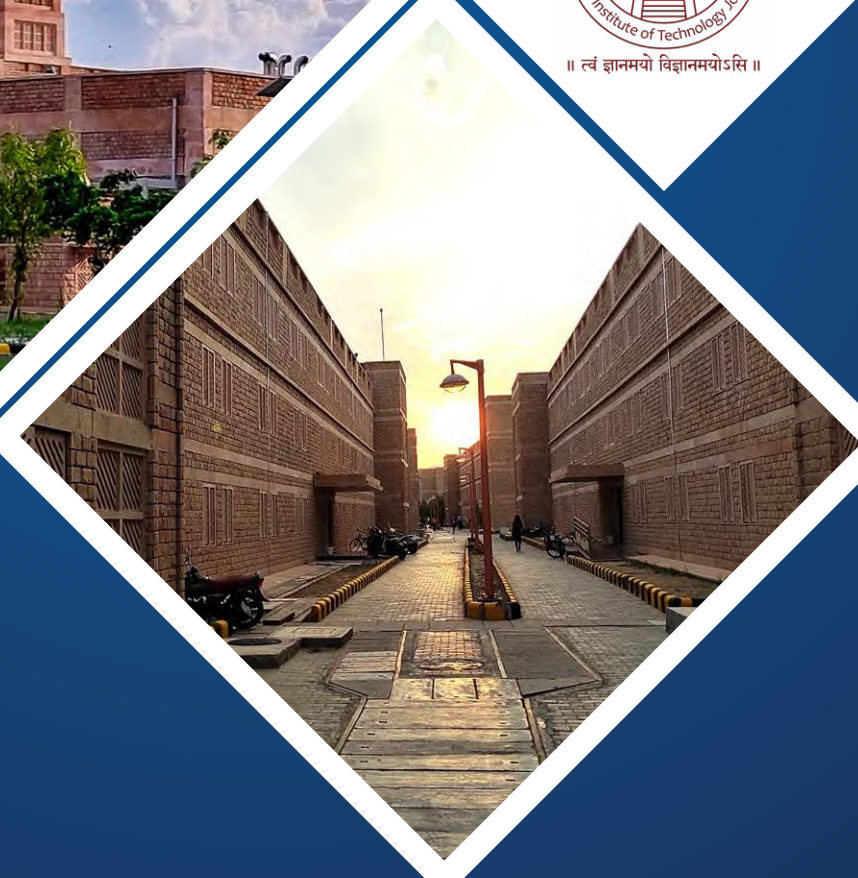


# Annual Report 2022-23



॥ त्वं ज्ञानमयो विद्वानमयोऽसि ॥



# Indian Institute of Technology Jodhpur



# Annual Report

## FY 2022-23



॥ त्वं ज्ञानमयो विज्ञानमयोऽसि ॥

**Indian Institute of Technology Jodhpur**

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**Prof. Santanu Chaudhury**  
Director, IIT Jodhpur

# Preface

As we look back on the past year, IIT Jodhpur has made significant progress in several directions in terms of academics, research, social outreach and industry connect. The Institute has showcased unwavering commitment to fostering innovation, inclusivity and excellence in education aligning seamlessly with NEP 2020.

I am glad to inform you that the Institute has successfully completed the Academic Session 2022-23 in the physical mode after the COVID-19 pandemic. In terms of academics, the Institute offered 10 full-time Undergraduate Programs, 25 (among these 3 programmes are also offered for working executives) full-time Postgraduate Programs, 16 Postgraduate and Doctoral Dual Degree programs, 21 Doctoral programs in the A.Y. 2022-23. In addition, the institute has introduced new post-graduate Industry-Ready Programmes as envisaged in the National Education Policy 2020. A list of new programmes started at the Institute is placed as under:

1. Masters in XR Design (M. Des.)
2. M.S. (by Research)
3. Dual Degree M.Sc. in Chemistry and M.Tech. in Materials Engineering
4. M.B.A. in FinTech and Cybersecurity
5. Ph.D. in Center for Emerging Technologies for Sustainable Development

We have seen the creation of new Centers that will add to the Institute's vibrant ecosystem and promote cutting-edge interdisciplinary, multi-disciplinary and cross-disciplinary research. By bringing together talent and expertise from academia, industry and the government, the DRDO Industry-Academia Center of Excellence (DIA-CoE) represents a unique multi sectoral partnership for research and development for defense applications that has few parallels across the country. Similarly, the Rishabh Centre for Research and Innovation in Clean Energy, supported by Rishabh Instruments Ltd. and Ivaan foundation, represents a unique

example of Industry investment in the pursuit of research excellence. The Centre of Excellence on Arts and Digital Immersion (ADI) is an example of an initiative for cross talk between classical visual and performing arts and technology. IITJ has also created IIT-UB CoE in AI & Data Science for promoting collaborative research between IITs and University of Buffalo.

We have been supporting our research scholars and faculty in many ways so that they can take advantage of global opportunities and exposure. 32 MoUs were signed (in the reporting period) with various Institutions/organizations/companies, both national and international, in order to promote various key activities in the institute including research, teaching and training activities. Such outreach has also yielded strong academic opportunities. For example, the Institute has signed MoUs for Dual Degree programmes with University of Albany, State University of New York, USA and for Joint PhD programmes with University at Buffalo, USA, to name a few such initiatives. The most reputed national and international scientists and academicians, who have excelled in the domains of science, technology, humanities, industry, & governance, routinely interact with students as well as faculty through the Institute Lectures, seminars, workshops and other platforms on subjects of relevance to the academic fraternity, especially the students. The Institute enables research scholars to attend and present a research paper in an international conference of repute by providing a partial financial support of up to Rs. 2 Lakh for presenting a quality work in an esteemed international conference.

The results of this vibrant ethos are evident in terms of the research output of both faculty and students and can be seen in terms of publications, projects, patents and products developed. The Institute has got 134 new research projects, worth 42.93 crores. 6 IP were granted, 2 patents were published and 23 new patents were filed. The intellectual capital represented by students and faculty is recognized globally and may be witnessed in their fellowship of top academic societies, invitations as speakers and experts at prestigious global and national forums and service in administrative positions, with one of our faculty serving as the VC of a University.

We have also been consistently engaging with Industry through research and other collaborations. The “Conclave for Friends of IIT Jodhpur 2023” conducted on 11th and 12th February 2023. We also organized Industry Day. IITJ students and faculty showcased the research and product development by them. We actively foster such platforms to understand industry requirements as well as to develop areas of shared interests and opportunities. The Institute received 70.25 crores in terms of CSR funding.

We invite you to go through this Annual Report and observe the multi-faceted results of the rich academic and research ecosystem at IIT Jodhpur. As per our vision and mission, it is our earnest expectation that the Institute will continue to create and nurture technology-foresight based research, innovative academic programs and vital social outreach to equip a young generation for the tasks of nation-building and service to all humanity.

Jai Hind.

**Prof. Santanu Chaudhury**

Director, IIT Jodhpur

IIT Jodhpur has made significant progress in several directions in terms of academics, research, social outreach, and industry connect.

# 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 a high quality, futuristic educational, and research ecosystem.
- Develop socially responsible faculty, 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 collaborations 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  
Chairman(Honorary), School for Advanced Studies  
in Nuclear Science and Technology  
Bhabha Atomic Research Centre (BARC)  
Former Principal Scientific Adviser to the  
Government of India, 6th Floor, Central Complex,  
Trombay, Mumbai-400085

**Email:** rajachid@gov.in, rc@barc.gov.in

**Professor Santanu Chaudhury**

Member (Ex-officio)  
Director  
Indian Institute of Technology Jodhpur

**Email:** director@iitj.ac.in

**Professor Akhil Ranjan Garg**

Council Nominees  
Faculty of Engineering & Technology,  
Department of Electrical Engineering,  
Faculty of Engineering & Technology,  
Jai Narayan Vyas University,  
Jodhpur (Rajasthan)

**Email:** agarg@jnvu.edu.in

**Additional Secretary/ Joint Secretary  
(Technical Education)**

Council Nominees  
Department of Higher Education  
Ministry of Education  
203-C, Shastri Bhawan,  
New Delhi 110 001

**Professor Narpat S. Shekhawat**

Council Nominees  
Former Professor, Jai Narayan Vyas University,  
B131, Prithviraj Nagar near Maharani Park,  
Pali Road, Jodhpur

**Email:** biotechunit@gmail.com

**Shri Anil Bhavarlal Jain**

Council Nominees  
Vice Chairman,  
MD & CEO,  
Jain Irrigation Systems,  
Jalgaon, Maharashtra

**Email:** jisl@lains.com

**Professor Richa Singh**

Senate Nominees on the Board of Governors  
Department of Computer Science &  
Engineering  
Indian Institute of Technology Jodhpur  
N. H. 62, Nagaur Road  
Karwar, Jodhpur 342030

**Email:** richa@iitj.ac.in

**Professor Mitali Mukerji**

Head & Professor  
Department of Bioscience & Bioengineering  
Indian Institute of Technology Jodhpur  
N. H. 62, Nagaur Road  
Karwar  
Jodhpur 342030

**Email:** mitali@iitj.ac.in

**Chief Secretary**

Member  
(Nominee of Government of Rajasthan)  
Government of Rajasthan  
Secretariat Jaipur  
Jaipur 302005 (Rajasthan)

**Email:** secretaryhte@gmail.com

**Prof. S.R. Vadera**

Special Invitee  
Deputy Director  
Indian Institute of Technology Jodhpur

**Email:** dydir@iitj.ac.in

**Sh. P. G. Basak**

Secretary to the BoG  
Offg. Registrar  
(Tenure Upto: 26.07.2022)

**Dr. Hari Om Yadav**

Registrar  
(Tenure w.e.f. 27.07.2022)  
**Email:** registrar@iitj.ac.in

## Finance Committee

**Dr. R.Chidambaram**

Chairman, FC  
Chairman(Honorary), School for Advanced Studies  
in NuclearScience and Technology  
Bhabha Atomic Research Centre (BARC)  
Former Principal Scientific Adviser to the  
Government of India, 6th Floor, Central Complex  
Trombay,Mumbai-400085  
**Email:** rajachid@gov.in, rc@barc.gov.in

**Professor Santanu Chaudhury**

Member (Ex-officio)  
Director  
Indian Institute of Technology Jodhpur  
**Email:** director@iitj.ac.in

**Sh. S. S. Bhandari, CA**

Members  
P-7, Tilak Marg, C-Scheme  
Jaipur- 302005  
Phone: (0141) 238 5412  
**Email:** bhandariss@hotmail.com

**Additional Secretary /Joint Secretary  
(Technical Education)**

Members  
Department of Higher Education  
Ministry of Education  
203-C, Shastri Bhawan,  
New Delhi 110 001

**Sh. Ashoke Guha, CA**

Members  
3403 ATS Greens II  
Plot A-58, Sector 50  
NOIDA 201307  
Gautam Budh Nagar, Uttar Pradesh  
**Email:** ashoke\_guha@yahoo.co.in

**Joint Secretary & Financial Advisor  
(JS & FA)**

Members  
Integrated Finance Division (IFD)  
Department of Higher Education  
Ministry of Education  
Shastri Bhavan, New Delhi 110115  
**Email:** jsfa.edu@gov.in

**Prof. S.R. Vadera**

Special Invitee  
Deputy Director  
Indian Institute of Technology Jodhpur  
**Email:** dydir@iitj.ac.in

**Secretary to the Finance Committee**

**Sh. P. G. Basak**  
Offg. Registrar  
(Tenure Upto: 26.07.2022)  
**Dr. Hari Om Yadav**  
Registrar  
(Tenure w.e.f. 27.07.2022)  
**Email:** registrar@iitj.ac.in

# Senate

Constitution of Senate	
The Director, Ex-officio, who shall be the Chairman of the Senate	<b>Prof. Santanu Chaudhury</b> , Director, IIT Jodhpur and Chairman, Senate
The Deputy Director, Ex-officio	<b>Prof. S.R. Vadera</b> , Deputy Director, IITJ
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;	<p><b>1. Dr. Sanjeev Misra</b>, Vice Chancellor, Atal Bihari Vajpayee Medical University, Lucknow (U.P.) &amp; (Former Director, AIIMS, Jodhpur)</p> <p><b>2. Prof. H. P. Kincha, Chairman</b>, Karnataka State Innovation Council, Bangalore</p> <p><b>3. Prof. Purnima Singh</b>, Deptt. of Humanities &amp; Social Sciences, IIT Delhi</p>
The professors appointed or recognized as such by the Institute for the purpose of imparting instruction in the Institute.	<p><b>Prof. S.R. Vadera</b>, Deptt. of Physics</p> <p><b>Prof. Surajit Ghosh</b>, Deptt. of BB</p> <p><b>Prof. Mayank Vatsa</b>, Deptt. of CS&amp;E</p> <p><b>Prof. Richa Singh</b>, Deptt. of CS&amp;E</p> <p><b>Prof. Neeraj Jain</b>, Deptt. of BB</p> <p><b>Prof. Somitra Kumar Sanadhya</b></p> <p><b>Prof. Ajay Agarwal</b></p> <p><b>Prof. Mitali Mukherjee</b></p> <p><b>Prof. Manoj Choudhary</b> (On Lien from 13.01.2023)</p>
Deans	<p><b>10. Prof. Sangeeta Sahney</b></p> <p><b>Prof. Surajit Ghosh</b>, Dean (R&amp;D) <i>upto 31.08.2022</i> <b>Prof. Mayank Vatsa</b>, Dean (R&amp;D) <i>from 01.09.2022</i></p> <p><b>Prof. Manoj Choudhary</b>, Dean (IR, AR, CR) <i>upto 13.01.2023</i> <b>Prof. Surajit Ghosh</b>, Dean (IR,AR,CR) <i>from 14.01.2023</i></p> <p><b>Prof. Somitra Kumar Sanadhya</b>, Dean (Digital Transformation)</p>
Heads of the Departments or Schools as may be established by the Institute.	<p>Department of Bioscience and Bioengineering <b>Prof. Mitali Mukerji</b></p> <p>Department of Chemical Engineering <b>Prof. P.K. Tewari</b></p> <p>Department of Chemistry <b>Dr. Manikandan Paranjothy</b>, (<i>Tenure Upto 31.08.2022</i>) <b>Dr. Ramesh K. Metre</b>, (<i>Tenure w.e.f. 01.09.2022</i>)</p> <p>Department of Computer Science &amp; Engineering <b>Prof. Richa Singh</b></p> <p>Department of Electrical Engineering <b>Dr. Arun Kumar Singh</b> (<i>Tenure Upto 31.08.2022</i>) <b>Dr. Ajay Agarwal</b> (<i>Tenure w.e.f. 01.09.2022</i>)</p> <p>Department of Humanities &amp; Social Sciences <b>Dr. K. J. George</b> (<i>Tenure Upto 31.08.2022</i>) <b>Dr. Farhat Naz</b> (<i>w.e.f. 01.09.2022</i>)</p>

Constitution of Senate	
	Department of Mathematics <b>Dr. Puneet Sharma</b>
	Department of Mechanical Engineering <b>Dr. Prodyut R. Chakraborty</b> ( <i>Tenure Upto 31.08.2022</i> ) <b>Dr. Suril V. Shah</b> ( <i>Tenure w.e.f. 01.09.2022</i> )
	Department of Metallurgical & Materials Engineering <b>Prof. B.P. Kashyap</b> ( <i>Upto 31.08.2022</i> ) <b>Dr. K. R. Ravi</b> ( <i>w.e.f. 01.09.2022</i> )
	Department of Physics <b>Dr. Ashutosh K. Alok</b>
	Department of Civil & Infrastructure Engineering <b>Dr. Ranju Mohan</b>
	School of Management & Entrepreneurship <b>Dr. Krishna Kumar Balaraman</b> ( <i>Upto 31.08.2022</i> ) <b>Prof. Sangeeta Sahney</b> ( <i>w.e.f. 01.09.2022</i> )
	School of Artificial Intelligence & Data Science <b>Prof. Neeraj Jain</b>
	School of Liberal Arts (SoLA) <b>Dr. Farhat Naz, (From 01.09.2022)</b>
	Centre for Emerging Technologies for Sustainable Development <b>Dr. Anand K. Plappally</b>
	Centre for Technology Foresight & Policy <b>Dr. Krishna Kumar Balaraman</b>
	IDRP <b>Dr. S. C. Bose</b>
	Center for Advance Scientific Equipment (CASE) Renamed as Center for Research and Development of Scientific Instruments (CRDSI) <b>Dr. Mahesh Kumar</b> ( <i>Tenure Upto 30.01.2023</i> ) <b>Dr. Samanwita Pal</b> ( <i>Tenure w.e.f. 31.01.2023</i> )

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 <b>Dr. Sushmita Jha, Associate Professor</b> <i>(Tenure Upto 31.08.2022)</i> <b>Dr. Indranil Banerjee, AD (Hostel Affairs)</b> <i>(Tenure w.e.f. 01.09.2022)</i>
	Department of Chemical Engineering <b>Dr. Deepak Arora, Associate Professor</b>
	Department of Chemistry <b>Dr. Rakesh Kumar Sharma, Associate Professor</b> <i>(Tenure Upto 31.08.2022)</i> <b>Dr. Atul Kumar, AD (academics-PG Programs)</b> <i>(Tenure w.e.f. 01.09.2022)</i>
	Department of Civil & Infrastructure Engg. <b>Dr. Debanjan Guha Roy, Assistant Professor</b>

	Department of Computer Science & Engineering <b>Prof. Mayank Vatsa</b> ( <i>Tenure Upto 31.08.2022</i> ) <b>Dr. Gaurav Harit</b> ( <i>Tenure w.e.f. 01.09.2022</i> )
	Department of Electrical Engineering <b>Dr. Mahesh Kumar</b> ( <i>Tenure Upto 31.08.2022</i> ) <b>Dr. Deepak Fulwani</b> ( <i>Tenure w.e.f. 01.09.2022</i> )
	Department of Mathematics <b>Dr. Gaurav Bhatnagar, Associate Professor</b>
	Department of Mechanical Engineering <b>Dr. Anand K. Plappally, Associate Professor</b>
	Department of Metallurgical & Materials Engineering <b>Dr. Ravi K.R., Associate Professor</b> ( <i>Tenure Upto 31.08.2022</i> ) <b>Dr. Abir Bhattacharya Assistant Professor</b> ( <i>Tenure w.e.f. 01.09.2022</i> )
	Department of Physics <b>Dr. Satyajit Sahu, Associate Professor</b>
	IDRP, IRC <b>Dr. S.C. Bose</b>
	School of Management & Entrepreneurship <b>Dr. Sankalp Pratap</b>
	School of Artificial Intelligence & Data Science (AIDE) <b>Dr. Dipanjan Roy</b>
	School of Liberal Arts <b>Dr. Ankita Sharma, AD (Student Affairs)</b>
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.	<b>Dr. Souvik Bhattacharyya, Vice Chancellor, BITS Pilani</b> <b>Dr. Jitendra Balakrishnan, CTO-Products, Sterlite Technologies</b>
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, Student Senate 2. General Secretary, ACAC 3. Vice President, Board of Academic Interaction
Special Invitees	<b>Professor-in-charge (Faculty)</b> <b>Professor-in-charge (Infrastructure)</b> <b>Advisor (Administration)</b> <b>Faculty-in-Charge (Executive Education)</b> <b>Faculty-in-Charge (Alumni Relations)</b> <b>Faculty-in-Charge (Curriculum Implementation)</b>
Secretary to the Senate	

# Building and Works Committee

## **Professor Santanu Chaudhury**

Chairman  
Director  
Indian Institute of Technology Jodhpur  
NH 62, Nagaur Road  
Karwad, Jodhpur 342030  
**Email:** director@iitj.ac.in

## **Professor Neeraj Gupta**

Members  
Head & Dean  
Department of Architecture  
Central University of Rajasthan  
**Email:** ng@curaj.ac.in, ng2560@yahoo.com

## **Professor B. Bhattacharjee**

Members  
Emeritus Professor  
Department of Civil Engineering  
Indian Institute of Technology Delhi  
Hauz Khas, New Delhi – 110 016  
**Email:** bishwa@civil.iitd.ac.in,  
bishwa54@gmail.com

## **Sh. Ramesh Chand Jain**

Members  
Additional Chief Engineer (Retd.),  
KA-1, Bhagat Ki Kothi Extension, Pali Road  
Jodhpur 342 003  
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rameshjain1953@gmail.com

## **Prof. Amitava Mitra**

Members  
Professor-in-Charge (Infrastructure)  
**Email:** pi\_infrastructure@iitj.ac.in

## **Sh. Anil Kumar Jain**

Members  
Flat 9-B, Tower -X, Meghdutam Apartments  
Plot F-21C, Sector 50, NOIDA (UP) 201301  
**Email:** akjain54@yahoo.com

## **Sh. Raju Ram Parihar**

Members  
Superintending Engineer, IIT Jodhpur  
**Email:** rparihar@iitj.ac.in  
(Tenure w.e.f. 27.05.2022)

## **Superintending Engineer cum Project Director**

Special Invitee  
Chief Project Manager, IIT Jodhpur Project  
Division, Central Public Works Department  
Nirman Bhawan, Jodhpur 342011  
**Email:** sepdjodhpur@gmail.com

## **Prof. S.R. Vadera**

Special Invitee  
Deputy Director  
Indian Institute of Technology Jodhpur  
**Email:** dydir@iitj.ac.in

## **Secretary to the B&WC**

**Sh. P. G. Basak**  
Offg. Registrar  
(Tenure Upto: 26.07.2022)  
**Dr. Hari Om Yadav**  
Registrar  
(Tenure from 27.07.2022)  
**Email:** registrar@iitj.ac.in



# Key Functionaries

<b>Director</b>	
<b>Prof. Santanu Chaudhury</b>	
<b>Dean (R&amp;D)</b>	
Prof. Surajit Ghosh (Tenure Upto 31.08.2022)	
Prof. Mayank Vatsa (Tenure w.e.f. 01.09.2022)	
<b>Dean (IR,AR,CR)</b>	
Prof. Manoj Choudhary, (Tenure Upto 13.01.2023)	
Prof. Surajit Ghosh, (Tenure w.e.f. 14.01.2023)	
<b>Dean (Digital Transformation)</b>	
<b>Prof. Somitra Kumar Sanadhya</b>	
<b>Associate Deans</b>	
<b>Dr. Shree Prakash Tiwari</b> (Tenure Upto 31.08.2022)	Research & Development
<b>Dr. Deepak Arora</b> (Tenure w.e.f. 01.09.2022)	
<b>Dr. Suril V. Shah</b> (Tenure Upto 10.03.2022)	Academics (UG Programs)
<b>Dr. Gaurav Harit</b> (Tenure w.e.f. 11.03.2022)	
<b>Dr. Somnath Ghosh</b> (Tenure Upto 10.03.2022)	Academics (PG Programs)
<b>Dr. Atul Kumar</b> (Tenure w.e.f. 11.03.2022)	
<b>Dr. Samanwita Pal</b> (Tenure Upto 31.08.2022)	Student Affairs
<b>Dr. Ankita Sharma</b> (Tenure w.e.f. 01.09.2022)	
<b>Dr. Indranil Banerjee</b>	Hostel Affairs
<b>Dr. Deepak M. Fulwani</b>	Planning & Resource Generation (PRG)
<b>Dr. Kaushal Kumar A. Desai</b> (Tenure Upto 31.08.2022)	International Relations & Outreach (IRO)
<b>Dr. Gaurav Bhatnagar</b> (Tenure w.e.f. 01.09.2022)	
<b>Head of Departments/School/Centers/Division</b>	
Department of Bioscience and Bioengineering	
<b>Prof. Mitali Mukerji</b>	
Department of Chemical Engineering	
<b>Prof. P.K. Tewari</b>	
Department of Chemistry	
<b>Dr. Manikandan Paranjothy</b> (Tenure Upto 31.08.2022)	
<b>Dr. Ramesh K. Metre</b> (Tenure w.e.f. 01.09.2022)	
Department of Computer Science & Engineering	
<b>Prof. Richa Singh</b>	
Department of Electrical Engineering	
<b>Dr. Arun Kumar Singh</b> (Tenure Upto 31.08.2022)	
<b>Dr. Ajay Agarwal</b> (Tenure w.e.f. 01.09.2022)	

<b>Head of Departments/School/Centers/Division</b>	
Department of Humanities & Social Science	<b>Dr. K. J. George Tenure</b> ( <i>Tenure Upto 31.08.2022</i> )
Department of Mathematics	<b>Dr. Puneet Sharma</b>
Department of Mechanical Engineering	<b>Dr. Prodyut R. Chakraborty</b> ( <i>Tenure Upto 31.08.2022</i> ) <b>Dr. Suril V. Shah</b> ( <i>Tenure w.e.f. 01.09.2022</i> )
Department of Metallurgical & Materials Engineering	<b>Prof. B.P. Kashyap</b> ( <i>Tenure Upto 31.08.2022</i> ) <b>Dr. K. R. Ravi</b> ( <i>Tenure w.e.f. 01.09.2022</i> )
Department of Physics	<b>Dr. Ashutosh K. Alok</b>
Department of Civil & Infrastructure Engineering	<b>Dr. Ranju Mohan</b>
School of Management & Entrepreneurship	<b>Dr. Krishna Kumar Balaraman</b> ( <i>Tenure Upto 31.08.2022</i> ) <b>Prof. Sangeeta Sahney</b> ( <i>Tenure w.e.f. 01.09.2022</i> )
School of Artificial Intelligence & Data Science	<b>Prof. Neeraj Jain</b>
School of Liberal Arts	<b>Dr. Farhat Naz</b> ( <i>Tenure w.e.f. 01.09.2022</i> )
<b>Centre for Emerging Technologies for Sustainable Development</b>	<b>Dr. Anand K. Plappally</b>
<b>Centre for Technology Foresight &amp; Policy</b>	<b>Dr. Krishna Kumar Balaraman</b>
IDRP	<b>Dr. S. C. Bose</b>
Computer Center	<b>Dr. Suman Kundu</b>
Center for Advance Scientific Equipment (CASE) Renamed as Center for Research and Development of Scientific Instruments (CRDSI)	<b>Dr. Mahesh Kumar</b> ( <i>Tenure Upto 31.08.2022</i> ) <b>Dr. Samanwita Pal</b> ( <i>Tenure w.e.f. 31.01.2023</i> )

<b>Professors In-Charge</b>	
<b>Prof. C. Venkatesan</b>	Faculty
<b>Prof. Amitava Mitra</b>	Infrastructure Engineering
<b>Prof. Mayank Vatsa</b>	Corporate Relations ( <i>Tenure Upto 31.08.2022</i> )
<b>Prof. Surajit Ghosh</b>	Animal House
<b>Prof. Neeraj Jain</b>	Post Doctoral Fellowship
<b>Registrar</b>	
<b>Sh. P. G. Basak</b>	<i>Offg. Registrar (Tenure Upto 26.07.2022)</i>
<b>Dr. Hari Om Yadav</b>	Registrar, IIT Jodhpur ( <i>Tenure w.e.f. 27.07.2022</i> )

<b>Chairman</b>	
Admissions (UG and PG)	<b>Dr. Sandeep K. Yadav</b> ( <i>Tenure upto 31.08.2022</i> )
Admissions (UG)	<b>Dr. Sandeep K. Yadav</b> ( <i>Tenure w.e.f. 01.09.2022</i> )
Admissions (PG)	<b>Dr. Pradyut R. Chakraborty</b> ( <i>Tenure w.e.f. 01.09.2022</i> )
<b>Faculty-in-charge</b>	
Grades and Registration (UG & PG)	<b>Dr. Aashish Mathur</b>
Timetable	<b>Dr. Hardik Kothadia</b>
Evaluations (UG & PG)	<b>Dr. Atul Kumar</b> ( <i>Tenure upto 31.08.2022</i> )
Academic Research Programs	<b>Dr. Gaurav Bhatnagar</b> ( <i>Tenure upto 28.02.2022</i> )
UG Curriculum	<b>Dr. Gaurav Harit</b> ( <i>Tenure upto 28.02.2022</i> )
Curriculum Implementation	<b>Dr. Somnath Ghosh</b> ( <i>Tenure w.e.f. 01.09.2022</i> )
Executive Education	<b>Dr. Kaushal Desai</b>
IITJ Connect	<b>Dr. Kaushal Desai</b>
Continuing Education Programme (CEP)	<b>Dr. Venkatesha Murthy R</b> ( <i>Tenure Upto 31.08.2022</i> )
Security and Transport	<b>Dr. Satyajit Sahu</b>
TISC	<b>Dr. Sankalp Pratap</b>
Technology Park	<b>Dr. Ram Prakash</b>
Marudhara Foundation	<b>Associate Dean</b> (PRG)
Career Development Cell	<b>Dr. Anuj Pal Kapoor</b>
Alumni Relations	<b>Dr. Shankar Manoharan</b>
Guest House and Visiting Faculty Accommodation	<b>Dr. Abir Bhattacharyya</b>
Social Media	<b>Dr. Debanjan Guha Roy</b>
<b>Coordinators IDRs</b>	
Coordinator- Robotics and Mobility System	<b>Dr. Niladri Sekhar Tripathy</b>
Coordinator- Digital Humanities	<b>Dr. Parichay Patra</b>
Coordinator- IoT & Applications	<b>Dr. Kamaljit Rangra</b>
Coordinator- Quantum Information and Computation	<b>Dr. Subhashish Banerjee</b> ( <i>Tenure Upto 31.08.2022</i> ) <b>Dr. Kirankumar Hiremath</b> ( <i>Tenure w.e.f. 01.09.2022</i> )
Coordinator- Smart Healthcare	<b>Dr. Meenu Chhabra</b> ( <i>Tenure Upto 31.08.2022</i> ) <b>Dr. Sumit Kalra</b> ( <i>Tenure w.e.f. 01.09.2022</i> )
Coordinator- Space Science & Technology	<b>Dr. Arun Kumar R</b>
<b>Liaison Officers</b>	
1. SC & ST	<b>Dr. Ramesh K. Metre</b> , Associate Professor, Department of Chemistry ( <i>Tenure Upto 31.08.2022</i> ) <b>Dr. Moumita Mandal</b> , Assistant Professor, Department of mathematics ( <i>Tenure w.e.f. 01.09.2022</i> )
2. OBC, PWD and Minority	<b>Dr. Appala N. Gandhi</b> , Assistant Professor, Department of MME
3. Economically Weaker Sections (EWSs)	<b>Dr. Shree Prakash Tiwari</b> , Associate Professor, Department of EE
4. Diversity Officer	<b>Dr. Samanwita Pal</b> , Associate Professor, Department of Chemistry

Statutory Charge	
1. Part-Time Chief Vigilance Officer (CVO)	<b>Dr. Gaurav Harit</b> , Associate Professor, Deptt. of CS&E
2. Transparency Officer	<b>Dr. S.C. Bose</b> , Advisor (Academics)
3. First Appellate Authority (RTI)	Deputy Director ( <i>Tenure Upto 26.07.2022</i> ) Registrar ( <i>Tenure w.e.f. 27.07.2022</i> )
4. Central Public Information Officer (CPIO), RTI	<b>Sh. Ashok K. Khanduri</b> , Joint Registrar
5. Assistant Public Information Officer (APIO), RTI	<b>Sh. Prashant Bhardwaj</b> , Assistant Registrar
6. Estate Officer	<b>Sh. Raju Ram Parihar</b> , Superintending Engineer
7. Public Relations	Office of Director Hindi Officer <b>Dr. Puneet Sharma</b> , Associate Professor, Deptt. of Mathematics ( <i>Tenure Upto 07.10.2022</i> ) <b>Dr. Nitin Bhatia</b> , Assistant Professor, Department of Electrical Engineering ( <i>Tenure w.e.f. 08.10.2022</i> )

Nodal Officers	
1. GIAN Program	Dean (IRO) ( <i>Tenure Upto 31.08.2022</i> ) <b>Dr. Kaushal Desai</b> ( <i>Tenure w.e.f. 01.09.2022</i> )
Swachh Bharat Abhiyan	<b>Dr. Meenu Chhabra</b> , Associate Professor, Deptt. of BB
Unnat Bharat Abhiyan	<b>Dr. Anand K. Plappaly</b> , Associate Professor, Deptt. of ME
Vigyan Jyoti Program	<b>Dr. Ritu Gupta</b> , Associate Professor, Department of Chemistry
DAAD Scholarships Program	<b>Dr. Kaushal K. Desai</b> , Associate Professor, Deptt. of ME ( <i>Tenure Upto 31.08.2022</i> ) Dean (IR, AR, CR) ( <i>Tenure w.e.f. 01.09.2022</i> )
Study in India Program	<b>Dr. Kaushal K. Desai</b> , Associate Professor, Deptt. of ME ( <i>Tenure Upto 31.08.2022</i> ) AD (IRO) ( <i>Tenure w.e.f. 01.09.2022</i> )
National Institutional Ranking Framework (NIRF)	<b>Prof. Richa Singh</b> , Professor, Deptt. of CS&E
All India Survey on Higher Education (AISHE) Portal	<b>Dr. Kshema Prakash</b> , Deputy Librarian
Atal Ranking of Institution on Innovation Achievements (ARIIA) Portal	Faculty-in-charge (TISC)
Ek Bharat Shrestha Bharat (EBSB)	<b>Dr. Rohan Diliprao Erande</b> , Assistant Professor, Deptt. of Chemistry
Corporate Social Responsibility (CSR)	Associate Dean (PRG)
Indian Science, Technology and Engineering facilities Map (I-STEM)	Head, CRDSI
Fit India Programme	<b>Sh. Gaurav Nigam</b> , Superintendent, Office of Students ( <i>Tenure Upto 31.08.2022</i> ) Assistant Sports Officer ( <i>Tenure w.e.f. 01.09.2022</i> )
IIT Council Webportal	Dean (Digital Transformation)

# Departments



# Department of Bioscience & Bioengineering

The Department of Bioscience & Bioengineering at IIT Jodhpur aspires to build a unique academic and research ecosystem that enables the sustainable development of human resource capacity and technological solutions in healthcare, renewable energy, food, and the environment. We provide state-of-the-art domain knowledge and training to understand biological systems as well as innovative Bio-Tech solutions for applications in medical and environmental engineering domains. These include biofuels, diagnostics, therapeutics, and smart healthcare devices. The Department currently has 16 faculty members with expertise ranging from fundamental research to applied sciences. The Department has organized itself into nine thematic

areas including cell and molecular physiology, neuroscience & neuroengineering, biomaterials & tissue engineering, genomics & systems biology, environmental biotechnology, molecular microbiology, biophysics, molecular motors & cell motility, and computational biology & bioinformatics. The Department faculty members are also affiliated with the School of Artificial Intelligence and Data Science (AIDE), Centre for Emerging Technologies for Sustainable Development (CETSD), AyurTech Centre of Excellence, and interdisciplinary research platforms (IDRP) that provide avenues and platforms for extensive trans-disciplinary interactions of the faculties and students from diverse disciplines in academic and research programs.

## Faculty Members

S. No.	Faculty Members	Designation	Research area
1.	Prof.Mitali Mukerji	Head of the Department	Human Genomics, Ayurgenomics and Precision medicine
2.	Prof. Neeraj Jain	Professor	Systems Neuroscience
3.	Surajit Ghosh	Professor	Chemical Neurobiology, Chemical Biology and Cancer Biology
4.	Dr. Amit Kumar Mishra	Associate Professor	Cellular and Molecular ,Neuroscience, Cell Cycle Regulation and Cancer
5.	Dr. Meenu Chhabra	Associate Professor	Environmental Biotechnology: Renewable Bioenergy Bioremediation
6.	Dr. Sushmita Jha	Associate Professor	Cell and Molecular Physiology, Cellular and Molecular Neuroscience
7.	Dr. Priyanka Singh	Assistant Professor	Cellular and Molecular Biology; Centrosome Biology; Cell proliferation
8.	Dr. Indranil Banerjee	Assistant Professor	Tissue Engineering; Regenerative medicine; Biomaterials Theranostic systems; Biomicrofluidic
9.	Dr. Raviraj Vankayala	Assistant Professor	Nanobiotechnology; Biomaterials and Photomedicine
10.	Dr. Shankar Manoharan	Assistant Professor	Molecular Microbiology, Host-Microbe Interaction, Genomics and Metagenomics

S. No.	Faculty Members	Designation	Research area
11.	Dr. Pankaj Yadav	Assistant Professor	Statistical Genetics and Big Data Analytics
12.	Dr. Neha Jain	Assistant Professor	Molecular Biophysics and Microbiology
13.	Dr. Sudipta Bhattacharyya	Assistant Professor	Structural Biology; Enzyme Chemistry and Protein Engineering
14.	Dr. Sucharita Dey	Assistant Professor	Structural Bioinformatics
15.	Ayan Sadhukhan	Assistant Professor	Plant Functional Genomics
16.	Dr. Dinesh Kumar Ahirwar	Assistant Professor	Cell and Molecular Physiology: Tumor Microenvironment
<b>Adjunct and affiliated faculty members:</b>			
1.	Dr. Bala Pesala	Adjunct Professor, IITJ, Founder & CEO Ayur, AI	
2.	Prof. Samir Brahmachari	Former Director General, CSIR; Scholar in Residence, IITJ	
3.	Prof. Greg Gibson	Adjunct Professor, IITJ; Georgia Institute of Technology	Integrative human genomics, quantitative genetics
4.	Dr. Siddartha Shrivastava	Professor of Practice, IITJ	Professor of Practice
5.	Prof. Surajit Sen	Professor of Physics, SUNY Buffalo; Visiting Professor, IITJ	Dynamics of ecological systems
<b>Staff Members Associated with the Department</b>			
1.	Mr. Bharat Pareek	Technical Superintendent	
2.	Mr. Poonam	Junior Technical Assistant	
3.	Ms. Swati Kushwaha	Senior Assistant	



Named after the first woman scientist to earn a D.Sc. from an Indian University, Dr. Asima Chatterjee, the new building of the Department of Bioscience & Bioengineering standing tall at sunset. The new premises of the Department was inaugurated on 11<sup>th</sup> August 2022.

## Research themes

### 1. Cell & Molecular Physiology Laboratory

**Faculty members associated:** Dr. Amit Mishra, Dr. Sushmita Jha, Dr. Dinesh Ahirwar

The thematic area in Cellular and Molecular Physiology focuses on understanding how cellular and molecular processes give rise to complex physiologic functions. Our understanding of the normal and diseased states of human physiology allow for development of better technologies and therapeutics to tackle disease, prolong life-span and delay disease progression. Additionally, studies of physiology can allow for development of bioinspired engineering solutions. Proteins in their native conformation are essential for maintaining the structure and function of different cellular systems. Multiple cellular physiological processes depend on proteins for their smooth functioning, such as cell growth, division, and metabolism. Any alteration in the native structure of proteins due to stress events can cause their misfolding and disturb cellular homeostasis. Another vertical under this thematic area is to understand cellular protein homeostasis, especially in the context of neurodegenerative disorders.

### 2. Environmental Biotechnology Laboratory

**Faculty members associated with this theme:** Dr. Meenu Chhabra

Environmental biotechnology thematic lab at IITJ focuses 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 clean up. Another critical focus is waste to energy conversion systems, in particular, bio electrochemical systems which combine the versatility of microbial metabolism with electrochemistry. The bio electrochemical systems can also serve as biosensors for environmental monitoring and assessment.

### 3. Biomaterials & Tissue Engineering Laboratory

**Faculty members associated:** Dr. Indranil Banerjee and Dr. Raviraj Vankayala

Biomaterials and Tissue Engineering is a multidisciplinary knowledge domain and encompasses sub-domains of material science, chemistry, physics, cell and molecular biology, chemical engineering, mechanical engineering, nanotechnology, and microfluidics. The 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. Here, the nanomaterials can be engineered to incorporate various multifunctionalities and create versatile theranostic platforms in tackling various diseases. Novel scaffolds were also used to develop various tissue engineered organs for biomedical applications.

### 4. Molecular Microbiology Laboratory

**Faculty members associated :**

Dr. Shankar Manoharan, Dr. Neha Jain

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.



## 5. Biophysics Laboratory

**Faculty members associated:** Dr. Sudipta Bhattacharya, Dr. Neha Jain, Dr. Sucharita Dey

“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.

## 6. Computational Biology & Bioinformatics Laboratory

**Faculty members associated:** Dr. Pankaj Yadav and Dr. Sucharita Dey

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.

## 7. Molecular Motors & Cell Motility Lab

**Faculty member associated:** Dr. Priyanka Singh

“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. 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. The work has provided mechanistic insights in the role of regulatory proteins involved in functioning of mitotic cellular machinery. Further, the group is involved in the identification of a novel chemical scaffold which target microtubule cytoskeleton proteins in cancer cells.

## 8. Neuroscience & Neuroengineering Laboratory

**Faculty members associated:** Prof. Neeraj Jain, Prof. Surajit Ghosh, Dr. Sushmita Jha and Dr. Amit Mishra

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.

## 9. Genomics and Systems Biology Laboratory

**Faculty members associated:** Dr. Ayan Sadhukan, Dr. Mitali Mukerji, Dr. Shankar Manoharan, Dr. Pankaj Yadav

Genomics and metagenomic tools /approaches can provide insights from a systems biology perspective at the cellular, organismal, population and ecosystem levels. These are anticipated to provide deeper insights into the functioning of living systems and communities as a whole. In this thematic area we aim to integrate genomics with knowledge systems from diverse disciplines including engineering, environmental sciences, medicine and local traditional knowledge in a big-data, one health framework. These are being applied in several transdisciplinary initiatives of the Institute including Thar DESIGNS, AyurTech, Smart Healthcare etc. This would provide insights on networks between the environment and their inhabitants. The insights from this area

are likely to address different aspects of SDG and ecosystem services in the areas of climate change, conservation, disaster management, sustainable agriculture and education. This thematic area encompasses diverse areas:

- (i) Metagenomics profiling of microbiota of the Thar desert
- (ii) Long-read sequencing for genomic surveillance of hospital-associated pathogens etc
- (iii) Human genomics in Thar natives and transition populations for integrative precision medicine
- (iv) Single-cell genomics and spatial transcriptomics: method development and applications
- (v) Functional genomics of plant abiotic stress tolerance.

