics	
1.	Print Books added	Total 455	
	a. Number of titles added		154
	b. Number of volumes added		455
2.	eBooks added		
	a. Number of titles & volumes added		419
2.	Number of Scholarly Resources subscribed (For CY 2019)	Total 38	
	a. Fulltext resources		24
	b. Archive of fulltext journals		3
	c. Research databases		6
	d. Research support tools		5
3.	Document Supply & Inter Library Loan service requested fulfilled	Total 61	
	a. Document supply of articles & research papers		60
	b. Books arranged on Inter Library Loans		1
4.	Circulation Transactions	Total 3,937	
	a. Number of book check-outs		1,566
	b. Number of book check-ins		1,799
	c. Number of book renewals		525
	d. Number of book recalls		47

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.

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.

SC-ST Cell

The Institute is sensitive about any kind of discrimination against Students and Employees of SC and ST Categories. Therefore, an SC and ST Helpdesk for ensuring the proper utilization and adaptation of reservation policies and guidelines issued by the Government of India, is functional at IIT Jodhpur. The Institute ensures that Faculty Members, Staff Members and Students desist from any act of discrimination of any kind against Students and employees belonging to these categories.

The Helpdesk deals with matters related to grievances received from SC and ST employees and students in the Institute. The Helpdesk acts as a communicator between the Institute and the Ministry of Education in matters related to SC and ST students and employees in the Institute."

Primary Health Centre

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 are available at the Primary Health Center (PHC).

1. Qualified Medical Doctors,
2. Regular Visits of Specialist Doctors,
3. Paramedical Staff,
4. Diagnostics Laboratory
5. Physiotherapy Unit,
6. Pharmacy,
7. 24 Hours Emergency Room, and
8. 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, Vasundhara Hospital, and ASG Eye 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 the Health Center are all computerized. Visits of Specialist Doctors are scheduled at the Primary Health Centre on weekends i.e., on Saturday and Sunday.

Primary Health Centre on Campus

Staff at the Primary Health Centre

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.
(7) Volleyball Ground;
(8) Kabaddi Ground; and

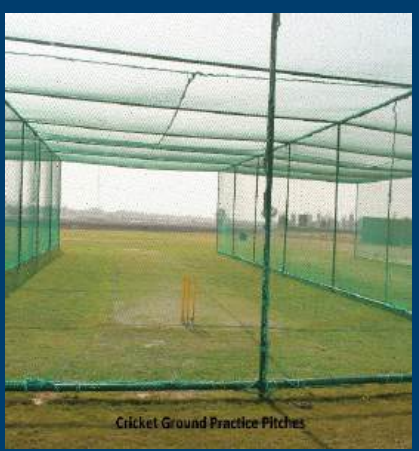
The Indoor Stadium (Aakash Complex) with facilities such as Badminton Courts, Table Tennis, Squash and Gymnasium is under construction.

Sports Facility – Indoor (Aakash Complex) and Outdoor Stadiums/Courts

Aerial view of the Sports Grounds at IIT Jodhpur

Lawn Tennis Court

Basket Ball Courts



Cricket Practice Pitch

Student Activities

Student Council

This year 24th senate meeting has approved in principle the framework of a new structure for student activities and to frame its Constitution and the broad scope of activities. The final constitution of Student Activity Council (SAC) and Academic and Co-Curricular Activity Council (ACAC) was formed after the due approval. The constitution is in line with ordinance and amendment clauses and participation of PWD students.

As per the Constitution of SAC and ACAC, the President of the various Boards under SAC and ACAC has been appointed to organize the student activities in a smooth manner over offline and online platforms.

Student Activity Council (SAC)

1. Board of Art & Culture
2. Board of Literary Affairs
3. Board of Student Sports
4. Board of Student Welfare
5. Board of Hostel Affairs

Academic and Co-Curricular Activity Council (ACAC)

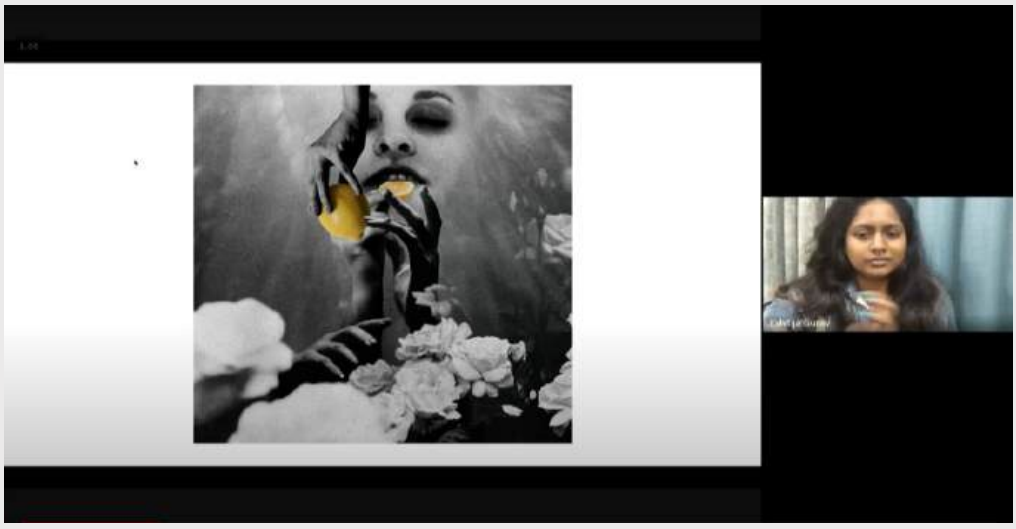
1. Board of Academic Interactions
2. Board of Co-curricular affairs
3. Board of Departmental Society
4. Board of Innovation and Entrepreneurship
5. Board of Career Development
6. Society for Alumni Affairs

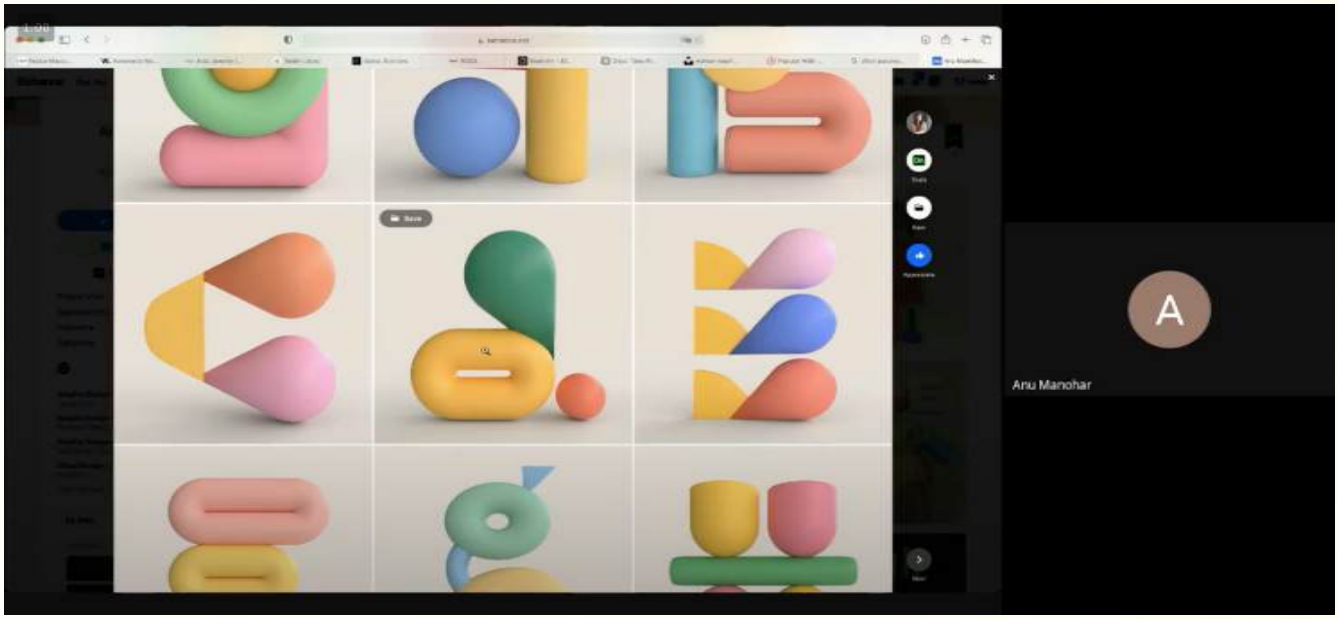
Student Fests & Events

The students' societies have organized the following events.

1. Designing Workhop

During the Academic Year 2020-21, the Logo Designing Workshop, 3 D Designing Workshop and Digital Collage Workshop was organized by the core members of the Student Design and Creativity Society through online mode wherein students got exposure to the designing.





2. Dramatics

The following sessions were conducted by the Drama Club during an introductory session to the Drama Club.

1) Theatre (Stageplay) basics with National Theatre UK Frankenstein screening: 2 sessions
2) Nukkad (Street play) basics: 2 sessions
3) Facial expressions, voice modulation and control, body movements: 3 sessions
4) Improve acting: 3 sessions
5) Role-playing and character background: 1 session
6) Monologue basics - 1 session
7) Monologue tasks for first-year students
8) Group acting tasks for first-year students

3. Fresher's Dance Competition

Two days' workshop on Dance was conducted by the core members of the Student Dance Society through online mode. The Fresher's Dance Competition was enjoyed by all students.

4. Shutterbugs

The Photography Club of IIT Jodhpur, Shutterbugs, had organized an Event Poster Competition on the Republic Day 2021, Colour Correction Activity and an inter-college Photography Contest AINDRI - IN FRAMES on International Women's Day 2021.

Introductory sessions, basics photography and mobile photography tutorials have been conducted online by the Shutterbugs.