### Academic programs

- » B.Tech. Bioengineering
- » M.Tech. Bioscience & Bioengineering
- » M.Tech. / Ph.D. Dual degree program Bioscience & Bioengineering
- » Ph.D. Bioscience & Bioengineering

## Patents filed / awarded

Faculty Name	Patent Number	Name of patent	Patent Authority	Status
Sushmita Jha	202311002108	Designing and development of scaffold free 3d multicellular Spheroids and characterisation of the same	Office of the Controller General of Patents, Designs and Trade Marks (CGPDTM)	Provisional patent application submitted
Sudipta Bhattacharyya	202311015493	2,3 Dihydrofuro Dimedone (DHF_20) as Staphylococcal Thioredoxin Reductase Inhibitor	Office of the Controller General of Patents, Designs and Trade Marks (CGPDTM)	
Raviraj Vankayala	202311023777	Colorimetric sensor for the detection of bacterial and biofilm contamination	Office of the Controller General of Patents, Designs and Trade Marks (CGPDTM)	Provisional patent filed
Meenu Chhabra	Indian Patent application No: 202311016263	Electrochemical Potentiometric device	Office of the Controller General of Patents, Designs and Trade Marks (CGPDTM)	Provisional patent filed
Dinesh K. Ahirwar	US Patent: P2022-0587020	Induced Electric Fields Reduced Metastasis of Mvt-1 orthotopic model.	US Patent Office	Provisional patent filed

Faculty Name	Patent Number	Name of patent	Patent Authority	Status
Surajit Ghosh	202311028857	Development of Novel Utrophin Regulator for the treatment of Duchene muscular dystrophy.	Indian Pat. Appl. (2023), IN	Provisional Patent Filed
	202311014414	MMP-9 responsive growth factor releasing Neuroprotective Hydrogel	Indian Pat. Appl. (2023), IN	Provisional Patent Filed
	202211052566	SPIV3_1: a cationic synthetic peptide with broad-spectrum antibacterial activity	Indian Pat. Appl. (2022), IN	Provisional Patent Filed

## Publications

### Prof. Mitali Mukerji

- Singhal K, Dhamija S, **Mukerji M**. Exonized Alu repeats in the 3'UTR of a CYP20A1<sub>Alu</sub>-LT transcript act as a miRNA sponge. *BMC Res Notes*. 2023 Mar 9;16(1):32. doi: 10.1186/s13104-02306289-z.
- Gupta I, Shankrit S, Narta K, Ghazi M, Grover R, PandeyR, KarHK, MenonSM, GuptaA, Yenamandra VK, Singh A, **Mukerji M**, Mukhopadhyay A, Rani R, Gokhale RS, Dash D, Natarajan VT. Whole-Exome Sequencing of Vitiligo Lesions Indicates Lower Burden of Somatic Variations: Implications in Risk for Nonmelanoma Skin Cancers. *J Invest Dermatol*. 2022 Dec 17:S0022-202X(22)02884-6. doi: 10.1016/j.jid.2022.11.018.
- Chauhan NS, **Mukerji M**, Gupta S. Editorial: Role of microbiome in diseases diagnostics and therapeutics. *Front Cell Infect Microbiol*. 2022 Sep 12;12:1025837. doi: 10.3389/fcimb.2022.1025837. eCollection 2022.
- Bhandari S, Dolma P, **Mukerji M**, Prasher B, Montgomery H, Kular D, Jain V, Dadhwal V, Williams DJ, Bhattacharyya A, Gilbert E, Cavalleri GL, Hillman SL. Population history and genome wide association studies of birth weight in a native high altitude Ladakhi population. *PLoS One*. 2022 Sep 20;17(9):e0269671. doi: 10.1371/journal.pone.0269671. eCollection 2022.
- Rani R, Rengarajan P, Sethi T, Khuntia BK, Kumar A, Punera DS, Singh D, Girase B, Shrivastava A, Juvekar SK, Pesala B, **Mukerji M**, Deepak KK, Prasher B. Heart rate variability during head-up tilt shows inter-individual differences among healthy individuals of extreme Prakriti types. *Physiol Rep*. 2022 Sep;10(17):e15435. doi: 10.14814/phy2.15435.
- Prakrithi P, Jha P, Jaiswal J, Sharma D, Bhojar RC, Jain A, Imran M, Senthilvel V, Divakar MK, Mishra A, Scaria V, Sivasubbu S, **Mukerji M**. Landscape of Variability in Chemosensory Genes Associated With Dietary Preferences in Indian Population: Analysis of 1029 Indian Genomes. *Front Genet*. 2022 Jul 12;13:878134. doi: 10.3389/fgene.2022.878134.
- Haider M, Anand V, Enayathullah MG, Parekh Y, Ram S, Kumari S, Anmol, Panda G, Shukla M, Dholakia D, Ray A, Bhattacharyya S, Sharma U, Bokara KK, Prasher B, **Mukerji M**. Anti-SARS-CoV-2 potential of *Cissampelos pareira* L. identified by connectivity map-based analysis and in vitro studies. *BMC Complement Med Ther*. 2022 Apr 22;22(1):114. doi: 10.1186/s12906-022-03584-3.

### Prof. Surajit Ghosh

- Mallesh, R., Khan, J., Gharai, P.K., Ghosh, S., Garg, S., Arshi, M.U. and **Ghosh, S.**, 2023. HighAffinity Fluorescent Probes for the Detection of Soluble and Insoluble A $\beta$  Deposits in Alzheimer's Disease. *ACS Chem. Neurosci*. 2023, 14, 8, 1459–1473

2. Mallesh, R., Juhee Khan, Gharai, P.K., Gupta, V., Roy, R. and **Ghosh, S.**, 2023. Controlling Amyloid Beta Peptide Aggregation and Toxicity by Protease-Stable Ligands. *ACS Bio & Med Chem Au*, 3(2), pp.158-173.
3. Gharai, P.K., Khan, J., Mallesh, R., Garg, S., Saha, A., Ghosh, S. and **Ghosh, S.**, 2023. Vanillin Benzothiazole Derivative Reduces Cellular Reactive Oxygen Species and Detects Amyloid Fibrillar Aggregates in Alzheimer's Disease Brain. *ACS Chemical Neuroscience*, 14(4), pp.773-786.
4. Roy, R., Khan, J., Pradhan, K., Nayak, P., Sarkar, A., Nandi, S., Ghosh, S., Ram, H. and **Ghosh, S.**, 2022. Short Peptoid Evolved from the Key Hydrophobic Stretch of Amyloid- $\beta$ 42 Peptide Serves as a Potent Therapeutic Lead of Alzheimer's Disease. *ACS Chemical Neuroscience*.
5. Gupta, V., Mahata, T., Roy, R., Gharai, P., Jana, A., Garg, S. and **Ghosh, S.**, 2022. Discovery of imidazole-based GSK-3 $\beta$  inhibitors for transdifferentiation of human mesenchymal stem cells to neurons: A potential single-molecule neurotherapeutic foresight. *Frontiers in Molecular Neuroscience*, 15.
6. Adak, A., Das, G., Gupta, V., Khan, J., Mukherjee, N., Mondal, P., Roy, R., Barman, S., Gharai, P.K. and **Ghosh, S.**, 2022. Evolution of Potential Antimitotic Stapled Peptides from Multiple Helical Peptide Stretches of the Tubulin Heterodimer Interface: Helix-Mimicking Stapled Peptide Tubulin Inhibitors. *Journal of Medicinal Chemistry*, 65(20), pp.13866-13878.
7. Bhosle, A.A., Banerjee, M., Gupta, V., **Ghosh, S.**, Bhasikuttan, A.C. and Chatterjee, A., 2022. Mechanochemical synthesis of an AIE-TICT-ESIPT active orange-emissive chemodosimeter for selective detection of hydrogen peroxide in aqueous media and living cells, and solid-phase quantitation using a smartphone. *New Journal of Chemistry*, 46(39), pp.18961-18972.
8. Mallesh, R., Khan, J., Pradhan, K., Roy, R., Jana, N.R., Jaisankar, P. and **Ghosh, S.**, 2022. Design and Development of Benzothiazole-Based Fluorescent Probes for Selective Detection of A $\beta$  Aggregates in Alzheimer's Disease. *ACS Chemical Neuroscience*, 13(16), pp.2503-2516.
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### Dr. Pankaj Yadav

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### Dr. Sucharita Dey

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### Dr. Ayan Sadhukhan

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### Dr. Dinesh K. Ahirwar

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### Prof. Surajit Sen

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## Recent Research Grants secured

Project Title	Sponsoring Agency	PI	Sanctioned Amount (Rs.)	Start Date
Enable youth to fight against antimicrobial resistance	IndiaBioscience	Neha Jain	1,50,000	01/12/2022
Role of fungal and bacterial amyloids in polymicrobial biofilm assembly	IIT Jodhpur	Neha Jain	10,00,000	16/08/2022
Probing immune activation in response to amyloid crossseeding for early detection of Parkinson's disease	International Brain Research Organization	Neha Jain	5,00,000	09/08/2022
Genome-wide association study (GWAS) in Arabidopsis to identify the genetic basis of drought stress memory in plants under conditions mimicking the Thar desert environment	SERB	Ayan Sadhukhan	32,98,707	28/09/2022
ChAracterizing, Reviving, Supporting, Monitoring and MAnaging Sustainable Food Systems to address malnutrition in indigenous tribal communities of India. CARISMMA food system study	DBT/Wellcome Trust India Alliance	Shankar Manoharan	47,20,750	01/04/2023
Monitoring extrapyramidal symptoms in patients with psychiatric disorders	JCKIF	Pankaj Yadav	1,20,000	01/03/2023
Genome wide transcriptome profiling to study the impact of breath and meditation based. Sudarshan Kriya Yoga	SSIAR	Pankaj Yadav	15,11,910	07/5/2023
Point of use and inline coliform sensors for smart water management	Jal Jeevan Mission	Meenu Chhabra	72,12,000	01/07 2022
Edible emulgel based novel, cost-effective formulation for colon targeted synbiotic-drug delivery	BIG-BIRAC	Indranil Banerjee	49,81,000	Mar, 2023
Cellular self assembly based angiogenic micromodule for tissue engineering application	IIT Jodhpur	Indranil Banerjee	25,00,000	Mar, 2022

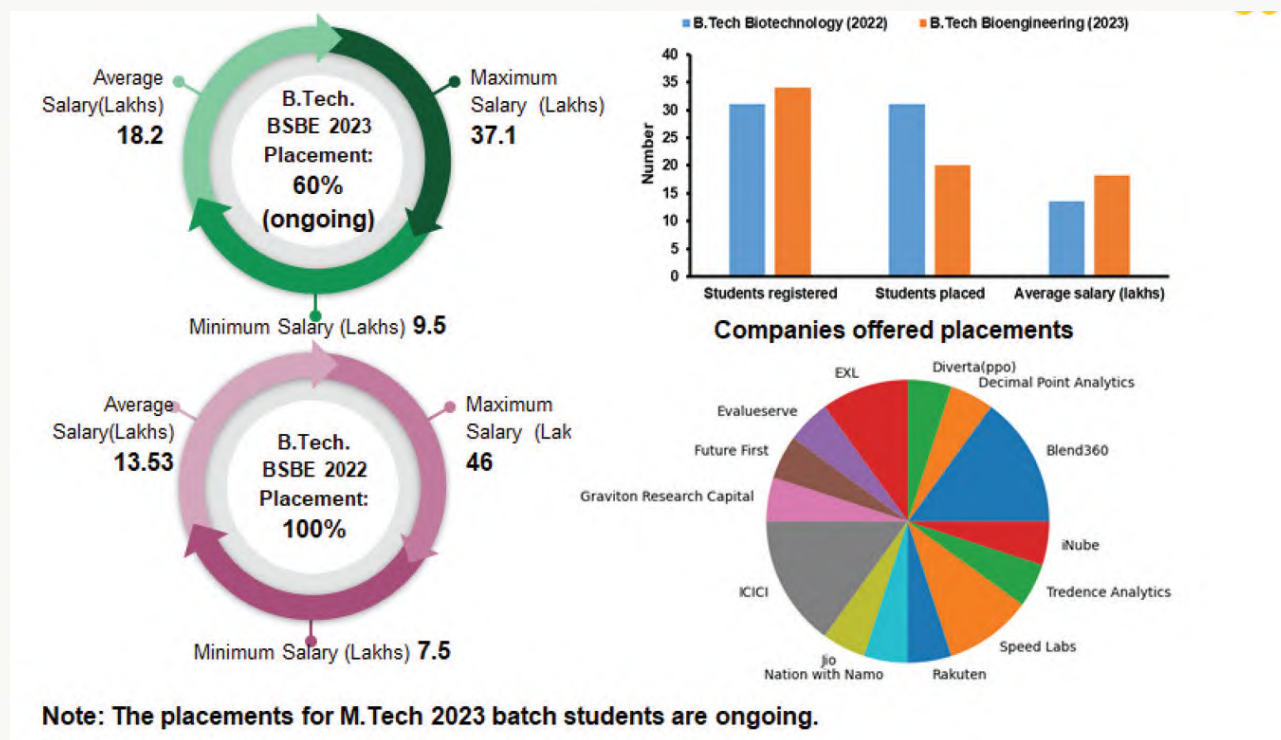
## Faculty Awards and Achievements

Faculty Member	Achievement	Year
Neha Jain	IBRO Collaborative Grant Award	2022
	International Research Mobility Grant	2022
Amit Mishra	National Academy of Medical Sciences India: Best Research (Dr. Bhargava) Biomedical Scientist Drug Development Award	2022
	Coveted Honour: Melpadom George A.V Jones Scientist Merit Award	2022
	Best Biomedical Scientist Award: Translational Biomedical Research Society (TBRS), India	2023
Shankar Manoharan	Dr. Vandana Sharma memorial award for Teaching Innovation, IIT Jodhpur	2022
	Illustrious Alumnus Award, Thiagrajar College of Arts & Sciences, Madurai, Tamilnadu	2022
Indranil Banerjee	IIT Jodhpur Institute Awards for Research Excellence-2022; Senior Researcher Award (Engineering).	2022
Surajit Ghosh	Appointed as Editorial Board Member in the Journal RSC Advances.	2022
	Appointed as Associate Editor in Frontiers in Chemistry.	2022
	Appointed as Dean of International Relations, Corporate Relations, and Alumni Relations	2022

## Student achievements

- Dheemant Jallepalli (B20BB015)**
  - Selected for Mitacs GRI summer research internship at University of Manitoba.
  - Selected for SRIP IIT Gandhinagar research program.
  - Selected for Amazon ML Summer School
- Amit Singh (B22BB007):** State level Kabaddi player; Gold medal in Kabaddi tournament at Kridansh.
- Atharva Kamle (B22BB012):** In Spandan: 1<sup>st</sup> in Charcoal painting and Soft pastel drawing; 2<sup>nd</sup> in sketching competition. 1<sup>st</sup> rank in Poster Making in the event Entrepreneurship as a Social Movement organized by IITJ.
- Akanksha Mishra (P19BB003):** 1<sup>st</sup> prize in poster presentation in industry day on the theme 'technologies for sustainability'.
- Nupur Kanwar (P20BB0205):** 1<sup>st</sup> prize in logo design on the occasion of Swachata Pakhwada 2022
- Antony Vinci Fernando C (D20BB001):** PMRF fellowship 2023 (cycle 10)
- Anurupa Karmakar (M21BB009):** Got internship opportunity at BCCN Berlin, Germany
- Shubham Garg (P19BB013):** 2<sup>nd</sup> prize in Spinco cell fie competition.
- Dipro Mukherjee (M22BB001):** 1<sup>st</sup> prize in Paper Presentation, Technical Session on Smart Health Care: INAE-SERB Youth Conclave 2022, IITJ.

## Student placement



## Major Equipment Available

Cell culture facility  
Fluorescence microscope  
Gel documentation system  
Microplate reader  
Nanodrop spectrophotometer  
Real Time PCR Oxford  
Nanopore sequencers

Single tube multi-mode reader  
Nanodrop spectrophotometer  
Gene pulser electroporator  
Ultrasonic vapor humidifier  
Multi-vessel fermenter  
Photobioreactor  
Probe sonicator

AKTA protein purification system  
BOD Incubator  
UV visible spectrophotometer  
Algal growth chamber  
Electrochemical workstation  
Microvolume Fluorometer

## Outreach activities

Faculty Name	Year	Outreach
Neha Jain	2023	Conducted four workshops in rural areas of Rajasthan on Antimicrobial resistance
	2022	Conducted five workshops in and around Jodhpur on Microbial communities
		Invited Speaker at STUTI-DST SCXRD workshop held at IIT Gandhinagar
		Invited as speaker at the University of Engineering & Management, Kolkata on the World Microbiome Day

Faculty Name	Year	Outreach
Sudipta Bhattacharyya	2023	Coordinator, CME AYUSH Workshop
Priyanka Singh	2023	Invited Speaker, at the Microtubule, Motors, Transport & Trafficking (M2T2), IISER Bhopal
	2022	Invited Short Lecture, at the Future-Oriented Research Conferences and Exhibitions (FORCE)- Interdisciplinary Initiative in Chemical Sciences (IICS) organized by IISER Kolkata, IIT Kanpur & IISER Bhopal at Jaypee Palace, Agra.
Dinesh K Ahirwar	2022	Invited Speaker at 36th Annual Meeting of Society for Neurochemistry India and International conference on One Health and Translational research in Neurosciences, 10-12 November, 2022, IIIT Nagpur, Maharashtra, India
Pankaj Yadav	2023	Invited plenary speaker, 10th annual conference of research society for the study of diabetes in India (RSSDI), Pushkar, Rajasthan
	2022	Invited speaker, SCI-OMICS session, Pine Biotech
Meenu Chhabra	2022	Invited talk at BSBB- 2022 to be held from 7-11, December 2022 at Indian Institute of Technology (IIT), Guwahati, India (BRSI conference).
	2022	Invitation as Eminent Speaker and be on board of National Advisory Committee of AICTE sponsored "National Conference on Environmental and Industrial Biotechnology (NCEIB-2022)", 10-12 November 2022 at AITH Kanpur
	2022	Delivered a lecture on 'Biological carbon capture' in Five-Day Online Faculty Development Program on "Advances in Biological Wastewater Treatment Methods: Teaching and Learning Strategies" organized by the Department of Civil Biotechnology in Association with the Centre for Training and Learning of NIT Warangal during 5-9 December 2022.
Indranil Banerjee	2023	Invited speaker , AIIMS Jodhpur - IIT Jodhpur Joint Conclave & Workshop on Stem Cells, Cellular Therapy, Gene Therapy, and Tissue Engineering, (JCSCTE-2023) 26-28th March, 2023
	2022	Invited speaker at International conference on Biomaterials, Regenerative medicine and Devices, IIT Guwahati , India, Dec 14th -18th , 2022
	2022	Speaker, Indo-US joint meeting at IIT Delhi (Participation of University at Buffalo (UB), USA, IIT Delhi, IIT Bombay, IIT Kanpur, IITJodhpur, IIT BHU, Ashoka University, US Department of Defense Research), Nov 28th -30th, 2022
	2022	Conducted workshop at SHRI MISHRILAL SANWAL Govt Girls College, Jaisalmer, Rajasthan, under SSR activity scheme of SERB-CRG project, 14th May 2022
	2022	Special invitee, Expert Committee meeting of Engineering Science – SRG scheme for project review, June 6-7 , IIT Madras
	2022	Invited as expert in 4th PAC, Exponential Technologies (CRG) SERB for project review, April 11-12, 2022
	2022	Invited to join the mentoring program of KIIT for Pre TEP BIRAC BIG 20 applicants as super mentor.

# Department of Chemical Engineering

Introduction: The inception of the Chemical Engineering Department at IIT Jodhpur took place in the year 2020 with the admission of the first batch of undergraduate and postgraduate students in four different academic programs (B.Tech, M.Tech., Ph.D., and M.Tech.-Ph.D. Dual degree). Through the academic programs, the department is making a conscious effort to establish itself as a leading institute in a new genre of chemical engineering education, in line with the National Education Policy. The program involves traditional courses, emerging areas and specializations such

as process engineering intelligence, molecular engineering and sustainability. With Industry 4.0 transforming the chemical industry, AI and IoT for chemical engineering forms an integral part of the curriculum. The Chemical Engineering program at IIT Jodhpur has been formulated to produce future ready chemical engineers capable of meeting new industrial challenges. It is full of opportunities and flexibility for the students. Department is also keen on collaboration with industry and academia world-wide.



## Vision:

“To become a globally recognized department of chemical engineering through its contribution in emerging and demand-driven areas with a multidisciplinary approach.”

## Mission:

» Empower students with fundamentals of chemical engineering and emerging concepts.

- » To become a center of excellence in process engineering intelligence, molecular engineering and sustainability
- » To engage in research programs 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.

## Faculty details

- » Total Number of Faculty in Department – 13
- » Research Profile of each Faculty Member is as following

### Faculty Members

Faculty Name	Designation	Research areas
Prof. Pradip K Tewari	Jal Jeevan Mission Professor Chair and Head, Department of Chemical Engineering	Water Technologies; Membrane Technology; Desalination; Nanocomposite Membrane Technology; Heat Transfer and Two Phase Flow
Dr. Abhilasha Maheshwari	Assistant Professor	Process Systems Engineering; Water Distribution Networks; Modelling; Optimization; Sustainability; Environmental Chemistry; AI and ML in Chemical and Environmental Systems, Digital twins
Dr. Angan Sengupta	Assistant Professor	Molecular Modelling & Simulation; Theoretical Material Design; Carbon dioxide Capture; Hydrogen Storage; Water Treatment; Fuel Cell; Thermodynamic Studies; Continuum Modelling & Simulation; Fire and Explosion Modelling; Steady and Transient State Modelling; Safety Modelling; Process Modelling; Transport Processes
Dr. Deepak Arora	Associate Professor	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
Dr. Nirmalya Bachhar	Assistant Professor	Nanomaterials; polymer nanocomposite; self-assembly
Dr. Prasenjit Sarkar	Assistant Professor	Biomolecular Engineering; Biochemical Engineering
Dr. Prashant Kumar Gupta	Assistant Professor	Electrochemical Energy Storage Devices (Lithium, Sodium and Zinc Ion Battery), Electrocatalysis (HER, OER, CER, and Electrochemical CO <sub>2</sub> Reduction), Electrochemical Biosensors
Dr. Praveen Kumar Sappidi	Assistant Professor	Multiscale modeling, Molecular simulation, Free energy simulations, Contaminant separation materials, Ionic liquid based solvents, Polymeric materials
Dr. Ramesh Asapu	Assistant Professor	Photocatalysis; Environmental remediation; Modeling & Simulation; Plasmonic nanomaterials; Perovskites
Dr. Sumit Kamal	Assistant Professor	Fine Chemicals; Catalysis and Reaction Engineering, Process Development; Green Technology; Chemical Reaction Kinetics
Dr. Tara Chand Kumawat	Assistant Professor	Hydrodynamic stability; flow through porous media; Computational Fluid Dynamics; Antibubbles
Dr. Vikky Anand	Assistant Professor	Electrohydrodynamics; Multiphase flow; Electro-desalting; Soft matter; Rheology
Dr. Krunal Gangawane	Assistant Professor	CFD; Lattice Boltzmann method; Aerogels; Nanoparticles-based phase change material

## Description of Research Areas and Groups



Department has research interest in both core chemical engineering and emerging areas. With the advent of Industry 4.0, artificial intelligence (AI), machine learning (ML), data analytics, internet of things (IoT), molecular engineering and nanocomposites, the research efforts in the department are focused towards the incorporation of new emerging technologies and demand-driven areas. To this end, following research groups focus on several areas such as:

- » **Advanced Water Treatment Technologies:** new energy driven desalination, membrane technologies, nanocomposite membrane, heat transfer and two-phase flow. Future directions include lab to land demonstration of water technologies with particular focus in rural and remote areas.
- » **Molecular Engineering:** molecular material design for CO<sub>2</sub> capture, water treatment, geomaterials, molecular designing of membranes for fuel cells, enhanced oil recovery, and molecular development of fabric-based sensors for space applications.
- » **Polymers:** for advanced and sustainable manufacturing with applications in Agritech and semiconductors.
- » **Electrochemical Engineering:** Energy conversion and storage devices, battery management systems, conversion of CO<sub>2</sub> to fuels, biosensors, electro coalescence of emulsion, electro-desalting in refinery upstream process.
- » **Heterogeneous Catalysis & Reaction**

**Engineering:** process development, process intensification, membrane-based separation to work in the domain of fine chemicals, hydrogen economy and biomass valorization.

- » **Process Systems Engineering & Sustainability:** Advanced control, AI and machine learning (ML) applications for process modelling and, Decision Support Systems for achieving Sustainable Development Goals, Smart water infrastructure, Water-Food-Energy Nexus, Process Optimization. Future focus of the group also includes the setup of a digital twin pilot plant for industrial applications and operational excellence studies to name in brief.
- » **Fluid & Interfacial Engineering:** Understanding stability of micro-scale free surface flows and antibubble. use of stable anti-bubbles for various real-life applications such as encapsulation, material transport and delicate mixing
- » **Biochemical Engineering & Biomolecular Engineering:** development and large-scale production of new proteins, cells, and tissues of therapeutic and biotechnological value. Future research will also focus on scale-up for large scale production of such tissues in the lab.

**Academic Programmes: The department has students enrolled in following four academic programmes.**

- » B. Tech. in Chemical Engineering
- » M.Tech. in Chemical Engineering
- » M.Tech.-Ph.D. Dual Degree in Chemical

Engineering

- » Ph.D. Chemical Engineering

### Significant Research Achievements

- » **Research Collaboration with University of Buffalo:** Dr. Angan Sengupta initiated a joint research work on ML based Computational Material Design for CO<sub>2</sub> capture with the scientist team at UB.

- » **Scientific Social Responsibility through Canara bank CSR Funds:** Thirteen water purification units based on membrane assisted sorption process have been designed and installed with local participation in the three rural schools of Jodhpur districts providing clean drinking water as a part of technology transfer under Scientific Social responsibility.

**Co-PI:** Prof. Pradip K Tewari

- » **MOU with Military Station, Jodhpur.** Signing of MOU between Military Station Jodhpur and Department of Chemical Engineering, IIT Jodhpur, for Sewage Wastewater Treatment Plant Automation.

**PI:** Dr. Vikky Anand

- » **MOU with Eastar Chemical Corporation:** for validating the synthesis route for the preparation of fine and speciality chemicals using heterogeneous catalysts.

**PI:** Dr. Sumit Kamal

- » **Research Project Sponsored by SERB:** on Experimental and Numerical Analysis for Stabilization of Antibubbles

**PI:** Dr. Tarachand Kumawat

- » **L&T- IITJ Industry- Academia Collaboration:** Signed the NDA between IIT Jodhpur and L&T to initiate several joint research projects in the area of Water Technology Research.

**PI:** Dr. Abhilasha Maheshwari

- » **AgriTech for sustainable food supply:** Dr. Deepak Arora has signed MoU with Eeki Automation Pvt Ltd for another year to develop technologies to cater to the growing demand of healthy food supplies.

- » **Inauguration of JJM water centre:** The IITJ- JJM Centre for Sustainable Drinking Water under JJM- Chair Professorship to Prof. Pradip K Tewari (Dept. of Chemical Engineering) was inaugurated with the visit of Shri Gajendra Singh Shekhawat, Hon'ble Union Minister of Jal Shakti, Government of India on Sep 22, 2022. The centre further conducted various outreach and capacity-building activities to equip participants with the advanced skills and knowledge to address current water-related challenges and develop sustainable solutions by providing an in-depth understanding of the latest techniques and technologies in water resource management.



Total number of Sponsored Research and Consultancy Projects ongoing in department in FY 22-23: 17



## Faculty/ Department Laurels

- » **Prof. Pradip K Tewari** joined as Member of *Sectional Committee of Indian National Academy of Engineering (INAE)* and *INAE-DAE Consultative Committee*
- » **Prof. Pradip K Tewari** being elected as *Fellow of Indian Chemical Society*
- » **MSRI Prize to Dr. Nirmalya Bacchar** for best paper published in *Bulletin of Material Science* by Material Research Society of India.
- » **Dr. Deepak Arora** has been serving as a *member, Board of studies for plastic technologies* with RTU.

## Student Laurels

- » **Ambuja Young Researchers Award** to Ph.D. Students Mr. Goga Ram and Mr. Rahul Painuly at Chemcon-2023.
- » **Best poster presentation Award, Compflu-2022** - Mr. Siddhart Saraswati (guided by Prof. Deepak Arora) received the best poster award during 16<sup>th</sup> edition of Complex Fluids Symposium.
- » **Hack of PI 2021 qualifier:** Mr. Vikram Jat (guided by Dr. Deepak Arora) qualified for the semifinals in the event. He was among 30 out of 3000 participants who qualified for the semifinals.

## Laboratories and equipments

- » **EHS Activities:** Conducted Safety Training for PG Students in the department on 11th Nov 2022.



## UG teaching laboratories



## List of UG Lab Equipment

Lab Name	Equipment name	Location
Mass Transfer Lab	<ul style="list-style-type: none"> <li>» Natural Draft Dryer</li> <li>» Adsorption in Packed Bed</li> <li>» Experimental Water Cooling Tower</li> <li>» Packed Bed Solid Liquid Extraction</li> <li>» Liquid-Liquid Extraction Apparatus</li> <li>» Sieve Plate Distillation Column</li> <li>» Simple Batch Distillation Column</li> <li>» Vapour Liquid Equilibrium Setup</li> <li>» Absorption in Sieve Plate Column</li> <li>» Absorption in Packed Bed</li> <li>» Liquid Diffusion Coefficient Apparatus</li> <li>» Solid in Air Diffusion Apparatus</li> <li>» Vapour in Air Diffusion Equipment</li> <li>» Absorption in packed bed with different packing</li> <li>» Ion exchange equipment</li> <li>» Forced draft tray dryer equipment</li> </ul>	Berm E-09
Chemical Reaction Engineering lab	<ul style="list-style-type: none"> <li>» Adiabatic Batch Reactor</li> <li>» Isothermal Batch Reactor</li> <li>» Isothermal CSTR</li> <li>» CSTR with RTD</li> <li>» CSTR in series</li> <li>» Isothermal PFR</li> <li>» PFR with RTD</li> <li>» Isothermal semi-batch reactor</li> <li>» Packed bed reactor</li> </ul>	Berm E-10
Process Control Lab	<ul style="list-style-type: none"> <li>» Single tank system</li> <li>» Two tank non-interacting system</li> <li>» Two tank interacting system</li> <li>» Interacting &amp; non-interacting system</li> <li>» Characteristics of PID controller</li> <li>» Flow control trainer</li> <li>» Level control trainer</li> <li>» Temperature control trainer</li> <li>» Time constant of thermocouple</li> <li>» Time constant of a manometer</li> </ul>	Berm E-11

Lab Name	Equipment name	Location
<b>Fluid Mechanics Lab</b>	<ul style="list-style-type: none"> <li>» Discharge Through Venturimeter, Orificemeter &amp; Rotameter</li> <li>» Pitot Tube Setup</li> <li>» Reynold's apparatus</li> <li>» Bernoulli's Theorem Apparatus</li> <li>» Fluid friction measurement apparatus</li> <li>» Boundary layer apparatus</li> <li>» Drag coefficient apparatus</li> <li>» Hydrodynamics of packed bed</li> <li>» Flow through fluidized bed</li> <li>» Cavitation Apparatus</li> </ul>	Berm E-12
<b>Heat Transfer lab</b>	<ul style="list-style-type: none"> <li>» Thermal conductivity of metal rod</li> <li>» Heat transfer through composite wall</li> <li>» Heat transfer in natural convection</li> <li>» Heat transfer in forced convection</li> <li>» Emissivity measurement apparatus</li> <li>» Stefan Boltzmann's apparatus</li> <li>» Heat transfer in agitated vessel</li> <li>» Shell and tube heat exchanger</li> <li>» Parallel flow/counter flow heat exchanger</li> <li>» Dropwise/filmwise condensation apparatus</li> <li>» Pool boiling apparatus</li> <li>» Unsteady state heat transfer unit</li> </ul>	Berm E-13

### Research Laboratories Equipment

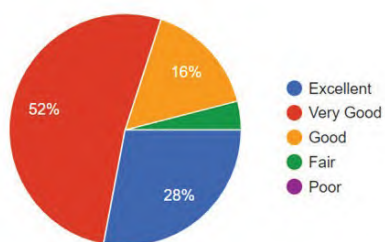
Equipment name	Lab Location
CO2 Incubator	Lab 205
See-saw shaker	Lab 205
Dry block heater	Lab 205
Battery Testing Equipment 5V 10mA	Berm E11
Battery Testing Equipment 5V 20A	Berm E11
Electrochemical workstation with RRDE	Lab 203
Horizontal arm microscope	Lab 203
Programmable forced convection oven	Lab 206
Vacuum Oven	Lab 206
Programmable Spin Coater	Lab 206
Tube Roller	Lab 206
Chemical baths	Lab 206

Equipment name	Lab Location
Computational GPU System + 42 Rack	Rack #18, New Data Center
Computation Work Stations	E8
UV-vis spectrophotometer	Lab 205
Hanna Multiparameter Water Analysis Field Kit	Lab 203
Hermle Centrifuge	Lab 205
Eppendorf Microcentrifuge	Lab 205
Spin Coater (being sent to vendor for repair)	Lab 205
Aspen Server	CC (Rack 18)
Upright Microscope	Lab 203
Trinocular microscope	Lab 203
Camera with cable	Lab 203
High speed homogenizer	Lab 206
Viscometer	Lab 206
Electrochemical analyzer	Lab 203
hydraulic crimping machine and split test cell	Lab 203
electrode punching machine and manual rolling press machine	Lab 203
Autoclave Reactor	Lab 203
Quantum ATK	Lab E8
Function generator	Lab 203
Oscilloscope	Lab 203
Multimeter	Lab 203
GAMS Optimization Suit	Lab E8

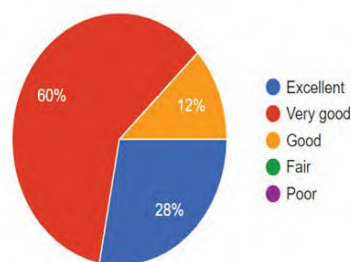
### Outreach activities

» **Successful Organisation of a Short-Term Certificate CEP Course for Working Professionals and Academicians:** Dr. Abhilasha Maheshwari & Dr. Angan Sengupta conducted a 3 day program on Data Analytics & Fundamentals of Machine Learning for Process Modelling from 6-8 Oct, 2022. The course received excellent learning feedback with 65 participants from diverse academic institutes and industries across India.

How well did you achieved the learning goals of the course?



How would you describe the overall quality of the instruction in this course?



- » **BDS Activities:** Department organised several Industrial Visits nearby Jodhpur region and facilitation of student's participation in institute level inter-department events (Intellia).



- » **Chem-E-Sorption:** First edition of Department's Annual Symposium organized on Jan 14, 2023 at Jodhpur Club, IIT Jodhpur.

## Chem-E-Sorption Symposium : 22<sup>nd</sup> March 2023



- » **Training & Capacity Building Program:** for State Government/ PHED engineers on Water Sustainability on World Water Day on March 22, 2023.
- » **Green Hydrogen Mission workshop:** One day workshop organised by Dept. of Chemical Engineering on "IIT Jodhpur: Destination for Green Hydrogen Mission for India" on Feb 5, 2023.

## One-day workshop on 'IIT Jodhpur: Destination for Green Hydrogen Mission for India': 05 February 2023



- **More than 150 participants**
- **Experts from IIT, BARC, CSIR, DAE**
- **Industry Experts L&T, ACME, CEEW, Ossus, Cairn Energy**
- **Local industry associations JIA/MIA**

- » **Invited as Evaluator Dr. Deepak Arora :** for the Thermal Analysis forum of Delaware Valley
- » **Prof. Pradip K Tewari appointed as Member, Academic Council** of Pandit Deendayal Energy University (PDEU) Gandhinagar
- » **Research Work Presentation at PSE Asia 2022: Dr. Abhilasha Maheshwari** presented her work on "*Integration of Supply and demand-side management: Optimal energy storage design incorporating the effect of uncertainty*" and paper in 10<sup>th</sup> International Asian Symposium on Process Systems Engineering held at IIT Madras on Dec 10-14, 2022.
- » **Invited talk by Dr. Deepak Arora at C4DFED, IIT Mandi:** Delivered talk on advanced electronic packaging
- » **Invited talk: Prof. Pradip K Tewari:** Delivered lecture on 'Sustainability of Drinking Water Sources' during India Water Week in Delhi during Nov 1- 5, 2023.
- » **Institute industry day 2023 poster presentation:** Dr. Deepak Arora's research group presented three posters in the session.
- » **Invited talk: Dr. Vikky Anand** gave a talk in the Training and Capacity Building Program on Sustainability of Water on 22nd March, 2023.
- » **Invited talk by Dr. Prasenjit Sarkar in AIIMSJ-IITJ Joint Conclave** on Stem Cells, Cellular Therapy, Gene Therapy, and Tissue Engineering on 28th March 2023
- » **Invited talk by Dr. Deepak in ICTFAB 2021** International Conference for Semiconductor Fabrication and Packaging
- » **Invited talk by Dr. Nirmalya** in Recent Advances in Smart and Sustainable Nanomaterials for Chemical and Biological Applications
- » **Invited talk by Dr. Deepak Arora to NATAS:** Organized by Thermal analysis forum of Delaware Valley.
- » **Invited talk by Dr. Nirmalya** on "Understanding the effect of "Magic Methyl"-group in polymer solution" at FCSXIII
- » **Session Chair: Dr. Angan Sengupta** chaired a session in the conference on CHEMSMART-22, 2022, NIT Rourkela, India.
- » **Newsletter publications:** Half yearly publication of newsletter volumes highlighting various department activities
- » **Monthly Webinar Series:** Renowned Scientist and eminent academicians were invited for monthly (both online/offline mode) webinar series in the department.
- » **Invited panelist Dr. Deepak Arora:** to SCL, Mohali as a panelist and expert in the domain of Advanced Electronic Packaging.

# Department of Chemistry

Chemical science meets Technology at the Department of Chemistry, IIT Jodhpur. The department was formally established in the year 2015 at IIT Jodhpur. The Department offers M.Sc.(2 Yrs), M.Sc.(Chemistry)-M.Tech. (Materials Engineering) with specialization, BS in Chemistry with Specialization (4 years) and Ph.D. programs. In addition, it offers core and elective courses in chemistry and allied areas for undergraduate B. Tech. Engineering Students of the Institute. The Department of Chemistry at IIT Jodhpur is striving to be acknowledged for excellence in teaching, research

and outreach, at a distinctive locus of science and technology. Research is carried out in all major areas of chemical sciences. It has started its journey of making technology contributions in new materials for energy solutions, environmental remediation, water and healthcare. Also, fundamental research in the areas of Chemical Reaction Dynamics, Computational Biophysics, Nuclear Magnetic Resonance techniques, Organic Synthetic methods, organometallic chemistry, Main Group Chemistry, Nanomaterials, Quantum Chemistry and Quantum Information are being carried out in the department.

## Faculty Members & Research Areas

Name	Designation	Research area
Ramesh K. Metre Head of Department	Associate Professor	Main-group organometallic chemistry, Coordination polymers, Inorganic-organic hybrid materials and Metal phosphonate and phosphate chemistry
Rakesh Kumar Sharma	Associate Professor	Catalysis for Energy and Stereocontrol, Feedstock Chemistry, Fuel and Lubricants, Energy Storage and Water Treatment Technology
Atul Kumar	Associate Professor	Quantum Information Processing
Samanwita Pal	Associate Professor	Solution and solid-state NMR and NQR spectroscopy
Manikandan Paranjothy	Associate Professor	Theoretical and Computational Chemistry, Chemical Reaction Dynamics
Ananya Debnath	Associate Professor	Theoretical and Computational Chemistry
Ritu Gupta	Associate Professor	Nanomaterials & Nanodevices for Water, Energy and Healthcare
Sandip Murarka	Associate Professor	Organic Synthesis, Development of Novel Synthetic Methods, Transition Metal Catalyzed Synthetic Transformations, C-H Functionalization Reactions, Asymmetric Catalysis
Nirmal Kumar Rana	Associate Professor	Asymmetric Catalysis and Continuous Flow Chemistry
Rohan D. Erande	Assistant Professor	Synthesis of Natural Products & Medicinally Active Compounds, Method development Lewis Acid Catalysis
Subrata Chakraborty	Assistant Professor	Organometallics, Homogeneous Catalysis

Name	Designation	Research area
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
Suresh Sarkar	Assistant Professor	Nanomaterials; NIR-Quantum dots; Spectroscopy; Surface Chemistry; Shape control; Photo-catalysis; photo-voltaics; cell-imaging

## Academic Programmes

1. M. Sc. Chemistry (2 year)
2. Ph. D. in Chemistry
3. BS in Chemistry with Specialization in a Focused Area (4 years)
4. M.Sc.(Chemistry)-M.Tech. (Materials Engineering) with specialization

## Significant Research Achievements

1. Sushanta Kumar Parida and Sandip Murarka's research article got published in the journal 'Advanced Synthesis and catalysis' (Impact Factor: 5.981). The article was also selected as a 'Very Important Publication (VIP)'
2. Prahallad Meher and Sandip Murarka's research article published in the 'Journal of Organic

Chemistry' was one of the Most Read Article in August 2022. It also got highlighted on 'Organic Chemistry Portal'. See here: <https://www.organic-chemistry.org/abstracts/lit8/590.shtm>.

3. Sudhir Kumar Hota and Sandip Murarka's research article published in the 'Journal of Organic Chemistry' was One of the Most Read Article in February 2023.
4. Prahallad Meher and Sandip Murarka's research article was published in the journal 'Chemical Communications' (Impact Factor: 6.222).
5. Satya Prakash Panda and Sandip Murarka's research article was published in the journal 'Organic Letters' (Impact Factor: 6.072).
6. Nisha Kamboj and Ramesh K. Metre's latest research article is published in the journal 'Inorganic Chemistry' (Impact Factor: 5.43).

## Faculty/Department Laurels

- » Sandip Murarka received "Thieme Chemistry Journal Award" by the editorial boards of the journals Synthesis, Synlett, and Synfact (2022).
- » Sandip Murarka became "Early Career Advisory Board Member" of Wiley-VCH "ChemistrySelect" Journal (2022).

## Student Laurels

S.No	Major Achievements of the students	
1	Sakshi Bhagat, a PhD student working under the supervision of Dr. Samanwita Pal, is awarded "Best Poster Award" in the 28th NMRS conference held at IISER Berhampur from 24-27th February.	24-27th of February.
2	Nisha Kamboj and Ramesh K. Metre's latest research article is published in the journal 'Inorganic Chemistry' (Impact Factor: 5.43).	
3	Nisha Kamboj, a PhD research scholar working under the supervision of Dr. Ramesh K. Metre, is awarded "Best Poster Prize" in the conference, "EMEE-2023: Emergent Materials for Energy and Environment Conference", held during March 4-5, 2023, at IIT Roorkee, India.	4th – 5th March 2023



S.No	Major Achievements of the students	
4	Abhishek Mishra (Roll No. P17CY001), Ph.D. Student under the supervision of Dr. Ramesh K. Metre has been awarded the 'C. V. Raman Gold Medal' for Best Thesis Work among students of all Ph.D. programs of the class of 2022.	
5	Debasish Rout (P21CY001), Ph.D student has got a PMRF Fellowship.	
6	Jyoti Faujdar (P15CY003), PhD student under the supervision of Dr. Atul Kumar, received postdoctoral fellowship from the department of Mathematics and Statistics, University of Ottawa in collaboration with Ericsson Canada Inc	
7.	Sudhir Kumar Hota, a PhD student working under the supervision of Dr. Sandip Murarka, is awarded "Best Poster Award" in the Contemporary Facets in Organic Synthesis (CFOS) conference held at IIT Roorkee.	01-04th of December, 2022.

## Laboratories and equipment

**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.



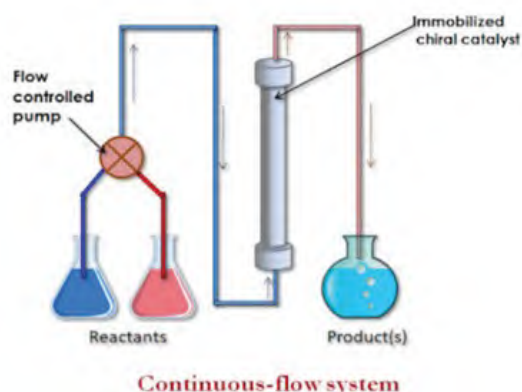


**Research Laboratories:** The Department of Chemistry has set up 7 thematic research laboratories for advanced experimental research activities for PhD scholars, project staff and Post-Doctoral Researchers. The details of the research, experimental facilities etc. can be found under the webpages of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

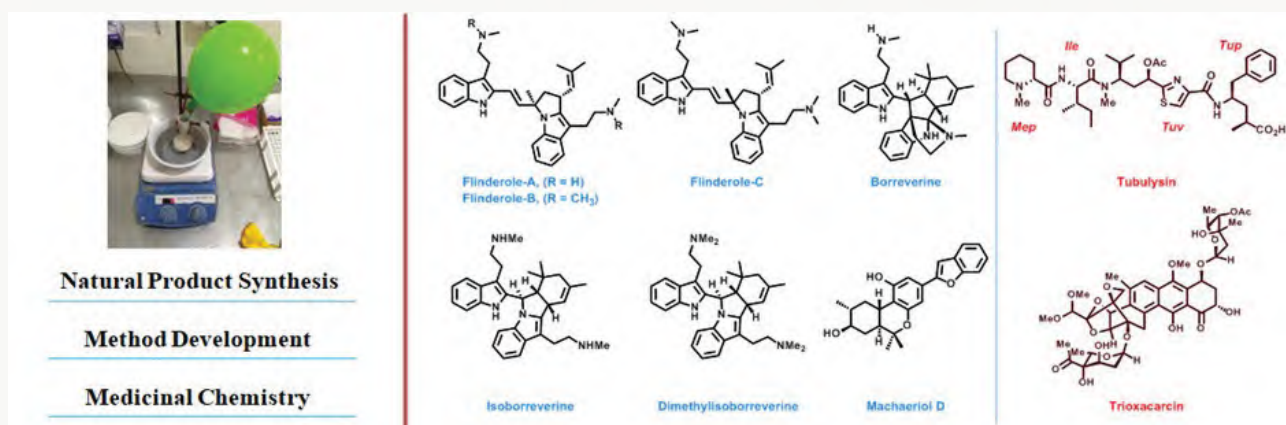
### Asymmetric Synthesis and Continuous Flow Chemistry

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.



## 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 powe



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

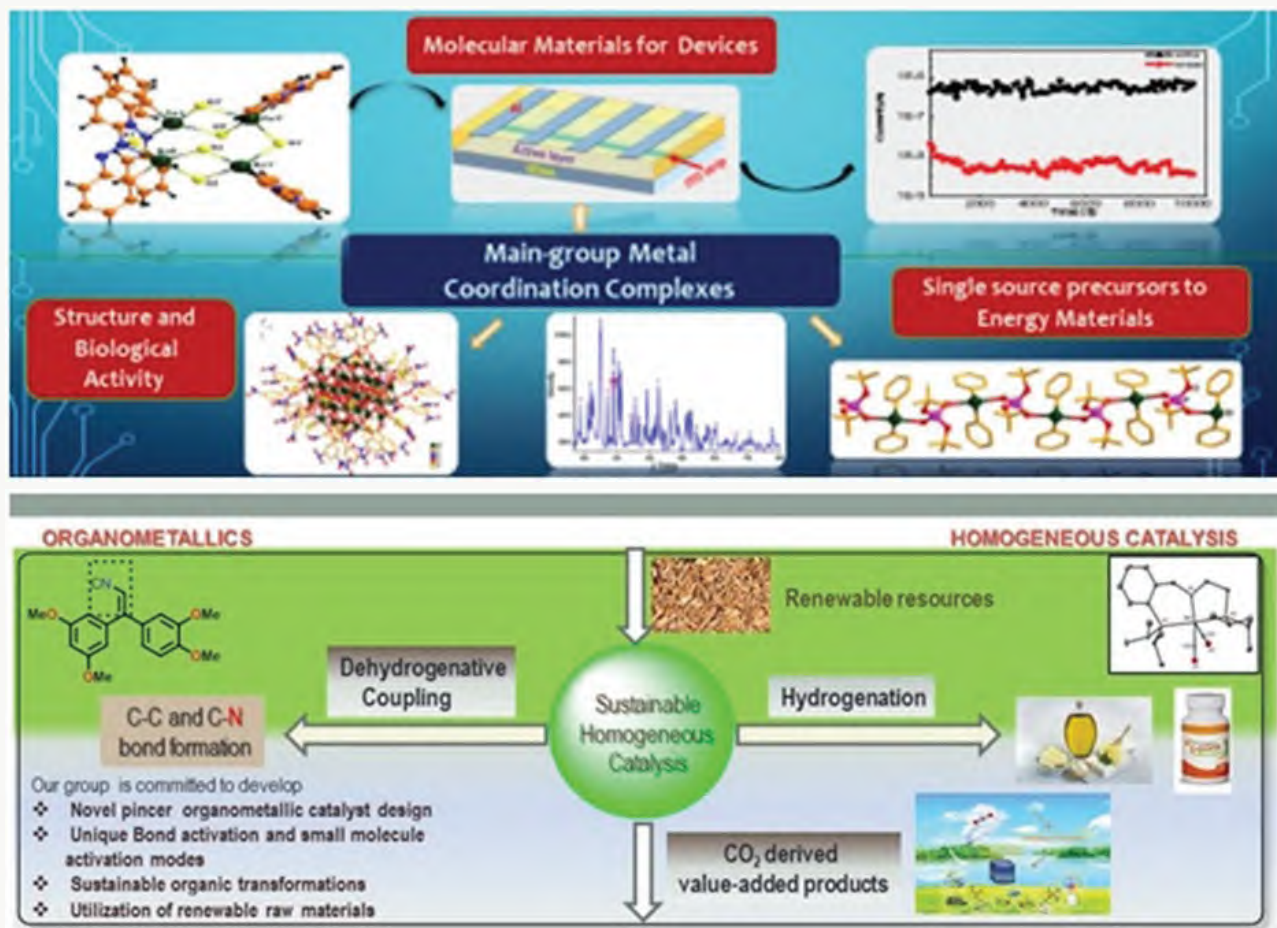
electron transfer-based organic transformations is an another heavily investigated area in Murarka research group. The group has recently unfolded a visible light induced and organophotoredox catalyzed efficient and robust radical cascade cyclization strategy towards the synthesis of biologically important 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).

## Transition Metal and Organometallics Research Laboratory

The organometallic chemistry laboratory focuses on developing novel transition metal and main-group

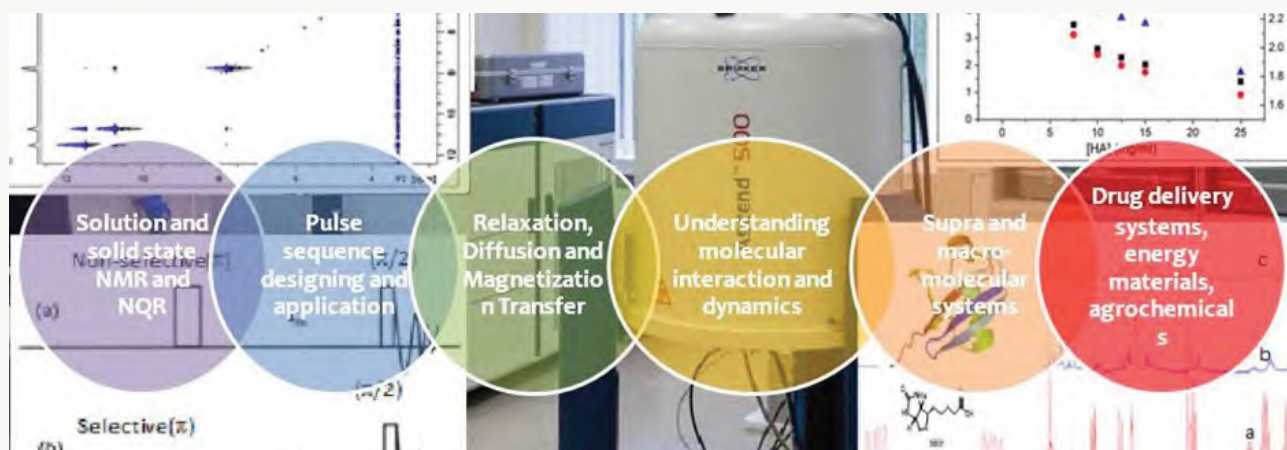
element based organometallic complexes, study and characterize their properties, understanding unique behaviour and potential applications in

material chemistry and sustainable homogeneous catalysis.



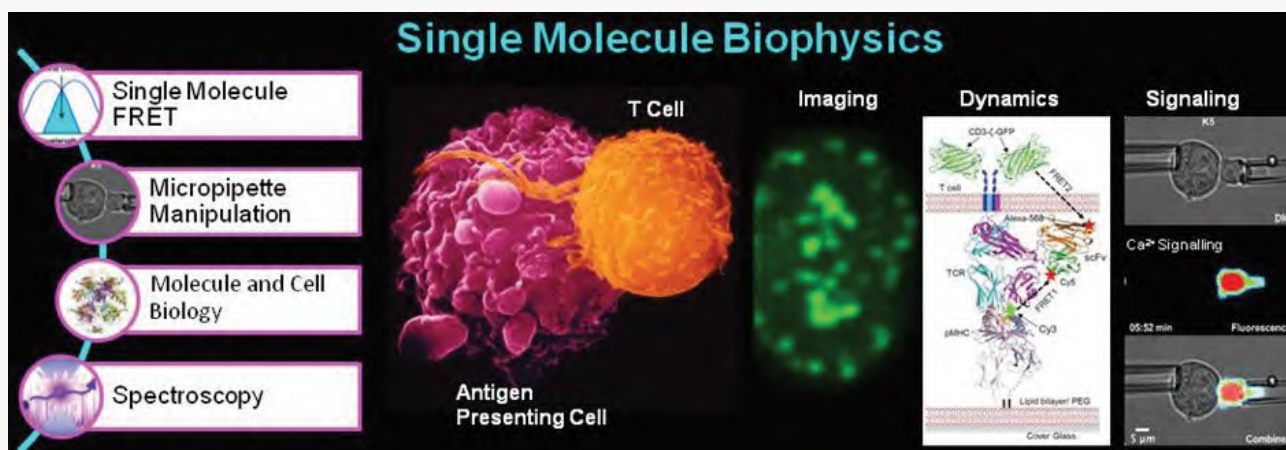
## Spectroscopy & Biophysics Laboratory

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

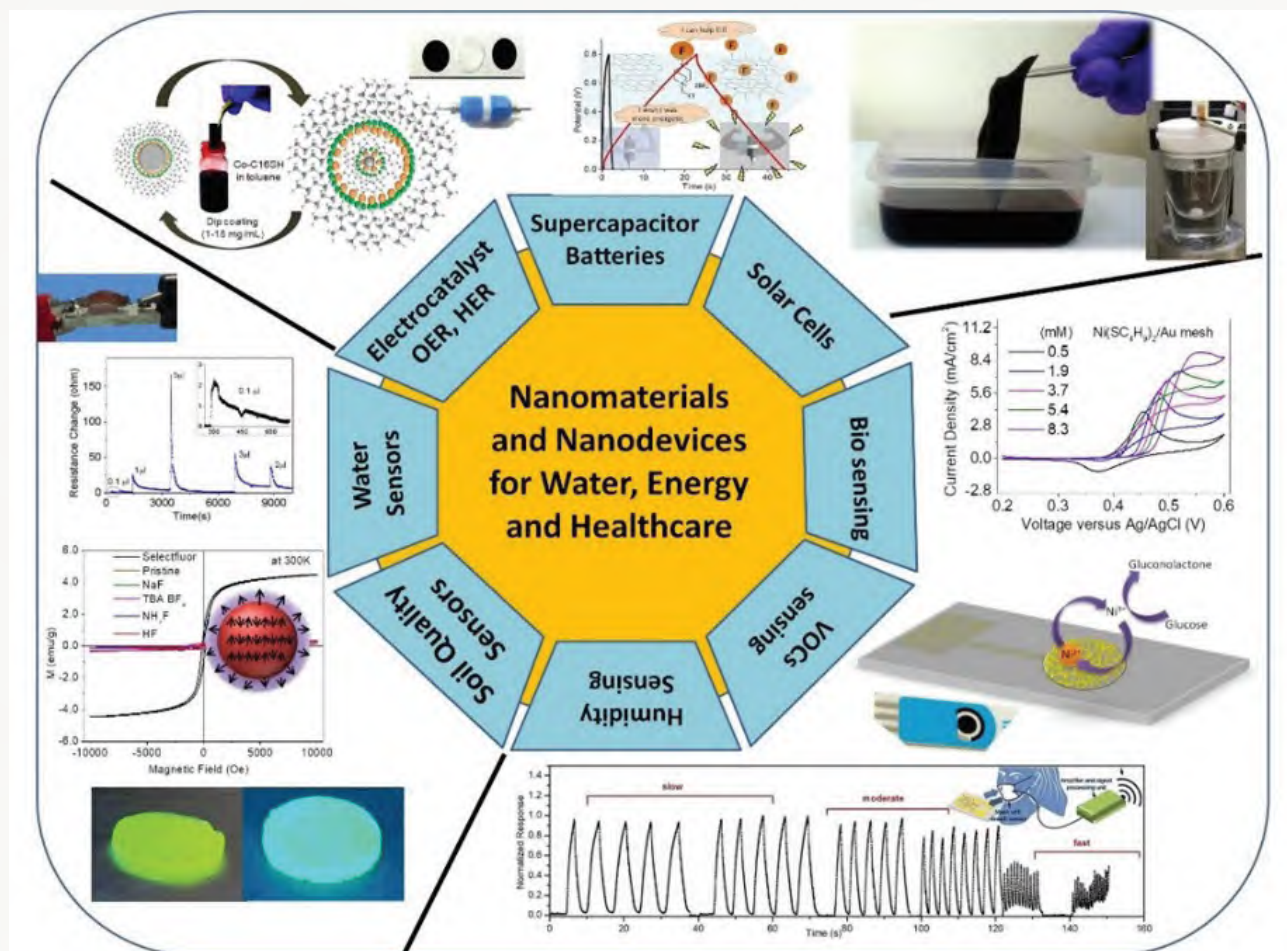
spectroscopy and fluorescence correlation spectroscopy (FCS).

### 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 heirarchical 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.

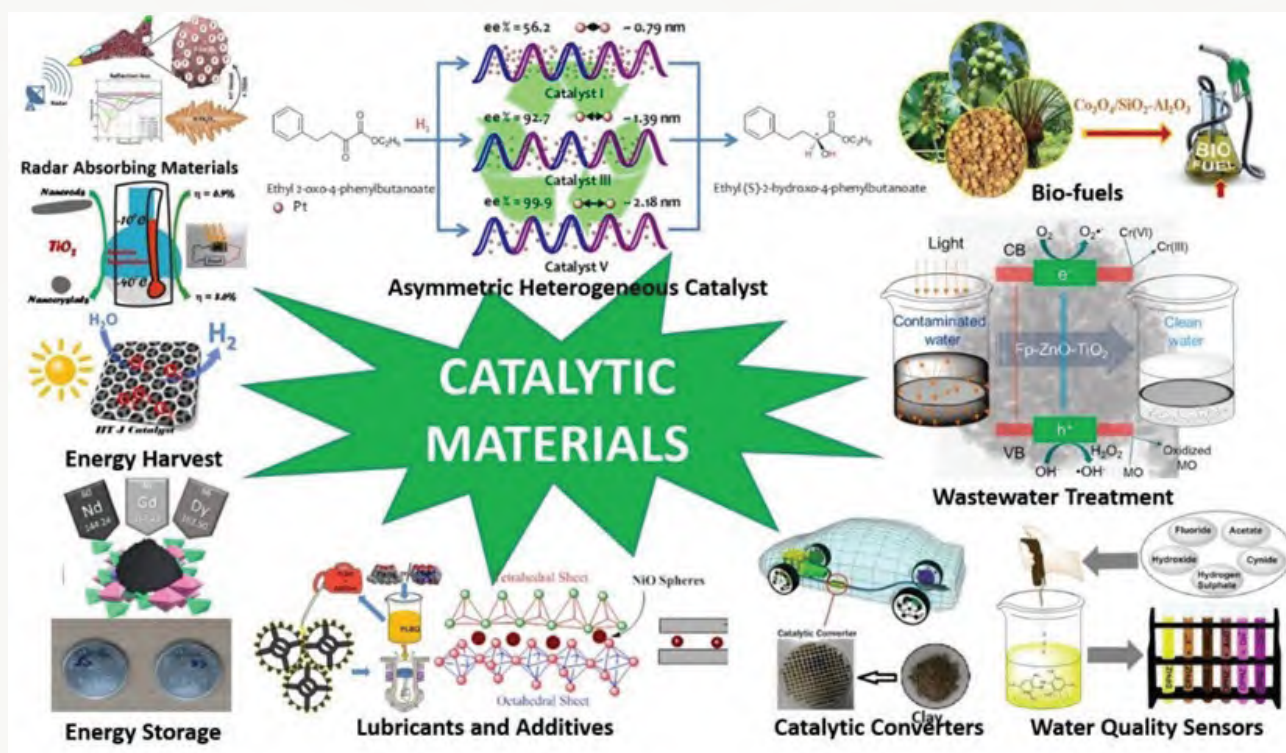


## Energy and Environmental Catalysis Research Laboratory

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.



## Computational Chemistry Laboratory

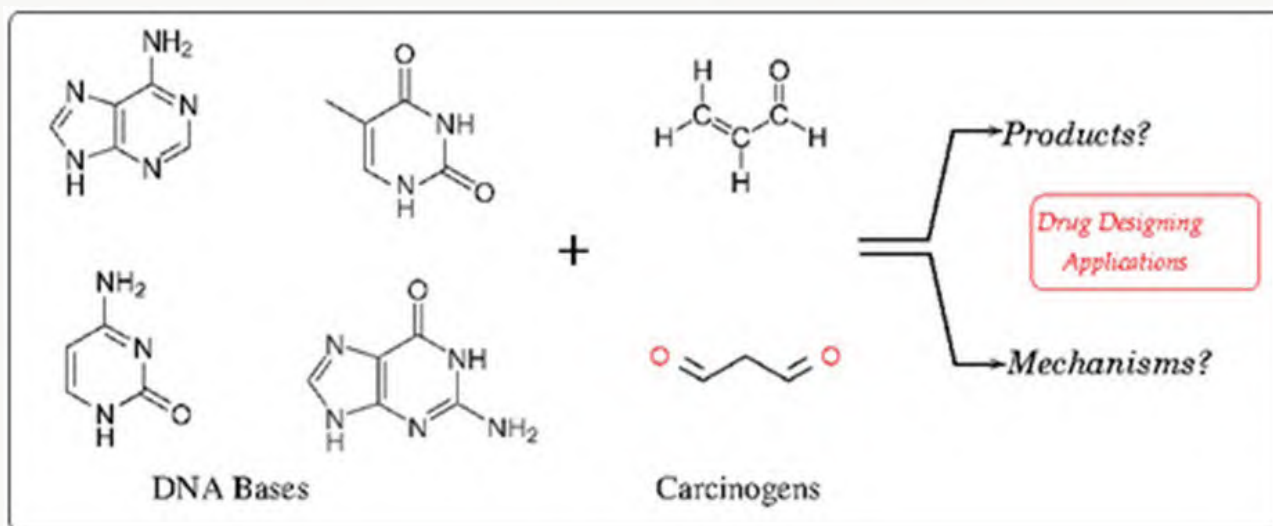
This laboratory is focused on studying the structure and dynamics associated with important chemical processes. Modern computational techniques including electronic structure theory and molecular dynamics simulations are used to understand complex chemical phenomena. Computing facilities are available 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



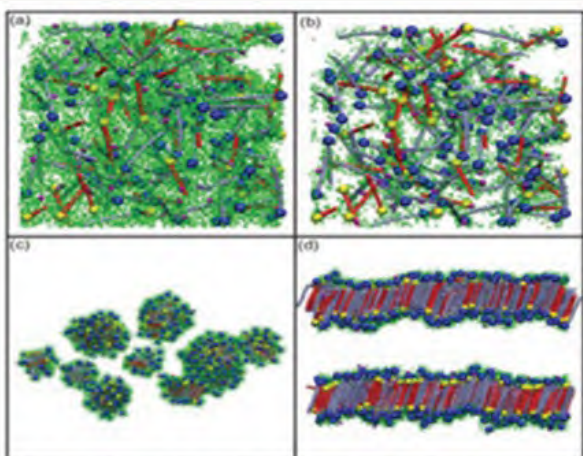
reaction from a static picture – the potential energy surface – is insufficient in completely describing the process. One needs to look at the dynamics i.e., the time-dependent nuclear motion at the atomic level. Classical trajectory simulations with potentials and gradients computed on-the-fly using 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.

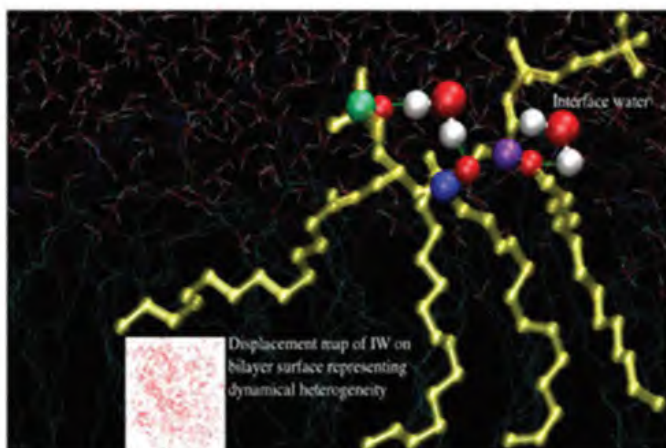


**Computational Molecular Biophysics:** The research aims at understanding principles of complex biophysical processes using principles of Statistical Mechanics and Quantum Chemistry. High end supercomputers located at computer centres are used to simulate the systems. The research group associated with 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.



## Publications

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6. Diorganostannoxanes Stabilized by Intramolecular N→ Sn Coordination Approach: Synthesis, Structure, TD-DFT and Hirshfeld Surface Analysis Mishra, A.; Betal, A.; Kamboj, N.; Lama, P.; Ji, R. S.; Sahu, S.\*; Metre, R. K.\* **J. Mol. Struct.**, **2022**, 1255, 132478.
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  55. Ghanshyam Mali, Sushobhan Maji, Kailas Arjun Chavan, Manjari Shukla, Manish Kumar, Sudipta Bhattacharyya\*, and Rohan D. Erande\*, Effective Synthesis and Biological Evaluation of Functionalized 2,3-Dihydrofuro[3,2-c]coumarins via an Imidazole-Catalyzed Green Multicomponent Approach; *ACS Omega* **2022**, **7**, **40**, 36028–36036.
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Advances in [3+2] Cycloaddition Enabled Cascade Reactions: Application to Synthesize Complex Organic Frameworks; *SYNLETT, (Invited Article) 2022, 10.1055/s-0042-1751369.*

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  60. Nonlocality and efficiency of three-qubit partially entangled states, J. Faujdar, H. Kaur, P. Singh, A. Kumar and S. Adhikari, *Quantum Studies: Mathematics and Foundation 2022, 10, 27*
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- Maiti (Eds.), Wiley. 2022, DOI: <https://doi.org/10.1002/9783527834242.chf0027>, pp. 1-30.
  2. Srikanth Ponnada, Indu Kumari, Meena Yadav, Demudu Babu Gorle, Meghali Devi, Rapaka S Chandra Bose and Rakesh K Sharma, (2023) Challenges and advances in aptamer-based biosensing approaches (in press); Springer Nature
  3. Srikanth Ponnada, Indu Kumari, Sampath Chinnam, Maryam Sadat Kiai, A. Lakshman K, Rapaka S. Chandra Bose, Demudu Babu Gorle, Annapurna Nowduri and Rakesh K. Sharma, (2022) *Renewable energy: Introduction, Current Status and Future Prospects*; Wiley; ISBN: 978-1-119-77605-5
  4. Devika Laishram, Divya Kumar, Kiran P. Shejale, Bhagirath Saini, Harikrishna, R Krishnapriya, Rakesh K Sharma\* (2022) *2D Transition Metal Carbides (MXenes) for Applications in Electrocatalysis*, Wiley; <https://doi.org/10.1002/9781119772057.ch6>

## Patents

1. Vineet Soni and Rakesh K Sharma, METAL(S)/CLAY CATALYSTS FOR CONVERTING BIOMASS INTO DIESEL GRADE HYDROCARBONS patent no.201711025555 granted on 18-08-2022
2. Poonam Sharma and Rakesh K Sharma, FACET CONTROLLED PREPARATION OF METAL HEXAGONAL NANO CRYSTAL/CARBON MATERIALS CATALYST AND APPLICATION THEREOF patent no.201611022543 granted on 20-09-2022
3. Kiran Shejale, Devika Laishram and Rakesh K Sharma, SUB-ZERO TEMPERATURE PROCESS FOR PRODUCTION OF HIGH SURFACE AREA, PHASE AND DIMENSIONALLY CONTROLLED NANOTITANIA FOR SOLAR CELL AND WATER TREATMENT APPLICATION THEREOF patent no.201611022531 granted on 03/08/2022
4. Erande Rohan D., Bhattacharyya Sudipta, Supriya, Shukla Manjari, Mali Ghanshyam, 2, 3- Dihydrofuro Dimedone (DHF20) as Staphylococcal Thioredoxin Reductase Inhibitor, *Indian Appl.*, 2023, 202311015493.

## Book Chapters

1. Rhodium(II)-Carboxylate Catalyzed Carbene Transfer Reactions: Towards C–H Functionalizations, S. Hota, P. Meher, S. Murarka\*, in *C–H Functionalizations*, D.

# Department of Civil and Infrastructure Engineering

The Department of Civil and Infrastructure Engineering, IIT Jodhpur was established in January 2020 and started academic programs in the year 2020-2021. The Civil and infrastructure industry has undergone profound changes in recent years due to rapid urbanization and increasing quality of life that demand reliable and intelligent infrastructure systems. The new-age designs and innovations in the civil and infrastructure industry can only be driven by a group of engineering graduates having multidisciplinary training and a sound understanding of emerging technologies. With this viewpoint, the department offers unique programs that incorporate and integrate 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. Additionally, a major thrust is also planned on the design, implementation, and maintenance of large-scale integrated infrastructure systems across different domains. The focus areas of the department includes Energy and Environment, Building Sciences, Safety, and Services, Applications of AI, IoT, and CPS in Civil and Infrastructure Engineering, Smart and Integrated Infrastructure, Urban Architecture and Planning, Construction Technology and Management, Transportation Engineering, Structural Engineering, Geotechnical Engineering, Water resources Engineering, and Engineering Geology.

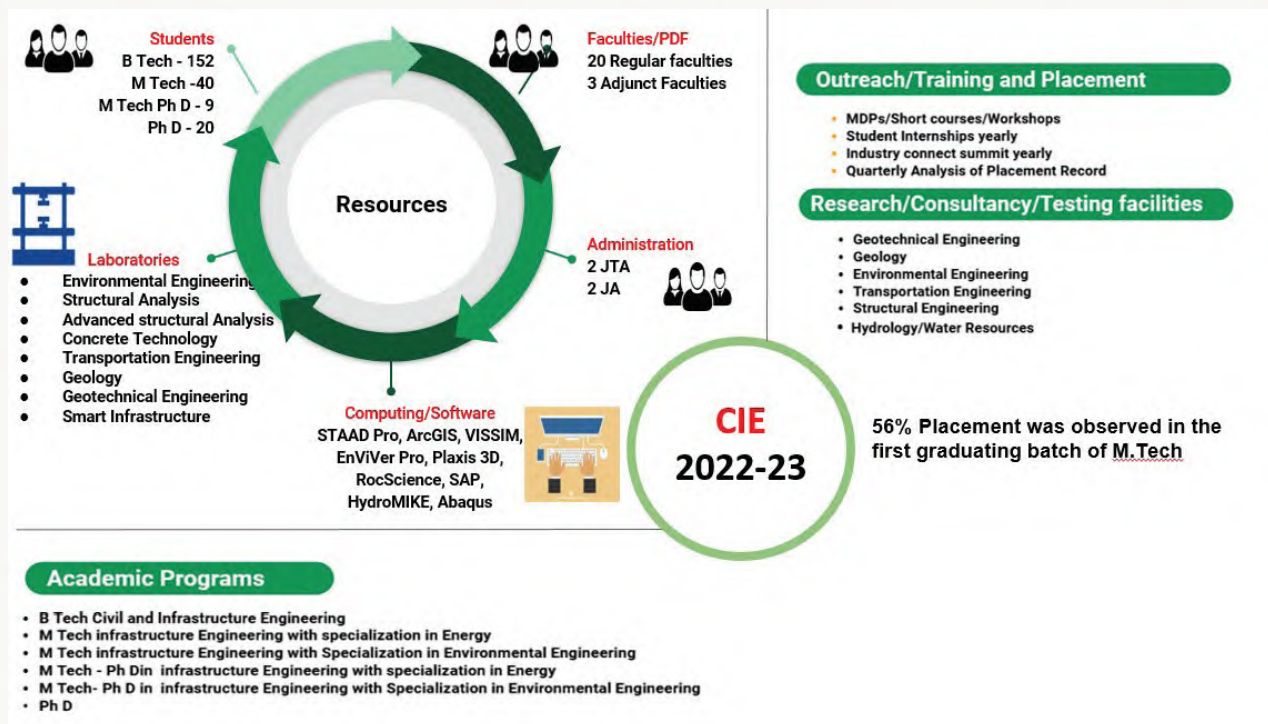




## Vision and Mission

The Department strives to be an internationally renowned center of excellence in education, research, and innovation with a major focus on sustainability and digitalization of infrastructure.

- » Develop unique courses in the field of Civil and Infrastructure Engineering through advanced UG and PG programs with a multidisciplinary perspective.
- » Establish high quality teaching and research facilities in the areas of smart, resilient, and sustainable infrastructure engineering to foster the needs of society.
- » Promote consilient research through application of AI/ML, cyber-physical-systems, digital twin and advanced visualization in the areas of Energy, Environment, Transportation, and Construction.
- » Promote innovative and entrepreneurial activities through intellectual property generation and transfer.
- » Nurture the potential of students to become future leaders in the Civil Engineering industry for leadership achievements, scientific breakthroughs and social welfare.



## Faculty Members

S. No.	Name	Designation	Research Area
1.	Ranju Mohan	Head of the Department	Traffic flow theory; Macroscopic and Microscopic modelling of traffic flow; Connected and autonomous vehicles; Dynamic Traffic Assignment
2.	Tushar Kanti Datta, FNAE	Adjunct Professor	Structural Dynamics, Offshore Structures, Seismic Risk and Response Analysis of Structures, Wind induced Vibration of Structures, Disaster Mitigation, Structural Control

S. No.	Name	Designation	Research Area
3.	Bishwajit Bhattacharjee	Adjunct Professor	Concrete Technology and Building Science
4.	Subhamoy Bhattacharya	Adjunct Professor	Offshore Engineering, Wind Turbine Design
5.	Aali Pant	Assistant Professor	Geoenvironmental Engineering; Reinforced Soil; Sustainable Geotechnics; Machine Learning
6.	Amit Kumar Rathi	Assistant Professor	Structural Engineering; RCC Design; Steel Structures and Pre-Engineered Buildings; Reliability Analysis and Design; Uncertainty Quantification; Stochastic Modelling and Mechanics; Composite Materials; Vibration Control and Structural Health Monitoring
7.	Amit Sharma	Assistant Professor	Atmospheric Chemistry; Air Pollution; Climate change; Impact on crops and human health
8.	Bhupendra Singh	Assistant Professor	Pavement Materials; Pavement Analysis; Pavement Design; Sustainable Pavement Materials
9.	Debanjan Guha Roy	Assistant Professor	Rock mechanics, Reservoir geomechanics, Engineering geology
10.	Deepika Bhattu	Assistant Professor	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
11.	Mayank Suman	Assistant Professor	Effect of changing climate on hydrological extremes; Climate change mitigation strategies; Remote sensing application in hydrology
12.	P. Ravi Prakash	Assistant Professor	Computational Mechanics; Structural Fire Engineering; Application of AI in Structural Engineering, Building Information Modelling (BIM)
13.	Pradeep Kumar Dammala	Assistant Professor	Soil Dynamics; Experimental Geotechnics; Seismic Liquefaction; Seismic Ground Response Analysis; Soil Structure Interaction; Pile Foundations; Seismic Requalification studies; Sustainable Geotechnics; Stability Analysis of Earth Retaining Structures
14.	Saran Aadhar	Assistant Professor	Surface Hydrology; Hydroclimatic extremes; Hydrologic modeling in natural and anthropogenic climate; Impact of climate variability and climate change on water resources
15.	Tekcham Gishan Singh	Assistant Professor	Civil Engineering, Structural Engineering, Steel Structures
16.	Trishikhi Raychoudhury	Associate Professor	Environmental Engineering: colloid filtration; contaminant fate and transport; water treatment; applications and implications of nanotechnology

## Academic Programmes

S.No	Name of the Programme	Level: UG/PG/Research	Number of Students Enrolled
1	B Tech Civil and Infrastructure Engineering	UG	152
2	M Tech Civil and Infrastructure Engineering with Specialization in Energy	PG	12
3	M Tech Civil and Infrastructure Engineering with Specialization in Environmental Engineering	PG	17
4	M Tech-Ph D Civil and Infrastructure Engineering with Specialization in Energy	Research	3
5	M Tech-Ph D Civil and Infrastructure Engineering with Specialization in Environmental Engineering	Research	2
6	Ph D	Research	16

### Faculty/ Department Laurels

1. Dr. Amit Sharma: DST-SERB Start up Research Grant 2022-2024
2. Dr. Pradeep Kumar Dammala: SERB International Research Experience (SIRE) Fellowship at the University of Illinois Chicago (UIC), working with Prof. Krishna R Reddy in his GAGE Laboratory.
3. Dr. Ranju Mohan: DST-SERB Start up Research Grant 2021-2023
4. Dr. P. Ravi Prakash: DRDO-Armaments Research Board, Extra mural research grant 2022-2024 under the Grant-in-aid scheme
5. Dr. Saran Adhaar: Selected for an award for the 2022 Best Discussion for the Journal of Hydrologic Engineering. he received this award at the 2022 World Environmental and Water Resources Congress in Atlanta, Georgia June 5-8, 2022
2. **Sumaja Kolli:** Awarded the ISSMGE (International Society for Soil Mechanics and Geotechnical Engineering) travel grant of 1600 USD to attend the ICEG 2023 at Greece in May 2023.
3. **Sumaka Kolli:** Received India Institute Fellowship to conduct part of her PhD thesis work at the University of Birmingham, UK for a duration of six months. She is researching on aeolian soil erosion in Thar Desert through experimental and numerical simulations under the guidance of Dr. Pradeep Kumar Dammala
4. **Sumaja Kolli:** Recipient of the PMRF fellowship in the 2022-23 cycle
5. **Satish Adari:** ISSMGE supported Travel Grant to attend the Geo congress conference in Los Angeles, USA in March 2023
6. **Satish Adari:** SERB funded Overseas Visiting Doctoral Fellowship (OVDF) to conduct one year of research at the Purdue University, USA

### Student Laurels

1. Rampunit Kumar (M20CI061) was recently selected for a special award category in a national competition (Climate data hackathon) themed 'Climate resilient agriculture' organized by United nations development programme (UNDP) and Government of Telangana. He was also invited and currently working on a startup accelerator program to initiate a startup in the same area. This all is the work of an interdisciplinary team (including one student from AI at IITJ and rest from other institutes)

### Outreach activities

1. UG and PG openshouse- Yearly prior to admission (2022)
2. Departmental newsletters published (January 2023)
3. Industry Connect Summit (ICS) with Buro Happold in Oct 2022

4. Seminars/ Workshops/ Conferences organised
  - a. Dr. Pradeep Kumar Dammala: Indo-UK International Workshop on Design of Foundation Systems for Offshore Wind Turbines- Indian Scenario on 4th February 2023.
  - b. IEE Seminar Series: Dr. Aloknath De who is currently adjunct Professor at IISc Bangalore & IIT Jodhpur gave a seminar on “Envisioning 6G enabled Cyber Physical World” on September 16th, 2022
  - c. IEE Seminar Series: Mr. Arpit Maheshwari, Co-Founder Jeevantika delivered an IEE Webinar Series on “ A Journey into a sustainable Living” on September 20th, 2022
5. Lecture Series and Student Seminars
  - a. Dr. Amit Kumar Rathi Delivered an Invited Lecture on Reliability Analysis in Civil and Infrastructure Engineering for SOA Weekly Academic Lecture (SOAWAL) at Siksha ‘O’ Anusandhan (Deemed to be) University, Bhubaneswar scheduled on 26 Nov. 2022
  - b. Dr. Trishikhi Raychoudhury gave a keynote lecture in the International Groundwater Conference (IGWC), IIT Roorkee, Uttarakhand, November 2-4, 2022
  - c. Dr. Trishikhi Raychoudhury served as a resource person for One- Week Online Short Term Course on ‘Recent Advances in Environmental Engineering through Sustainability (RAEES 2022), NIT Patna, 10-14 October, 2022.
  - d. Dr. Pradeep Dammala is invited as a guest speaker for the departmental workshop series at the North Dakota State University, USA Civil Engineering Department.
  - e. Dr. Pradeep Dammala is invited as a special speaker for geotechnical lecture at University of Nevada Las Vegas, USA in December 2022
  - f. Dr. Pradeep Dammala gave an Invited Lecture at the Department of Civil, Materials and Environmental Engineering at the University of Illinois Chicago on 24th February 2023
  - g. Dr. Saran Aadhar delivered a few lectures in 21 Days Winter School (Level-1) on Geospatial Science and Technology under National Geospatial Programme (NGP) of Department of Science and Technology (DST), Govt of India . The winter school was organised at ICAR-Central Arid Zone Research Institute (ICAR-CAZRI), Jodhpur during 1-21 November, 2022
  - h. Dr. Saran Aadhar delivered a lecture on Mapping/ Geospatial Basic thought of Rural infrastructure in Faculty Development Program- Community Engagement - IIT J
  - i. Dr. Saran Aadhar represented IIT Jodhpur at the 2nd United Nations World Geospatial Information Congress (UNWGIC) 08-10 October 2022 in Hyderabad under the theme , “Towards Geo-enabling the Global Village.”
  - j. Dr. Bhupendra Singh delivered a lecture in a short term course titled “New Technology Initiatives in Rural Roads Including Use of Marginal Materials” on the topic “Use of Cold Mixes in Rural Road Construction” on 13th March 2022 at IIT (BHU) Varanasi.
  - k. Dr. Bhupendra Singh delivered a lecture in online FDP titled “Emerging Trends in Engineering for Sustainable Development-2022 (ETESD-2022)” on the topic “Recent advances in Road Construction Materials” on 08th April 2022 at IIMT University, Meerut.
  - l. Dr. Bhupendra Singh Delivered two expert lectures in Online Training programme on “Design of Flexible and Rigid Pavement” on 31/10/2022 and 1/11/2022 at MANIT Bhopal

## Publications

### Journal Publications

1. S. Mishra et al., “Rapid night-time nanoparticle growth in Delhi driven by biomass-burning emissions,” Nature Geoscience, vol. 16, pp. 224-230, Mar. 2023, doi: <https://doi.org/10.1038/s41561-023-01138-x>
2. R. Casotto et al., “Organic aerosol sources in

- Krakow, Poland, before implementation of a solid fuel residential heating ban," *Science of The Total Environment*, vol. 855, pp. 158655, Jan. 2023, doi: <https://doi.org/10.1016/j.scitotenv.2022.158655>.
3. Kolli, S., Dammala, P. K., Bhattacharya, S., Fan, C., Wang, T., & Cui, L. (2023). Offshore wind farms as additional coolant power sources to enhance seismic resilience of nuclear power plants—A case study. *Nuclear Engineering and Design*, 405, 112204. <https://doi.org/10.1016/j.nucengdes.2023.112204>
  4. V. Kumar et al., "Highly time-resolved chemical speciation and source apportionment of organic aerosol components in Delhi, India, using extractive electrospray ionization mass spectrometry," *Atmospheric Chemistry and Physics*, vol. 22, no. 11, pp. 7739–7761, Jun. 2022, doi: <https://doi.org/10.5194/acp-22-7739-2022>.
  5. N. Tripathi et al., "Characteristics of VOC Composition at Urban and Suburban Sites of New Delhi, India in Winter," vol. 127, no. 12, May 2022, doi: <https://doi.org/10.1029/2021jd035342>
  6. V. Jain et al., "Seasonal variability and source apportionment of non-methane VOCs using PTR-TOF-MS measurements in Delhi, India," *Atmospheric Environment*, vol. 283, p. 119163, Aug. 2022, doi: <https://doi.org/10.1016/j.atmosenv.2022.119163>.
  7. V. Moschos et al., "Equal abundance of summertime natural and wintertime anthropogenic Arctic organic aerosols," *Nature Geoscience*, vol. 15, no. 3, pp. 196–202, Feb. 2022, doi: <https://doi.org/10.1038/s41561-021-00891-1>.
  8. S. Mishra et al., "Rapid night-time nanoparticle growth in Delhi driven by biomass-burning emissions," *Nature Geoscience*, vol. 16, no. 3, pp. 224–230, Mar. 2023, doi: <https://doi.org/10.1038/s41561-023-01138-x>.
  9. A. Sharma, A. C. F. Valdes, and Y. Lee, "Impact of Wildfires on Meteorology and Air Quality (PM<sub>2.5</sub> and O<sub>3</sub>) over Western United States during September 2017," *Atmosphere*, vol. 13, no. 2, p. 262, Feb. 2022, doi: <https://doi.org/10.3390/atmos13020262>.
  10. M. Tiwari, P. K. Shukla, Ajay, V. Deshpande, and T. Raychoudhury, "Performance of FeS synthesized within the porous media for in-situ immobilization of arsenic under varying water chemistry and groundwater conditions," *Groundwater for Sustainable Development*, vol. 19, p. 100835, Nov. 2022, doi: <https://doi.org/10.1016/j.gsd.2022.100835>.
  11. S. Kumar and T. Raychoudhury, "Activated Charcoal as a Component of Mortar Material for Thermal Insulation of Buildings," *Journal of Civil Engineering and Materials Application Journal of Civil Engineering and Materials Application* is published by Pendar Pub, vol. 6, no. 2, pp. 67–77, doi: <https://doi.org/10.22034/jcema.2022.349211.1087>.
  12. S. Aadhar and V. Mishra, "Challenges in drought monitoring and assessment in India," *Water Security*, vol. 16, p. 100120, Aug. 2022, doi: <https://doi.org/10.1016/j.wasec.2022.100120>.
  13. D. Prasad, B. Singh, and S. K. Suman, "Utilization of recycled concrete aggregate in bituminous mixtures: A comprehensive review," *Construction and Building Materials*, vol. 326, p. 126859, Apr. 2022, doi: <https://doi.org/10.1016/j.conbuildmat.2022.126859>.
  14. SK Hafizul Islam, G.D.R.N. Ransinchung, B. Singh, and Sumit Randhir Singh, "Effect of short-term and long-term ageing on the elastic and creep behaviour of modified binder containing different SBS copolymer," vol. 55, no. 5, Jun. 2022, doi: <https://doi.org/10.1617/s11527-022-01902-2>.
  15. S. N. Sakthivel, A. Kathuria, and B. Singh, "Utilization of inferior quality aggregates in asphalt mixes: A systematic review," *Journal of Traffic and Transportation Engineering (English Edition)*, vol. 9, no. 5, pp. 864–879, Oct. 2022, doi: <https://doi.org/10.1016/j.jtte.2022.03.001>.
  16. S. Jain and B. Singh, "Recycled concrete aggregate incorporated cold bituminous emulsion mixture: Mechanical, environmental and economic evaluation," *Journal of Cleaner*

Production, vol. 380, p. 135026, Dec. 2022, doi: <https://doi.org/10.1016/j.jclepro.2022.135026>.