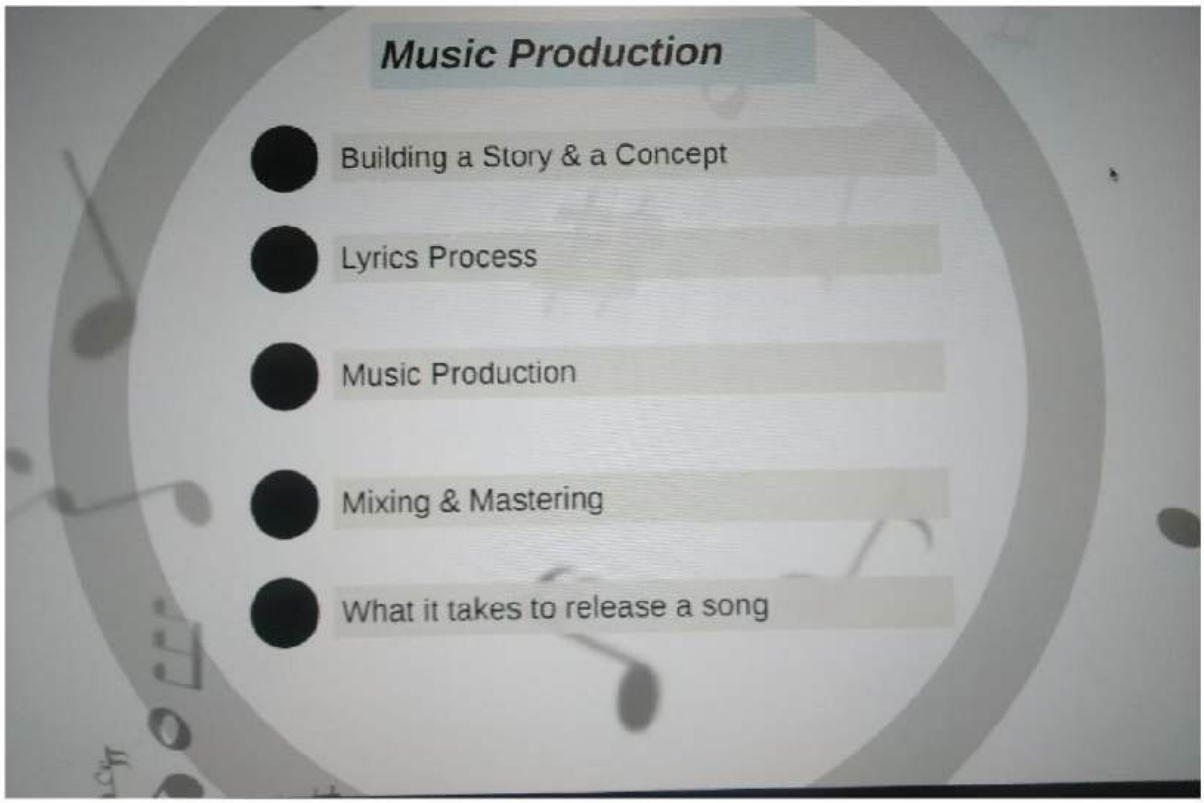
5. Fine Arts & Crafts

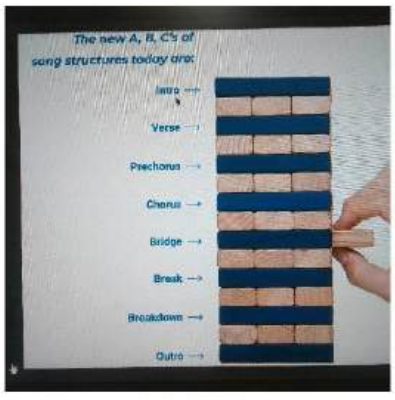
The below-mentioned workshops were organized by the Fine Arts and Crafts Society

Dates	Purpose
7 January 2021	Introduction to Camera Technology and Types Introductory session
8 to 14 January 2021	"Complete Your Way" Challenge
17 to 23 January 2021	Theme-Based Art Competition
24 February to 3 March 2021	Sketching Week

6. Music

The Music Club of IIT Jodhpur had organized a Music and Video Production workshop on Art of Storytelling using Music through online mode on 20 February 2021 with the collaboration of Frame X.





7. Ek Bharat Shresth Bharat

EBSB is a program to enhance interaction & promote mutual understanding between people of different states/UTs through the concept of state/UT pairing. Under the EBSB scheme proposed by MHRD, Govt. of India different activities have been conducted by the EBSB IIT Jodhpur.

Webinar on Dehing patkai was organised by EBSB, IITJ on 29 May 2020. The lifestyle of the Dehing patkai including the lifestyle of the forest people of Assam was shared.

Webinar on the language workshop was organised by EBSB, IITJ on November 29, 2020. Prof. Shakuntala Mahanta was the speaker of the Webinar.

EBSB club of IIT Jodhpur also hosted a webinar on the "Role of youth in the development of the nation" by Professor Vivek Vijay, IIT Jodhpur on 11 September 2020.

EBSB Club of IIT Guwahati in coordination with IIT Jodhpur hosted a webinar on the Sattriya dance by Artist Dr Anwesha Mahanta on Monday, 31 August 2020 through Google Meet. Dr. Mahanta is an impanelled artist with Indian Council for Cultural Relations (ICCR) and is an A-Grade artist of Prasar Bharati.

Webinar on "Enhancing Psychological Wellbeing and Resilience" was hosted by EBSB IITJ on 16 Jan 2021. The speaker of the webinar was Mr. Prasad Gadkari. In this webinar, the information on mental wellbeing was shared by Mr. Gadkari.

The online orientation session was conducted by the EBSB club, IITJ on 12 February 2021 which was shared with IIT Guwahati.

EBSB club of IIT Jodhpur has hosted a webinar by Professor Vivek Vijay on 26 February 2021. The title of the webinar was "Mental Balance- A key to happiness."

8. Rotaract Club

Rotaract Club of IIT Jodhpur

District ID: 3053

Rotaract club, IIT Jodhpur has organised the following webinars.

a) Webinar on "आत्म निर्भर आप-Security of Investments in tough times of COVID-19"

b) Webinar on "Building Resilience in the face of Danger" with Twin Club participation Rotaract Club of GCET College (RID 3060)

c) Webinar on "Power of Rotaract"

Rotaract Club, IIT Jodhpur has done two Project Collaborations with other Rotaract Club.

a) Behind the White Coat in collaboration with Rotaract Club of Global youth (RID 3131)

b) EARTH BALL project in collaboration with Rotaract Club of Latur Midtown (RID 3132)

Donation Drives have been organised by Rotaract Club, IIT Jodhpur.

- Mask Distribution Drive in IIT Jodhpur campus
- Collection and Donation Drive of Clothes in IIT Jodhpur campus
- Blood Donation Camp in IIT Jodhpur campus

Mask Distribution Drive

Collection and Donation of Clothes

Student Accolades

During the Financial Year 2020-21, students of the Institute received their share of accolades.

9. UG Orientation 2020

The Orientation programme is an opportunity to introduce the new students to life at the Institute and facilitate a smooth transition to the new life. The objective is to help both undergraduate students and their parents adjust to the campus through a series of activities and sessions organized as part of the programme. During Orientation program 2020 from 20th to 28th November 2020, a total 17 nos. of guest speakers were invited through online mode.

10. Adequate measures to prevent and control the spread of COVID-19

IIT Jodhpur has taken adequate measures to prevent and control the spread of COVID-19 on campus, like, random RT-PCR testing on weekly/twice/ thrice in a week, Vaccination, Slot system in Dining Hall, sanitization of Hostel rooms and common area, separation of dining tables by acrylic sheets, creation of isolation centres etc.