17. P. Ravi Prakash, "Numerical modelling of damage in tunnels subjected to fire exposure", *The Indian Concrete Journal*, Vol. 96, No. 3, pp. 1-6, 2022.
  18. D. Guha Roy and T. N. Singh, "Effect of heat-treatment on the pure- and mixed-mode fracture properties of a homogeneous sandstone," *Geomechanics for Energy and the Environment*, vol. 33, p. 100430, Mar. 2023, doi: <https://doi.org/10.1016/j.gete.2022.100430>.
  19. A. Pant and G. V. Ramana, "Prediction of pullout interaction coefficient of geogrids by extreme gradient boosting model," *Geotextiles and Geomembranes*, Sep. 2022, doi: <https://doi.org/10.1016/j.geotexmem.2022.08.003>.
- Conference Publications**
1. S.K. Adari, S. K., P.K Dammala and A.M. Krishna, "Site-Specific Dynamic Behavior of Cohesive Soils—A Case Study from Northeastern India". In *Geo-Congress 2023*, 2023.
  2. S.Banerjee, Dibyanshu, and T.Raychoudhury. "Understanding the transport behavior of ENPs from secondary data analysis", *International Groundwater Conference*, IIT Roorkee, Uttarakhand, 2022.
  3. V. Prajapat., and T. Raychoudhury, "Fluoride contamination in groundwater in Rajasthan and its possible removal by suitable adsorbent", *International Groundwater Conference*, IIT Roorkee, Uttarakhand, 2022.
  5. P. K.Shukla, V.Deshpande, and T. Raychoudhury, "In-situ approach of Arsenite removal in 3-D tank system under reducing condition', *International Groundwater Conference*, IIT Roorkee, Uttarakhand, 2022.
  6. Chhay and T. Raychoudhury, "Aggregation behavior of nano-ZnO Particle in the presence of Carbamazepine", *International Groundwater Conference*, IIT Roorkee, Uttarakhand, 2022.
  7. A.K Maruya, S.K.Mushahary. T.G.Singh and K.D.Singh., "Mechanical performance of corroded TMT steel rebars under post-fire conditions", *International Conference on Corrosion and Coatings (i3C)*, CSIR-NML, Jamshedpur, 2022.
  8. S.K.Adari and P.K.Dammala, "Transient response of pile foundations during partial liquefaction", *AGU Fall Meeting*, Chicago USA, 2022.
  9. K.Sumaja., P.K,Dammala and S.Bhattacharya "Simplified Seismic Analysis Of Monopile Foundations Incorporating SSI Effects In Homogeneous Cohesive Soils", *ISOG IIT Chennai*, 2022.
  10. K,Sumaja, A.Ul Haq and P.K,Dammala, "Comprehensive Geotechnical Characterization of Thar Desert Soils for Infrastructure Development", *IGC 2022*, 2022
  11. S.Aadhar, and E.Morin. "Attribution of hydrometeorological variability in flood generation over the Godavari River (No. IAHS2022-374). *XIth IAHS Scientific Assembly*, Montpellier, France, 2022.
  12. S.Aadhar, and V. Mishra, "The unprecedented year 2022 heatwave in South Asia", *AGU Fall Meeting*, Chicago, 2022.
  13. S. Aadhar and V. Mishra, "Challenges in drought monitoring and assessment in India" , *AGU Fall Meeting*, Chicago, 2022.
  14. D. Prasad, S.K Suman, B. Singh,N. Saboo, and A.Kathuria, . "Utilization of fly ash as a filler in cold bituminous emulsion mix". *Proc. Eleventh International Conference on the Bearing Capacity of Roads, Railways and Airfields*, Norway, 2022
  15. A. Singh, A.Sengupta and D.Guha Roy, " A study on nitrogen adsorption in porous silica rocks using molecular simulations". *Advances in Smart Materials, Chemical & Biochemical Engineering (CHEMSMART22)*. December 16-18, Rourkela, 2022.
  16. G. V. Ramana, Jaisingh Verma, and P. Ravi Prakash. "Testing and Numerical Simulations on Fracture Behavior of Fresh Quartzite Rock Using the Discrete Element Method." *Recent Advances in Applied Mechanics*. Springer, Singapore, 2022, pp-183-193.

## Projects

### *Sponsored Research Projects: (2022-2023)*

1. Dr Amit Kumar Rathi: Deep Learning Based Structural Condition Assessment and Health Monitoring, IIT Jodhpur-SEED Grant, Rs. 25 lakhs
  2. Dr. Amit Sharma:
    - a. Climate sensitivity to anthropogenic aerosol loading over western India, Sponsoring Agency: Science and Engineering Research Board (SERB), Rs 23.33 Lakhs
    - b. High-resolution climate-chemistry modeling over the Indo-Gangetic Plain (IGP) and western India, Sponsoring Agency: Sponsoring Agency: IIT Jodhpur-SEED Grant, Rs. 25 lakhs
  3. Dr. Debanjan Guha Roy:
    - a. Fracture-mechanical response of rocks subjected to freeze-thaw cycles, Sponsoring Agency: IIT Jodhpur-SEED, Rs. 24.5 lakhs
    - b. Mechanical response of sedimentary rocks under extreme conditions: implications for cryogenic fracking, Sponsoring Agency: Department of Science and technology, Rs. 35 lakhs
  4. Dr. Deepika Bhattu:
    - a. Black Carbon - Quantification and Real-time contribution of Key Sources (BC-QuaRKS), Sponsoring Agency: IIT Jodhpur-SEED Grant, Rs. 25 lakhs
    - b. Source apportionment study, Emission inventory and Carrying capacity for Kota city, Rajasthan, RSPCB, 115.27 Lakhs
  5. Dr. Pradeep Kumar Dammala: Development of Subsonic wind tunnel facility for Aeolian Soil Migration and Mitigation in Thar Desert, Sponsoring Agency: IIT Jodhpur-SEED Grant, Rs. 32.6 lakhs
  6. Dr. Ranju Mohan:
    - a. Dynamic Traffic Assignment model for multi-class traffic lacking lane discipline, Sponsored by Science and Engineering Research Board, Department of Science and Technology, Rs. 29.92 lakhs
    - b. Development of a two-way interactive driving simulator for Indian traffic, Sponsoring agency: IIT Jodhpur- SEED, Rs. 25 lakhs
  7. Dr. Ravi Praksh:
    - a. Thermal performance of multi-layered ensembles subjected to fire exposure using ANSYS, Sponsoring agency: Armaments research board, DRDO, Rs. 17.3 lakhs
    - b. Discontinuum numerical modelling of confined masonry structures under in-plane and out-of-plane loading scenarios, Sponsoring agency: IIT Jodhpur- SEED, Rs. 25 lakhs
  8. Dr. Saran Adhaar: Long-term fate of selected ENPs through porous media, Sponsoring Agency: IIT Jodhpur-SEED, Rs. 25 lakhs
- Dr. Trishikhi Raychoudhury: Long-term fate of selected ENPs through porous media, Sponsoring Agency: IIT Jodhpur-SEED, Rs. 25 lakhs

# 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 be among the top 10 departments in terms of research contributions, practical impact, and applications of Computer Science and Engineering in the country in the next 3 years, and internationally well known in some focused areas in the next 5 years.

The faculty members work in different core and allied areas of computer science including theoretical computer science, high performance computing, networking, software, Artificial Intelligence, Machine Learning, and cyber-physical

system security. The research activities of the department are supported by agencies such as the Department of Science and Technology, Ministry of Electronics and Information Technology, and Ministry of Home Affairs. The department works closely with industry leaders like Microsoft, Meta, Accenture, Intel, and TCS, and academic and research collaborators like IIT Delhi, IIT Kanpur, IIT Bombay, and AIIMS Jodhpur.

The faculty members have several international collaborations with universities like University of Texas A&M at Kingsville and SUNY at Buffalo. The department is steadily striving towards excellence in both academics, research and service to the community with active participation from faculty, staff and students.

## Faculty details

Assistant Professors	
<b>Anand Mishra</b> Ph.D.: International Institute of Information Technology Hyderabad	<b>Angshuman Paul</b> Ph.D.: Indian Statistical Institute Kolkata
<b>Debasis Das</b> Ph.D.: Indian Institute of Technology Patna	<b>Deepak Mishra</b> Ph.D.: Indian Institute of Technology Delhi
<b>Dip Sankar Banerjee</b> Ph.D.: International Institute of Information Technology Hyderabad	<b>Kshitij Gajjar</b> Ph.D.: Tata Institute of Fundamental Research, Mumbai
<b>Lawqueen Kanesh</b> Ph.D.: Institute of Mathematical sciences, Chennai	<b>Palash Das</b> Ph.D.: Indian Institute of Technology Guwahati
<b>Pallavi Jain</b> Ph.D.: Dayalbagh Educational Institute	<b>Pratik Mazumder</b> Ph.D.: Indian Institute of Technology Kanpur
<b>Romi Banerjee</b> Ph.D.: Calcutta University, Indian Statistical Institute	<b>Suchetana Chakraborty</b> Ph.D.: Indian Institute of Technology Guwahati
<b>Suman Kundu</b> Indian Statistical Institute, Jadavpur University	<b>Sumit Kalra</b> Ph.D.: Indian Institute of Technology Kanpur



Assistant Professors	
<b>Vimal Raj Sharma</b> Ph.D.: Indian Institute of Technology, Kanpur	<b>Yashaswi Verma</b> Ph.D.: International Institute of Information Technology Hyderabad
Associate Professors	
<b>Gaurav Harit</b> Ph.D.: Indian Institute of Technology Delhi	
Professors	
<b>Mayank Vatsa</b> Ph.D.: West Virginia University	<b>Richa Singh (Head of the Department)</b> Ph.D.: West Virginia University
<b>Santanu Chaudhury</b> Ph.D.: Indian Institute of Technology, Kharagpur	<b>Somitra Sanadhya</b> Ph.D.: Indian Statistical Institute, Kolkata
Adjunct Faculty	Advisors
<b>Aloknath De</b> Corporate Vice President, Samsung Electronics & CTO Samsung R&D Institute	<b>Bimal Roy</b> Professor, ISI Kolkata
<b>Chiranjib bhattacharya</b> Professor, IISc Bangalore	<b>Gargi Banerjee Dasgupta</b> Director, IBM Research India & CTO, IBM India and South Asia
<b>Gautam Shroff</b> Sr. Vice President & Head of Research Tata Consultancy Services	<b>Hiranmay Ghosh</b> Research Advisor & Principal Scientist
<b>Nalini Ratha</b> Empire Innovation Professor State University at Buffalo	<b>Naveen Garg</b> Professor IIT Delhi
<b>Sajal K. Das</b> Professor and Daniel St. Clair Endowed Chair, Missouri University of Science and Technology	<b>Saket Saurabh</b> Professor Institute of Mathematical Sciences
<b>Sameep Mehta</b> IBM Distinguished Engineer - AI & Hybrid Data, IBM Research	<b>Sartaj Sahni</b> Professor University of Florida, USA
<b>Venkataraman Balaji</b> Vice President, COL	<b>Shivkumar Kalyanaraman</b> CTO, Microsoft Energy & Mobility, Microsoft R&D India (& Azure Global)
<b>Venu Govindaraju</b> Vice President, Office of Research and Economic Development, SUNY	
Scholars-in-Residence	
<b>Sankar Kumar Pal</b> National Science Chair, Distinguished Scientist and Former Director, Indian Statistical Institute	

## Projects

Sponsored projects - started in 2022				
S. No	Project Title	Sponsoring Agency	Principal Investigator	Sanctioned Amount
1	FIST Program - 2021(TPN-70315)	DST-FIST	Richa Singh	1,28,00,000
2	Detecting Behavioral Health Disorders of Older Adults using Self-supervised Learning and Causal Reasoning	IDEAS-TIH ISI Kolkata	Suchetana Chakraborty	22,96,800
3	AI-driven Robot-assisted Cardiac Ultrasound System to Acquire Clinically Useful Standard Echocardiographic Views	SERB-CRG	Deepak Mishra	57,15,293
4	ConSenseHAR: Decentralized collaborative context sensing towards pervasive Human Activity Recognition	SERB-CRG	Suchetana Chakraborty	28,62,679
5	Large-scale Multi-label Learning with Limited Compute Resources	SERB-CRG	Yashashwi Verma	27,87,290
6	Computationally Lightweight Convolutional Neural Network for Generalizable Chest X-ray Diagnosis	SERB-SRG	Angshuman Paul	28,72,820
7	M(atching)A(uction)C(ontract): Parameterized Algorithms for Economics and Computation	SERB-SUPRA	Pallavi Jain	28,86,260
8	Data Annotation and Marketplace	TIH iHub Drishti, IIT Jodhpur	Suman Kundu	1,70,00,000
9	Realtime Computer Vision and Sensing	TIH iHub Drishti, IIT Jodhpur	Deepak Mishra	1,33,00,000
10	Analogy Based Visual Relationship Interpretation from Cross-Task Videos and Standard Operating Procedures	Accenture	Anand Mishra	16,32,792
11	Swiggy Face Recognition	BUNDL Technologies Pvt. Ltd.	Mayank Vatsa	18,45,000
<b>Total Amount</b>				<b>6,59,98,934</b>
Consultancy Projects				
1	IHC (TSCHE-Python Prg., FDP)	TCS	Debasis Das	46,020
2.	Table detection and Layout Analysis on Clinical Documents	HealthcareNLP	Anand Mishra	13,19,914
<b>Total Amount</b>				<b>13,65,934</b>
Fellowship Projects				
1	IBM PhD Fellowship	IBM-PhD Fellowship	Surbhi Mittal, Richa Singh	9,40,168
2	Young Faculty Research Fellowship (YFRF) of Visvesvaraya PhD Scheme	MeitY	Gaurav Harit	22,20,000
3	SwarnaJayanti Fellowship	DST	Mayank Vatsa	78,00,000
<b>Total Amount</b>				<b>10,960,168</b>
Ongoing Projects from previous years				
1	Gaming of Cultural Heritage Sites of ASI	Architectural Society of India	Santanu Chaudhury	48,50,000

S. No	Project Title	Sponsoring Agency	Principal Investigator	Sanctioned Amount
2	Algorithms for Facial Recognition System Under Disguise	DRDO	Mayank Vatsa	40,52,576
3	Energy Efficient Communication and Data Flow in Smart City using CRN based IoT Framework	DST-Indo-Uzbek	Debasis Das	17,80,200
4	AI Driven Estimation of COVID-19 Prognosis using Multimodal Data	DST-RAKSHAK	Deepak Mishra	10,00,000
5	AI-driven diagnosis of COVID-19 using X-ray images	DST-RAKSHAK	Richa Singh	7,00,000
6	Lightweight Anonymous Authentication and Communication Protocol for Internet of Vehicles	DST-TWN-MOST	Debasis Das	42,22,000
7	FG 2021	IEEE Biometrics Council	Richa Singh	8,07,525
8	OCR's an Application in Indian Languages	MeitY, Govt. of India	Anand Mishra	1,83,90,000
9	A Wellness Device for Real-time Non-contact Blood Oxygen Saturation Measurements	MSME	Deepak Mishra	15,00,000
10	Quantum Cryptanalysis	SERB	Somitra Kumar Sanadhya	6,60,000
11	Multimodal Query-guided Natural Scene Retrieval	SERB-SRG	Anand Mishra	29,64,110
12	DigitID Consulting	DigitID Technologies Private Ltd.	Mayank Vatsa	11,50,500
13	Mitigation Bias in face recognition for vast regional diversity in India	Facebook India Online Services Pvt Ltd	Richa Singh	21,26,191
14	Sentinel-Bias Detection and Mitigation in Face Analysis	Facebook International	Richa Singh	1,11,63,804
15	Design of cuffless BP monitoring device	Johari Digital Healthcare Pvt.Ltd.	Dip Sankar Banerjee	9,20,400
16	Inference and Reasoning over Web-Scale Multimodal Knowledge Graph	Microsoft R&D Ltd, Hyderabad	Anand Mishra	14,16,000
17	TCS-ION Consultancy	Tata Consultancy Limited	Gaurav Harit	10,22,110
18	Multimodel bias estimation and mitigation	Verisk Analytics India Pvt Ltd	Mayank Vatsa	18,30,508
<b>Total Amount</b>				<b>67,086,524</b>
<b>Award Money Projects</b>				
1	Unrestricted Research Gift, Meta, 2022	Meta Platforms Technologies, LLC	Mayank Vatsa & Richa Singh	1,13,74,763
<b>Total Amount</b>				<b>1,13,74,763</b>

## Description of Research Groups

Research Areas	Labs
<b>Artificial Intelligence and Machine Learning</b>	<ul style="list-style-type: none"> <li>» Trusted AI &amp; Biometrics</li> <li>» Cognitive and Social Analytics (CSA) Lab</li> <li>» Visual Interaction and Understanding Lab</li> </ul>
<b>Vision and AR &amp; VR</b>	<ul style="list-style-type: none"> <li>» Samsung AR-VR Innovation Lab</li> <li>» Trusted AI &amp; Biometrics</li> <li>» Visual Interaction and Understanding Lab</li> </ul>
<b>Systems &amp; Software</b>	<ul style="list-style-type: none"> <li>» Vehicular Ad-Hoc Networks (VANETs) Lab</li> <li>» Software Innovation Lab</li> <li>» Systems for Intelligence, Networking, and Communications (SINC) Lab</li> <li>» Ubiquitous Systems (UbiSys) Lab</li> </ul>
<b>Theoretical Computer Science</b>	<ul style="list-style-type: none"> <li>» Theoretical Computer Science</li> <li>» Cognitive and Social Analytics (CSA) Lab</li> </ul>

## Research Labs

**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 actions 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 behavior, for governance. The group also works on algorithmic questions related to streaming graphs and big data social networks.

**IoT and Network Lab:** IoT and Network lab aims to support undergraduate and postgraduate courses linked to Internet of Things (IoT), Pervasive and Mobile Computing etc. The students also get hands-on with experiments using IoT devices Like Raspberry Pis, Sensors, Wearable Devices, Arduino, LoRa, Jetson Nano etc which help to design and develop IoT based Framework for real time application.

**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.

### **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 the 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

**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 behavioral 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 & Biometrics:** The research goal of the lab is to become one of the most coveted research groups for pursuing research in trusted AI and trusted biometrics in the country and globally. The group has two primary themes: biometrics and forensics, and designing trusted AI solutions. The research group has been publishing in top-tier venues in Artificial Intelligence and Computer Vision

along with domain specific publication venues of biometrics and forensics. The lab has a global footprint with students in top ML and AI research labs across the globe..

**Software Innovation Lab:** The focus of SIL is on scalable and robust software architectural solutions. Our solutions cater to IoT-based systems in the domain of structural health monitoring and smart healthcare with focus on innovation and IP generation. The lab has successfully deployed various real world systems such as telemedicine portal, hospital bed occupancy tracker, talking gloves independently and as well as in collaboration with various corporate and government organizations. The lab is actively working on various sponsored projects from corporate as well as government agencies with national and international collaborators.

**Knowledge Management and Language Technology Lab:** This lab focuses on knowledge extraction and representation, multilingual document image understanding, vision and language tasks, and addresses practical as well as core problems in this space. This lab currently has three faculty members and more than 10 research students including PhD, MTech and Research Assistants associated. The lab is equipped with state-of-the-art GPU compute infrastructure.

## Academic Programmes

Undergraduate Programs	Post Graduate Programs	Doctoral Programs
» B.Tech Computer Science & Engineering (CSE)	» M. Tech Computer Science and Engineering (CSE)	» Ph.D. CSE
» B.Tech Artificial Intelligence & Data Science (AI & DS)	» M.Tech Artificial Intelligence (AI)	» Joint Ph.D. (JPD) with SUNY Buffalo (UB)
	» Joint MTech Prog. in AI & Cybersecurity with University at Albany, SUNY (UAlbany)	» M.Tech- Ph.D. Dual Degree CSE
	» Executive M.Tech. in AI program	» M.Tech- Ph.D. Dual Degree AI

## Programs for Working Professionals

Certificate Course	Diploma	M.Tech
» Introduction to AI and ML	» Diploma in AI and ML	» Artificial Intelligence
» Dependable ML	» Dependable ML	

## Faculty/ Department Laurels

### Anand Mishra

- » Anand Mishra served as a session chair and a workshop chair at ICFHR 2022.
- » Invited talk Search Technology Centre India (STCI), Microsoft and ACM-India ARCS 2023.

### Deepak Mishra

- » Team received RAKSHAK grant for project on "AI Driven Estimation of COVID-19 Prognosis using Multimodal Data".
- » Winner of Moonshot Competition (first phase) at IIT Jodhpur.

### Debasis Das

- » Selected for International Travel Support (ITS) Award, 2022 Science and Engineering Research Board (SERB), Govt. of India.
- » Selected for BRICS Young Scientist Award, 2022, BRICS Young Scientists Conclave, Govt. of India.
- » Selected for Poster Chair, 23rd ACM International Conference on Distributed Computing and Networking (ICDCN) 2022.

### Pallavi Jain

- » The paper "Preserving Consistency for Liquid Knapsack Voting" by Pallavi Jain, Krzysztof Sornat, and Nimrod Talmon won Best Paper Runner-Up Award at EUMAS 2022.

### Mayank Vatsa

- » Mayank Vatsa honored with IAPR Fellowship.
- » Mayank Vatsa is elected Fellow of the Asia-Pacific Artificial Intelligence Association.

- » Unrestricted Research Gift, Meta, 2022.
- » Verisk AI Faculty Fellowship, 2022.

### Richa Singh

- » Richa Singh is elected Fellow of the Asia-Pacific Artificial Intelligence Association
- » Unrestricted Research Gift, Meta, 2022.
- » Verisk AI Faculty Fellowship, 2022.

### Romi Banerjee

- » Best Poster (NAiBS 2023): End-to-end explainable artificial intelligence derived Theory-of-Mind fingerprints to distinguish between autistic and neuro-Typicals: Km. Bhavna, R. Banerjee, D. Roy

### Suchetana Chakraborty

- » Jury member for Aegis Graham Bell Awards (AGBA) supported by MeitY and Niti Ayog

### Suman Kundu

- » Team received RAKSHAK grant for project on "Social Distance Alert And Monitoring System Using Smartphone, IoT And AI".

### Sumit Kalra

- » Google Cloud Education Grant Award.
- » 1st and 3rd Prize in Tech4Seva Award 2022.
- » Judge at Science Model and Teaching Competition organized by DST, Rajasthan.

## National/International Committees

### Mayank Vatsa

- » Effectiveness of CCTV in Police, Ministry of Home Affairs, 2021-2023
- » NITI Aayog and World Economic Forum Committee for Responsible AI
- » Trustworthy AI Standing Committee, Indo-U.S. Science and Technology Forum

- » Expert Committee Member for DIGIYatra, NITI Aayog and AAI, 2021
- » Publications Committee, IEEE Biometrics Council

### Richa Singh

- » Vice President Publications, IEEE Biometrics Council

## Journal Editorship

### Mayank Vatsa

- » Pattern Recognition
- » Information Fusion

### Richa Singh

- » Associate Editor-in-Chief, Pattern Recognition
- » Suchetana Chakraborty
- » Area Editor, As Hoc Networks, Elsevier
- » Conference Organizing Committee Member

### Dip Sankar Banerjee

- » ACM CCGRID 2023
- » IEEE HiPC 2022
- » IEEE/ACM UCC BDCAT 2023

### Mayank Vatsa

- » Demo Chair, ACM CODS-COMAD, 2023
- » Organizer, IEEE CVPR Workshop on Fair Data Efficient and Trusted Computer Vision 2022
- » Area Chair, Conference on Computer Vision and Pattern Recognition, 2022

## Student Laurels

- » Surbhi Mittal (Ph.D. Student) selected for Doctoral Consortium at IEEE International Conference on Face and Gesture Recognition, Hawaii, USA 2022
- » Kartik Thakral (Ph.D. Student) selected for Doctoral Consortium at IEEE International Conference on Face and Gesture Recognition, Hawaii, USA 2022
- » Surbhi Mittal (Ph.D. Student) selected for Doctoral Consortium at IEEE/IAPR International Joint Conference on Biometrics, Abu Dhabi, 2022
- » Kartik Thakral (Ph.D. Student) selected for Doctoral Consortium at IEEE/IAPR International Joint Conference on Biometrics, Abu Dhabi, 2022
- » Ankur Nahar and Amritesh Kumar (Ph.D. Student), working under the guidance of Dr.

- » Area Chair, European Conference on Computer Vision, Tel-Aviv, October 2022
- » Senior Area Chair, AAAI Conference on Artificial Intelligence, Washington DC, USA, 2023
- » Awards Committee, AAAI 2023, USA 2023

### Richa Singh

- » Program Co-Chair, CVPR 2022
- » Organizing committee ACM-Grad Cohort 2022
- » Area Chair, AAAI, 2023
- » Area Chair, European Conference on Computer Vision, Tel-Aviv, October 2022
- » Program Co-Chair, International Conference on Multimodal Interaction, Bangalore, India, 2022

### Romi Banerjee

- » Organizing committee ACM-Grad Cohort 2022
- » Organizing committee NAIBS 2023
- » Organizing committee "International Workshop on 'AI and Creative Arts" 2023

### Suchetana Chakraborty

- » ICDCN Workshop co chair

Debasis Das received INFOCOM 2022 student grant for participating in the conference.

- » Bhumika (Ph.D. Student) working under the guidance of Dr. Debasis Das received ECML PKDD Free Ph.D Registration Award for participating in ECML PKDD 2022 Conference.
- » Ankur Nahar (Ph.D. Student) working under the guidance of Dr. Debasis Das received IEEE LCN 2022 student grant for participating in the conference.
- » Swapnil Mane (Ph.D. student) awarded PMRF 2022.
- » Km. Bhavna (Ph.D. Student) won the "Best Poster" award in NAIBS 2023.
- » Jayant Vyas (Ph.D. Student), working under the guidance of Dr. Debasis Das and Prof. Santanu Chaudhury received Best Poster Award 2023 in Industry Day at IIT Jodhpur.

- » Shruti Sureshan (M. Tech (CSE) Student), working under the guidance of Dr. Debasis Das, received Student Travel Grant (Registration fees, Travel, and Accommodation) for attending CODS-COMAD 2023 at IIT Bombay.
- » Ankur Nahar (Ph.D. Student) working under the guidance of Dr. Debasis Das, received ACM India Anveshan Setu Fellowship 2023 for participating in the conference.
- » Ishaan Shrivastava (B.Tech (AI & DS)) IKDD Uplink Research Internship cohort of '23, selected to do research under Dr. Shweta Jain @IIT Ropar.
- » Garvit Chugh (Ph.D. Student), Smart Mobility Challenge Finalist, Top 5 out of 175, Sole Rep. of India & epic-collab competition by Stanford - Selected in top 20 out of 50 final teams, Selected as webchair for COMSNETS 2024, Best Poster Award (Runner Up) Industry Day Poster Session | IIT Jodhpur & First Runner Up iS3 | IIT Jodhpur's ACM Student Chapter Ideathon.
- » Harshita Kalani (B.Tech CSE), Oncampus internship at Warner Bros. Discovery.
- » Rushi Shah (B.Tech AI & DS), Off-campus Computer Vision Internship at Bosch Global Software Technologies.
- » Riyanshu Winning (B.Tech AI & DS), submission of UG Research Day Presentation '23 & Associate SWE Internship @ MAQ Software On campus.
- » Shreyas Vaidya (B.Tech CSE), Came in top 10 teams out of 23 IITS in the problem statement given by CloudPhysician in the Inter IIT Tech meet 11.
- » Dev Goel (B.Tech CSE), On Campus Internship (Company), SMS DataTech, Software Engineer Intern, Tokyo, Japan, & Off Campus Internship (University), Queen's University, MITACS Globalink Research Intern, Kingston, Canada.
- » Kartik Narayan (B.Tech CSE), Selected for Ph.D. in CS in Johns Hopkins University, USA (2023).
- » Anurag Bhat (B.Tech CSE), Google Summer Of Code Selected Contributor - Organization SymPy & Google Summer of Code - One amongst the 960 selected student developers from about 44, 000 thousand that applied from 165 countries worldwide.
- » Mohit Chandra Saxena (Mtech Executive AI), Invented and Launched Indian Encryption protocol named Infi Bharat & Won voice and Data awards in Make in India Category.
- » Patel Samarth Rajeshkumar (B.Tech CSE), Chandigarh Police Hackathon 2022, 2nd Rank & Received certificate and 50000 INR prize from the honorable governor of Punjab during the Raising Day Parade of Chandigarh Police.
- » Pranav Goswami (B.Tech CSE), Google Summer of Code 2023- Fortran Language, Intern - Warner Brothers Discovery & open Source Compiler Developer Intern - LFortran funded by NumFOCUS & Tech.
- » Harikrishnan Chandrasekharan Nair (Mtech Executive AI), Meta Hacker Cup 2022 - Round 2.
- » Kartik Sharma (B.Tech CSE), Campus Innovation Prize for Design Credit Project, "Solar Powered EV Charging for Remote Locations" .
- » Atharva Pande (B.Tech CSE), Selection in MITACS Globalink Research Internship at Carleton University, Ottawa, Canada & Working on Exploration of Latent Spaces for 3D Shape Generation.
- » Keshika Patwari (B.Tech CSE), Achieved 2177 rank in Codeforces Round 839 (Div. 3) among 13575 people & Theatre Competition - Inter IIT Cultural Meet 5.0.
- » Sindhav Khushal (B.Tech AI & DS), Rank 1464 in Codeforces Round 849 (Div. 4) out of 11, 000 people.
- » Sahil Harpal (B.Tech CSE), Google Summer of Code (2022) with PostgreSQL | Google Summer of Code (2023) with PostgreSQL & On campus Internship (2022) - Truminds Software Systems.
- » Soham Parikh (B.Tech CSE), First in 24hr Web Hackathon of Prometeo '22.
- » Akshat Jain (B.Tech AI & DS), World Rank 817 in International Quant Championship and Qualified for Stage 2 & Quant Research Intern at Graviton Research Capital.
- » Abhishek Kumar Gupta (M.Tech Executive AI), Implementation of NIC eOffice in CSIR Headquarters New Delhi.
- » Susim Mukul Roy (B.Tech AI & DS), Qualified IITB Techfest Micromouse Challenge(2022),



Remote Research Internship at University of Seigen – 2023, MITACS GRI 2023 at University of Alberta, On-site Research Internship at IIT Guwahati – 2022, Secured Overall Institute Rank 5 in Inter IIT Tech Meet 2022 & Secured 100/100 in Robocon 2022 Stage - 1.

- » Aditya Raj (B.Tech CSE), Internship at PayPal (Software Engineer Intern) & Vageesh Reliance JIO(ML Internship).
- » Jayant Vyas (Ph.D. Student), Best Poster Award: Secured first position in poster presentation for the theme: Dependable and Responsible AI of the Industry Day-2023 organized by the Indian Institute of Technology Jodhpur from 3-4 February, 2023. Poster Title: Federated Learning-Based Recommender System for Next-Generation Transportation, PG Representative

(DA), Student Activity Council (SAC), Student Senate, IIT Jodhpur. (Academic Year 2022-23), Nominated for Outstanding Teaching Assistant Award from Dept. of CSE IIT Jodhpur for the course Cyber Security in Semester-II, Jan-May 2023. Course Instructor: Dr. Somitra Sanadhya. Received Registration & Travel Grant for attending 6th Joint International Conference on Data Science & Management of Data (CODS-COMAD 2023) January 4-7, 2023 | IIT Bombay, India, Received Registration & Travel Grant for attending Indian Symposium on Machine Learning (IndoML-2022) December 15 – 17, 2022 | IIT Gandhinagar, India & Outstanding Teaching Assistant Award from Dept. of CSE IIT Jodhpur for the course Cyber Security in mester-II, Jan-Jun 2022. Course Instructor: Dr. Debasis Das

## Patents

Inventors	Patent Details	Month & Year	Status	Patent Nationality
Deepak Mishra	Adaptive Frame Resolution Based Image System for Always-On Imaging Applications	May-22	Filed	Indian
Deepak Mishra	Automated Personalized Assistance and Monitoring System for People with Special Needs	Sep-22	Filed	Indian
Deepak Mishra	Camera System for Image Recognition Using Edge Information	Dec-22	Filed	Indian
Deepak Mishra	System And Method For Robot Assisted Echocardiography	Dec-22	Filed	Indian
Mayank Vatsa Richa Singh	System, Apparatus and Method To Detect Deepfakes	Dec-22	Published	Indian
Mayank Vatsa Richa Singh	System And Method for Detecting Presentation Attacks	Dec-22	Filed	Indian
Santanu Chaudhury Suchetana Chakraborty	Up Cities@2047: A Conceptual Framework.(Copyright)	March-23	Filed	Indian

## 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.

## Industry Collaborations

<b>Anand Mishra</b> <ul style="list-style-type: none"> <li>» Accenture</li> <li>» Microsoft</li> <li>» HealthcareNLP</li> </ul>	<b>Debasis Das</b> <ul style="list-style-type: none"> <li>» VIZARA Technologies Pvt Ltd</li> <li>» Samsung</li> <li>» Kritikal Solutions</li> <li>» IBM Technology corporation</li> </ul>	<b>Dip Sankar Banerjee</b> <ul style="list-style-type: none"> <li>» Intel Semiconductor corporation</li> <li>» Johari Digital Healthcare Ltd</li> </ul>
<b>Mayank Vatsa</b> <ul style="list-style-type: none"> <li>» DigitID Technologies Private Limited</li> <li>» Meta Platforms Technologies</li> <li>» Verisk Analytics company</li> <li>» Bundl Technologies Private Limited</li> <li>» Nvidia Software company</li> <li>» Teleradiology Solutions</li> </ul>	<b>Richa Singh</b> <ul style="list-style-type: none"> <li>» Meta Platforms Technologies</li> <li>» Verisk Analytics company</li> <li>» Bundl Technologies Private Limited</li> <li>» Nvidia Software company</li> <li>» Teleradiology Solutions</li> </ul>	<b>Sumit Kalra</b> <ul style="list-style-type: none"> <li>» NPBridge Solutions</li> <li>» Novealthy Innovations Pvt. Ltd.</li> <li>» Uniconverge Technologies Pvt. Ltd.</li> </ul>

## Academic Collaborations

### National Collaborations

Faculty	Research Area	Organization
Angshuman Paul	Medical Image Analysis	AIIMS Rishikesh
Deepak Mishra	Jointly working on various medical image analysis problems	AIIMS Jodhpur
Deepak Mishra	Evaluation and development of Machine Learning (ML) models for the automated detection, localisation and characterisation of traumatic rib fractures on CT scans	AIIMS Delhi
Debasis Das	Software-Defined Networking- (SDN)	IIT Kharagpur
Debasis Das	5G and Federated Learning	IIT (BHU) Varanasi
Debasis Das	Cognitive Radio Networks (CRNs) IITRAM Ahmedabad	IITRAM Ahmedabad
Dip Sankar Banerjee	High Performance Computing	IIIT Hyderabad, IIT Tirupati
Mayank Vatsa	AI for Social Good	IIIT Delhi
Mayank Vatsa	Medical Image Analysis	PGI Chandigarh
Pallavi Jain	Algorithms	IMSc, IIT Hyderabad
Richa Singh	AI for Social Good	IIIT Delhi
Richa Singh	Medical Image Analysis	AIIMS Rishikesh
Richa Singh	Medical Image Analysis	AIIMS Rishikesh
Somitra Sanadhya	Security	IIT Ropar
Suchetana Chakraborty		IIIT Guwahati, IIT Kharagpur
Sumit Kalra	Industry 4.0	Uniconverge Technologies Pvt Ltd
Sumit Kalra	Software Architecture	IIT Dhanbad

## International Collaborations

Faculty	Research Area	Organization	Country
Angshuman Paul	Medical Image Analysis	University of Bucharest	Romania
Debasis Das	VANETs	Missouri University of Science and Technology	USA
Debasis Das	Edge and Cloud	University of Melbourne	Australia
Debasis Das	Security	National Sun Yat-sen University	Taiwan
Debasis Das	Blockchain and Edge Intelligence	Centre for Artificial Intelligence Research (CAIR), University of Agder	Norway
Debasis Das	Unmanned Aerial Vehicle (UAV)	University of Perugia	Italy
Mayank Vatsa	AI for Social Good	University of South Florida	USA
Mayank Vatsa	Trusted Biometrics	University of Buffalo	USA
Pallavi Jain		Ben-Gurion University	Israel
Richa Singh	AI for Social Good	University of South Florida	USA
Richa Singh	Trusted Biometrics	University of Buffalo	USA
Somitra Sanadhya		University of Haifa	Israel
Somitra Sanadhya		Nanyang Technological University	Singapore
Suchetana Chakraborty		University Maryland, Baltimore	USA
Suchetana Chakraborty		Missouri University of Science and Technology	USA
Sumit Kalra	Telemedicine	Queensland University of Technology	Australia
Sumit Kalra	Software	University of Sannio	Italy

## Publications

The faculty members of the department have a rich array of publications in 2022-2023. The details are given below.

### Anand Mishra

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- » COFAR: Commonsense and Factual Reasoning in Image Search, P Gatti, AS Penamakuri, R Teotia, Anand Mishra, S Sengupta, R Ramnani, AACL-IJCNLP 2022, Page 4391-4400, <https://doi.org/10.48550/arXiv.2210.08554>.

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### Angshuman Paul

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### Debasis Das

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## Gaurav Harit

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## Kshitij Gajjar

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## Lawqueen Kanesh

#### Conferences:

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## Mayank Vatsa

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## Palash Das

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## Laboratories and equipment

Network Lab: Network lab aims to support undergraduate and postgraduate courses linked

to Computer Networks, Wireless Networks, and Network Protocol etc. The students also get hands-on with 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

Hardware Lab: Hardware lab aims to support undergraduate and postgraduate courses linked to computer organization and facilitate research activities on edge analytics platforms, computing architectures, embedded systems, autonomous systems, and CAD for VLSI

## High end equipment facilities

DGX-2 Server- NVIDIA designed the DGX-2 Server as a high-performance computing system for deep learning applications. It features 16 interconnected GPUs that provide high-speed data throughput for massive machine learning and artificial intelligence operations. The DGX-2 is also endowed with NVIDIA's Tensor Cores, which accelerate matrix operations commonly employed in deep learning tasks. One DGX-2 machine with 16 Volta 100 GPUs and 1.5 terabytes of RAM is available in the CSE lab. It comes equipped with an additional 50 terabytes of storage that is all flash-based.

GPU Systems: The department has 16 Nvidia 1080Ti GPU and 1 Nvidia A5000 GPU cards for the department users. NVIDIA GeForce GTX 1080 Ti is a graphics card that is often used in deep learning applications due to its powerful CUDA cores and high memory bandwidth. It has 3584 CUDA cores and 11 GB GDDR5X memory with a memory bandwidth of 484 GB/s. NVIDIA A5000 is based on the latest NVIDIA Ampere architecture and features 8, 192 CUDA cores, 256 Tensor Cores, 64 RT Cores, 24GB GDDR6 with error-correction code (ECC) and a 384-bit memory interface.

In addition, there are more than 30 servers and workstations available for research in the department

## Outreach activities:

### Seminars/ Workshops/ Conferences organized

#### Conferences Organized

ACM-W India Grad Cohort Workshop	<a href="https://cse.iitj.ac.in/index.php/events/acm-w-india">https://cse.iitj.ac.in/index.php/events/acm-w-india</a>
Winter School on Algorithms for Graphs & Games -2022	<a href="https://cse.iitj.ac.in/index.php/events/winter-school/algorithms-graphs-games">https://cse.iitj.ac.in/index.php/events/winter-school/algorithms-graphs-games</a>
Winter School for Responsible AI- 2022	<a href="https://cse.iitj.ac.in/index.php/events/winter-school/responsible-ai">https://cse.iitj.ac.in/index.php/events/winter-school/responsible-ai</a>
IITJ Industry Connect 2022, The Energy and Resources Institute (TERI), Bengaluru	<a href="https://cse.iitj.ac.in/index.php/events/iitj-industry-connect-2022">https://cse.iitj.ac.in/index.php/events/iitj-industry-connect-2022</a>

### Events organized by the ACM Student Chapter

#### Academic activities

An Interactive session	UG Research showcase
Open Problem Solving	Workshops and Webinars
Codeathon	My research in 2-3 minutes (Elevator Pitch)
Golden Rules for Research Process	Research Collaboration Meet

#### Non-academic activities

Research Scholar Day (RSD) Celebration	Meet the Grads Night
Bulletin Boards	Scrapbook
Buddy System	Science and Cultural Fair
Achievement Parties	

### Department Webinar

The department of Computer Science and Engineering started a bi-weekly webinar series in 2022 comprising talks on various topics in Computer Science & Engineering. We invite eminent speakers from various institutes as well as industries.

Speaker	Speaker
<b>Dr. Akshima</b> NYU Shanghai	<b>Prof. Dipti Prasad Mukherjee</b> Indian Statistical Institute
<b>Prof. Henning Fernau</b> Universität Trier	<b>Mr. Jibu Elias</b> INDIAai
<b>Dr. Karthik Mohan</b> University of Washington, Seattle	<b>Dr. Kshitij Gajjar</b> IIT Jodhpur
<b>Dr. Lawqueen Kanesh</b> IIT Jodhpur	<b>Dr. Manish Gupta</b> Principal Applied Scientist at Microsoft
<b>Dr. Naresh Manwani</b> IIIT Hyderabad	<b>Dr. Palash Das</b> IIT Jodhpur
<b>Dr. Suhail Sherif</b> University of Toronto	<b>Prof. Sudeep Sarkar</b> USF I Corps Programs
<b>Prof. Venu Govindaraju,</b> SUNY Distinguished Professor	



## Webinars/Presentations delivered by Faculty Members

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

### Anand Mishra

- » Microsoft Search Technology Centre India (STCI).
- » ACM-India ARCS 23.
- » Workshop on Scaling-up Document Image Understanding (in conjunction with ICDAR 23),
- » ICFHR 2022 (Workshop Co-Chair)
- » pre-conference workshop on multimodal interactions at ICMI 2022

### Angshuman Paul

- » Data-efficient machine learning methods for medical image analysis at the CSI Kolkata Chapter.
- » "Application of Machine/Deep Learning" on June 16 at the Indian Statistical Institute.

### Debasis Das

- » Blockchain and Its Applications, SERB Sponsored Workshop on Advanced Topics in Network Security at NIT Surathkal, during 30thMay -5thJune2022.
- » Machine Learning in Vehicular Communications/ Networks, SERB Funded KARYASHALA Workshop on Vehicular Communications (13 July 2022 to 19 July 2022) at IIT Indore.
- » Blockchain for Smart Grid Applications, AICTE ATAL sponsored Faculty Development Program on "Blockchain in Smart City: Emerging Technologies for the Next Decade and Beyond" from 19th-22th September 2022 at NIT Raipur.

### Deepak Mishra

- » "Current Trends in Medical Imaging" in the webinar organized by IIT Mandi iHub and HCI Foundation.

Placement:

	Placement Percentage	Median Salary	Highest Salary
B.Tech CSE	96%	22.2 Lacs	53 Lacs
M.Tech CSE	100%	12.25 Lacs	40 Lacs
M.Tech AI	100%	20 Lacs	34 Lacs

### Richa Singh

- » Security and Protection of Women in Cyberspace, International Women's Day Celebration, IIT Jodhpur, March 2023.
- » Adventures of AI: Deepfake and Bias, 10th Year Celebration of ACM W India, Bhopal, India February 2023.
- » Bias in Facial Analysis, Next-gen AI: Inspiration from Brain Science, IIT Jodhpur, January 2023. Keynote Talk on Adventures of AI: Deepfake and Bias in Audio Processing, at The 23rd International Society for Music Information Retrieval Conference (ISMIR 2022), India, Nov 2022.
- » Trustworthiness of AI Systems with Adversarial Attacks and Deepfakes, Indian Research Network (IRN), Samsung RD Institute India-Bangalore, August 2022.

### Somitra Sanadhya

- » On the "Cyber Jagrukta Diwas" on May 4, 2022 - organized by the Ministry of Education and the Ministry of Home Affairs

### Suman Kundu

- » On the "Cyber Jagrukta Diwas" on May 4, 2022 - organized by the Ministry of Education and the Ministry of Home Affairs

### Sumit Kalra

Expert talk at FDP "IoT Induced Artificial Intelligence for Emerging Computing Paradigms" Oct 2022



# Department of Electrical Engineering

## Introduction to the department

The Department of Electrical Engineering was initially started in 2009 as the Centre for Information and Communication Technologies (ICT), and later developed into a full-fledged Department in 2015. As of 2023, the Department offers a wide range of degree programs at UG, Masters, Dual-degree, and Doctoral levels, with curricula that cater to the needs of next-generation engineers and researchers.

The Department leverages technology-enhanced learning and innovative teaching pedagogies to impart quality engineering education in the increasingly digital world. With more than thirty faculty members working in diverse areas of electrical engineering, the Department has an

h-index of 47 with over 800 publications and numerous patents. With new workforce-ready degree programs, and cutting-edge curriculum handcrafted to meet the requirements of the rapidly evolving industry, the Department collaborates with organizations around the world, and produces graduates who are well-equipped to tackle complex challenges and make a meaningful impact in their careers.

The Department has state-of-the-art research infrastructure and actively focuses on emerging technology tracks in the areas of electrical engineering such as 5G & Beyond Communication, Signal Processing & Interpretation, Cyber Physical Systems, Nanoelectronics & Integrated Circuits, Smart Grid, Embedded Computing & SoC, and Artificial Intelligence of Things.

## Faculty Members

**Ajay Agarwal**, Professor and Head

**Aashish Mathur**, Assistant Professor

**Abdul Gafoor Shaik**, Associate Professor

**Amandeep Kaur**, Assistant Professor

**Amit Bhardwaj**, Assistant Professor

**Anil Kumar Tiwari**, Associate Professor

**Anoop Jain**, Assistant Professor

**Arani Ali Khan**, Assistant Professor

**Arpit Arvind Khandelwal**, Assistant Professor

**Arun Kumar Singh**, Associate Professor

**Bhupendra Singh Reniwal**, Assistant Professor

**Bijnan Bandyopadhyay**, Visiting Professor

**Binod Kumar**, Assistant Professor

**Deepakkumar M. Fulwani**, Associate Professor

**Harshit Agarwal**, Assistant Professor

**Himanshu Kumar**, Assistant Professor

**Jai Narayan Tripathi**, Assistant Professor

**Kamaljit Rangra**, Visiting Professor

**Kunwar Aditya**, Assistant Professor

**Mahesh Kumar**, Associate Professor

**Manish Narwaria**, Assistant Professor

**Manoj Choudhary**, Professor

**Niladri Sekhar Tripathy**, Assistant Professor

**Nishant Kumar**, Assistant Professor

**Nitin Bhatia**, Assistant Professor

**Rajendra Nagar**, Assistant Professor

**Rajlaxmi Chouhan**, Assistant Professor

**Ravi Yadav**, Assistant Professor

**Saakshi Dhanekar**, Assistant Professor

**Sai Kiran M. P. R.**, Assistant Professor

**Sandeep Kumar Yadav**, Associate Professor

**Shree Prakash Tiwari**, Associate Professor

**Soumava Mukherjee**, Assistant Professor

## Adjunct Members

### Akshay Kumar Rathore

Associate Professor, Electrical and Computer Engineering,  
Concordia University, Montreal, Canada

### Tapan Mishra

Former Director, Space Application Center, Ahmedabad, ISRO

### Ajoy Kumar Ray

Electronics & Electrical Communication Engineering, IIT Kharagpur

### Hari Mohan Gupta

Formerly Professor (HAG), Chair Professor, and Emeritus Professor  
Department of Electrical Engineering, Indian Institute of Technology Delhi

### Rajesh Kumar Sharma

Former Director, (Distinguished Scientist/Outstanding Scientist)  
Solid State Physics Laboratory, Delhi

### R.M. Suresh Babu

Distinguished Scientist & Director, Health Safety & Environment Group  
Bhabha Atomic Research Center, Mumbai

## Research Areas and Technology Tracks

The research areas pursued by faculty members of the Department of Electrical Engineering broadly covers the following areas of conventional electrical engineering: Communication Engineering, RF, Microwave and Photonics, Signal Processing, Microelectronics and VLSI, Control Systems, Power Engineering & Computing Systems. The Department has also identified six technology tracks of emerging technologies in these areas and these tracks along with their associated research themes and laboratories are shown as follows:

Technology Track	Research Themes	Associated Laboratories
5G & Beyond Communication	<ul style="list-style-type: none"> <li>» Rate, reliability, and complexity limits in MIMO communications</li> <li>» Performance improvement and security of Optical Wireless Communications</li> <li>» Millimeterwave antennas and circuits for 5G application</li> </ul>	<ul style="list-style-type: none"> <li>» Wireless &amp; Microwave Lab</li> <li>» Wireless Communications and Navigation Lab</li> <li>» Microwave Circuits and Systems Lab</li> <li>» Lightwave Technology Lab</li> </ul>
Signal Processing & Interpretation	<ul style="list-style-type: none"> <li>» Sociodigital Reality (AR, VR, Haptics, Speech and Language Analysis)</li> <li>» Visual Computing (Computer Vision, Visual Forensics, Machine Learning)</li> <li>» Signal Processing for IoT (Predictive Maintenance, Digital Twin, Communication)</li> </ul>	<ul style="list-style-type: none"> <li>» Signal Processing Lab</li> <li>» Image Processing &amp; Computer Vision Lab</li> <li>» Multimodal Interaction Lab</li> </ul>
Cyber-Physical Systems	<ul style="list-style-type: none"> <li>» Multi-agent system</li> <li>» Mechatronics &amp; cyber-physical systems</li> <li>» Robust &amp; optimal control</li> <li>» Adaptive control &amp; robotics</li> <li>» Electric vehicles</li> </ul>	<ul style="list-style-type: none"> <li>» Cyber Physical Systems Modelling Lab</li> <li>» Microgrid &amp; Real-time Simulator Lab</li> <li>» Control &amp; Computing Lab</li> </ul>

Technology Track	Research Themes	Associated Laboratories
Nanoelectronics & Integrated Circuits	<ul style="list-style-type: none"> <li>» Multi-agent system</li> <li>» Oxide metal semiconductors by sputtering for sensor applications</li> <li>» 2D materials: MoS<sub>2</sub>, AlGa<sub>N</sub>/Ga<sub>N</sub> HEMTs</li> <li>» Bandgap engineering and surface studies of semiconductors</li> <li>» Micro and Nano device fabrications</li> <li>» Organic and Flexible Electronics: Field-effect transistors (FETs), Circuits, and Sensors</li> <li>» Electrical characterization, Parameter extraction, Interface characterization</li> <li>» Device Simulation: New and Unconventional Devices</li> <li>» Compact Modeling for Circuit Simulations</li> <li>» CMOS image sensors</li> <li>» Analog and mixed-signal circuits</li> </ul>	<ul style="list-style-type: none"> <li>» Microelectronics Lab</li> <li>» Electronic Circuit Simulation &amp; VLSI Systems Lab</li> <li>» SMDP Lab</li> <li>» Flexible Large Area Microelectronics (FLAME) Research Lab</li> </ul>
Smart Grid	<ul style="list-style-type: none"> <li>» Control of micro-grid &amp; uncertain system</li> <li>» Demand-side management</li> <li>» Microgrid Control and dynamics of distributed generation</li> <li>» Condition monitoring</li> <li>» Power System Dynamics</li> <li>» Wide area Monitoring systems</li> <li>» Cyber security in Grid</li> <li>» Climate resiliency of power grid</li> </ul>	<ul style="list-style-type: none"> <li>» Smart Grid Lab</li> </ul>
Embedded Computing & SoC	<ul style="list-style-type: none"> <li>» High-speed VLSI Systems and EDA tools</li> <li>» Signal Integrity</li> <li>» Neuromorphic Computing</li> </ul>	<ul style="list-style-type: none"> <li>» Electronic Circuit Simulation &amp; VLSI Systems Lab</li> <li>» SMDP Lab</li> </ul>
Artificial Intelligence of Things (AIoT)	<ul style="list-style-type: none"> <li>» Communication protocols for RF energy harvesting-based systems</li> <li>» Chipless RFID</li> <li>» Signal Processing for IoT (Predictive Maintenance, Digital Twin, Communication)</li> <li>» Visual Computing (Computer Vision, Visual Forensics, Machine Learning)</li> </ul>	<ul style="list-style-type: none"> <li>» IoT Lab</li> <li>» Wireless &amp; Microwave Lab</li> <li>» Microelectronics Lab</li> <li>» Electronic System Simulation and VLSI Systems Lab</li> <li>» SMDP Lab</li> <li>» FLAME Lab</li> </ul>

## Academic Programmes

The Department offers a range of degree programs with a flexible and broad-based curriculum. These programs are as follows:

### Undergraduate Program

- » BTech in Electrical Engineering (4 Years)
- » BTech with Specialization (4 Years) in
  - Cyber Physical Systems
  - Artificial Intelligence of Things (AIoT)
  - Communication Engineering
  - Intelligent Communication and Networking
  - VLSI Systems
  - Nano and Flexible Electronics
  - Visual Computing
  - Smart Grid
  - Engineering Innovation
- » BTech with Minor (4 Years)

- » BTech–MTech Dual-degree (5 Years)
- » BTech–MBA Dual-degree (5 Years)

### Postgraduate Programs

- » MTech (Intelligent Communication Systems)
- » MTech (Cyber Physical Systems)
- » MTech (Sensors and Internet of Things)
- » MTech-PhD Dual Degree (Intelligent Communication Systems)
- » MTech-PhD Dual Degree (Cyber Physical Systems)
- » MTech-PhD Dual Degree (Sensors and Internet of Things)
- » Executive MTech (Intelligent VLSI Systems)

### Doctoral Program

- » PhD in Electrical Engineering

## Faculty/ Department Laurels

S. No.	Date	Description
1.	Apr 2022	Dr. Rajlaxmi Chouhan received the Best Presentation Award on Web-based Learning, Game-based Learning and Online Discussion Analysis at IEEE ICIET 2022, Matsue, Japan [for the paper "Game-based Learning for Engineering Education: Supplementing Basic Electronics Instruction with Educational Games" coauthored by K. Sanodariya, M. Shekhar, A. Pandey, A. Raj, A. Gupta, P. Suryavanshi and R. Chouhan.
2.	Apr 2022	Dr. Saakshi Dhanekar became the Chair, Women in Sensors Committee, IEEE Sensors Council
3.	Jun 2022	Dr. Jai Narayan Tripathi joined the Special Interest Group (SIG) of Agrifood Electronics of IEEE Circuits and Systems Society.
4.	Aug 2022	Dr. Harshit Agarwal received 2022 Young Researcher Award, IIT Jodhpur
5.	Nov 2022	Dr. Bhupendra Singh Reniwal received Science & Engineering Research Board (SERB) International Research Experience (SIRE) Fellowship from the Department of Science and Technology and Joined the Charles L. Brown Department of Electrical and Computer Engineering, University of Virginia USA.
6.	Nov 2022	Dr. Saakshi Dhanekar received Late Shri Pralhad P. Chhabria Awards under the Best Woman Professional Category in Nov 2022 during IEEE INDICON conference
7.	Dec 2022	Professor Manoj Choudhary, Head, Department of Electrical Engineering, has been appointed as the first Vice Chancellor for the Gati Shakti Vishwavidyalaya, Vadodara, Gujarat.
8.	Dec 2022	Dr. Jai Narayan Tripathi was invited to be a Session Co-Chair, for the session "Power Integrity", in IEEE Electrical Design of Advanced Packaging and Systems Symposium (EDAPS), Dec. 2022.

S. No.	Date	Description
9.	Jan 2023	Dr. Rajlaxmi Chouhan joined the International IEEE Signal Processing Society Women in Signal Processing (WISP) Subcommittee on Empowerment, Awareness and Visibility
10.	Jan 2023	Prof. B. Bandyopadhyay has been elevated to IEEE Life Fellow
11.	Jan 2023	Research work of Dr. S. Mukherjee was selected for Best Poster Award (3rd position) in IIT Delhi Industry Day Poster Session
12.	Jan 2023	Dr. S. Mukherjee Elected as Joint Secretary of IEEE Rajasthan Subsection and as the Joint Secretary of IEEE APS Rajasthan Chapter
13.	Feb 2023	Dr. Aashish Mathur elevated to IEEE Senior Member
14.	Feb 2023	Dr. Aashish Mathur's paper (coauthored with PhD Student Vinay Mohan) appears in the list of Popular Articles of IEEE Open Journal of Communication Society for February 2023
15.	Feb 2023	Dr. Harshit Agarwal reappointed as Member of IEEE EDS Technical Committee on Compact Modeling

## Student Laurels

**Champalal Lalani**, PhD student of Dr. Aashish Mathur and Dr. Nitin Bhatia, selected for the prestigious Prime Minister's Research Fellowship (PMRF) under the Lateral Entry Scheme, in Cycle 10

**Anant Singhal**, PhD student of Dr. Harshit Agarwal, selected for the prestigious Prime Minister's Research Fellowship (PMRF)

**Aryan Himmatlal Prajapati**, BTech Student, secured Global Rank 38 (India Rank 3) in Codechef's December Long 2022.

**Champalal Lalani** and **Somnath Bhattacharjee**, PhD Students, were selected for the Prime Minister Research Fellowship (PMRF).

**Chirag Bhawnani** and **Dinesh Junjariya**, BTech Students, were part of the team of electrical subsystem design and manufacture for IIT Jodhpur's first e-ATV / Finalists of e-BAJA 2022.

**Aaditya Baranwal**, BTech Student, and his team won the National PAN India Michelin Mobility Innovation Challenge 2022.

**Somshuvra Basu** and **Rohan Raj**, BTech Students, won the Second Prize from the Hon'ble Governor of Punjab at the National Hackathon conducted by Chandigarh Police and Infosys 2022.

**Mohan Chhabaria**, BTech Student, won the Samsung NLP Challenge held during Promoteo 2023, IIT Jodhpur.

**Salim Rukhsar**, PhD Student, received a Travel Grant from IEEE Kerala Section to attend IEEE Indicon 2022, and secured Rank #5 at the 2022 Samsung NLP challenge (Kaggle).

**Hemant Kumar**, PhD Student, received the Best Paper Award (for Poster Category) during IEEE Innovative Smart Grid Technologies ISGT-Middle East Conference, held at Khalifa University, Abu Dhabi from March 12 - 15, 2023. He also received the CSIR Travel Grant for presenting his work at the 21st Wind and Solar Integration Workshop held at The Hague, Netherlands from October 12 - 15, 2022.

**Somnath Bhattacharjee** (PhD Student), **Rachit Agnihotri**, and **Lovish** (BTech Students) received the TIH IoT-Chanakya Fellowship, IIT Bombay.

**Gargi Konwar**, PhD Student, received the Second Prize at Three-Minute Thesis Presentation at INAE-SERB Youth Conclave 2022

Best Oral Presentation award at 6th International Conference on Emerging Electronics (ICEE 2022), Bangalore, India

CSIR Travel Grant to present her work at 7th IEEE Electron Devices Technology and Manufacturing (EDTM) Conference 2023, Seoul, South Korea

**Harsh Agarwal**, BTech Student, received the MITACS Graduate Research Internship (2022).

**Hiteshi Singh**, BTech Student, co-authored a paper titled 'Prediction of protein–protein interaction using graph neural networks' that was ranked #9 among the Top 100 most downloaded research papers on Cell and Molecular Biology 2022.

**Kritarth Srivastava** received the International Travel Support Grant from SERB-DST for presenting

a paper in the Conference on Lasers and Electro-Optics/Pacific Rim 2022 in Sapporo, Japan.

**Idury Satya Krishna**, Ph.D. student of Dr. Soumava Mukherjee, has received the prestigious European Microwave Conference Student Grant Award in EuMC 2022 held in Milan, Italy.

### Laboratories and equipment

The Department of Electrical Engineering hosts state-of-the-art research facilities with world-class infrastructure and computational facilities. The list of laboratories and a preview of equipment is shown in the figure below.

In accordance with the new UG curriculum, a laboratory component was introduced in the course of *Analog Circuits*. These experiments were conducted in the last Academic Year and were based on MOS devices and included design and implementation of basic amplifier topologies, such as single-stage amplifiers to op-amp design.

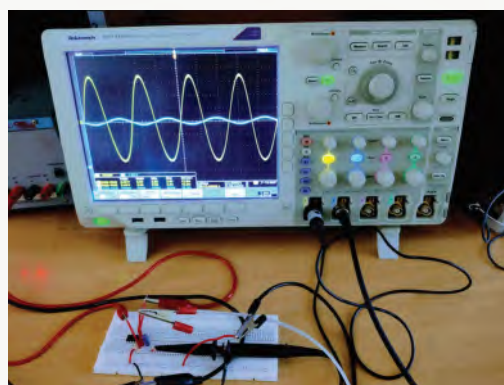


Figure: Lab experiment on Analog Electronics

A new server was procured for the thematic lab of VLSI Systems. The equipment is a part of a SERB-funded project to develop advanced algorithms for optimization of high-speed integrated systems.



















 Cyber-Physical Systems (CPS) Modelling Lab	 Control & Computing Lab
 Device Modelling & MEMS Simulation Laboratory	 Electronics Lab
 Electronic Circuit Simulation & VLSI Systems Lab	 Energy Conversion & Systems Lab
 Image Processing & Computer Vision Lab	 Internet of Things (IoT) Lab
 Lightwave Technology Lab	 Microelectronics Lab
 Microgrid & Real-time Simulator Lab	 Microwave Circuits and Systems (MCS) Lab
 Multimodal Interaction Laboratory	 Power Electronics & Drives Lab
 Signal Processing Lab	 Smart Grid Lab
 Wireless & Microwave Lab	 Wireless Communications & Navigation Lab

Figure: List of laboratories



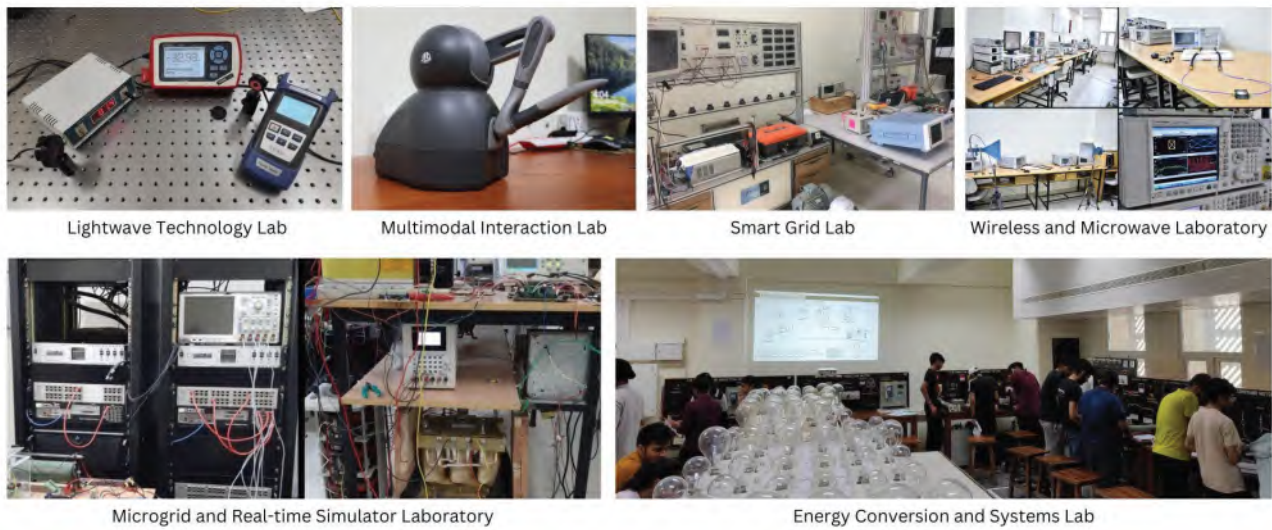


Figure: Preview of Lab equipment

## Projects

New Sponsored Projects (that started during Apr 2022-Mar 2023)

- » Design and Development of Smart Chaff using low profile microwave circuit / DRDO / Soumava Mukherjee (PI) / 1 Year / ₹ 9,99,600
- » Feasibility Study of Organic Field Effect Transistors for Radiation Detection (RAD-OFETs) / Defence Laboratory Jodhpur / Shree Prakash Tiwari (PI) and Arpit Khandelwal (Co-PI) / 1 Year / ₹ 9,96,000
- » Development of Hardware Trojan Testing Methodology / DRDO-CARS / Binod Kumar (PI) and Manoj Choudhary (Co-PI) / 2 Years / ₹ 24,92,000
- » Specification-guided Design of Intelligent, Secure and Dependable Hardware Architectures for Edge Computing Applications / SERB-SRG / Binod Kumar(PI) / 2 Years / ₹ 27,53,870
- » Investigating Analogy between Polynomial Chaos and Orthogonal Experiments for Uncertainty Quantification / SERB- MATRICS / Jai Narayan Tripathi (PI) / 3 Years / ₹ 6,60,000
- » Low Profile Compact Antenna System for Millimeterwave Communication and Sensing Application / SERB-CR / Soumava Mukherjee (PI) / 3 Years / ₹ 52,87,832
- » Multifunctional Flexible Devices for Eco-Sustainable E-Textile Applications / SERB-CRG / Shree Prakash Tiwari (PI) / 3 Years / ₹ 60,44,093
- » Smart Radio Environments: Implementation and deployment for targeted use-cases / IIITB COMET / Soumava Mukherjee (PI) / 3 Years / ₹ 53,46,722
- » Electronic nose system based Asthma detection through exhaled breath / SERB-CRG / Saakshi Dhanekar (PI), Dr. Kamaljit Rangra (IIT Jodhpur) (Co-PI), Dr. Monika Aggarwal (IIT Delhi) (Co-PI), Dr. Nishant Chauhan (AIIMS Jodhpur) (Co-PI), Dr. Jaspreet Singh (SCL) (Co-PI) / 3 Years / ₹ 69,55,586
- » Design and Fabrication of Energy Efficient In-Memory Computing Design Framework for Analog Neural Processor with Improved Linearity for Neuromorphic Computing Applications / SERB-CRG / Bhupendra Singh Reniwal (PI) / 3 Years / ₹ 30,99,932.

## Fellowship Projects

- » IoT-enabled 2D Materials functionalized AlGaIn/GaN transistor for water quality monitoring / Indian National Academy of Engineering- Abdul Kalam Technology Innovation National Fellowship / Mahesh kumar / 3 Years / ₹ 57,00,000
- » High Throughput, Robust Processing in Memory (PiM) Heterogeneous Architectures for Neuromorphic Computing (Neural Networks Engines) / SERB-SIRE / Bhupendra Singh Reniwal / 6 Months / ₹ 17,37,364

- » Design and Analysis of MmWave Flying Networks / TiHAN Foundation, IIT Hyderabad / Sai Kiran M. P. R. / 2 Years / ₹ 18,00,000
- » "Design and investigation of high performance RF-microwave bandpass filters and duplexers for frontend applications"/SERB-SIRE./ Dr. Arani Ali Khan

### Sponsored Conference

- » IUMRS ICA 2022 / IITJ & MRSI co-organized / Mahesh Kumar / ₹ 6,52,251

### Travel Grants

- » SERB International Travel Support Grant (ITS)/ Jai Narayan Tripathi / ₹ 213847
- » IGSTC-CONNECT Plus Travel Grant / Indo-German Science & Technology Centre (IGSTC) / Shree Prakash Tiwari / ₹ 75,000
- » CSIR Foreign Travel Grant for Hemant Kumar / ₹ 79,511

### Outreach Project

- » IEEE Delhi Section Sensors Council Chapter - Rajasthan / Saakshi Dhanekar (PI) and Arpit Khandelwal (Co-PI) / 1 Year

## Publications

### JOURNALS

#### Aashish Mathur

- » Sikri, A. Mathur and G. Kaddoum, "Joint Impact of Phase Error, Transceiver Hardware Impairments, and Mobile Interferers on RIS-Aided Wireless System Over  $\kappa$ - $\mu$  Fading Channels," in IEEE Communications Letters, vol. 26, no. 10, pp. 2312-2316, Oct. 2022, doi: 10.1109/LCOMM.2022.3191706.
- » V. Mohan and A. Mathur, "Secrecy Analysis of DCSK-Based PLC Systems With Multiple Eavesdroppers," in IEEE Systems Journal, doi: 10.1109/JSYST.2022.3224982.
- » V. Mohan, A. Mathur and G. Kaddoum, "Analyzing Physical-Layer Security of PLC Systems Using DCSK: A Copula-Based Approach," in IEEE Open Journal of the Communications Society, vol. 4, pp. 104-117,

### PATENTS

- » Venkateswaran PS, Abhishek Sharma, **Ajay Agarwal**, Sanket Goel, An Optofluidic Microviscometer For Measuring Adulteration In A Fluid, Indian Patent No. 425504, 16th March 2023
- » (*Filed*) Bhaskar Mitra, Madhusudan Singh, Priya Vinayak, Vikram Maharshi, and **Ajay Agarwal**, Regenerable Anodized Porous Alumina Device and a Method of Fabrication Thereof, Indian Patent No. 202211031722, 02 June 2022
- » (*Filed*) Bhaskar Mitra, Vikram Maharshi, **Ajay Agarwal**, Sumit Sharma, Samresh Das, Rahul Prajesh, A Lithography Free Flexible Tactile Sensor for Fruit Ripeness Detection, Indian Patent No. 202211033863, 13 June 2022
- » (*Filed*) Bhaskar Mitra, Vikram Maharshi, **Ajay Agarwal**, Imran Ahmad, Wafer-Wafer hermetic bonding using recrystallized Parylene material, Indian Patent No. 202211071382, 10 Dec 2022

2023, doi: 10.1109/OJCOMS.2022.3232753.

#### Abdul Gafoor Shaik

- » Mahmood Shaik, Abdul GafoorShaik, Sandeep Kumar Yadav, "Hilbert-Huang transform and decision tree based islanding and fault recognition in renewable energy penetrated distribution system", Sustainable Energy, Grids and Networks (Elsevier), Volume 30, 2022, 100606, ISSN 2352-4677,

#### Ajay Agarwal

- » Kumar, Pawan and Chaudhary, Sumit and Khan, MdArif and Singh, Ruchi and Htay, Myo Than and Prajesh, Rahul and Agarwal Ajay and Mukherjee, Shaibal, "Impact of ZnO Cap Layer on the Performance of MgZnO/CdZnOHeterostructure With YO Spacer Layer," in IEEE Transactions on

- Electron Devices, vol. 69, no. 11, pp. 5991-5995, Nov. 2022, doi: 10.1109/TED.2022.3206172.
- » Rakesh Kumar Saini, Ashok Kumar Sharma, Ajay Agarwal, Rahul Prajesh, "Label-free detection of Thiram pesticide on flexible SERS-active substrate" *Materials Chemistry and Physics*, vol. 295, pp. 127088, 2023. Doi: <https://doi.org/10.1016/j.matchemphys.2022.127088>.
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- » I. S. Krishna, N. Delmonte, L. Silvestri, M. Bozzi and S. Mukherjee, "Substrate Integrated Coaxial Line based Branch Line Coupler with Broad Out of Band Rejection," 2022 52nd European Microwave Conference (EuMC), 2022, pp. 492-

### BOOK CHAPTERS

#### Ajay Agarwal

- » Anju Yadav, Praveen Saini, Ajay Agarwal, "Analyzing the Effect of Various Reducing Agents and Their Concentrations on Gas Sensing Performance of Graphene Aerogel-Based Ammonia Sensor", Micro and Nanoelectronics Devices, Circuits and Systems: Select Proceedings of MNDCS 2021, pp. 173-179, 2022. Doi: 10.1007/978-981-16-3767-4\_16
- » ArunKishorJohar, Gaurav Kumar Sharma, C Periasamy, KoushikGuha, Ajay Agarwal, DharmendarBoolchandani, "Investigating the Effect of Various Bragg's Reflector Configurations on the Performance of Flexible

FBAR Sensors”, Micro and Nanoelectronics Devices, Circuits and Systems: Select Proceedings of MNDCS 2021, pp. 129-138, 2022. Doi: DOI: 10.1007/978-981-16-3767-4\_12.

- » VikramMaharshi, Ajay Agarwal, “Reliability Analysis of Thermally Actuated MEMS Micromirror”, Micro and Nanoelectronics Devices, Circuits and Systems: Select

Proceedings of MNDCS 2022, pp. 427-436, 2022. Doi: 10.1007/978-981-19-2308-1\_43.

#### **Kamaljit Rangra**

- » Deepak Bansal, KamaljitRangra, Ajay Agarwal, “Progress in RF MEMS/ NEMS Switches”, MEMS Applications in Electronics and Engineering, pp. 6-1-6-44, 2023.



Inauguration and Abstract Booklet Release of IUMRS-ICA 2022 (From Left: Prof. Mahesh Kumar, Prof. P.S. Anil Kumar, Prof. Santanu Chaudhury, Prof. Rodrigo Martins, Prof. S.B. Krupanidhi, Prof. S.P. Tiwari)

### **EE Open House (18 Apr 2022)**

The Department of EE organized an online Open House for their PG and PhD Programs on 18 April 2022. The event included discussion on various MTech, MTech-PhD, and PhD programs and video demonstrations by various labs. The event also included a Paper Presentation Contest for external participants.

### **IITJ Padharo 1.0 and 2.0 (20 Apr 2022 and 12 Feb 2023)**

The Department organized various activities as a part of the Institute Open Houses - IITJ Padharo on 20 Apr 2022 and 12 Feb 2023. The events witnessed massive footfall and an enthusiastic participation from the attendees from and outside the city of Jodhpur. The Departmental activities included lab demonstrations, game demonstrations, poster sessions, and invited talks.



Game demonstration during IITJ Padharo 1.0 (20 Apr 2022)



Lab demonstration during IITJ Padharo 2.0 (12 Feb 2023)

Scan the following QR code or click here for a video report of the 2023 IITJ Padharo 2.0 EE activities.



## Special Sessions

- » Prof. Ajay Agarwal developed and chaired a focussed session on “**Sensors and Systems for Alternative Diagnosis and Therapies**” during IEEE Applied Sensing Conference 2023 held in Bengaluru, India from 23-25 Jan 2023.
- » Prof. Ajay Agarwal developed and chaired a focussed session on “**E-textile Based Sensors**” during IEEE Applied Sensing Conference 2023 held in Bengaluru, India from 23-25 Jan 2023.

## Invited Talks by Faculty Members

1. **Dr. Aashish Mathur** delivered an invited talk on Power Line Communications in SERB-sponsored Karyashala (High-end Workshop) under Accelerate Vigyan (AV) scheme on the topic ‘*Smart Grid: Network, Communication and Security*’ (Sep. 2022) at IIIT Kota.
2. **Dr. Rajlaxmi Chouhan** delivered the Keynote Lecture on *Game-based learning for engineering education*, at Faculty Conclave, Center for Engineering Education Research, KLE Technological University, Hubli (Jan. 2023)
3. **Dr. Jai Narayan Tripathi** delivered invited talks on
  - » “Addressing Computational Challenges in Signal/Power Integrity Issues”, organized by Department of Electrical Engineering, Indian Institute of Technology Ropar, 10 March 2023.

- » “Computational Intelligence for Designing Integrated Circuits and Systems”, in Workshop on “Emerging Devices, Circuits and Systems”, organized by Department of Electronic Science, University of Delhi South Campus and IEEE Electron Devices Society Delhi Chapter, 17 Nov. 2022.
- » “Fundamentals of Signal/Power Integrity”, at Digital University Kerala, Thiruvananthapuram, Kerala, 23 Feb. 2023.

4. **Dr. Harshit Agarwal** delivered invited talks at
  - » IIT Roorkee (“BSIM-HV: Advanced High Voltage MOSFET Compact Model”, Nov. 2022)
  - » IEEE ICEE 2022 (“Steep-Slope Technology for Continued Scaling: Prospective and Recent Developments”, Dec. 2022)
  - » IEEE WDC (Feb. 2023)
  - » NIT Jalandhar (“Recent Trends in Nanoelectronics”, March 2023)
5. **Prof. Ajay Agarwal** delivered Invited talks on:
  - » Micro Nanotechnologies Enabled Sensors for Healthcare, Emerging Tools and Techniques in VLSI, MEMS & MOEMS (ETTMMM-2022), SKIT Jaipur, 26th January 2022
  - » Nano - Structured Sensors for Healthcare, Workshop on Recent Trends on

Nanostructured Thin Films & Application, 19th February 2022, BITS Pilani

- » Micro Nano Sensors for Sensory Perception based Ayurvedic Diagnosis, Lecture Series on Technology-ased Evidence for Ayurved Solutions in Precision Health organized by Centre for Human Resource Development (CHRD), Dr. SR Rajasthan Ayurved University, Jodhpur, 7th April 2022
- » Technologies being Explored Today for Better Tomorrow, PRAGYATA-2022 - Innovative & Sustainable Developments in Electrical & Electronics Engineering, 27th May 2022 at Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
- » Drinking Water Sustainability: Challenges & Possibilities, Research, Development, and Innovations in Water Quality Monitoring: Sensors, System, Software & Networks (iCEN-64), 29th July 2022, Chandigarh (Plenary talk)
- » Leadership talks on Diversity, Equity, and Inclusion in IEEE Nanotechnology Council Women in Nanotechnology, 19th Aug 2022 IIT Indore.
- » Smart Sensors and Data Processing, Second International Conference on Signal and Information Processing-2022 "IEEE IConSIP-II-2022", 26-27th August 2022, College of Engineering Pune (COEP)

#### 6. Dr. Soumava Mukherjee

- » Participated in the Annual Visitor Program, Department of Electronic Science University of Delhi South Campus
- » Delivered an Invited Talk in IEEE SBC, IIT Jammu
- » Delivered an Invited talk in Workshop on Standards-driven Research, IEEE COMSNETS 2023
- » Moderated the Panel discussion on "Standards Driven Research in Indian Academia: Achievements, Challenges and the Way Forward" in IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS) 2022

7. **Dr. Bhupendra Singh Reniwal** was invited as an Expert member for the Board of Study of Department of Electronics & Communications at Vellore Institute of Technology (VIT) Mar. 2023.