SPACESHIP


I-2
कोरोना से बचें
SHOT ON MI A1
MI DUAL CAMERA


कोरोना से बचें
SHOT ON MI A1
MI DUAL CAMERA

Student Wellbeing

The Student Wellbeing Committee (SWC) is an integral part of IIT Jodhpur since 2008. It takes care of the mental wellbeing and overall happiness factor of all the students of IIT Jodhpur. Every year, it strives to ensure that every student gets to know the Institute in intricate details and to help absorb all 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 the Student Wellbeing Committee 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 Wellbeing Committee 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 Wellbeing Committee 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. The Counsellor and a wellbeing moderator are available 24 x 7 at the disposal of students. Besides, the Student Wellbeing Committee 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) Stress management, (b) Time management, (c) Health care and hygiene, (d) Substance Abuse, (e) Relationships, (f) Cope with homesickness, (g) Addiction and others, and (h) 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.

The details of the events organized by SWC are also mentioned on the website: http://swc.iitj.ac.in/. The following activities were conducted in the past year:

1. Fresher's Orientation (including campus tour, Counsellor's talk, Alumni interaction and virtual talent show)

20th – 28th Nov 2020

The Orientation Week is organized by the SWC 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. It started with a Formal Session by Student Wellbeing Committee team UG describing the Team Members, Team Structure, Hierarchy, Functioning of Team, whom to approach, etc. Next day was a virtual Campus Tour and Campus activities tour. Next couple of days included Session with Mr. Arvind Bhatt (Importance and technique of Goal Setting and Time Management), Your Dost (Introduction of YourDost app), Student Counsellor and Wellbeing Moderator (Importance of Mental health, counseling facilities at campus, concept of socially connected world, digital fasting,etc.). The following days were more fun for students as there were sessions with IITJ Alumnus (Kirtivardhan Singh Rathor (IITJ 2012-16) on College life, opportunities, how to study while enjoying, achieving your goals, working on your hobbies, etc. and virtual talent show and other informal sessions.

2. Freshanza 2020

25th - 30th December 2020

This was a fun-filled event included Freshenza Kick off, Mr./Ms. Freshers Events (Group discussion, tasks, etc), informal events, Group task Show Drama Showcase, Dance Showcase, Music Showcase and declaration of Mr. and Ms. Freshers.

3. Virtual Progressive Muscle Relaxation by the Counsellor (every week)

Progressive Muscular Relaxation (PMR) is a medically proven technique to soothe and calm an individual's nerves. Well-known for its ease, this user-friendly exercise can take care of anxiety and it's resultant fall-outs. The relaxed state of mind and body, achieved through PMR learning, leaves it's positive effect on students' health, with better self-control and preparedness to face tensions in life. Most of those situations are when students become very tense, worry too much, anticipate bad outcomes such as exam tensions, anxiety/ headaches before viva/ interview, stage fright, speaking in front of class, strangers/ opposite gender and so forth. It helps in improving disturbed sleep, poor appetite/ digestion, fatigue, hypertension, ulcers and other problems having origins with mental anxiety and emotional disturbances. Learning Progressive Muscular Relaxation (PMR) helps in a positive step towards a healthy lifestyle.

4. Covid conquered: How to move forward - Interaction with the Counsellor

27th Nov 2020

The students were given an opportunity to share their experiences, ask health related queries and receive inputs for better coping from Student Counselor and Team. It was conducted to provide extended psychological support for students who all went through difficult times with COVID.

5. In person - counselling sessions in campus (17th, 18th and 30th Nov 2020)

This session was organized for those who are staying in hostels and many students are facing stress, isolation, and worries regarding their health and well-being. Through this the students could interact with the Student Counselor who took care of worries and negativity in these interactions.

6. World Mental Health Day (10th Oct 2020)

7. PG Orientation 2020 (02nd Sept 2020)

It started with the introduction of the PG wellbeing team, Role and responsibility of the team members, role of student counsellor and well being moderator and the contact information and procedure of contact.

8. Basic Counselling Skills Workshop - Training by Student Counsellor to both UG and PG teams (19th Dec 2020)

The main aim was to discuss basic Counselling Skills. Educate students of the Communication Skills (Do's and Don'ts of Communication in Counselling) and Future Plan of the Year

9. Repeated virtual group sessions with new students

10. Cafe Connection - Every week on campus

The objective of this meeting is to break the stigma about mental health, to normalize the Counselling among the students. Students are hesitant to come to the health centre

sometimes and this stops students from taking help from team Counselor therefore we started to provide a space and time (After their classes) for their convenience.

11. Enhancing Psychological Well-being and Resilience - Webinar in EBSB by the counsellor (16th Jan 2021)

12. Covid - 19: Fighting the second Wave

For students who were COVID positive or in quarantine (Virtual group sessions and one to one sessions on 17.04.2021, 22.04.2021, 24.04.2021, 01.05.2021, 03.05.2021, 10.05.2021)

13. Gratitude Day celebration – 25th Feb 2021

14. Yearbook class of 2021

As it is said, it's the little memories that last a lifetime and so to make this adieu indelible, we planned to make a YEARBOOK for passing out batches. This included uploading the photo, adding a line that aptly describes this voyage and the information will be updated on the website of SWC.

15. Airmeet by UG team

In an airmeet, there are many tables (breakout rooms) and anyone can join any table to have a conversation with the people already sitting on the table. This is to promote conversations and encourage students to talk about their problems / interests and their lives with their peers.

16. Fare Thee Well by UG team

17. Few webinars organized by YourDost

Career Development Cell

The Career Development Cell (CDC) aspires to provide comprehensive career counseling to IIT Jodhpur students during their academic involvement and after graduation. CDC performs various individual and collective activities relating to the training and placement process planning, career development, counseling, competence/skill assessment, decision making. CDC fosters students' abilities, competencies, and interests and assists them in developing professional skills, knowledge, and positive attitude to manage their career path. Due to the current pandemic situation worldwide, the entire placement process was conducted virtually. To date, more than 100+ companies participated in the Placement Season 2020-2021. Some renowned companies that participated in the placements are Microsoft, Morgan Stanley, Oil India, Tata Consultancy Services, L&T Engineering, Maruti Suzuki, Amazon, Goldman Sachs, Accenture, ZS Associates, Nippon Steel, Adani Enterprise, CDAC, Sterlite Technologies, Ceremorphic, DE Shaw, and Gojek.