#### 8. Dr. Shree Prakash Tiwari

- » **Invited Speaker**, Topic: Flexible Devices for Eco-Sustainable Electronics, **IWE1-Institute of Materials in Electrical Engineering 1**, RWTH Aachen University, Aachen, Germany, March 30, 2023.
- » **Invited Speaker, CM@S Colloquium**, Topic: Flexible Organic Electronic Devices for Eco-Sustainable Electronics University of Wuppertal, Wuppertal, Germany, March 29, 2023.
- » **Invited Speaker**, Topic: Flexible Organic Transistors and Memory Devices for Eco-Sustainable Electronics, **Institute of Solid-State Physics**, University of Bremen, Bremen, Germany, March 21, 2023.
- » **Invited Speaker**, Topic: Flexible Electronics, Faculty of Engineering, Free University of Bozen-Bolzano, Bolzano, **Italy**, January 18, 2023.
- » **Invited Speaker**, Topic: Flexible and Multifunctional Devices for Green Electronics, Department of Physics, Computer Science and Mathematics, University of Modena and Reggio Emilia, Modena, **Italy**, January 17, 2023.
- » **Expert Talk and Guest for Valedictory Function**, DST-STUTI Workshop, Punjab Engineering College (PEC), Chandigarh, November 21-27, 2022.
- » **Invited Speaker**, Workshop on "Emerging Devices, Circuits and Systems" Centenary Celebration of Delhi University and 75th Anniversary of the Transistor Invention, IEEE EDS Delhi Chapter & Delhi University, November 15-18, 2022, (Virtual)
- » **Guest-of-Honour** for the valedictory function, and Keynote Speaker: AICTE Training and Learning (ATAL) Academy, sponsored FDP on "Advancement in VLSI Interconnects and Nanoscale Devices" ABV-IIIITM Gwalior, during October 03-14, 2022,
- » **Invited Speaker**, IEEE UP Section Webinar "Flexible Devices for Organic and Green Electronics", IIT BHU, July 21, 2022. (Virtual)

#### Media

- » **Dr. Rajlaxmi Chouhan** authored an article titled 'Video-based flipped classrooms will bridge the digital divide' for Education Times, The Times of India, New Delhi (25 July 2022)

# School of Liberal Arts (SoLA)

[FKA Department of Humanities and Social Sciences]



Inauguration of School of Liberal Arts

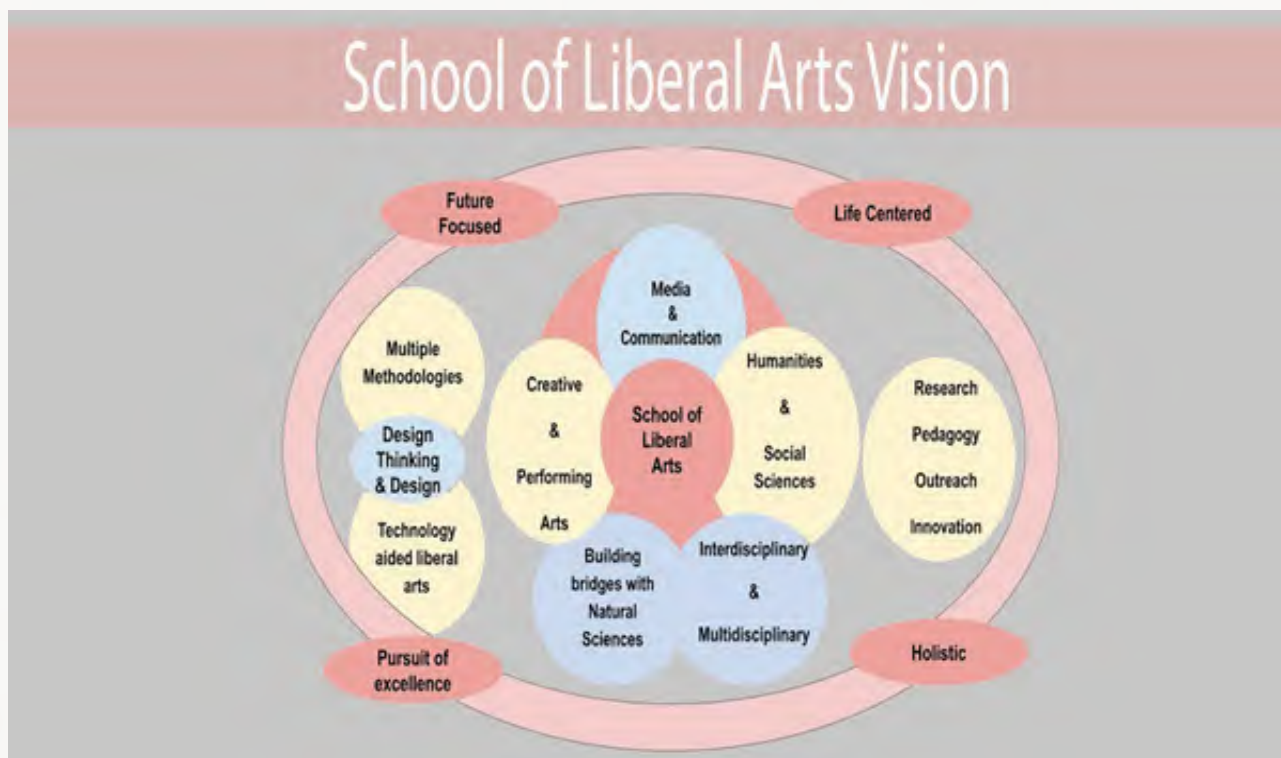
In light of the NEP 2020, with the goal to promote holistic and experiential learning, the Department of Humanities and Social Sciences evolved into the School of Liberal Arts in June 2022. In accordance with the future-driven vision of IIT Jodhpur, the change in name signifies a change in orientation. The newly established School promotes the idea of transformation by breaking the traditional silos between disciplines through multi-, trans-, and interdisciplinary means to strengthen the existing research ecosystem of the institute. The idea is to collaborate with stakeholders, and create a distinctive research and teaching ecosystem that bridges the gaps between the humanistic, the social, the environmental, and the technological.

The School has launched its two years' flagship program MSc in Computational Social Science (CSS)

in July 2022, with plans to offer Masters in XR Design and MS by Research in (i) AI and Creative Arts (ii) Mixed Media Arts from July 2023-2024.

## Vision of the School

The vision of the School of Liberal Arts is to emerge as a forerunner in Liberal Arts education with a novel, open, futuristic, transdisciplinary, and inclusive liberal humanist approach. The School seeks to engage not only with the human, the non-human, and the planetary, but also to recognize and amplify the diverse possibilities and potentials of human-technology interfaces as both agents and sites for social change.



### Mission of the School

The School has been founded on the principles that quality education in the Liberal Arts is a primary requisite for solving the multidimensional challenges that our current and future generations face. The programs of the School are intended to address societal and environmental concerns in transdisciplinary ways. It hopes to create a body of distinctive research that will inform novel teaching programs in emerging areas that remain considerably underexplored in the Indian Humanities and Social Sciences scene. Further, the School’s partnership with the industry will suit its demand for flexible and adaptable programs.

### FACULTY AND RESEARCH GROUPS OF THE SCHOOL OF LIBERAL ARTS

1 APRIL, 2022- 31 MARCH, 2023

S. No.	Name	Designation	Research Specialization/ Interest
<b>1. Literature, linguistic and cultural studies</b>			
1.	Dr. Farhat Naz	Head of the Department	Sociology
2.	Dr. Vidya Sarveswaran	Associate Professor	Ecocriticism, Environmental Humanities, Blue Humanities, Literatures of the Anthropocene, and Documentary filmmaking
3.	Dr. Anupama Mohan	Associate Professor	Indian Ocean Studies; Working class literature; Transmodernity and Literature; Environmental Humanities; History of Ideas
4.	Dr. Parichay Patra	Assistant Professor	Transnational Cinema, Indian New Wave, The Global 1968, Film Aesthetics
5.	Dr. Natasa Thoudam	Assistant Professor	Literary Studies, Gender Studies, Religious Studies, Comic Studies, Performance Studies, Digital Humanities and their intersections focused on India's Northeast (Manipur)

S. No.	Name	Designation	Research Specialization/ Interest
6.	Dr Gurujegan Murugesan	Assistant Professor	Theoretical/Formal Linguistics, Syntax.
7.	Dr. Tonisha Guin	Assistant Professor	Knowledge systems in Global South, Decoloniality, Identity Studies, Space Studies, New Media Issues
8.	Dr. Sreedevi D	Assistant Professor	Sensory Studies; Literary and Critical Theory; Senses and Writing; Touch and Aesthetics
9.	Dr. Kanak Yadav	Faculty Associate	Literature and Cities, Dalit Literature, Indian English Writing and the Postcolonial Anglophone Novel
<b>2. Philosophy</b>			
1.	Prof. Chhanda Chakraborti	Visiting Professor	Bioethics, Public Health Ethics, CSR and Business Ethics; Philosophy of Mind, Philosophy of Logic
2.	Dr. K. J. George	Associate Professor	Applied Ethics, Ethics of Technology, Bioethics
3.	Dr. V Hari Narayan	Associate Professor	Cognitive Studies, Evolutionary Theory, Analytic Philosophy and Mindfulness
<b>3. Psychology</b>			
1.	Dr. Ankita Sharma	Associate Professor	Gerontology, Clinical and Positive Psychology
2.	Dr. Suman Dhaka	Assistant Professor	Cognitive Neuroscience, Cognitive Psychology; Sleep, Cognition, Decision Making, Affect Regulation
<b>4. Sociology</b>			
1.	Dr. Farhat Naz	Associate Professor	Natural Resource Management; Water Governance; Climate Change, Disaster Risk Reduction, Gender
2.	Dr. Prasanjeet Tribhuvan	Assistant Professor	Anthropology of Material Objects, STS studies in Sociology, Political Ecology, Tourism and Youth Subcultures
3.	Dr. Rachel Philip	Assistant Professor	Sociology of Education; Education Policy; Childhood Studies; Social Stratification; Science, Technology, Society Studies
<b>5. Economics</b>			
1.	Dr. Alok Ranjan	Assistant Professor	Public Health, Universal Health Coverage, Health Systems, Health Economics, Health Equity, Elderly Health, Non-Communicable Diseases, Disability & Rehabilitation
2.	Dr. Ruhi Sonal	Assistant Professor	Decision theory, Social Networks, Bounded Rationality.
3.	Dr. Akanksha Choudhary	Assistant Professor	Development economics, education and health economics, unfair inequalities, public policy and gender studies
4.	Dr. Gopakumar K U	Assistant Professor	Structural Macroeconomic Modelling, Development Studies, Applied Econometrics
<b>Affiliate Faculty of the School of Liberal Arts</b>			
1.	Dr. Dweepobotee Brahma	Assistant Professor, School of Artificial Intelligence and Data Science, IIT Jodhpur	Econometrics, Causal Inference and Machine Learning, Health Economics

S. No.	Name	Designation	Research Specialization/ Interest
2.	Prof. Nimish Vohra	Professor of Practice	Design thinking, interaction design, visual arts, digital museums, craft entrepreneurship, Indian miniature paintings, digital marketing
3.	Prof. Mitali Mukerji		Genomics, Human molecular genetics, functional genomics of Alu repeats, Ayurgenomics, genetics of rare diseases
Scholar-in Residence			
1.	Prof. Ashutosh Sharma	Institute Chair Professor, IIT Kanpur, and President (2023-25), Indian National Science Academy (INSA)	

## Academic Programs

The School of Liberal Arts offers the following academic programs:

### Under-Graduate Programs

The School of Liberal Arts offers a number of courses for undergraduate students.

#### I. Compulsory Non-Graded Courses for Btech Students

1. Professional Communication I and II for all first-year B.Tech. programmes
2. Professional Ethics I and II for all B.Tech. programmes
3. Social Connect and Responsibility I and II (co-taught by faculty members from SoLA with other Departments)

### Preparatory Courses

The faculty members of the English group also teach the following:

1. Preparatory English I
2. Preparatory English II

### Streamwise List of Bouquet Courses

The School offers a diversity of courses from various social science and humanities disciplines for Btech students from their IV to VII semesters

#### II. Post-Graduate Programs

The Masters in Computational Social Science (MSc. CSS), which commenced in July 2022, is the flagship program of the School of Liberal Arts (SoLA), Indian Institute of Technology (IIT) Jodhpur. The program seeks to develop highly-skilled graduates equipped with theoretical, technical, and application-oriented knowledge that will enable them to construct, improve, analyze and apply theoretically-informed models to understand processes and phenomena. Bridging disciplines and technical expertise, this program is also in line with the National Education Policy (2020), and also with the Government of India's Vision 2047 which seeks future skill sets for a future society.

#### III. Doctoral Program

The School of Liberal Arts offers a Ph.D. Programme in diverse disciplines including Philosophy, Psychology, Economics, Sociology, Film Studies, Literary Studies, Linguistics, Cultural Studies, Public Health and other interdisciplinary areas.

#### Faculty Achievements

- » **Dr. Alok Ranjan** was awarded Young Researcher Award (Humanities and Management) for Outstanding Contribution to Public Health



- » **Dr. Parichay Patra** co-edited the volume *Sine ni Lav Diaz* which was shortlisted for the *British Association of Film, Television and Screen Studies (BAFTSS) Publication Awards 2023 in the edited collection category*
- » **Dr. Sreedevi D** received an Early Career Fellowship from Kerala Council for Historical Research (KCHR).
- » **Dr. Farhat Naz** was appointed as DAAD South Asia Research Ambassador for 2022-2025 by DAAD and German Embassy, New Delhi, India. She was also nominated in the ISTR (International Society for Third-Sector Research) International Publication Committee, a Global forum where she has been nominated to represent the Global South. Dr. Naz was also the Guest editor (international forum) ISTR's Asia Pacific Third-Sector Researchers Network Newsletter. Further she was also nominated to speak and present Global South at the forum of SDG Alumni German Projects, geared towards the Sustainable Development Goals (SDGs) set by the United Nations. She also won the Moonshot project idea award 2022, IIT Jodhpur on the idea "CogTree or WiseTree: Tree that knows you"
- » **Dr. Suman Dhaka** won two awards which include (1) Moonshot Award 2022, IIT Jodhpur on the idea "Sleep Switch: Personalized Optimization of Sleep" and (2) Moonshot project idea award 2022, IIT Jodhpur on the idea "CogTree or WiseTree: Tree that knows you"
- » **Dr. Vidya Sarveswaran** is the Nodal officer for Fulbright Alumni Association Rajasthan

## Student Achievements



Head of the School, Dr. Farhat Naz, with PhD Students

## Journal Publications

- » Barman, B. (2022). "Mise-en-scène: Art and Aesthetics of Space in Ritwik Ghatak's Films." *Kala: Journal of Indian Art History Congress*, 28 (5), 169-79.
- » Bissoyi, S. K. (2023). "Review of Provincializing Bollywood: Bhojpuri Cinema in the Comparative Media Crucible by Akshay Kumar." *South Asian History and Culture*. DOI: 10.1080/19472498.2023.2184918 (Scopus).

- » Roy, S. B. (2022). "Hitman 2 and its spectre of Mumbai: A city lost in translation", in *Literary Cultures and Digital Humanities in India*, eds. Nishat Zaidi and A. Sean Pue, Routledge India, December 2022 ISBN 9781032406756.
- » Sohel, A., Naz, F., Das, B. 2022. Who Is Gaining, Who Is Losing? Examining Benefit Sharing Mechanism (BSM) under REDD+ in India, *Environ. Sci. Proc.* 2022, 22(1). <https://www.mdpi.com/2673-4931/22/1/17>

### Conference presentations

- » Barman, B. (2022). Aesthetics of Ritwik Ghatak's Films. International Conference on "Humanities through Literature, Film and Media" at Vellore Institute of Technology, Chennai. 18th – 19th August, 2022
- » Barman, B. (2022). Post-Pandemic Perspectives of Film-viewing and Interpretation in India: Some Reflections on Possibilities and Realities. International Conference on Post Pandemic Perspectives: Reflections and Realities, at NIT Agartala. 5th - 6th August, 2022.
- » Barman, B. (2022). Some Thoughts on Movie-going Trajectories of Post-pandemic Digital India. Shodhotsav 2022, Ambedkar University Delhi. 1st - 3rd June, 2022.
- » Bissoyi, S. K. (2023). The Art of Resistance: A Study of Music Industry and the Dalit Community in Odisha. Raw. Con, University of Hyderabad, March 27-29, 2023.
- » Roy, D., Roy, S. B., Banerjee, S. (2022). Detecting the Quotidian and Challenging Cultural Commodification: A Case Study of 'Sharodiya Pujabarshikis' from India. BCLA, University of Oxford, September 30, 2022.
- » Roy, S.B. (2022). Translation as the Performance of Negotiation in DH, DH2022 Tokyo, Alliance of Digital Humanities Organisations, 25-29 July 2022.
- » Roy, S. B. (2022). 1 year of Electronic Literature India. ELO 2022, Collegio Gallio in Como, Italy, May 30- June 1, 2022.
- » Surabhi Singh (2022). Social Dimensions of Water-Energy-Food Nexus in Western Uttar Pradesh, at the 47th Indian Sociological Conference, organized by the Indian Sociological Society, December, 2022
- » Amir Sohel (2023). Politics of Forest Rights in India: Un/Re-Doing Historical Injustice to Forest-Dwelling Communities? World Convention Injustice in A World Of Uncertainty In Mikkeli, Finland, March, 2023.
- » Amir Sohel (2022). Role of Indigenous knowledge in Sustainable Forest Management and Wildlife Conservation in Thar Desert, India" at the conference 'Reimagining Development Futures in the Anthropocene and Climate Change', organised by Chulalongkorn University, Bangkok, Thailand and the Asia Pacific Sociological Association (APSA), October, 2022.
- » Kritika Mishra (2022). Climate Action and Sustainability: A Case Study of Barefoot College Tilonia at the conference 'Reimagining Development Futures in the Anthropocene and Climate Change', organised by Chulalongkorn University, Bangkok, Thailand and the Asia Pacific Sociological Association (APSA), October, 2022.
- » Surabhi Singh (2022). Effect of Climate Change on Water and Food Security in India, at the conference 'Reimagining Development Futures in the Anthropocene and Climate Change', organised by Chulalongkorn University, Bangkok, Thailand and the Asia Pacific Sociological Association (APSA), October, 2022.

### Invited talks

- » Roy, S. B. (2023). E-Literature: Explorations in Literary Creativity. Department of English, Jamia Millia Islamia in collaboration with ELitIndia, January 2023.

### Laboratories and Equipment

The School of Liberal Art has three specialized research facilities, which are described below.

- (i) **Multimedia Language Lab:** 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.



Digital Language Laboratory

(ii) **Psychology Lab:** The Psychology laboratory of the School of Liberal Arts is a research facility that works in the domain of Positive-Cognitive Psychology focusing on 'OPTIMAL HUMAN FUNCTIONING'. The lab's work is oriented towards understanding, intervening and promoting the well-being and excellence of human beings. At present, research is being conducted 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. Other topics include student learning (style and strategies), memory (mnemonic strategies and distortions), 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



Psychology Laboratory

**(iii) Social Science Laboratory**

The SoLA has got state of the art social science lab that caters to needs of students as well as the faculty. We have softwares that aid in communication skills, quantitative (R, SPSS, Tableau, Scaler, Orange) and qualitative data analysis (NVivo, MAXQDA), etc



## Outreach Activities

- » **Dr. Akanksha Choudhary** was invited speaker at (1) Institute of Rural Management Anand (Digital Platforms Economy: August 2022) and (2) National Rail and Transportation Institute (Transportation Economics: June 2022)
- » **Dr. Alok Ranjan** delivered an invited talk on Research Methods: NSS Data and its Uses, IIM Kozhikode, 18th July 2022.
- » **Dr. Ankita Sharma** was involved in a variety of academic outreach activities that include, (1) invited speaker at Jai Narain Vyas University, Jodhpur under the Flagship of Rajiv Gandhi National Institute Of Youth Development, (2) Plenary talk at National seminar on 'Psychology and society today: Issues, challenges and intervention' organized by Dept. of Psychology, MG Kashi Vidyapith sponsored by Dept. Higher Education, Govt. of UP, (3) Co-Chair (along with Dr. Romi Banerjee), Special session on 'Where natural wisdom meets artificial wisdom' approved for 10th International Conference on Pattern Recognition and Machine Intelligence (PReMI'23), scheduled at ISI Kolkata during December 12-15, 2023, and (4) Co-coordinator, International conference on 'Next Gen-AI: Inspiration from Brain Sciences'. Organized by CBSA-SAIDE, 26-28 January 2023.
- » **Dr. Anupama Mohan** presented a talk titled 'Deep Waters: Histories on the Indian Ocean' at the 2023 Spring Symposium on Climate Change and Literature at the Centre for South Asian Studies, U of Hawai'i Manoa, 18-20 April 2023. <https://southasiasymposium2023.wordpress.com/>
- » **Prof. Chhanda Chakraborti** was invited speaker at (1) 'Nature and Source of Moral values', International Seminar on Ethics and Human behavior, The Ramakrishna Institute of Culture and Ministry of Culture, Govt. of India, May 18-20, 2022 (2) 'A few Ethical Musings', International Conference on Next-Gen AI Inspiration from Brain Science, Jan 27, 2023 (SERB, DST).
- » **Dr. Farhat Naz delivered** invited talks at various national and international events that include (1) Dynamics of Water Access: Trust and Mistrust at the International Border Line' at the online symposium on 'Reframing Water and Climate Resilience', held on 27 May 2022, organized by University of Reading, The Institute of Development Studies (IDS) and European Communication Research and Education Association (ECREA), UK, (2) Climate Justice: Lessons from Recent Disasters and Covid-19 Pandemic' (co-author with Prof. K.J.George) at the Conference on 'Development' amidst the COVID-19 Crisis and Beyond: Where do we go from here?, held from 17-19 May 2022, organized by CASID (The Canadian Association for the Study of International Development), (3) Global Forum for Food and Agriculture 2023; International Green Week 2023 at Berlin, Germany in January 2023, organized and funded by the Federal Ministry of Food and Agriculture, Government of Germany and DAAD, (4) 'Desertification, Traditional Knowledge and Water Management: A Perspective from Thar, India 2022, at the International Sociological Association and the American Sociological Association's , Oct 2022, and (5) Gottingen University, Germany, in January 2023.
- » **Dr. Gopakumar K U** delivered an invited talk on Structural Equation Model for Policy Analysis, Christ University, Bangalore, September, 2022. He was also invited as a reviewer for the Journal of Economic Studies, Emerald Publications (Scopus, Q1).
- » **Dr. K J Gero** was Ethics Committee Member at The Indian Council of Medical Research and was also invited as reviewer for Humanities & Social Sciences Communications; Springer Nature (Scopus, Q1).
- » **Dr. Natasa Thoudam** delivered invited talks on (1) "Performances and Representations of Maternal Rage in the Kangla Protest (2004), Swar Thounaojam's Bogey Systems (2013), and Nepram Maya's Complaint (2007)"—an online lecture delivered during GIAN course 194025F1 and (2) "Manuals of Motherhood: Meditations on Transnational Literary Tropes" hosted by Women's College, Aligarh Muslim University,

- India, 30 Nov 2022 (online). Dr. Thoudam was also invited as the Judge for the 2022 Sabin Award.
- » **Dr. Parichay Patra** delivered several invited lectures and popular talks including (1) Cinema Ritrovato on Tour Festival, National Gallery of Art, Washington DC, USA, March 2023, (2) Program of Cinema and Media Studies, University of Maryland, College Park, USA, September 2022, (3) IV Coloquio de Estudios de Cine y Audiovisual Latinoamericano de Montevideo, GESTA, Uruguay, September 2022, (4) Dept of Liberal Arts, IIT Hyderabad, January 2023, (5) Dept of Film Studies, EFLU Hyderabad, January 2023. Dr. Patra also worked as curator for the Global South Cinema section in the 'Cinema Ritrovato on Tour' Festival, National Gallery of Art, Washington DC, and University of Maryland, College Park, USA and was invited as book reviewer for Routledge (Taylor and Francis).
  - » **Dr. Prasenjeet Tribhuvan** delivered an invited talk on (1) "Social Policing" at the Rajasthan Police Training Academy, Mandore, Jodhpur, Rajasthan, February 20th, 2023
  - » **Dr. Rachel Philip** delivered an invited talk: 'Liberal Arts - A Practitioner's Perspective', 21 March, 2023, at the Workshop on Transdisciplinary Studies, organized by Madras Christian College, Chennai.
  - » **Dr. Sreedevi D** delivered an invited talk on "Lighting the Streets: Cultural History of Electric Lighting and its Experience in the 20th Century Kerala", at KCHR Research Fellows Workshop, March 13-15, 2023, Thiruvananthapuram, Kerala.
  - » **Dr. Suman Dhaka** delivered the plenary talk on "Cognitive Enhancement with Non-invasive Brain Stimulation: Opportunities" Department of Biomedical Engineering, at North Eastern Hill University (NEHU), Shillong, Meghalaya is organizing the Department of Science and Technology (DST) Serb Karyashala Workshop and Society for Neurochemistry India (SNCI) Satellite Meeting. 19th to 24th September, 2022. She also delivered invited lecture on (1) "Brain Imaging Techniques and Their Applications" Scientific and Technological Infrastructure (STUTI) supported by DST. On 09/08/2022 organized by The Centre for Advanced Scientific Equipment (CASE), IIT Jodhpur and (2) Invited to deliver a Talk during DST STUTI Hands on Training Programme on "Innovations in Healthcare" Department of Biomedical Engineering, NEHU, Shillong in collaboration with Jamia Hamdard University from 6th to 11th February, 2023.
  - » **Dr. Tonisha Guin** was the plenary speaker and was also invited to many events that includes (1) "Digital Pedagogy, Feminist Critique and the Indian Popular: Vitamin Stree and Agents of Ishq as Case Studies around Sex Education in India" in the International Conference on "Humanities In the Digital Age: New Directions and Emerging Trends" hosted by Kristu Jayanti College Autonomous, Bengaluru on 29-30 March 2023, (2) "Feminisms and Popular Culture: Contexts, Concerns from the Global South" on October 28, 2022, for postgraduate and doctoral students of English, Applied Psychology, Applied Philosophy and Development Studies at GITAM School of Humanities and Social Sciences at Gandhi Institute of Technology and Management (Deemed to be University), Visakhapatnam, (3) "Thinking and Writing Critically" for undergraduate students on 27 October 2022 at GITAM School of Humanities and Social Sciences at Gandhi Institute of Technology and Management (Deemed to be University), Visakhapatnam, (4) International Faculty Development Programme organized by Kristu Jayanti College, Bengaluru on 21 November 2022 to conduct a session on "Understanding Identities as Discursive-Performative." and (5) "Critical Making and Political Ecology" for Information Arts and Information Design Practices, Earth Education program postgraduate and research students on 9 March 2023
  - » **Dr. Vidya Sarveswaran** was invited speaker at The Fulbright Orientation Program organized by the United States Educational Foundation, New Delhi, April 2023. Dr. Sarveswaran was also plenary speaker for (1) Emerging Trends in Literary Studies - Presidency University Bangalore, October 2022 and (2) Conference

on Sustainability organized by ICSSR and PSG College of Technology Coimbatore, August 2022. She chaired Faculty Development Programme Organized by NIT Calicut August 2022. Dr. Sarveswaran is reviewer for national and international journals that include (1) Trumpeter Journal of Ecosophy, (2) Interdisciplinary Studies in Literature and Environment OUP, (3) Journal of South Asian Studies, (4) Environmental Humanities - Duke University Press. Further, she is also Academic board member of NLU Jodhpur, VIT Chennai, VIT Amravathi, and MNIT Jaipur.

### Faculty Publications

- » Muraleedharan, V. R., Vaidyanathan, G., Thiagarajan, S., Dash, U., Rajesh, M., & **Ranjan, A.** (2022). Better to Reflect Than Shoot the Messenger-Learning from NSS 2017-18. *Economic & Political Weekly*, 57(30), 69 <https://www.epw.in/journal/2022/30/discussion/better-reflect-shoot-messenger.html>
- » Garg, S., Tripathi, N., **Ranjan, A.**, & Bebart, K. K. (2022). How much do government and households spend on an episode of hospitalisation in India? A comparison for public and private hospitals in Chhattisgarh state. *Health economics review*, 12(1), 1-15. <https://healtheconomicreview.biomedcentral.com/articles/10.1186/s13561-022-00372-0>
- » Ansari S., **Ranjan A.** (2022). Towards an equitable and universal health coverage amidst COVID-19 pandemic: learnings from 75th Round National Sample Survey, 2017-18. *Social Action*. No 1, Vol:72. [https://www.researchgate.net/publication/359760471\\_Towards\\_an\\_equitable\\_and\\_universal\\_health\\_coverage\\_amidst\\_COVID-19\\_pandemic\\_learnings\\_from\\_75th\\_Round\\_National\\_Sample\\_Survey\\_2017-18](https://www.researchgate.net/publication/359760471_Towards_an_equitable_and_universal_health_coverage_amidst_COVID-19_pandemic_learnings_from_75th_Round_National_Sample_Survey_2017-18)
- » **Mohan, A.** Where Mayflies Live Forever: A Novel. Picador, 2022. <https://www.panmacmillan.com/authors/anupama-mohan/where-mayflies-live-forever/9789390742592>
- » **Mohan, A.** "No one heard me!": Sexual Self-fashioning and the Child in 'Lihāf'." *South Asian History and Culture*. Vol. 14. Iss. 1. Jan. 2023. <https://doi.org/10.1080/19472498.2022.2141258>
- » Kaman, S., **Sharma, A.**, & Banerjee, R. (2022). Associativity between COVID-19 Pandemic and Serious Mental Illness: Rapid Systematic Review within Salutogenesis Model for Public Health Management. *Current Psychiatric Research and Reviews*, 18. (WoS indexed) <https://doi.org/10.2174/2666082218666220823153739>
- » **Sharma, A.**, Kaman, S., & Banerjee, R. (2023). Artificial wisdom vs. Human wisdom: A potential quest. Published on psycharxiv.com. DOI: 10.31219/osf.io/rnqq7
- » Dutta, D, **Chakraborti, C.**, & P.Mishra. (2023). Tuloni Biya and its impact on menstrual health: A qualitative exploration of the menstrual experiences of adolescent girls from Assam. *Development Policy Review*, March 02, 2023, DOI: 10.1111/dpr.12699
- » **Naz, F.** 2022. 'Land Grabbing in Common Property Resources: How Women Social Positions Intersect Access to Natural Resources,' *Sociological Bulletin*, Vol. 71, No. 3, 371-395. <https://journals.sagepub.com/doi/abs/10.1177/00380229221094767>
- » **George K.J. & Naz, F.** Intergenerational Fairness: Lessons from Pandemic Contexts, *SN Social Science*, (Springer Nature). 10.1007/s43545-022-00488-4. Sep. 2022.
- » **Naz, F.** 2023. (Book Review) Maryam Wasif Khan, "Who Is a Muslim? Orientalism and Literary Populisms" *Sociological Bulletin*, 72 (2): 1-5 <https://journals.sagepub.com/doi/10.1177/00380229221151063>
- » Sohel, A., **Naz, F.** and Das, B.. 2022. Who Is Gaining, Who Is Losing? Examining Benefit Sharing Mechanism (BSM) under REDD+ in India, *Environ. Sci. Proc.* 2022, 22(1), <https://www.mdpi.com/2673-4931/22/1/17>
- » **George K.J. & Naz, F.** Climate justice: Lessons from recent disasters and covid-19 pandemic; paper presented in the international conference of CASID (Canadian Association for the Study of International Development) May 2022
- » Kaushik Narayan S, Abishek V M., **Gopakumar K U** et al. (2023). "Surgical Management of Chronic Osteomyelitis - Organisms, Recurrence and Treatment Outcome." *Chinese Journal*

- of Traumatology, Elsevier Publications. (SCOPUS, Q3) DOI: <https://doi.org/10.1016/j.cjtee.2023.01.003>
- » **Yadav, K.** (2022). "The poetics of the (un)named city in Mohsin Hamid's *Exit West*." *Journal of Postcolonial Writing*. Online. Nov. 22 <https://doi.org/10.1080/17449855.2022.2119880>
  - » **Thoudam, N.** "Interrogating the 'Indian' in the Indian Novel." *Economic & Political Weekly (EPW)*, vol. 57, no. 33, 2022, pp. 64–65.
  - » **Thoudam, N.** "Mary Kom's Collaborative Autobiography: Negotiating Authorship." *Journal of Comparative Literature and Aesthetics*. Special Issue: Writing Self, Writing Resistance: Women's Life Writing in India, vol. 45, no. 3, Autumn 2022, pp. 70–80. [http://jcla.in/wp-content/uploads/2022/09/JCLA-45.3\\_Natasa-Thoudam.pdf](http://jcla.in/wp-content/uploads/2022/09/JCLA-45.3_Natasa-Thoudam.pdf)
  - » **Patra, P. (2022).** "Beyond the Metanarratives of Indian Cinema." *Discourse: Journal for Theoretical Studies in Media and Culture*, 44 (1), 101-108 <https://digitalcommons.wayne.edu/discourse/vol44/iss1/>
  - » **Tribhuvan, P.** "Making of a transgressive object: The case of Cannabis in the Himalayas", in *Reconceptualizing Material culture in the Tricontinent: When Objects write back*, ed. Koshy, M. and George, R., pp 165-182, 2023, Cambridge Scholars Publishers (London)
  - » **Philip, R.** (2022). *The Nation's Got Talent: Education, Experimentation and Policy Discourses in India*. Taylor Francis <https://www.routledge.com/The-Nations-Got-Talent-Education-Experimentation-and-Policy-Discourses/Philip/p/book/9781032290928>
  - » **Philip, R.** (2023). 'The Talented Student: Evolution of the Category in Post-Independence Education Policy' in 'Education, Teaching and Learning: Discourses, Cultures and Conversations' ed. Azra Razzack, Padma M. Sarangapani, and Manish Jain. Orient Blackswan <https://www.orientblackswan.com/details?id=9789354423253>
  - » Mishra, B., Sahu, N., & **Dhaka, S.** (2022). Association Between Pittsburgh Sleep Quality Index Factors, Academic Performance and Health. *Sleep and Vigilance*, 6(2), 313-322
  - » B Mishra, J Pradhan, **S Dhaka**. Identifying the Impact of Social Isolation and Loneliness on Psychological Well-being among the Elderly in India: The Mediating Role of Gender, Marital Status, and Education. - 2023, DOI:10.21203/rs.3.rs-2620380/v1 DOI:10.21203/rs.3.rs-2620380/v1
  - » **Guin, T.** (2022). "The Subject of Knowledge: Reading Manhood of Humanity as an Identity Project." *Anekaant: A Journal of Polysemic Thought*, 13, 35-39 (July 2022). *ETC: A Review of General Semantics*, 76 (September 2022).
  - » **Hari Narayanan V.** "Being One with the Planet: Experiencing the Sacred in a Secular Mind". *Journal of Dharma*. Vol 47 No (2) April-June 2022. <https://dvkjournals.in/index.php/jd/article/view/3642>
  - » **Hari Narayanan V**, AK Singh. "The Value of Epistemic Justice" *Journal of Human Values*. Vol 28 Issue 3 Sept 2022 <https://doi.org/10.1177/09716858221096819>
  - » **Hari Narayanan V.** "Self Model and Selflessness" *South African Journal of Philosophy*. 41:3, 2022. 10.1080/02580136.2022.2095164
  - » **Sarveswaran, V.** Review of *Women, Subalterns, and Ecologies in South and Southeast Asian Women's Fiction*. By Chitra Sankaran. *ISLE: Interdisciplinary Studies in Literature and Environment* (2023), Vol.30 Issue 1. Spring 2023. pp. 1–2 (OUP) <https://doi.org/10.1093/isle/isac079>
  - » **Sarveswaran, V.** *The Bloomsbury Handbook to the Medical Environmental Humanities*. Edited by Scott Slovic, Swarnalatha Rangarajan and Vidya Sarveswaran <https://www.bloomsbury.com/us/bloomsbury-handbook-to-the-medicalenvironmental-humanities-9781350197305/>



## Sponsored/Consultancy Projects

S. No.	Title	PI/Co-PI	Funder	Amount	Start Date	Finish Date
<b>Ongoing Projects</b>						
1	Health Financing by Urban and Rural Local Bodies in Rajasthan	Dr. Alok Ranjan	Quality Healthcare Access Private Limited	INR-6,45,781	March 2023	July 2023
2	Mapping Heritage Language Structure through Sociolinguistic cues: A case study of Swiss Tamil	Dr. Gurujegan Murugesan	ICSSR-SNSF	Rs. 22,57,000	April 2023	March 2026
3	Ashirwad Water Challenge-Knowledge/Evaluation Partner	Dr. Akanksha Choudhary	The Nudge Foundation	Rs 20,00,000	August 2022	Sept 2023
5	Offering Provocations, Surfacing Evidence: The Archiving of Cine-Politics under the Indian National Emergency through Digital Humanities 2.0	Dr. Parichay Patra (Co-PI)	SPARC, MoE, Gol		March 2019	October 2023
6	An interdisciplinary study of Technologically Manipulated Information: Its ecosystem and its psycho-social impact	Prof. Chhanda Chakraborti (PI), Dr. Ankita Sharma (Co-PI), Dr. Prasenjeet Tribhuvan	ICSSR	INR 18,00,000	March 2022	March 2024
7	'Digital Twins: negotiating identity and translocated heritage in the global age'	Dr. Ankita Sharma (PI), Chhanda Chakraborti Co PI	ICSSR-SNSF	INR 25,00,000	July 2023	August 2025
9	Science Technology and Innovation Hub in IIT Jodhpur, Karwar Block, Jodhpur District, Rajasthan State	Dr. Prasenjeet Tribhuvan (Co-PI)	SERB, DST	INR 2,10,41,500	February, 2023	February, 2026
13	Mapping the Waqf Property with GIS in Rajasthan, India	Farhat Naz (Co-PI)	Ministry of Minority Affairs, Govt. of India	1.9 Crore	1 Jan 2022	ongoing
<b>Completed Projects</b>						
1	Creative and Pedagogical Workshop on Literary, Performative, and Visual Art	Natasa Thoudam (PI)/ Parichay Patra (co-PI)	ICSSR	1,00,000 INR	13-05-2022	19-05-2022
2	Received SERB Grant Assistance to Professional Bodies & Seminar / Symposia Scheme	Suman Dhaka	SERB, DST	3 Lakh	Jan 2023	Completed
3	Consultancy Project with the National Centre for the Safety of Heritage and Structures, IIT Madras and Government of Tamil Nadu	Vidya Sarveswaran	IIT Madras and Government of Tamilnadu	Consultancy cost 1 Lakh		January 2023

# Department of Mathematics

Mathematics, being the basis of many disciplines, is a subject that evolves with time and creates new theories to solve real-world challenging problems. The department has been taking a leading role in developing new methods to model such situations that can be used in diverse areas of computer science, engineering, and basic sciences. We are excited to offer high-quality programs at postgraduate level for students who wish to apply math to science or engineering such as a two-year M.Sc. program in Mathematics, a four-year M.Sc-M.Tech. program in Mathematics-Data and Computational Sciences, a two year M.Tech program in Data and Computational Sciences. We also offer an M.Tech-Ph.D. dual degree program in Data and Computational Sciences and a Ph.D. Program with specialization in different areas of Mathematics to

those who wish to earn a deeper understanding of pure and applied Mathematics. The department has faculty with research interests in the areas of Algebra, Lie Groups and its Applications, Cryptography and Network Security, Mathematical Physics, Fluid Dynamics, Scientific Computations, Optimization, Frame Theory, Numerical Analysis, Partial Differential Equations, Topological Dynamics, Low Dimensional Chaos, Dynamical Systems, Renormalization in Low-dimensional dynamics, Wavelet Analysis, Fractional Transform Theory, Image Processing, Financial Risk Analysis, Categorical Data Analysis, Reliability Theory and Applied Probability.

The Department of Mathematics has shifted to its new premises in December 2022, which is situated beside the School of Liberal Arts (SoLA).



New vibrant building of the Department of Mathematics

## Faculty Members:

The following faculty members are associated with the department.

S. No.	Name	Designation	Research Interest
1.	Puneet Sharma	Head, Associate Professor	Ph.D.: IIT Delhi Topological dynamics, Low dimensional chaos
2.	Abhishek Sarkar	Assistant Professor	Ph.D.: TIFR, Bangalore Elliptic partial differential equations
3.	Bimal Mandal	Assistant Professor	Ph.D.: IIT Roorkee Cryptography, Cryptographic Boolean functions
4.	Dilpreet Kaur	Assistant Professor	Ph.D.: IISER Mohali Algebra (Group theory)
5.	Gaurav Bhatnagar	Associate Professor	Ph.D.: IIT Roorkee Wavelet analysis, Fractional transform theory, Multimedia security, Image processing Information fusion
6.	Kirankumar R. Hiremath	Associate Professor	Ph.D.: University of Twente Theoretical, mathematical and computational Matter interactions
7.	Md Abu Talhamainuddin Ansary	Assistant Professor	Ph.D.: IIT Kharagpur Numerical optimization, Multiobjective aspects of wave-optimization, Internal analysis
8.	Moni Kumari	Assistant Professor	Ph.D.: NISER, Bhubaneswar Number theory
9.	Moumita Mandal	Assistant Professor	Ph.D.: IIT Kharagpur Numerical functional analysis Integral equation
10.	Mriganka Mandal	Assistant Professor	Ph.D. : IIT Kharagpur Cryptography and Network Security
11.	Nil Kamal Hazra	Assistant Professor	Ph.D.: IISER Kolkata Reliability Theory, Applied Probability
12.	Pradip Sasmal	Assistant Professor	Ph.D.: IIT Hyderabad Frame theory, Sparse optimization theory, Reinforcement learning and their applications
13.	Subhash Bhagat	Assistant Professor	Ph.D.: ISI, Kolkata Distributed algorithms for Swarm Robotics, multi-agent systems, Distributed network algorithms
14.	Sukhendu Ghosh	Assistant Professor	Ph.D: IIT Madras Hydrodynamic Instability, Differential Equations, Lie Groups Applications, Dynamical Systems
15.	Tuhina Mukherjee	Assistant Professor	Ph.D.: IIT Delhi Analysis of Partial Differential Equations
16.	V.V.M.S. Chandramouli	Associate Professor	Ph.D. SUNY at StonyBrook, USA and RUG Smooth dynamical systems, Renormalization of unimodal maps and Henon-like maps
17.	Vivek Vijay	Assistant Professor	Ph.D.: IIT Bombay Financial risk analysis, Categorical data analysis, Regression
Inspire Faculty Members			
1.	Mandira Mondal	Inspire Faculty	Ph.D.: TIFR, Mumbai Algebraic geometry, Commutative algebra

## Description of Research Themes

1. Data Analytics: Dr. Nil Kamal Hazra, Dr. Vivek Vijay, Dr. Puneet Sharma, Dr. V. V. M. S. Chandramouli, Dr. Gaurav Bhatnagar, Dr. Pradip Sasmal, Dr. Kirankumar R. Hiremath

Data Analytics is an interdisciplinary research group in the Department of Mathematics, IIT Jodhpur. The members of this group possess versatile and complimentary mathematical skills which includes experts from statistics, financial mathematics, dynamical systems, image processing, graph theory and linear algebra. The primary focus of this group is to carry out theoretical research along with practical applications in the area of data science. We are presently working on the following research topics:

- » Novel methodologies for light-weight neural network
- » Run-time power management for edge devices using reinforcement learning
- » Technical and fundamental analysis of financial data
- » Financial risk analysis
- » Financial portfolio optimization

2. Cryptography and Information Security (CNIS): Dr. Bimal Mandal, Dr. Mriganka Mandal, Dr. Dilpreet Kaur, and Dr. Gaurav Bhatnagar

The Cryptography and Information Security (CNIS) research group is an indispensable part of the Department of Mathematics, Indian Institute of Technology (IIT) Jodhpur. We are currently working on the two major branches of cryptography: Symmetric-Key Cryptography and Public-Key Cryptography.

Our main objectives are to design and analyze the theoretical and practical aspects of the following cryptographic paradigms.

- » Design and analysis of cryptographic Boolean functions.
- » Cryptanalysis of block and stream ciphers.
- » Construction of secure and efficient One-to-Many encryption systems: Identity-Based

Encryption, Broadcast Encryption, Attribute-Based Encryption, Functional Encryption, etc.

- » Designing quantum-safe systems utilizing multivariate quadratic polynomials over finite fields, cryptographic lattices, and elliptic curves.
- » Blockchain technology and its applications to IoT-enabled cloud computing frameworks.
- » Quantum encryption with classical communication.

3. Distributed Autonomous Systems (DAS): Dr. Subhash Bhagat, Dr. Puneet Sharma, Dr. Pradip Sasmal, Dr. Bimal Mandal, Dr. Mriganka Mandal

Distributed Autonomous Systems (DAS) is a research group within the Department of Mathematics of IIT Jodhpur. The primary focus of the group is to conduct strong theoretical and simulation based research for distributed autonomous systems. We currently work in the following areas:

- » Distributed algorithms for swarm of robots and multi-agent systems.
- » Internet of Robotic Things (IoRT) and autonomous mobile robotic sensors
- » Distributed graph algorithms
- » Security in distributed computing
- » Discrete control in real-world driving environments using deep reinforcement learning

4. Mathematical Modelling, Differential and Integral Equations: Dr. Abhishek Sarkar, Dr. Tuhina Mukherjee, Dr. Moumita Mandal, Dr. Kirankumar Hiremath, Dr. Sukhendu Ghosh, Dr. Subhash Bhagat

This group focuses on analysis and applications of several differential and integral equations. It is universally accepted now that modeling and analysis of many natural phenomena relates to study of associated differential and integral equations. The development in research topics of this group closely occurs out of applied

functional analysis and broadly uses theory related to topology and measure theory. Further, the group explores the development of advanced mathematical models and the solution techniques of complex models related to various physical problems. We emphasize on the advances of following aspects of differential equations:

- » Existence results for nonlinear partial differential equations
- » Study of solution profile to nonlinear PDEs
- » Regularity of solutions
- » Lie symmetries of complex ODE and PDEs
- » Existence results, regularity of solutions, Convergence and Error analysis of numerical methods for integral equations.
- » Mathematical modeling and applied analysis of the models

5. Multimodal Interfaces: Dr. Gaurav Bhatnagar, Dr. Pradip Sasmal

Multimodal Interface (MI) is an interdisciplinary research group of the Department of Mathematics, IIT Jodhpur. The research topics of this group broadly arise from the intersection of linear algebra, optimization and functional analysis. The focus of the group is to pursue theoretical development in the area of finite frame theory and sparse vector representation along with real life-applications in image and video processing. We are currently working on the following topics:

- » Construction of compressed sensing matrices
- » Deterministic sampling strategies for CT image reconstruction
- » Object detection and extraction
- » Concealed objection detection
- » Multimodal information fusion

6. Applied Probability and Operations Research: Dr. Nil Kamal Hazra, Dr. Vivek Vijay, Dr. Md Abu Talhamainuddin Ansary

Applied Probability and Operations Research (APOR) is a research group within the Department of Mathematics of IIT Jodhpur.

The primary focus of the group is to conduct research in the field of applied probability and operations research that involves theoretical aspects as well as practical applications specially in the field of machine learning etc. We currently work in the following areas:

- » Numerical techniques of nonlinear multi-objective optimization- convergence analysis as well as numerical justifications.
- » Application of nonlinear multi-objective optimization in real life problems including data science and machine learning etc.
- » Reliability assessment of complex systems under random shocks
- » Study of various information measures and their applications

### Academic Programmes

- » The department of Mathematics offers an undergraduate program in Artificial Engineering and Data Science jointly with the Department of Computer Science and Engineering.
- » We also offer exciting high-quality programs at the postgraduate level such as a two-year M.Sc. program in Mathematics, a four-year M.Sc-M.Tech program in Mathematics-Data and Computational Sciences, and 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 specializing in different areas of Mathematics to those who wish to earn a deeper understanding of fundamentals of pure and applied Mathematics.
- » The Department of Mathematics also offers a Minor Program in Data Science (DS) at the undergraduate level (for all the B.Tech. students of the institute except the students enrolled in B.Tech.(CSE), B.Tech.(AI&DE), and B.Tech. (EE) programs). The program facilitates the study of a multidisciplinary field that extensively uses statistics, predictive modeling, and machine learning without changing its application, irrespective of the domain.
- » Moreover, the faculty members of the department actively participate in fulfilling

the teaching and executional requirements of Executive M.Tech. program in Data and Computational Sciences (with the School of Artificial Intelligence and Data Science (AIDE)) and Executive M.Tech. program in Artificial Intelligence (with the Department of Computer Science and Engineering).

Significant Research Achievements: The faculty members of the department have been making significant progress towards developing new methods to model and solve various problems that can be used in diverse areas of sciences, engineering and emerging technologies. Consequently, the faculty members have published research papers in some of the leading journals in their respective domains and have been awarded research projects by external agencies to continue research in different areas of fundamental and applied mathematics. A brief summary of the same is given below.

### Research Projects Awarded

1. Project title: Spectral methods for derivative dependent integral equations and integro-differential equations
  - » Project investigator: Moumita Mandal, IIT Jodhpur
  - » Funded by: NBHM, DAE (Govt. of India)
  - » Sanctioned amount: Rs. 15, 14, 800/-
  - » Duration: 3 years (2021 - ongoing)
2. Project title: Superconvergence results for integro-differential initial and boundary value problems by spectral projection methods
  - » Project investigator: Moumita Mandal, IIT Jodhpur
  - » Funded by: International Research Mobility Grant, Institute (IIT Jodhpur)
  - » Sanctioned amount: Rs. 10,000,00/-
  - » Duration: 2 years (2021 - ongoing)
3. Project title: Renormalization of multimodal maps with low smoothness
  - » Project investigator: V. V. M. S. Chandramouli, IIT Jodhpur.
  - » Funded by: SERB, MATRICS
4. Project title: Study of quantum attacks on block and stream ciphers and its counter-measures
  - » Sanctioned amount: Rs. 6,60,000/-
  - » Duration: 3 years (2023 - 2026)
  - » Principle investigator: Bimal Mandal, IIT Jodhpur
  - » Funding agency: CAIR, DRDO
  - » Sanctioned amount: Rs. 25,00,014/-
  - » Duration: 2 years (20-04-2023 to 19-04-2025)
5. Project title: Some important problems on information measures
  - » Principle investigator: Nil Kamal Hazra, IIT Jodhpur
  - » Funded agency: SERB
  - » Sanctioned amount: Rs. 6,60,000/-
  - » Duration: 3 years (Feb, 2022 - Feb, 2025)
6. Project title: Towards more realistic  $\delta$ -shock models and their applications
  - » Principle investigator: Nil Kamal Hazra, IIT Jodhpur
  - » Funding agency: SERB
  - » Sanctioned amount: Rs. 13,89,344/-
  - » Duration: 2 years (Jan, 2022 - Jan, 2024)
7. Project Title: Nonlocal variational problems with Dirichlet-Neumann mixed boundary conditions
  - » Principle investigator: Dr. Tuhina Mukherjee, IIT Jodhpur
  - » Funding agency: SERB, DST
  - » Sanctioned amount: Rs. 12,45,030/-
  - » Duration: 2 years (Dec. 2022 - Dec. 2024)
8. Project title: Computations in Wreath Product
  - » Principle investigator: Dr. Dilpreet Kaur, IIT Jodhpur
  - » Funding agency: SERB-DST
  - » Sanctioned amount: Rs. 6,60,000/-
  - » Duration: 3 years
9. Project title: Essential dimension and the least degree of faithful representation of a group
  - » Principle investigator: Dr. Dilpreet Kaur, IIT Jodhpur

- » Funding agency: International Research Mobility Grant, Institute (IIT Jodhpur)
  - » Sanctioned amount: Rs. 10,00,000/-
  - » Duration: 2 years
10. Project title: On Graph Induced Symbolic Systems
- » Principal investigator: Dr. Puneet Sharma, IIT Jodhpur
  - » Funding agency: SERB-DST
  - » Sanctioned amount: Rs. 6,60,000/-
  - » Duration: 3 years (2020-2023)
11. Project title: Eigenvalue type problems related to linear and quasi-linear operators
- » Principle investigator: Dr. Abhishek Sarkar
  - » Funding agency: DST
  - » Sanctioned amount: Rs. 35,00,000/-
  - » Duration: 5 years (2019 - 2024)
12. Project title: Mathematical modelling of infectious diseases using surfactant dynamics
- » Principle investigator: Dr. Sukhendu Ghosh, IIT Jodhpur
- » Funding agency: SERB-DST
  - » Sanctioned amount: Rs. 6,60,000/-
  - » Duration: 3 years (March, 2022-March,2025)
13. Project title: Mathematical framework of secondary and nonlinear instabilities for complex flow systems
- » Principle investigator: Dr. Sukhendu Ghosh, IIT Jodhpur
  - » Funding agency: SERB
  - » Sanctioned amount: Rs. 15,26,844/-
  - » Duration: 2 years (Feb, 2022 - Feb, 2024)
14. Project title: Numerical and Semi-analytical Techniques for Modeling of Wave Interaction with Porous and Flexible Structures
- » Co-Principle investigator: Dr. Sukhendu Ghosh, IIT Jodhpur
  - » Funding agency: SERB
  - » Sanctioned amount: Rs. 19,98,832/-
  - » Duration: 3 years (March, 2019 - Sept., 2022)

## Publications

### Abhishek Sarkar

- » Nirjan Biswas, Ujjal Das and Abhishek Sarkar, On the fourth order semipositone problem in RN, Discrete and Continuous Dynamical Systems, 43(1) 411-434 (2023).
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### Bimal Mandal

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Students are engaged in mathematical fun games with the audiences of Padharo 2.0

### Conference/ Workshop organized by the department

1. Department of Mathematics organized a two-days Symposium on Advanced Mathematical Modelling and Computing (SAMMC-2023) during March 04 - 05, 2023 at IIT Jodhpur.
  - » The symposium aimed to share knowledge

on various advances in Mathematical Modelling and Computing, in particular focused on several new and novel techniques and methodologies and their applications.

- » Total number participants: 145 (Physical: 110, Online: 35)
- » Number of renowned expert talks: 11



2. The Department of Mathematics of IIT Jodhpur celebrated the 135th birth anniversary of Srinivasa Ramanujan, one of the most brilliant mathematicians from India, by organizing a one-day symposium on December 22nd, 2022.

- » The symposium aimed at bringing the top number theorists and young scholars to discuss some of the mathematical ingenuity of Srinivasa Ramanujan and its impact on current mathematical research areas.
- » Number of invited speakers: 4

# Department of Mechanical Engineering

## Introduction

Department of Mechanical Engineering, IIT Jodhpur aspires to achieve a unique and flexible academic and research ecosystem towards sustainable development of human resource capacity and technological solutions in the areas like Advanced Manufacturing, Automation and Mobility, Energy and Water, Micro-Nano engineering, Smart Structures, Robotics and Mechanisms. The curriculum offered by the department enables students to pursue an exciting and flexible

academic career by assimilating Design thinking with a solid fundamental background in Mechanical Engineering. It not only enables them to excel in the broad areas of Mechanical Engineering but also to choose emerging career options by exploring emerging interdisciplinary areas such as Artificial Intelligence (AI) and Internet of Things (IoT), Cyber-Physical Systems (CPS), Augmented Reality and Virtual Reality (AR/VR), Data Science (DS), Robotics, etc. The mission and vision statements of the department are highlighted in the figure below.



## Programmes offered

The programmes offered by the Department of Mechanical Engineering focus on the holistic development of students and create strong internal systems for supporting diverse student cohorts in academic, industrial and social domains inside and outside the formal academic interactions of the classroom. Design thinking has been imbibed in the curricula and pedagogy to prepare them for technological innovations. Hands-on sessions, seminar courses, industry-linked projects and

modular fractalized credit structures have been included in the programmes. Programmes not only provide a basic foundation in core branches in respective disciplines but also aim to encourage the candidate to develop new technological solutions in the form of a product. Compulsory non-graded courses have been introduced as part of the curricula to develop skills oriented towards professions. Different academic programmes offered by the department are given below.

Type	Name
Undergraduate	<ol style="list-style-type: none"> <li><b>B.Tech in Mechanical Engineering</b>  <b>Department Specializations</b> <ol style="list-style-type: none"> <li>Micro-Nano Engineering,</li> <li>Energy Engineering leading to M.Tech in TFE</li> <li>Mechanical Design leading to M.Tech in AMD</li> <li>Smart Manufacturing leading to M.Tech in AMD</li> <li>Engineering Innovation</li> </ol> <b>Interdisciplinary Specializations</b> <ol style="list-style-type: none"> <li>Artificial intelligence leading to MTech in AI</li> <li>Robotics</li> <li>Cyber-Physical Systems leading to MTech in CPS</li> <li>Visual Computing</li> <li>Smart Healthcare</li> <li>Environmental Engineering</li> <li>Sustainability</li> </ol> <b>Minors</b> <ol style="list-style-type: none"> <li>Management leading to MBA,</li> <li>Entrepreneurship,</li> <li>Data Science leading to MTech in Data and Computational Science</li> <li>Science of Intelligence</li> <li>Quantum Information and Computation</li> </ol> </li> </ol>
Postgraduate	<ol style="list-style-type: none"> <li>M.Tech Thermo-fluids Engineering (TFE)</li> <li>M.Tech Advanced Manufacturing and Design (AMD)</li> <li>M.Tech-PhD Dual Degree in TFE</li> <li>M.Tech-PhD Dual Degree in Advanced Manufacturing</li> <li>M.Tech-PhD Dual Degree in Mechanical Design</li> <li>Ph.D in Mechanical Engineering</li> </ol>

For the B.Tech. programmes, Humanities and Social sciences form a significant component with a mandatory course on professional ethics. Extra-curricular (like Sports, performing arts, and literary activities) and Co-curricular activities (like robotics, hackathons, and entrepreneurship) have been integral parts of students' experiential learning

journey. The students can opt for one of the four department specialisations within four years of the programme. They can also choose Specialization to achieve interdisciplinary breadth. The department is also mindful of its role as a facilitator of the creation of advanced technology through entrepreneurial skills and actively encourages those students

who want to pursue an entrepreneurial or management career, e.g., by allowing them to opt for minors in Management and Entrepreneurship.


### New Faculty members since April 2022

Dr. Hirshikesh	October 2022
Dr. Gourhari Ghosh	September 2022
Dr. Vignesh G.	December 2022
Prof. Jaywant H. Arakeri	February 2023
Dr. Riby Abraham Boby	August 2022


**Faculty Research and Achievements:** 2.1 Research thrust areas Department faculties are working on the niche and emerging research directions predominantly in the three broad areas, namely, Thermo-fluids, Manufacturing and Mechanical Design.

**Thermo-fluids Engineering:** Thermo-fluids engineering combines the fundamentals of thermodynamics, heat transfer, fluid mechanics, and combustion with applied engineering applications. Thermo-fluids group at IITJ is working on thematic areas such as Energy Management, Water Technologies, Combustion, Fluid-Structure Interaction, Supersonic flow, Computational Fluid Dynamics (CFD), Machine Learning for CFD, Microfluidics and Sensor Systems, Solar Thermal Applications, etc. The group is involved in several sponsored projects and outreach activities at both national and international levels for developing and delivering sustainable engineering solutions for a variety of applications.

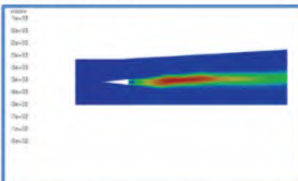
### Thermo-fluids (11)




**Energy Management**




**Water technologies**



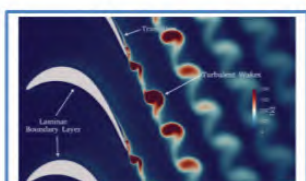
**Combustion**



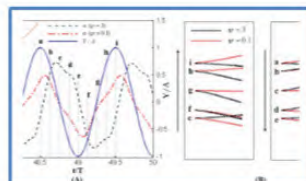
**Fluid-structure interaction**



**High speed flows**



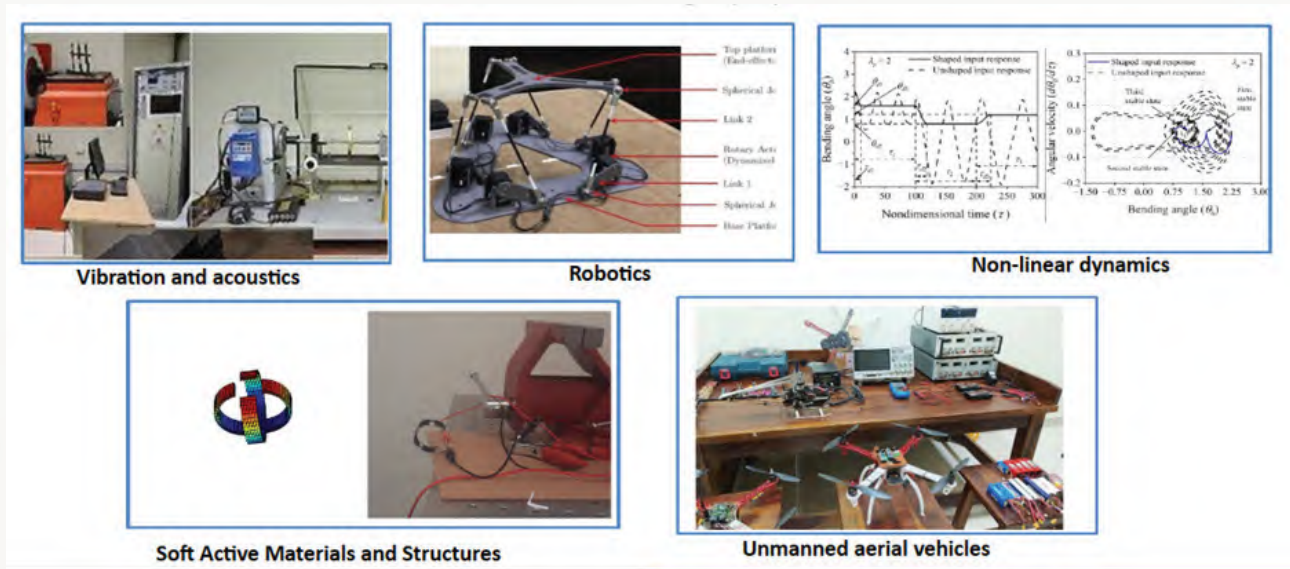
**Computational Fluid Dynamics (CFD)**



**Solar Thermal Applications**

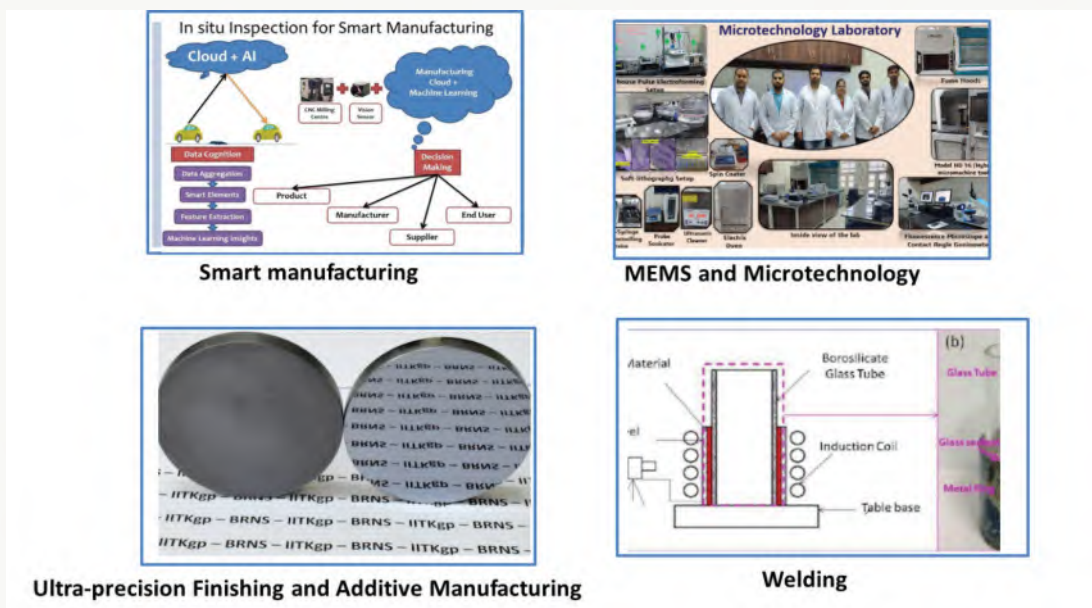
**Associated Faculty Members:** Prodyut R. Chakraborty, Sudipto Mukhopadhyay, Anand K Plappally, Hardik Kothadia, Arun K R, Shobhana Singh, Nipun Arora, Shruti dhara Sarma, Ashish Pathak, Harshal Akolekar, Vignesh G, Jaywant H Arakeri

**Mechanical Design:** Mechanical Design group at IITJ is involved in a wide range of projects in the areas of embedded systems and IoT, mechanics of solids, mechanical vibrations, robotics, autonomous unmanned vehicles, design optimization, acoustics and noise control, control systems, rotor dynamics, micro-nanomaterials, applications, etc., to name a few. The group strongly emphasizes interdisciplinary research in the emerging areas of smart designs and concepts. There are focused groups working on Vibrations and Acoustics, Nonlinear dynamics, robotics, Soft Active Materials and Structures (SAMS), and Manned/ Unmanned Aerial Vehicles.



**Associated Faculty Members:** C. Venkatesan, Ashok Joshi, B. Ravindra, Barun Pratiher, Suril V Shah, Amrita Puri, Atul Kumar Sharma, Jayant Kumar Mohanta, Riby Abraham Boby

**Advanced Manufacturing:** Manufacturing contributes to the rapid advancement of technologies from the stage of conception, design, and development to manufacturing. Faculty members in the Smart Manufacturing group at IITJ are working on micro-machining, welding, conventional and non-conventional manufacturing processes, etc. The current research has a strong interdisciplinary focus on industrial and recent research trends such as Smart Manufacturing, Industry 4.0, the Internet of Things (IoT), and Artificial Intelligence.



**Associated Faculty Members:** Kaushal Desai, Rahul Chhibber, Ankur Gupta, Chandan Pandey, and Gourhari Gosh

**Teaching and Research Facilities:** The teaching and research lab facilities owned by the department include the Advanced Manufacturing Laboratory, Central Workshop, Industrial Engineering laboratory, Metrology laboratory, Dynamics of Machine laboratory, Helicopter laboratory, Mechatronics Laboratory, Robotics Laboratory, Vibration Laboratory, Fluid Mechanics and Turbomachinery Laboratory, Heat Transfer Laboratory, Energy Conversion Laboratory, Automotive Propulsion, Refrigeration and Air Conditioning Laboratory, Gas Dynamics Laboratory, Microtechnology laboratory etc.

## 2.2 Achievements

- » Technology developed by Prof. Venkatesan and Prof. Prodyut Chakraborty was selected for exhibition at IIT R&D Fair at IIT Delhi during October 14-15, 2022.
- » Ankur Gupta: Received the prestigious “ISSS Young Scientist Award 2022”, membership of INYAS (Indian National Young Academics of Sciences) under INSA (Indian National Science Academy) for five years (2022-27), SERB International Research Experience Fellowship award in 2022.
- » Chandan Pandey: included in World Ranking of Top 2% Scientists in database by Stanford University, US in 2022, Editorial Board Member in “Metals and Materials International”; Editorial Board Member in “Engineering Failure Analysis
- » Hardik Kothadia: Teaching Excellence Award – IIT Jodhpur
- » Gourhari Ghosh: SERB International Travel Support (ITS) award - 2023
- » Kaushal A. Desai: Joint Guest Editor for the Transactions of the ASME: Journal of Computing and Information Science in Engineering; Guest Editor for MAPAN, the Journal of Metrology Society of India; Member, Research Committee, International Conference on Precision, Micro, Meso and Nano Engineering, IIT Kanpur; Symposium Organizer at ASME International Manufacturing Science and Engineering Conference (MSEC) 2022 and 2023;
- » Shrutidhara Sarma: Received the “Women Involvement in Science and Engineering Research” award for the year 2022-2025 by the Indo-German Science and Technology Centre for collaborative research with TU Braunschweig (Germany).
- » Atul Kumar Sharma: 2021 Best Paper Award, European Journal of Computational Mechanics, Editorial Board Member in European Journal of Computational Mechanics.
- » Suril V. Shah: Engaged with ISRO in developing robotic technology for the proposed Gaganyaan Mission, the first crewed mission, 2020-2022.

## Student Achievements

### 3.1 UG Students

Following UG students received recognition at various platforms:

- » Yuvraj Saran (2022 batch) - 3rd place in the AVINYA MedTech Innovation Challenge organized as a part of the Indian Conference on MedTech Innovations (ICMI) 2023 jointly by AIIMS and IIT Jodhpur
- » Rushil Patel (2020 batch) - best paper award in ICRAM conference, IIT Jodhpur August 2022
- » Students participated in ABU-ROBOCON challenge and successfully completed the Second round. Team consisted of 25 members and out of which 12 were from the Mechanical Engineering Department. The team was led by Udit Agarwal, Jayant Kataria and Devyani Gorkar from the Mechanical Engineering Department. They were responsible for developing and testing a concept robot that met the requirements of the ABU-ROBOCON Contest.
- » UG students of ME department have received summer Internship opportunities in various prestigious institutes all across the globe:
  - » 7 students were awarded MITACS (in Canada) from the 2020 batch:

- » Rushil Samir Patel; McMaster University
- » Kunj Golwala, University of Alberta
- » Noopur Zambare; University of Calgary
- » Shikhar Srivastava, Lakehead University
- » Satyam Kumar Gupta; Carleton University
- » Devyani Gorkar; University of Waterloo
- » Somil Maheshwari; Ecole Polytechnique de Montreal
- » Udit Agarwal at Nanyang Technical University, Singapore

### 3.2 PG Students

Following PG students received recognition at various platforms:

- » Bikash Pattanayak: SERB International Travel Support (ITS) award - 2023
- » Design Registration by Swarit Anand Singh, Aitha Sudheer Kumar, and K. A. Desai for "Portable Image Acquisition System." Design Number: 354560-001, The Indian Patent Office Journal No. 03/2023, Dated 20/01/2023.
- » Prince Kumar Rai: Best poster award for COPEN 12, the International Conference on Precision, Micro, Meso, and Nano Engineering that was held from December 8 to 10, 2022.
- » Gulshan Verma: Received for the prestigious Raman Charpak Fellowship.

PG Students enthusiastically participated in a series of conferences, showcasing their remarkable works and achievements. Among the notable conferences where students presented their research are: (1) 8th Asian Conference on MFMS (ACMFMS2022) at IIT Guwahati from 11-14 December 2022 (2) 8th International Congress on Computational Mechanics and Simulation (ICCMS) at IIT INDORE from 9-11 December 2022 (3) International Conference on Nanotechnology for Sustainable Living and Environment at BITS Pilani from 14-16 April 2022 (4) 7th ASTFE Thermal and Fluids Engineering Conference at Las Vegas from 15-18 May 2022, (5) International Conference on Recent Advances in Mechanical Engineering (ICRAM 2022) at IIT Jodhpur from 25 - 27 August 2022 (6) 9th International and 49th National Conference of Fluid Mechanics and Fluid Power (FMFP-2022) at IIT Roorkee from

14-16 December 2022 (7) 17th ASME International Manufacturing Science and Engineering Conference (MSEC 2022) at Purdue University, USA from 27 June 27– 1 July 2022 (8) SME North American Manufacturing Research Conference (NAMRC 50) at Purdue University, USA from 27 June 27– 1 July 2022. (9) International Conference on Precision, Micro, Meso and Nano Engineering (COPEN 12) at IIT Kanpur from 8-10 December 2022.

Research highlights of the PhD students delivered Open Seminar:

- » Manvendra Sharma's work focused on developing a semi-analytical model for droplets and laminar thin film flow in the flash evaporation process. The study investigated the flashing phenomenon under varying flow conditions using analytical and numerical methods, with the models validated against standard benchmarks. Additionally, novel correlations were proposed based on the developed methods.
- » Vishwa Deepak Kumar's research involved the development of a retrofitted solar convective furnace system with an open volumetric air receiver. The system incorporated thermal energy storage to minimize energy supply variations to the furnace. Feasibility assessments were conducted through experiments and the development of a mathematical model for scaling the air receiver. The results demonstrated the system's feasibility for heat treatment of aluminium and its potential for reducing the process's carbon footprint.
- » Bikash Pattanayak's study focused on heat transfer analysis in pool boiling, particularly in tube and plate heat exchangers. The research aimed to address the lack of qualitative theories, quantitative data, and explanations for boiling heat transfer and critical heat flux (CHF). SS 304 tubes and plate heat exchangers were utilized to investigate pool boiling heat transfer and CHF, with the findings offering valuable insights for the design and optimization of compact heat exchangers.



## Outreach

### 5.1 Department Seminars

Department seminars were conducted to increase interaction of the research fraternity as well as to increase awareness among students about different fields of Mechanical engineering. We invited speakers from prestigious universities in the country and abroad, industry professionals, and Indian Air Force officers. Seminars covered various topics ranging from basic to applied research.

In the months of September and October, 2022, we celebrated **Women in Mechanical Engineering**. We invited Prof. Sujatha Srinivasan (IIT Madras), Prof. Sangeeta Kohli (IIT Delhi), Prof. C. Sujatha (IIT Madras) and Dr. Sampada Bodkhe (Polytechnique Montreal, Canada) for online talk to encourage female students to build their career in mechanical engineering. The talks highlighted the changed scenario of Mechanical engineering in which women can contribute significantly.

Prof. Sujatha Srinivasan heads the TTK Center for Rehabilitation Research and Device Development (R2D2) at IIT Madras. Her talk entitled 'Innovation for Inclusion: Design of Assistive Devices for Persons with Disability' discussed applying mechanism design and movement biomechanics to develop functional and affordable assistive/rehabilitation devices for people with movement disability. Prof. Sangeeta Kohli shared her professional journey as a mechanical engineer through the talk entitled 'A Not so Mechanical Journey: From Raised Eyebrows to a Fulfilling Profession'. She also discussed her research about biomass based technologies specifically for rural applications. Prof. C. Sujatha presented a talk on 'Introduction to Vibration and Allied Fields', and discussed areas of whole body vibration, vehicle dynamics, condition monitoring, signal analysis and acoustics.

Dr. Sampada Bodkhe presented a talk on 'Additive Manufacturing of Intelligent Composite Structures'. She presented piezoelectric inks and a technique to co-fabricate electrodes with piezoelectric sensors via co extrusion-based 3D direct-write

technique. She also discussed 3D printing of adaptive systems, multifunctional materials and structures. Prof. Surjit Sen (SUNY Buffalo, and Bioscience and Bioengineering, IITJ) delivered a talk entitled 'About Sand, Nonlinear Dynamics and Metamaterials' on 27th February, 2023. The talk discussed impulse propagation in granular alignments and its connection to statistical physics, and novel metamaterials. Prof. Kirti Sahu (IIT Hyderabad) delivered a talk about dynamics of raindrops in an airstream on 6th March 2023. In the talk, he discussed the interaction of a droplet with straight and swirl airstreams. He also discussed a new breakup phenomenon, observed by his group, called 'retracting bag breakup when the droplet encounters a differential flow field created by the wake of the swirler's vanes and the central recirculation zone in swirl airflow.

### 5.2 Open House (Padharo 2.0) and Conclave for Friends of IIT Jodhpur

The Department of Mechanical Engineering actively participated in a noted institute-level event, namely, *"Open House (Padharo 2.0)" and "Conclave for Friends of IIT Jodhpur"*. All the faculty members, staff, students (UG, PG and Ph.D) were engaged enthusiastically to make this event successful. In 'conclave for friends of IIT Jodhpur', various poster presentations were organized to showcase the ongoing cutting edge research (i.e., smart and additive manufacturing, robotics and multibody dynamics, multiphase flows and microfluidics, etc.), industry oriented socially and economically impactful research works (i.e., green and sustainable energy, conservation and purification of water, and ultra-precision finishing, etc.), and a few dream projects of the departments (i.e, micro-nano engineering, robotics and omni mobility system, etc.). Moreover, visits of delegates to all the laboratories of the department including the central workshop were also arranged.



A few glimpses of the events of 'Padharo 2.0' and 'Conclave for Friends of IIT Jodhpur' at the department.

In 'Open House' (i.e., Padharo 2.0), the department extended a warm welcome to all members of the public to visit its laboratories, and facilitated them to engage with students, staff and faculty members of the department. Various research laboratories such as Robotics, IC engines, Smart Manufacturing, Fluid mechanics and Turbo-machinery, Heat and mass transfer, Flapping wing micro-aerial-vehicles (MAV), and Microfabrication, were on display. Students (UG, PG and Ph.D) demonstrated their research outputs through live experiments, real-life demonstrations of prototypes, and poster presentations. Additionally, for school students, many interesting games and science-based quizzes were organized.

### 5.3 Quindecennial Celebration

The Quindecennial celebrations were held on March 17-19, 2023, where the Dept. of Mechanical Engineering showcased research projects emanating out of its various labs. The Robotics Lab's exhibit comprised a wide variety of robotic systems and their real-world applications, such as autonomous drones and agile quadruped robots. The lab's initiatives inspired and awed the audience with their demos. The Smart Manufacturing Lab showcased intricate 3D-printed models and functional prototypes, demonstrating the adaptability and precision of additive manufacturing. The department further demonstrated the G filter, a ceramic water filter developed in the dept. It exemplified the department's commitment to

societal challenges and making a positive impact beyond academia. The exhibit at the Quindecennial event also included poster presentations, which provided a glimpse of research activities and thrust areas in the fields of thermofluid engineering, robotics, vibration and acoustics, renewable energy, smart manufacturing, ultra precision finishing, additive manufacturing, and CFD. The event was a great success and showcased the department's strong research capabilities. It was also a great opportunity for students, faculty, and industry partners to network and collaborate.

Engineering (ICRAM 2022)” was organized from 25 - 27 August 2022 by the Department of Mechanical Engineering at the Indian Institute of Technology, Jodhpur, through the virtual mode. The conference brought together innovative scholars and industry experts working in the field of mechanical engineering in a joint forum. The main purpose of the conference was to promote R&D activities and to improve the exchange of scientific information among researchers, developers, engineers, students, and practitioners working all across the globe.

### 5.4 Conference/Workshops

As part of outreach initiatives, the “International Conference on Recent Advances in Mechanical

**INDIAN INSTITUTE OF TECHNOLOGY JODHPUR**  
**INTERNATIONAL CONFERENCE ON RECENT ADVANCES IN MECHANICAL ENGINEERING (ICRAM 2022)**  
 25-27 AUGUST 2022

**PATRON**  
 Prof. Santanu Chaudhury  
 Director, IIT Jodhpur

**CHAIRMAN**  
 Prof. Prodyut Ranjan Chakraborty  
 Head, Department of Mechanical Engineering, IIT Jodhpur

**KEYNOTE SPEAKERS**  
 Prof. Pradheep Kumar, IIT Roorkee, India  
 Prof. Shantanu Bhattacharya, IIT Kanpur, India  
 Prof. Oded Amir, Technion - Israel Institute of Technology, Israel  
 Prof. M. M. Joglekar, IIT Bombay, India

**ORGANIZING COMMITTEE**  
 Dr. Ankur Gupta, Assistant Professor, IIT Jodhpur  
 Dr. Hardik Kathadia, Assistant Professor, IIT Jodhpur  
 Dr. Chandan Pandey, Assistant Professor, IIT Jodhpur  
 Dr. Atul Kumar Sharma, Assistant Professor, IIT Jodhpur  
 Dr. Anup Kumar R, Assistant Professor, IIT Jodhpur

**PLENARY SPEAKERS**  
 Prof. Andre Diaz Lantada, Universidad Politécnica de Madrid, Spain  
 Prof. Stephan Rudykh, University of Wisconsin - Madison, USA  
 Prof. C. Nataraj, Moritz Endowed Professor of Engineered Systems, Villanova University, USA  
 Prof. Michel Destree, Chair of Applied Mathematics, NUI Galway; Adjunct Professor, University College Dublin, Ireland  
 Prof. Dr. Jan Gerrit Korvink, Karlsruhe Institute of Technology, Germany  
 Prof. Richard Sandberg, University of Melbourne, Australia  
 Dr. Anshu K. Datta, Scientist - C, INST Chandigarh, India

**DEPARTMENT OF MECHANICAL ENGINEERING, IIT JODHPUR, ICRAM 2022, E-MAIL-ICRAM@IITJ.AC.IN**

Faculty members of the departments also organised a workshop on Field Robotics during 11-12 March 2023. Workshop covered talks on Space Robotics, Sampling Schemes for Probabilistic Robot Motion, Autonomous Vehicles, Autonomous Control of UAVs, Spherical Robots, Robotics Swarms, Agriculture and Field Robots, and Underwater Robots. The workshop ended with a Panel Discussion on the Impact of Robots on the Field with experts from academia and end users from the field.

### Placement, Industry and International relations

#### Student Placement

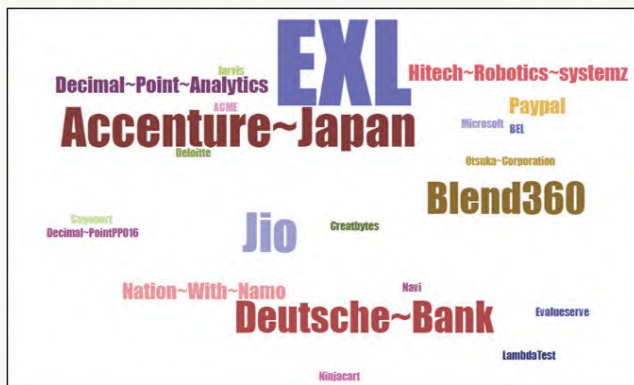
The curriculum for both UG and PG programs is designed to prepare engineers for the challenges of the future. The interdisciplinary curriculum provides a strong foundation in engineering principles and also teaches students the skills they need to be successful in the workforce. As a result, mechanical engineering graduates are able to find

jobs in a variety of fields, not just core mechanical engineering roles.

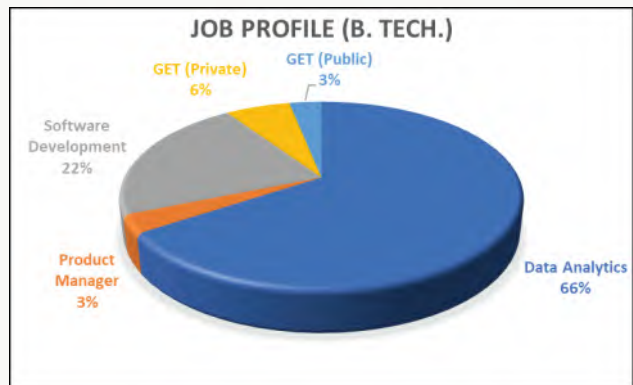
Statistics for campus placements of B. Tech. and M. Tech. students graduating in various degree programs (AY 2022-2023) are provided below.

### B.TECH. IN MECHANICAL ENGINEERING

A total of 68 students registered for campus placements in their final year B.Tech. degree



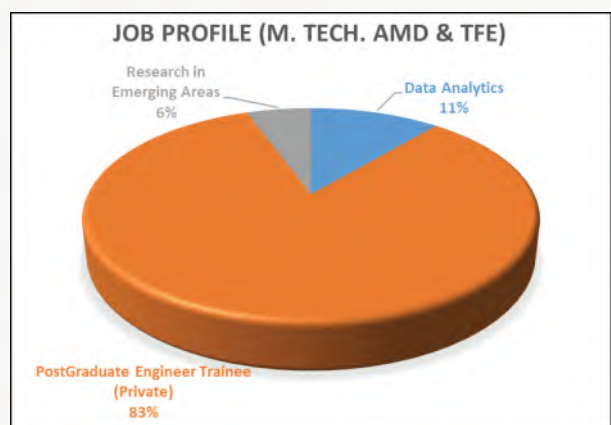
program. As of May 29, 2023, 50 students have been placed, which is a placement percentage of 75.53%. The mean and median salary received by the placed students were 19.67 lakh and 13.1 lakh respectively. The minimum and maximum salaries were 7 lakh and 51 lakh respectively.



Companies recruiting Mechanical Engineering B.Tech. graduates along with their job profiles.

### M.TECH. IN ADVANCED MANUFACTURING & DESIGN AND THERMOFLUIDS ENGINEERING

Of the 31 students in the Advanced Manufacturing & Design and Thermofluids M. Tech. degree programs, 18 have been placed as of May 29, 2023. This represents a placement percentage of 58.06%. The mean and median salaries for the placed students were 12.20 lakh and 10 lakh, respectively. The minimum and maximum salaries were 6 lakh and 44.25 lakh, respectively



Companies recruiting M.Tech. graduates in AMD & TFE along with their job profiles.

## Industry Collaboration

The faculty in mechanical engineering has a dynamic relationship with the industry. They work closely with industry partners to stay up-to-date on the latest trends and technologies, and to ensure that their students are learning the skills that are in demand in the workforce. In the academic year 2022-23, Dr. Nipun Arora and Dr Suril V. Shah received consultancy projects from ABC Transformers Pvt. Ltd. and Johari Digital Healthcare Ltd, respectively. Another industry project sponsored by GE UAY is currently being pursued by Dr Sudipto Mukhopadhyay and his PhD student Chandan Mukherjee. The title of the project is "Design and Development of low-cost thermal Insulation. The Department of Mechanical Engineering hosted three sessions as part of the Institute Industry Day on February 4, 2023. The day-long event featured three keynote lectures and panel discussions on the topics of Robotics & Mobility, Industry 4.0, and Hydrogen Economy. The keynote speakers were:

1. Dr. A. A. Parshilkar, Director, Center for Development of Advanced Technologies, CSIR-National Aerospace Laboratories (NAL)
2. Shri Suresh Perinjery, Principal Solutions Consulting, PTC
3. Dr. Sandeep KC, Senior Scientist, Heavy Water Division, Bhabha Atomic Research Centre, Trombay, Mumbai

The panel discussions were moderated by faculty members from the Department of Mechanical Engineering. The panelists included representatives from industry, government, and academia. The event was well-attended by students, faculty, and industry professionals. The keynote lectures and panel discussions provided valuable insights into the latest trends and challenges in these fields.