Key statistics from the season 2020-2021:

- 100+ companies participated in Internship and Placement.
- Total no. of students placed-135 (B.Tech. – 105 Students, M.Tech.- 29 Students, M.Sc.- 1 student)
- B.Tech. placement percentage - 83%
- Average salary offered to the B.Tech. Students – 14.36 Lakhs
- 23 PPOs offered

Activities in the season 2020-2021:

- Internship and placement planning
- Individual/Group Career Counselling
- Interaction Sessions with industry professionals
- Effective Job Search Strategies
- Soft Skills Training Sessions
- Welcome/Introduction Sessions
- Mock Interview Sessions

"Soft Skill Training Session" was organized on 28th August – 30th August 2020 by Thinkers and Fillers. The said training was conducted for the final year students. The topics covered were: Resume Writing, Corporate Etiquettes, Group Discussions, and Mock Interviews. In addition, a "Welcome/Introduction Session" was organized by CDC student body on 5th June 2021 for the second and third year students to introduce them to CDC functioning and to discuss the internship/placement process.

Happy faces are the symobol of Acceptance and growth.
A great experience with IIT Jodhpur Students.

roup discussion, personal interview, case study based interactions,
. Counselling from Industry mentors, real-time feedback is a successful
INTERVIEWS. A great experience with IIT Jodhpur Students

B.Tech. Placement for the year- 2020-2021

Sl. No.	Name of the Company	Number of Students selected per Branch			Total Number of Students Placed
		CSE	EE	ME	
1	Accenture		1	2	3
2	Adobe	1			1
3	Apty		1	2	3
4	Arcelormittal Nippon Steel		1		1
5	Arcesium	1			1
6	Ceremorphic		1		1
7	CGI			1	1
8	Cognizant			1	1
9	DE Shaw	1			1
10	EcomExpress		1		1
11	ET Media Labs			1	1
12	Exawizards	1	1		2
13	Future First			1	1
14	Goldman Sachs	1	1	1	3
15	Impact guru	1	2	1	4
16	L&T Engineering		1	2	3
17	IPL Electric Truck		2	3	5
18	L&T Infotech	5			5
19	Maq Software	3			3
20	Maruti Suzuki			2	2
21	MCZC		1		1
22	Microsoft	8			8
23	Morgan Stanley	1			1
24	Nebula		1		1
25	Nokia	2	5		7
26	Oil India			1	1
27	Optum	1			1
28	R System	1	1		2
29	Reliance Jio	4			4
30	Sigmoid analytics			1	1
31	Signalchip		2		2
32	Slice IT			1	1
33	SMS Datatech	2			2
34	Speedlabs			1	1
35	Sterlite Technologies	5			5
36	TCS			1	1
37	Technoforte	2		1	3
38	Tredence Analytics			1	1
39	Trueminds Software	1			1
40	Truminds		1		1

B.Tech. Placement for the year- 2020-2021

Sl. No.	Name of the Company	Number of Students selected per Branch			Total Number of Students Placed
		CSE	EE	ME	
41	Tuning Bill Software	1	2		3
42	Vedantu	1	2		3
43	Wipro	2	1	1	4
44	Yodlee	5			5
45	ZS Associates		1	1	2
	Grand Total	**50**	**29**	**26**	**105**

M.Tech. Placement for the Year 2020 - 2021

Name of the Company	Total number of students placed								Total number of students placed
	AI	CSE	CPS	DCS	TFE	AMD	BB	MT	
Adani Entreprise	1								1
Apty	1								1
CDAC	2	2					1		5
Impact Guru				1	2	1	1		5
Infosys	1		1						2
L&T Engineering					1				1
Nippon Steel						1		1	2
Spanidea	2	2		1					5
Sterlite Technologies		1							1
Tata Consultancy Services	1	1							2
TCS	1	1	1	1					4
Grand Total	**9**	**7**	**2**	**3**	**3**	**2**	**2**	**1**	**29**

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.

IITJ Alumni Featured in the 2020 - Forbes 30 under 30 list - Media, Marketing & Advertising

On 2nd April 2020, Forbes announced its 30 under 30 Asia list for 2020. This list features 30 entrepreneurs, leaders and innovators in each of the 10 different categories. This year, our Alumni, Lal Chand Bisu (Class of 2012, EE), Vinod Meena (Class of 2014, CSE) and Vikas Goyal (Class of 2014, CSE) have been featured in this list under the category "Media, marketing & advertising" for co-founding Kuku FM, which has re-envisioned traditional radio with new content. As always, our Alumni continue to make their Alma mater proud. More information on this recognition conferred upon our Alumni can be accessed here.

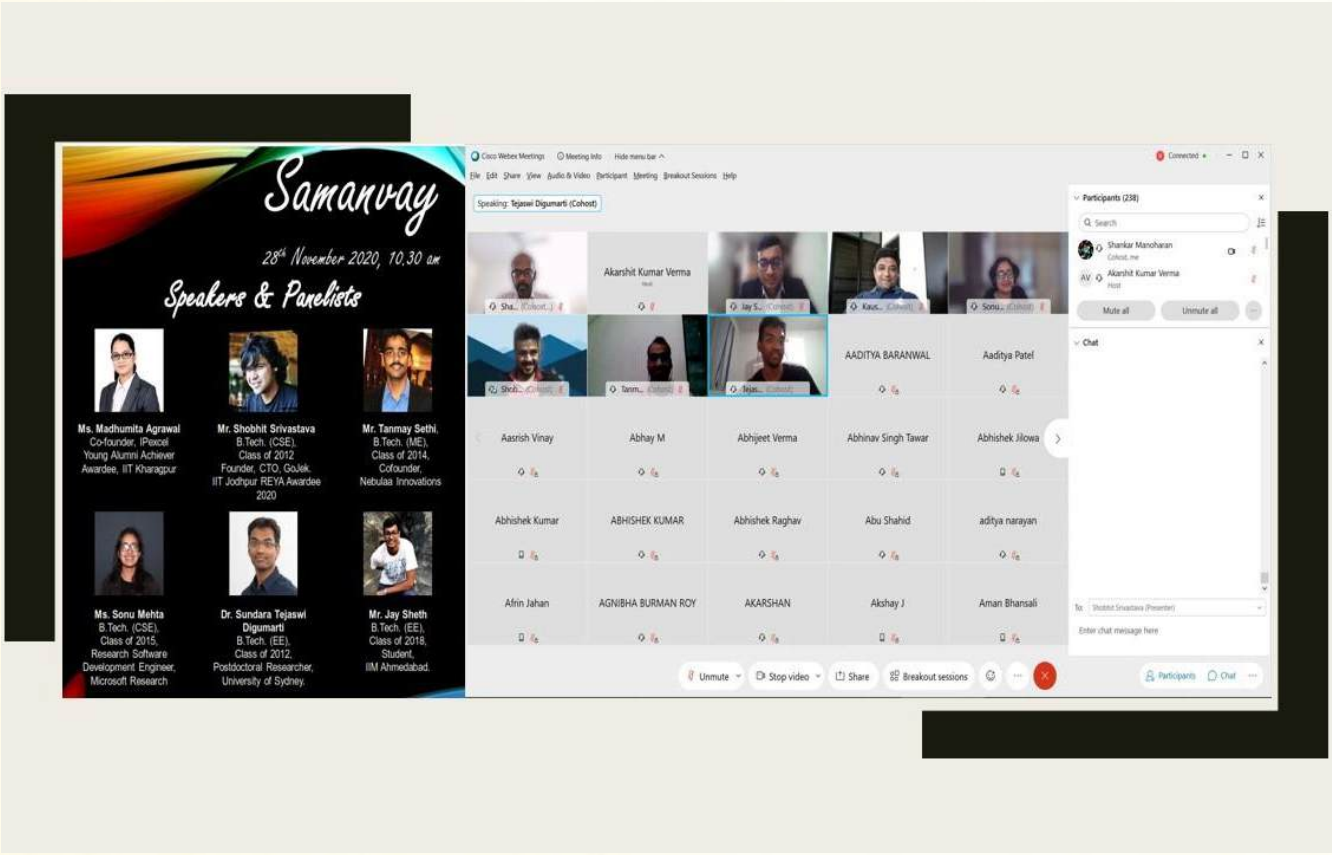
Alumni celebrate their Teachers on the occasion of Teacher's day

This Teacher's Day, on 5th September 2020, the Alumni Relations Committee invited its Alumni to pen words of gratitude towards their teachers whose efforts helped them in shaping their career and achieving their dreams. The Alumni enthusiastically participated to make this Teacher's Day special and penned down their thoughts about and experiences with their teachers.

Some Alumni also shared their journey and life lessons which they gained from their respective teachers. It was a pleasant surprise for the Faculty Members when the tokens of affection, respect and gratitude were shared with them. The ARC thanks all Alumni, who brought a smile to the faces of their teachers on this teachers day. Please click here to view the gallery.

Alumni as guiding beacons - Samanvay UG Orientation Program 2020

'Samanvay' was organized on 28th of November 2020 as the final leg of the UG orientation program for the 2020 batch of UG students at IIT Jodhpur. The purpose was to help students to navigate the world after graduating from IITJ. The event was planned for the new students to understand how IITJ could aid in realizing their dreams and aspirations from those who have navigated this path before: our Alumni. Over 250 students participated in the online event via WebEx. The students were enlightened about the annual activities conducted by the Office of International Relations and Outreach (IRO) by the Associate Dean, IRO, Dr. Kaushal Desai. The students were introduced to the Alumni web portal and the annual events organized by the Alumni Relations Committee by the Faculty Incharge (Alumni Relations), Dr. Shankar Manoharan.

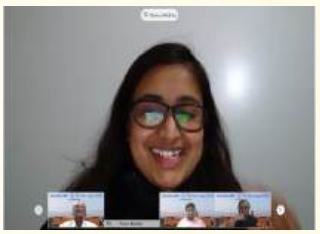


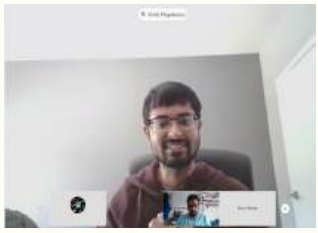
As part of Samanvay, an invited talk by Mr. Shobhit Srivastava (B.Tech., CSE, Class of 2012 and REYA awardee for 2020) on "Always finish the race" was organized. Ms. Madhumita Agrawal, Founder, IPexcel as well as young alumni achiever awardee, IIT Kharagpur discussed how an IIT helps shape one's career. The event also saw a panel discussion on "Making the most of your time at IITJ" by IIT Jodhpur Alumni: Mr. Tanmay Sethi, B.Tech. (ME), Class of 2014, Cofounder, Nebulaa Innovations; Ms. Sonu Mehta, B.Tech. (CSE), Class of 2015, Research Software Development Engineer, Microsoft Research; Dr. Sundara Tejaswi Digumarti, B.Tech. (EE), Class of 2012, Postdoctoral Researcher, University of Sydney; Mr. Jay Sheth, B.Tech. (EE), Class of 2018, Student, IIM Ahmedabad. The discussion was moderated by Dr. Kaushal Desai, Associate Dean, International Relations and Outreach, IIT Jodhpur. The panel addressed key questions on navigating through the various stages of life at IIT Jodhpur. Several Alumni also joined the event enthusiastically and interacted with the freshers. The freshers enjoyed the session and were motivated to hear from the Alumni. The program concluded with a vote of thanks proposed by Dr. Shankar Manoharan.

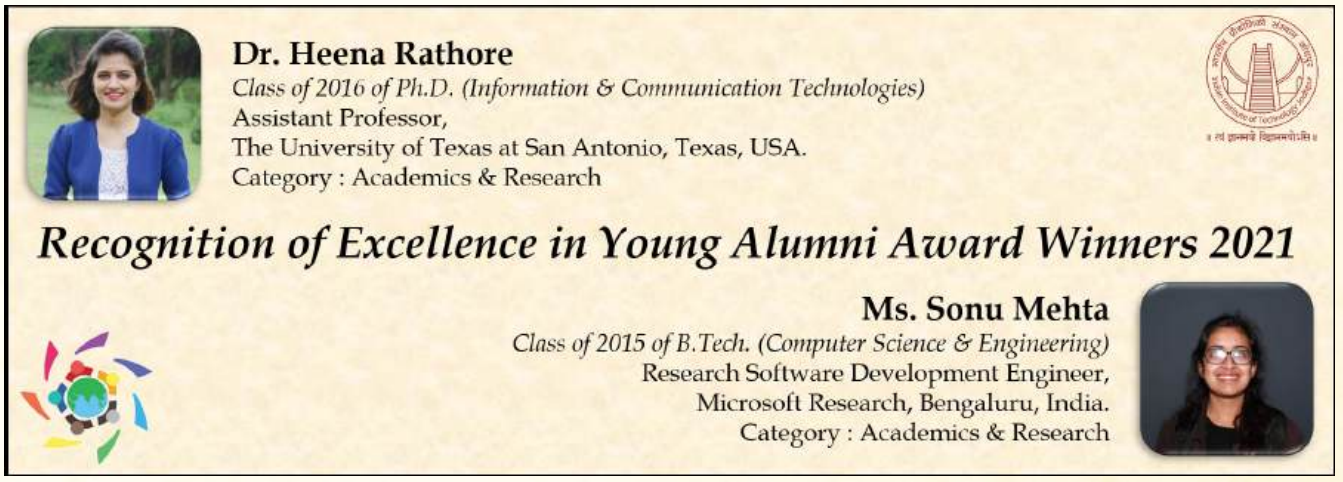
Annual Alumni Day 2021

The IIT Jodhpur Annual Alumni Day 2021 was organized virtually on 6th of February 2021 at 7.00 pm. The event was organized by the Alumni relations committee in collaboration with the IIT Jodhpur Alumni association. The event was attended by IIT Jodhpur Alumni across the world and by the IIT Jodhpur community. The event began with a welcome address by Dr. Shankar Manoharan, the Faculty in Charge, Alumni Relations, IIT Jodhpur. Prof. Santanu Chaudhury, Director IIT Jodhpur addressed the Alumni on the vision for IIT Jodhpur and how Alumni can contribute to achieving the vision. Prof. Chaudhury also outlined the various interesting updates to the academic programs of the Institute. He underscored how IIT Jodhpur considers Alumni as one of the key stakeholders of the Institute by describing several measures taken by the Institute to onboard in various roles at IIT Jodhpur. Representatives from the IIT Jodhpur Alumni association Mr. Tanmay Sethi and Mr. Saurabh Pandey, highlighted a summary of events and the association's plan for 2021.

This was followed by the main highlight of the evening, the Recognition of Excellence in Young Alumni Awards (REYA) 2021 presentation ceremony. Dr. Heena Rathore (Class of 2016), Ph.D., in Information & Communication Technologies and Ms. Sonu Mehta (Class of 2015), B.Tech. in Computer Science & engineering were both declared the winners in the Academic & Research category by Prof. Chaudhury. A citation on the merit of the awardee, for each award was read out by Dr. Kaushal Desai, Associate Dean (International relations & outreach). Both awardees made acceptance speeches highlighting how IIT Jodhpur had helped them reach their current positions in their career. The event concluded with a formal vote of thanks proposed by Dr. Kshema Prakash, Member, Alumni Relations Committee. At the end of the formal event, breakout sessions were organized in five popular areas for Alumni to network and build connections among themselves and with students.







On 7th February 2021, the Alumni reconvened for a trip down the memory lane together. Success stories of several IIT Jodhpur Alumni were highlighted in a dedicated session. A virtual tour of the permanent campus was also organized. This was followed by a networking breakout session. The second day ended with a batch-wise interactive session, where Alumni could reconnect with their batchmates and rekindle the memories made at IIT Jodhpur.

She Inspires 2021 Campaign

The Alumni Relations Committee, IIT Jodhpur started this edition of the #SheInspires Campaign on 8th March 2021. As IITJ alumni continue to excel and make their mark in diverse fields, crushing obstacles and crossing milestones, this annual campaign aims to inspire the fresh talents with the goals set by the experienced seniors.

To celebrate the women achievers, the Alumni Relations Committee brought some success stories of the women in its Alumni community. The first edition features Ms. Krati Saxena (B.Tech., System Science, 2011-2015) who has willingly shared her journey to inspire others like her to take the path less travelled.

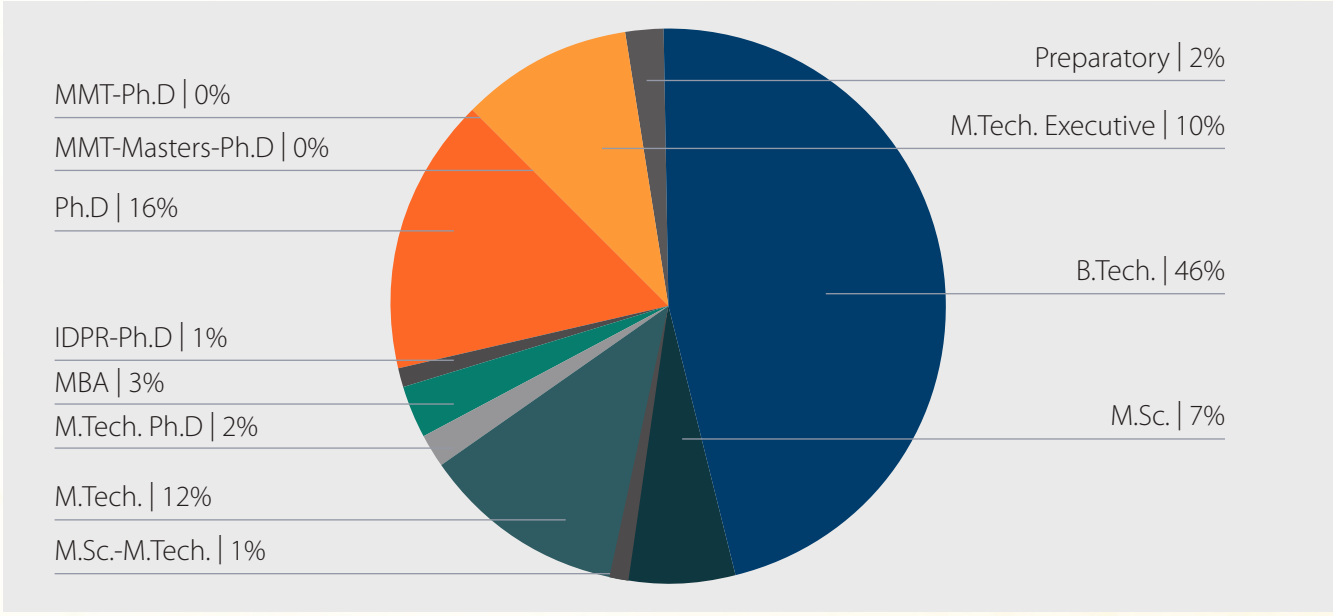
Digital ID Cards

The Institute issues digital ID cards to its Alumni enabling them to remain associated with the Institute lifelong. The authenticated user can avail the cards by accessing their profiles on the Alumni Relations Portal. The cards serve as proof that the holder is an Alumnus or Alumna of IIT Jodhpur. The Alumni Cards are assigned by the Office of Alumni Relations and are required for entry into the campus once the student leaves the Institute after graduation. An Alumni card-holder may avail the benefits such as free on-campus stay for the first three days, use of the Institute library and a guest login for the IITJ WiFi during the stay.

Registered Students in IIT Jodhpur

IIT Jodhpur has, as on 31 March 2021, a total of 2564 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
B.Tech.	1178
MSc.	176
M.Sc.-M.Tech.	21
M.Tech.	297
M.Tech.-Ph.D.	40
MBA	68
IDRP-PhD	27
Ph.D.	419
MMT-Masters	8
MMT-Masters-Ph.D.	8
MMT-Ph.D.	10
MTech. (Executive)	265
Preparatory	47



FINANCIAL POSITION

INDIAN INSTITUTE OF TECHNOLOGY JODHPUR

Balance Sheet as on 31 March 2021

Amount in Rupees

SOURCES OF FUNDS	Current Year	Previous Year
CORPUS/CAPITAL FUND	10,65,21,47,175	10,61,22,01,857
DESIGNATED/EARMARKED/ENDOWMENT FUNDS	37,40,02,715	
CURRENT LIABILITIES & PROVISIONS	3,02,84,72,433	2,35,45,67,394
TOTAL	**14,05,46,22,323**	**12,96,67,69,251**

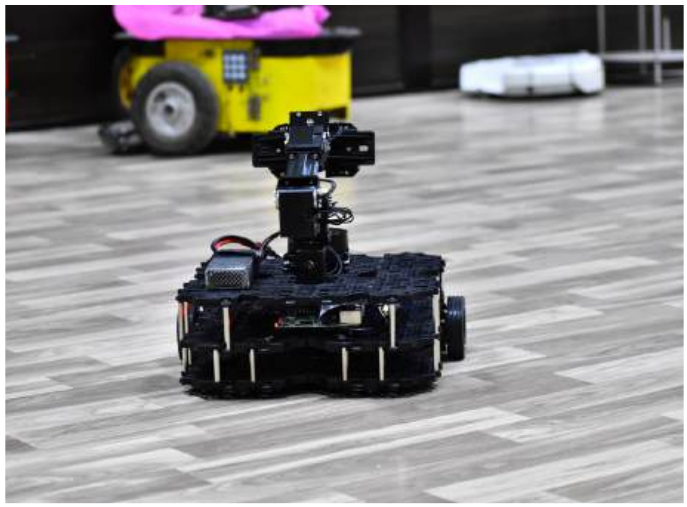
APPLICATION OF FUNDS	**Current Year**	**Previous Year**
FIXED ASSETS	11,19,43,06,213	10,08,50,94,842
Tangible Assets	11,11,12,88,414	5,83,56,85,889
Intangible Assets	5,77,97,274	3,31,76,028
Capital Works-in-Progress	2,52,20,524	4,21,62,32,925
INVESTMENTS FROM EARMARKED/ENDOWMENT FUNDS		
Long Term		
Short Term		
INVESTMENTS - OTHERS		
CURRENT ASSETS	2,42,06,31,222	1,96,02,70,724
LOANS, ADVANCES & DEPOSITS	43,96,84,889	92,14,03,685
MISCELLANEOUS EXPENDITURE NOT WRITTEN OFF		-
TOTAL	**14,05,46,22,323**	**12,96,67,69,251**

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. 2020-21	94,93,78,049	56,65,00,000	52,00,000	1,51,40,78,049
	(ii) EWS Grant Received during F.Y. 2020-21	-	-	-	-
	Total Grant Received	**94,93,78,049**	**56,65,00,000**	**52,00,000**	**1,51,40,78,049**

Notes

Notes



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