## International Relations

The Dept. of Mechanical Engineering has made significant advances in forging connections with prestigious academic institutions worldwide. These connections have allowed the department to collaborate on research projects, exchange students, and share resources. A few highlights are provided below:

- » Research project based collaboration with Prof. Alexandr Klimchik, Lincoln University, UK and Dr Alexander Maloletov are ongoing in the field of roboforming. Collaborating faculty: Dr. Riby Abraham Boby.
- » Joint research project with Waseda University on sociological studies on Human Machine Interface submitted to JSPS and ICSR. Collaborating faculty: Dr. Riby Abraham Boby.
- » Dr. Shrutidhara Sarma was awarded the prestigious WISER research grant 2022 to pursue a collaborative project with TU Braunschweig.
- » Dr. Nipun and his PhD student Mr. Raj Kiran Sangoju visited Hong Kong University of Science and Technology (HKUST) as part of the mobility grant awarded for the project titled "Role of Passive Deformation on the Aerodynamic Performance of a Flexible Flapping Wing."
- » Seven B. Tech. students in Mechanical Engineering were awarded the MITACS fellowship for pursuing Internship in prestigious universities across the globe

## Publications

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# Department of Metallurgical and Materials Engineering

## Introduction

The Department of Metallurgical and Materials Engineering at IIT Jodhpur was established in 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 committed to high-quality education and research in the broad area of Materials Engineering. The department continuously strives for excellence in teaching and research through innovative pedagogy

and curriculum, by undertaking interdisciplinary projects, and through active collaborations with industries, R&D labs, and academia. By enabling the students to think independently and equipping them with relevant skill sets, our goal is to encourage the graduates to innovate and address present-day materials challenges to meet the needs of the country. The department is currently offering degree programs namely, B.Tech., M.Tech., Ph.D. and M.Tech.-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:

S. No.	Theme area	Focus
01	Structural Materials	Materials Processing, Additive Manufacturing, Phase Transformations, Deformation Behavior and Microstructure evolution, Failure of Materials, High Temperature Materials, Materials Degradation.
02	Functional Materials	Electronic Materials, Energy Materials, Smart Materials, Battery Materials, Electrochemistry, Biomaterials.
03	Computational Materials Engineering	Scientific Computation, Data Structure and Algorithms, Machine Learning, Computational Thermodynamics, Alloy Design, First-Principles Calculation, Molecular Dynamics, Material Informatics, Machine learning in Materials Design.
04	Process Metallurgy	Iron and Steel making, Non-ferrous Metal Extraction techniques, Principles of Process Metallurgy, Kinetics of Metallurgical Processes.

## Faculty Details

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.

S.No.	Name	Research Areas
1.	Ravi K. R. Head of Department	Additive Manufacturing, Self-cleaning coating, Computational Approach in Alloy Design, Biomaterials
2.	Bhagwati P. Kashyap Visiting Professor	Thermo-mechanical treatment and Super-plasticity, Creep and low temperature deformation, Light metals and alloy development
3.	Abir Bhattacharyya	Mechanical Behavior of Materials, Fatigue of Bearing Steels, High-strain rate Deformation of Materials, Indentation Response of Materials
4.	Appala Naidu Gandhi	First Principles Calculations: Thermoelectric Transport, Lattice Dynamics, Mechanical Behaviour, Battery Materials; Phase Field Modelling
5.	Saurabh Nene	Alloy Design, High Entropy Alloys, Mechanical behaviour of Materials, Severe Plastic Deformation
6.	Jaiveer Singh	Microstructural/textural characterizations, Mechanical behaviour of Materials, Structure-property-processing correlations, Thermo-mechanical processing, Alloy design, Biomaterials.
7.	Srijan Sengupta	Lithium ion batteries, Corrosion, Electrochemistry, Hydrogen production
8.	Nitin Kumar Sharma	Phase Transformations, Grain Boundary Engineering, Thermo-mechanical Processing, Electron Microscopy, Atom Probe Tomography, Computational thermodynamics
9.	Devendra Singh Negi	Experimental and computational electron microscopy, Thermoelectric materials, quantum materials, Density functional theory calculations, EMCD
10.	Pranay Ranjan	2D materials, their hybrids and hetero-structures, Semiconductor Devices, Gas Sensors, Environmental Remediation, Water Desalination/ Filtration
11.	Sk Md Hasan	Phase transformations, High strength bainitic/martensitic steels, Thermomechanical processing, Microstructure-property correlation
12.	Amitava Banerjee	DFT, Molecular Dynamics, Crystal structures prediction, Hydrogen, and oxygen evolution reaction (HER, OER), 2D catalysts, Solar cell, 2D anodes, Battery Thermodynamics and Kinetics modeling, Defect engineering, Oxide growth

## Academic Programmes

The department is currently offering the following degree programs:

- » B.Tech in Materials Engineering
- » M.Tech. in Materials Engineering
- » B.Tech - M.Tech Dual Degree
- » M.Sc - M.Tech Dual Degree
- » M.Tech.- Ph.D. Dual Degree
- » Ph.D.

### Faculty/ Department Laurels

- » Dr. Saurabh Nene is conferred with INDO-ASIAN Distinguished Research Excellence Award

2022 conferred by RED TALKS International on February 28th, 2022.

### Laboratories and equipment

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 laboratory has following testing equipment:

1.	Universal Testing Machine (Up to 100 kN)	13.	Polishing Machines
2.	Micro-hardness Tester	14.	Spin Coater
3.	Metallurgical Microscopes with Software	15.	Jominy End-Quench Test
4.	Stereo-zoom Microscope	16.	Notch-Broaching Machine
5.	2D Digital Image Correlation Setup	17.	Charpy Impact Test for Plastics
6.	Muffle furnaces	18.	Beam deflection unit
7.	Vacuum Oven with pump	19.	Polarimeter
8.	Induction Melting Furnace	20.	FDM 3D printer
9.	Hot Mounting Press	21.	Stereolithography – 3D printer
10.	Precision Diamond Cutting Machine	22.	Magnetic Stirrer with hot plate
11.	Bend-saw Cutting Machine	23.	Ultrasonic Cleaner
12.	High Speed Grinder	24.	Oven (Microwave)



Mounting and Precision Cutting Machine



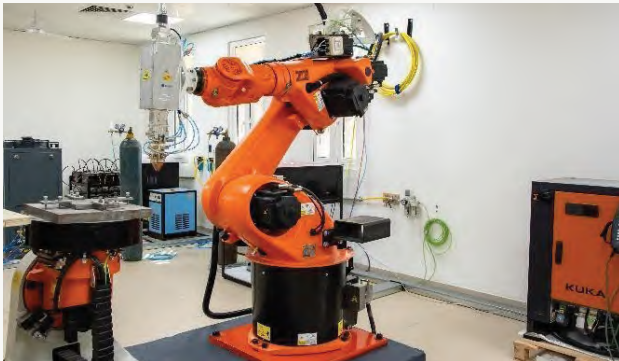
Polishing Machine



Metallographic Sample Preparation



Microstructural Observation



Additive Manufacturing



Lathe Machine



Drilling and Cutting Machine

### Heat Treatment Laboratory

The heat treatment Laboratory has state of the art research facilities to carry out heat treatments of a variety of materials like steel, aluminium alloys, Ti alloys and high entropy alloys (HEAs). There are different types of furnaces installed in the lab starting from conventional muffle furnaces, vacuum tubular furnaces and low temperature vacuum ovens. There are fumehood and microscopy facilities also set up for performing complete heat treatment experiments. Following are the equipment details of the lab:

1. High temperature tubular furnace (1600°C)
2. Muffle furnace
3. Horizontal tubular furnace (1400°C)
4. Vertical tubular furnace (1200°C)
5. Vacuum oven with pump (250 °C)
6. Jominy end quench test apparatus with hardness tester
7. Fume hood



Heat treatment lab showing fume hood, muffle and tubular furnaces

### Mechanical Testing Laboratory

The Mechanical Testing Laboratory has state of the art research facilities to carry out studies on quasi-static deformation of materials at macro and micro length scales. The facilities consist of Electromechanical Universal Testing Machine (100 kN load capacity) capable of carrying mechanical testing in cryogenic (up to -70 deg. C) and elevated temperatures (up to 1100 deg. C). The Universal Testing Machine is also equipped with customized fixtures to carry out experiments under compression, and three point bending. The laboratory also has a Universal Hardness Testing Machine, and a Vickers Microhardness Testing machine. While the Universal hardness testing machine can be used to carry out hardness measurements beyond 0.5 kg load, the microhardness testing machine can be used to carry out indentations as low as 1 g load. This lab is used for teaching and research.



100 kN Universal Testing Machine



Universal Hardness Tester

### Computational Materials Engineering Laboratory

The Computational Materials Engineering laboratory supports teaching and research activities in the domain of computational materials engineering. It is equipped with a server, twenty workstations, and ten desktop computers. The softwares required for studying materials at different length scales are installed in these facilities. These include first-principles calculations-based codes Quantum Espresso and VASP, Molecular



dynamics codes LAMMPS and xmd, Engineering and Multiphysics packages ANSYS, COMSOL Multiphysics, Materials selection software CES Selector and CES Edupack, and thermodynamic property calculator ThermoCalc with Steel, Mg, High Entropy alloy databases. Tutorials and laboratories based on computational materials science are conducted in this facility. Our research focuses on understanding mechanical behavior, thermoelectric transport, lattice dynamics in materials, and energy materials design such as catalysts for solar fuel, organic green battery electrodes, etc. We also characterized the materials by calculating the Infra-Red and Raman spectra, and simulated scanning tunneling microscope images.



Computational Materials Engineering Laboratory

## Structural Materials Research Laboratory

With an emphasis on structure-property correlations in novel and established metallic alloy systems, structural materials research lab primarily works in the broader fields of physical and mechanical metallurgy. The lab has competence in creating and processing ultralight Mg and Ti based alloys for automotive, aerospace, and biomedical applications, among other standard metallic alloy systems. A bigger portion of the group is primarily focused on the design and processing of multifunctional, microstructurally flexible high entropy alloys (HEAs), which is a dynamic yet challenging area of metallurgy in recent times. The majority of this activity entails modelling and experimenting tasks. Thermodynamic predictions for phase stability, the impact of slight changes in the concentrations of constituent elements in the alloy compositions

on thermodynamic factors are carried out by modelling. The experimentation on these newly designed HEAs entails fabrication, thermo-mechanical processing followed by mechanical and microstructural characterization.

The structural materials research laboratory is equipped with the following facilities:

1. Thermo-Calc v2022a software (TCFE9, TCHEA4, TCTI3 databases)
2. Vacuum arc melting furnace with suction casting facility (0.5 kg capacity, 10-5, 1440 C)
3. Universal Testing Machine (UTM) (25 kN capacity and a unique facility of performing tensile tests on 2mm gauge length tensile specimen)

4. Muffle furnace (maximum attainable temperature of 1400°C)
5. Hot mounting setup
6. Grinding and polishing machine
7. Lab scale rolling mill (under procurement)
8. Leica optical microscope (50X, 100X, 200X, 500X and 1000X magnification)
9. TSL-OIM v8 software



Facilities in Structural Materials Research Laboratory

### Functional Materials Research Laboratory

There are three levels of activities at the Functional Material Lab. On the theoretical level, we look for prospective areas to uncover intriguing 2D materials (at different length scales) and its intrinsic properties that may be used to fabricate and create novel devices. Another crucial activity in interpreting the findings of experimental study through theoretical and computational studies.

Functional material lab hosts a high performance computational facility to theoretically explore the material with density functional theory (DFT) calculation. We use various DFT based methods to study magnetic materials, 2D materials, thermoelectric materials, quantum materials etc.

The functional material lab is equipped with a high performance computation processor. The gained theoretical insight helps us further to synthesize the same material in the lab.

The lab hosts expertise in transmission electron microscopy to study the materials at atomic scale. Our lab possesses expertise in TEM image simulation and image processing, which immensely benefits to all material engineering domains.

In the second category of activity, 2D materials, their hybrids and heterostructures are synthesised (Top-down approach) to attain certain physical qualities for better device performance. For

instance, we research methods to introduce functionalities into low-dimensional materials and precisely regulate their bandgap, mobility, thermal conductivity and charge carrier concentration.

Making gadgets/devices, conducting tests, and characterising their performance under diverse situations make up the third layer. The functional material lab all together uniquely combines the synthesis/fabricate, characterization, computation material design and device application under a single lab.

The functional materials research laboratory is equipped with the following facilities:

1. Gas Sensing Machine
2. LCR Meter
3. Photolithography Machine
4. Digital Multimeter
5. Oscilloscope
6. High performance computational server (64 core)
7. Fume Hood
8. Hot Plate
9. Ultrasonicator
10. Battery Tester
11. HRTEM image simulation and processing
12. M-H Hysteresis Loop Tracer
13. Hall Measurement
14. Digital Microscope



Facilities at Functional Materials Laboratory

## Outreach Activities

The following Outreach activities have been undertaken by the faculty members of the department During the FY 2022-2023.

1. Dr. Saurabh Nene is continuing the 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. Saurabh Nene is continuing the official collaboration with Prof. Sheng Guo, Chalmers University of Technology, Sweden to work in the area of defect induced plasticity in HEAs.

3. Dr. Saurabh Nene is continuing the official collaboration with Prof. Satyam Suwas, IISc Bangalore to work in the area of alloy design and texture modification.
4. Dr. Abir Bhattacharyya is continuing the official collaboration with CSIR-National Metallurgical Laboratory in the area of multiaxial fatigue, and residual stress measurement
5. Dr. Abir Bhattacharyya is continuing the official collaboration with Indira Gandhi Centre for Atomic Research (IGCAR), DAE in the area of low cycle fatigue of nuclear steels
6. Dr. Jaiveer Singh is mentoring the Churu district, Rajasthan under Unnat Bharat Abhiyan (UBA) RCI IIT Jodhpur.
7. Dr. Jaiveer Singh is continuing the official collaboration with Prof. Shi-Hoon Choi, Suncheon National University, Suncheon, Korea in the area of formability behavior of Mg alloys and recrystallization of high entropy alloys.
8. Dr. Jaiveer Singh is continuing the official collaboration with Hindustan Zinc Limited (HZL) subsidiary of Vedanta Limited in the area of design and development of Mg/Cu based alloys.
9. Dr. Srijan Sengupta is continuing the official collaboration with Dr. Anindita Chakraborti of TATA Steel R&D in the area of electrodeposition and coating

## Conference/Seminar/Workshop Presentations

### Dr. Saurabh Nene

S. No.	Title	Sponsoring Authority	Type	Organizers	Dates
1.	Short Term Course on "ADDITIVE MANUFACTURING AND CHARACTERISATION"	Chennai Institute of Technology, Chennai	Short Term Course	21st-25th Feb. 2022	Invited Talk
2.	HEA 2021	TMS, USA	ICP	4-8th Dec. 2021	Oral Presentation
3.	International conference on Powder Metallurgy 2022 (PMAI-PM 22)	PMAI, India	ICP	18-21st April 2022	Invited Talk
4.	Advanced Technologies in Dissimilar Metal Welding (DMW-2022)	DAE-BRNS theme meeting, BARC Mumbai	ICP	15-16th July 2022	Invited Talk

### Dr. Jaiveer Singh

S.No.	Title	Organization	Type	Dates	Role
1.	International Conference and Exhibition on Materials Engineering & Technology and Advances in Heat Treatment (MET+HTS)	ASM International (India Chapter)	IC	November 2-4, 2022	Invited Talk
2.	Symposium on Innovations in Artificial Intelligence in Biotechnology & Healthcare	Jaipur National University	Symposium	March 24-26, 2023	Keynote Speaker

**Dr. Nitin Kumar Sharma**

S. No.	Title	Organization	Type	Dates	Role
1	Synergistic training program utilizing the scientific and technological infrastructure (STUTI)	Indian Institute of Technology (IIT) Jodhpur	DST Sponsored One-week workshop	August 08-14, 2022	2 Invited Lectures
2	Advances in Materials and Processing: Challenges and Opportunities (AMPCO'22)	Indian Institute of Technology (IIT) Roorkee	International Conference	October 17-19, 2022	Oral Presentation

**Dr. Srijan Sengupta**

S. No.	Title	Organization	Type	Dates	Role
1	Corrosion and Battery	Veer Surendra Sai University of Technology, Burla	Invited talk	6 February 2022	Keynote address delivered

**Dr. Devendra Singh Negi**

S. No.	Title	Organization	Type	Dates	Role
1	33 AGM of MRSI and the 4th Indian Material conclave IURMS-ICA 2022	IURMS-IITJ	Invited talk	19/12/2023	Invited talk and session chairperson
2	Differential Phase Contrast in Electron Magnetic Circular Dichroism in Transmission Electron Microscopy	HNB Garhwal University, Uttarakhand	Invited talk	10/3/2023	Invited speaker
3	Empowering S&T With Women- A Step Towards A New Era	IIT Jodhpur	Participation	19/4/2022	-
4	Next Generation Materials	Reliance	Special Invitee	30/03/2023	Invited Talk
5	Borophene -thinking beyond Graphene	ELCINA (Electronic Industries Association Of India)	Special Invitee	9/06/2023	Invited Talk
6	Synthesis of Freestanding borophene	Applied Materials	Special Invitee	4/04/2023	Invited Talk
7	Borophene	TATA New Material Division	Special Invitee	19/01/2023	Invited Talk

**Dr. Pranay Ranjan**

S. No.	Title	Organization	Type	Dates	Role
1	Next Generation Materials	Reliance	Special Invitee	30/03/2023	Invited Talk
2	Borophene -thinking beyond Graphene	ELCINA (Electronic Industries Association Of India)	Special Invitee	9/06/2023	Invited Talk
3	Empowering S&T With Women- A Step Towards A New Era	IIT Jodhpur	Participation	19/4/2022	-
4	Synthesis of Freestanding borophene	Applied Materials	Special Invitee	4/04/2023	Invited Talk

S. No.	Title	Organization	Type	Dates	Role
5	Borophene	TATA New Material Division	Special Invitee	19/01/2023	Invited Talk

### Dr. Amitava Banerjee

S. No.	Title	Organization	Type	Dates	Role
1	Next Generation Materials	Reliance	Special Invitee	30/03/2023	Invited Talk
2	Borophene -thinking beyond Graphene	ELCINA (Electronic Industries Association Of India)	Special Invitee	9/06/2023	Invited Talk
3	Synthesis of Freestanding borophene	Applied Materials	Special Invitee	4/04/2023	Invited Talk
4	Borophene	TATA New Material Division	Special Invitee	19/01/2023	Invited Talk

### Dr. Appala Naidu Gandhi

S. No.	Title	Organization	Type	Dates	Role
1	Simulation of Martensitic Transformations in Ti and Zr alloys (online mode)	Indian Institute of Technology Bhubaneswar	Workshop	12-13 November 2022	Invited Talk
2	Simulation of Martensitic Transformations in Ti and Zr alloys	IIM Hyderabad Chapter	Conference	13-16 November 2022	Invited Talk
3	Simulation of Martensitic Transformations in Ti and Zr alloys	Indian Institute Of Science, Bengaluru	Conference	21-23 December 2022	Invited Talk

### Dr. Abir Bhattacharyya

S. No.	Title	Organization	Type	Dates	Role
1	A Back Stress Deconvolution Technique to Model Low Cycle Fatigue Response of 316LN Stainless Steel	Indian Institute of Science, Bengaluru	Conference	21-23 December 2022	Invited Talk
2	A Back Stress Deconvolution Technique to Model Low Cycle Fatigue Response of 316LN Stainless Steel	Indian Institute of Metals (IIM) Hyderabad Chapter	Conference	13-16 November 2022	Oral Presentation

### Dr. Sk Md Hasan

S. No.	Title	Organization	Type	Dates	Role
1	Advances in Materials and Processing: Challenges and Opportunities (AMPCO22)	Indian Institute of Technology Roorkee	International Conference	October 17-19, 2022	Oral Presentation

## Publications

### Abir Bhattacharyya

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- » D.K. Pandey, P.K. Verma, A Bhattacharyya, and A. Sarkar, "A Back-stress deconvolution method towards modelling of low cycle fatigue behavior of type 316L (N) stainless steel at room temperature" *International Journal of Fatigue*, Vol 166, pp.107297, 2023
- » T. Sahu, A. Bhattacharyya, and A.N. Gandhi, "Raman spectra characterization of boron carbide using first-principles calculations" *Physica B: Condensed Matter*, 633, p.413738., 2022.

### Appala Naidu Gandhi

- » Gandhi, Appala Naidu; J. Zhu; "Martensitic Transformations of Phase in Zirconium," *Journal of Applied Physics*, vol. 129, no. 22, p. 225103, 2021.
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- » A. Betal, M. Alam, J. Bera, H. Meghnani, A. N. Gandhi, and S. Sahu, "Excellent optoelectronic and thermoelectric properties of two-dimensional transition metal dinitride HfN<sub>2</sub>," *Physica B: Condensed Matter*, vol. 649, p. 414505, 2023.
- » D. Saikia, M. Alam, J. Bera, A. Betal, A. N. Gandhi, and S. Sahu, "A First-Principles Study on ABBr<sub>3</sub> (A= Cs, Rb, K, Na; B= Ge, Sn) Halide Perovskites for Photovoltaic Applications," *Advanced Theory and Simulations*, vol. 5, no. 12, p. 2200511, 2022.
- » J. Zheng, Y. Wu, H. Xie, Y. Zeng, W. Liu, A. N. Gandhi, Z. Qi, Z. Wang, and H. Liang, "In Situ Alloying Sites Anchored on an Amorphous Aluminum Nitride Matrix for Crystallographic Reorientation of Zinc Deposits," *ACS nano*, vol. 17, no. 1, pp. 337–345, 2023. PMID: 36417699.
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- » J.N. Francis, I. Banerjee, A. Chugh, and J. Singh: Additive manufacturing of polyetheretherketone and its composites – A review, *Polymer Composites*, 43 (2022) 5802-5819. DOI: 10.1002/pc.26961
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#### **Nitin Sharma**

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- #### Saurabh Nene
- » S.S. Nene, Some distinct features of transformative high entropy alloys for metal additive manufacturing, *Frontiers of Materials* 9 (2022) 873911.
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### **SrijanSengupta**

- » Saptarshi Das, Swastika Banthia, Jhimli Manna, SrijanSengupta Electrodeposited Nickel Coating Reinforced with Chlorophyll-Reduced Graphene Oxide, July 2021, *Advanced Engineering Materials* 23(9), DOI: 10.1002/adem.202100254

### **Book Chapter**

#### **KR Ravi**

- » S Senthil, KR Ravi, A Brief Review on Self-cleaning Coatings for Photovoltaic Systems, *New Research Directions in Solar Energy Technologies*, 197-234, 2021

#### **Nitin Kumar Sharma**

- » ShashankShekhar, Nitin Kumar Sharma, Sandeep Sahu, and SantanuMisra (2022), "Electron backscatter diffraction technique: Fundamentals to Applications, In: Krishanu Biswas, Sri Sivakumar, Nilesh Prakash Gurao (editors) *Electron Microscopy in Science and Engineering*", IITK Directions, Vol. 6, Springer

### **Conference Abstracts/Proceedings**

#### **Abir Bhattacharyya**

- » Durgesh Kumar Pandey, Aritra Sarkar, Abir Bhattacharyya, A. Nagesha, Modelling of Low Cycle Fatigue Behaviour of type 316LN Austenitic Stainless Steel at Different Temperatures, 8th International Conference on CREEP, FATIGUE AND CREEP-FATIGUE INTERACTION, Aug 24-27, 2021
- » Juhi Srivastava, Aman Bansal, Bryan D. Allison, Abir Bhattacharyya, Investigation on the Formation of White Etching Region Due to Rolling Contact Fatigue in M50 Bearing Steel, 8th International Conference on CREEP,

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- » Rakesh Kumar, C. Venkatesan and Abir Bhattacharyya, "Structural dynamic analysis of a beam having random material properties", The Eighth Asian Conference on Mechanics of Functional Materials and Structures, IIT Guwahati, 11 - 14 December 2022, ACMFMS-2022)
- » D.K. Pandey, P.K. Verma, A. Bhattacharyya, A. Sarkar, "A Back-stress deconvolution method towards modelling of low cycle fatigue behavior of type 316L (N) stainless steel at room temperature", *Perspectives in Materials Research*, 21st-23rd December, 2022, Indian Institute of Science, Bangalore (Invited Talk)
- » Adarsh Bharti, Abir Bhattacharyya, S. Sivaprasad, "Effect of Strain Path on Multiaxial Fatigue Response of 304L(N) Stainless Steel", 4th Structural Integrity Conference and Exhibition, SICE 2022, 14th-16th December, 2022, IIT Hyderabad
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- » Adarsh Bharti, Abir Bhattacharyya, S. Sivaprasad, "Multiaxial Fatigue Analysis of 304L(N) stainless steel used in Indian PHWRS", International Conference on Recent Advances in Mechanical Engineering, 25-27 August, 2022, IIT Jodhpur

#### **Nitin Kumar Sharma**

- » Nitin Kumar Sharma, Rangasayee Kannan, Leijun Li, Neil Anderson, Muhammad Rashid, Laurie Collins, Jonathan D. Poplawsky, and Raymond Unocic, Microstructural Transformations during High-frequency Electric-Resistance Welding and Post-weld Heat-treatment of X70 Pipeline Steel, presented in *Advances in Materials and Processing: Challenges and Opportunities (AMPCO'22)* at IIT Roorkee during October 17-19, 2022.

### S.S. Nene

- » S.S. Nene, High Entropy Alloys: a potential material for efficient dissimilar welding, presented in DMW 2022 (invited talk) held during 15th-16th July 2022 at BARC Mumbai.
- » S.S. Nene, Transformative High Entropy Alloys: a potential solution for metal 3D printing using LPBF technique, (Invited abstract) presented in PM 22 to be held online during 18th-20th April 2022
- » A. Dutta, S.K. Gupta, M.H. Tsai, S.S. Nene, Extremely high compressive strength in as-cast dual phase high entropy alloy for emerging applications, presented in PM 22 (online mode) conducted during 18th-20th April 2022.
- » D. Mishra, S. Agrawal, J. Singh, S.S. Nene, Towards high engineering strength of newly designed brass like high entropy alloy for structural applications, presented in PM 22 (online mode) conducted during 18th-20th April 2022.
- » S.S. Nene and R.S. Mishra, Designing new corrosion resistant materials with exceptional strength-ductility synergy and good weldability using high entropy approach, presented in HEA 2021, USA (online mode) during Dec. 5-8th, 2021.

### Projects

New Projects in the Department of Metallurgical and Materials Engineering.

Sl. No.	Title of Project	Funding Agency	Financial Outlay	Date of start & total period	Name of P.I. and Other Investigations	Status
1.	Phase specific synthesis of borophene for lightwave electronics and energy devices	IITJ	INR 75 Lakh		Dr. Pranay Ranjan, Dr. Amitava Banerjee, Dr. Devendra Singh Negi	In progress
2.	Design of cost-effective ultralight high entropy alloys with transformation induced plasticity	SERB	INR 33 Lakhs	2 years	Dr. Saurabh Nene	In progress
3	Design and development of lightweight steels for structural applications	IIT Jodhpur	25 Lakh	3 Years	Dr. Nitin Kumar Sharma	In progress
4	Development of novel, reliable and cost-effective aluminium-nickel high-capacity intermetallic batteries for stationary large-scale energy storage applications	IIT Jodhpur	25 Lakh	3 Years	Dr. Srijan Sengupta	In Progress
5.	Development of Transparent Durable Superhydrophobic-Coating For Self-Cleaning of Endoscope	MSME	15 Lakhs	1.5 Years	Dr. Ravi K R	In progress
6.	Development of optical based in-situ monitoring techniques for porosity detection during laser cladding and additive manufacturing of stainless steel	SERB	54.5 Lakhs	3 years	Dr. Ravi K R	In progress

Sl. No.	Title of Project	Funding Agency	Financial Outlay	Date of start & total period	Name of P.I. and Other Investigations	Status
7.	Deep-Tech Biodesign Centre: A Multi-disciplinary centre to train, nurture and transform clinicians and engineers into the Deep-Tech innovators in the field of Medical/Health Technology	DBT	299.9 Lakhs	3 years	Dr. Ravi K R	In progress
8.	Developing Endoscope Socket to provide uninterpreted endoscopic visual field to ENT doctor for diagnosing patients with minimal discomfort	MSME	15 Lakhs	1.5 Years	Dr. Ravi K R	In progress
9	Large Scale Synthesis of Freestanding 2D Borophene Atomic Sheets and its Hybrids for Conducting Tapes	SERB	33 Lakhs	2 years	Dr. Pranay Ranjan	In progress
10	Designing lightweight and highly formable Mg-Li-Zn-Ca-RE based alloys using the CALPHAD method	Ministry of Mines	25 Lakhs	2 Years	Dr. Jaiveer Singh Dr. Saurabh Nene	Approved
11	Phase Specific Synthesis of Borophene for Lightwave Electronics & Energy Devices	UB-IITJ	25 Lakhs	2 Years	Dr. Pranay Ranjan Dr. Devendra Singh Negi Dr. Amitava Banerjee	Approved
12	Grain boundary engineering for improvement of high temperature strength and ductility in FCC alloys for structural applications	SERB	33 Lakhs	2 Years	Dr. Nitin Kumar Sharma	In Progress
13	Design of High strength, High Toughness, and Self-healable Hydrogels and Development of their Constitutive Response	IITJ	25 Lakhs	3 years	Dr. Abir Bhattacharyya	In Progress
14	Investigation of weldability and hydrogen embrittlement phenomenon in high-strength bainitic steel	SERB	32.5 Lakhs	2 years	Dr. Sk Md Hasan	In Progress

# Department of Physics

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 Department offers Undergraduate, Masters and Doctoral programs in Physics. In addition, it also offers core and several elective courses for undergraduate Engineering students.

S. No.	Name	Designation	Research areas
1.	Ashutosh Kumar Alok Head of Department	Associate Professor	Particle Physics and Cosmology
2.	Ambesh Dixit	Associate Professor	Semiconductors, multifunctional ferroics & materials for energy-fabrication & characterization, Photovoltaic materials & devices ab initio DFT study and device simulations
3	Amitava Mitra	Professor	Magnetism & Application of Magnetic Materials, Electromagnetic Techniques for Non-destructive Evaluation of Damage for Engineering Components, Research Planning & Project Management
4.	B.M. Krishna Mariserla	Assistant Professor	Light-Matter interactions, Ultrafast Spectroscopy, Terahertz Spectroscopy, and Higher harmonic generation
5.	Durgamadhab Mishra	Assistant Professor	Magnetic thin films & nanoparticles, Permanent Magnets, Synchrotron & Neutron Scattering & X-ray imaging
6.	Jitendra Kumar	Assistant Professor	Experimental high-energy physics (Belle II Experiment), Particle Detection Techniques, and AI/ML in HEP
7.	Monika Sinha	Assistant Professor	Astrophysics, Astroparticle physics
8.	Prabhat Kumar Jaiswal	Assistant Professor	Nonequilibrium Statistical Physics, Soft Condensed Matter Physics, Computational Physics
9.	Ram Prakash	Associate Professor	Plasma Science & Technology: Low temperature plasma applications
10.	Reetanjali Moharana	Assistant Professor	Astroparticle Physics, High energy Cosmic rays, Gamma rays and Neutrinos
11.	Sampat Raj Vadera	Professor	Solid State Physics, Materials Science, Nanoscience & Nanotechnology, Stealth Materials, Stealth Technology
12.	Santosh Mogurampelly	Assistant Professor	Transport in Polymer Electrolytes and Materials, Multiscale Modeling of Soft Matter Physics and Materials Science

S. No.	Name	Designation	Research areas
13.	Satyajit Sahu	Associate Professor	Molecular electronics, single molecular electronic devices, semiconductor devices, 2D materials and their applications, density functional theory, Information Processing in Biological Systems
14.	Shahab Ahmad	Assistant Professor	Condensed Matter Physics, Nanomaterials, Optoelectronics, Energy Storage Devices, Solar Cells, Photo-detectors, Light Emitting Diodes
15.	Somnath Ghosh	Associate Professor	Non-Hermitian and Topological Photonics, Mid-IR photonics and Unconventional devices
16.	Subhashish Banerjee	Associate Professor	Open Quantum Systems; Quantum Information; Non-Equilibrium Statistical Mechanics; Quantum Optics
17.	V. Narayanan	Associate Professor	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
18.	Sunita	Assistant Professor	Theoretical soft and active matter physics, Biophysics, Charged macromolecules
<b>DST Inspire faculty members</b>			
1.	Lakshay Daukiya	Assistant Professor	Condensed Matter Physics, 2-D Materials, Surface Science
2.	Vijay Kumar Singh	Assistant Professor	Condensed Matter Physics; Nanotechnology; Low dimensional materials; Photo-detector; Biosensor; Electrochemical water splitting
<b>Ramanujan faculty members</b>			
1.	S. Appalakondaiah	Assistant Professor	Computational Condensed Matter Physics, Density Functional Theory, Phase transitions, Strongly Correlated Phenomena, Metal-Semiconductor interfaces, Lattice Dynamics

## Department Research Groups

### Condensed Matter and Plasma Physics Group

The group at IIT Jodhpur is pursuing research in Experimental and Computational aspects of Condensed Matter and Plasma Physics. The blend of young and experienced faculty members in the group has a strong R&D focus to address the cutting edge challenges faced by the nation in the field of energy, climate change and sustainable growth, etc. The major field of research being pursued are Functional materials for strategic application, Materials for energy storage and harvesting, photovoltaics and solar thermal applications, Multiscale modeling of soft matter, Molecular devices for electronics, Magnetic and Multiferroic nanostructures and nanomaterials, Kinetics of phase

transitions, Mechanical properties of amorphous solids, Wetting-Dewetting behavior on surfaces, and Development of cold plasma technologies for health applications and surface engineering. The endeavor is to create an ecosystem to carry out interdisciplinary research by taking advantage of all the expertise and resources available at IIT Jodhpur. In order to encourage that, the group has established Thematic Research labs viz, Functional Materials Lab, Thin film and Plasma Devices Lab, Multiscale Characterization Lab and Computational Lab, where various applied and fundamental research activities are carried out. The faculty members have established strong collaboration

with national and international institutes and thus remain at the forefront of research via exchange of ideas and research scholars. The group envisions to

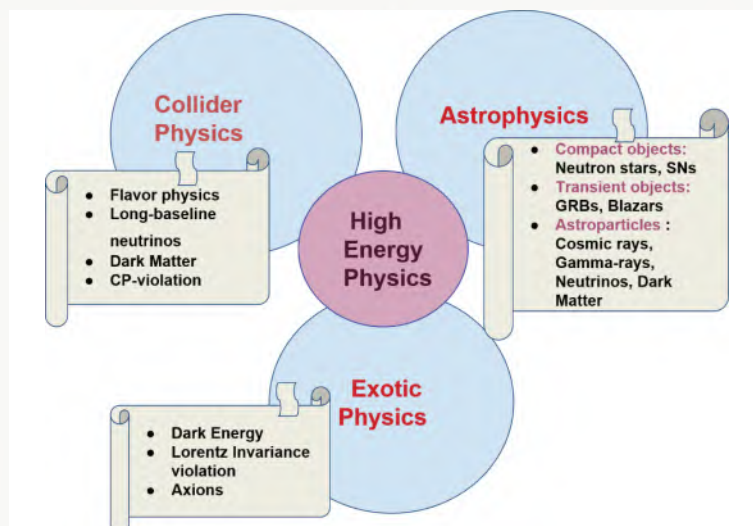
grow further and embrace new members into the family and continue to strive to carve a unique path in the future for the department and the nation.



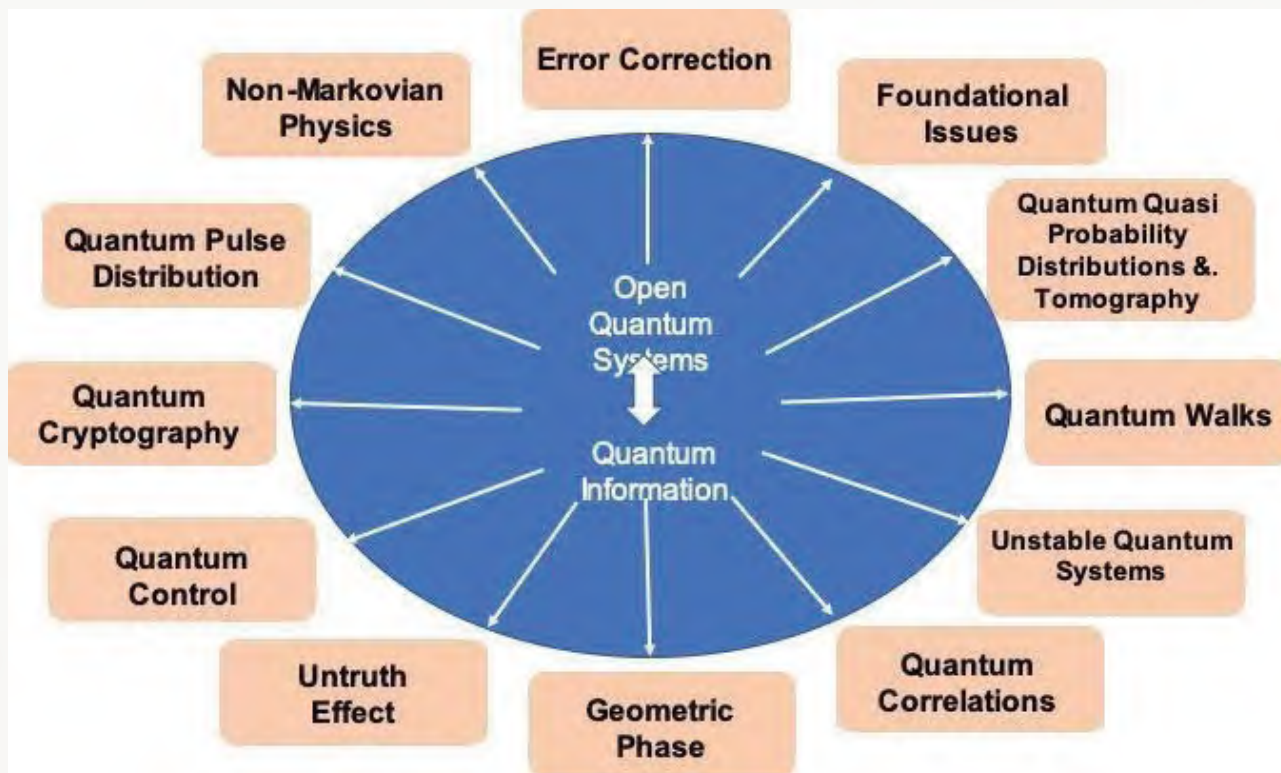
### High Energy Physics and Astrophysics Group

The group is involved in the research works comprising of astrophysics and particle physics as a part of understanding the origin and evolution of Universe. It aims at the participation in the exciting theoretical and phenomenological developments in the field of fundamental interactions of nature in cohesion with the rapid growth of new observational and experimental data in the field.

The group addresses the forefront problems on both scales: using the universe and astrophysical objects to learn fundamental underlying features of particle physics and employing what is learned from particle physics to provide a better understanding of the universe at large scale by exploring nature and properties of the objects in it. The group is robustly active in several sub-domains of High Energy Physics.



## Quantum Physics group



The Quantum Physics Group aims at the intersection of various facets of quantum physics, from foundational issues to technological applications.

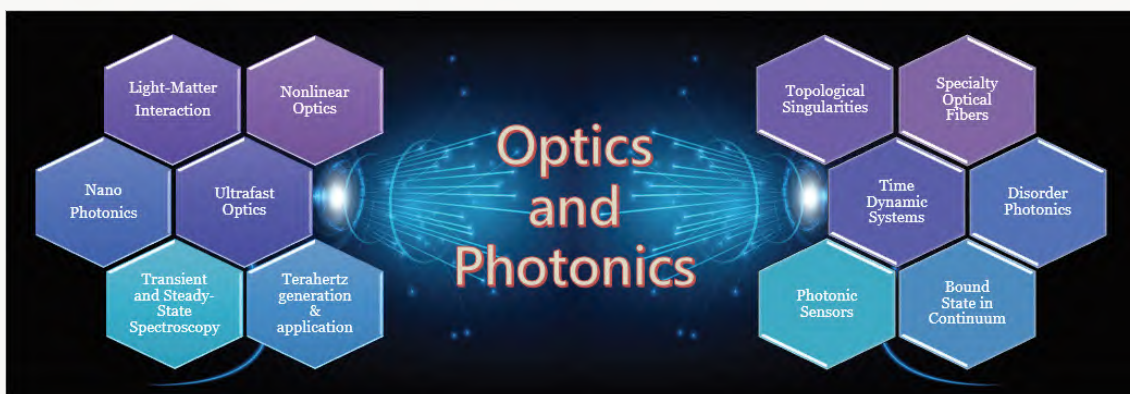
**Open Quantum Systems:** Open Quantum Systems: Dynamics of Nonclassical Evolution This provides an overall umbrella which allows for a global as well as a local viewpoint to be developed into various branches of quantum physics. In particular, efforts are made into: (i) Parity-Time (PT) Symmetric Quantum Physics: A non-Hermitian Hamiltonian with the parity (P) - time (T) symmetry; (ii) Quantum Thermodynamics: The major aim of these endeavors is to amalgamate quantum physics with thermodynamics. understanding of working efficiencies of quantum information processing devices.; (iii) Quantum Optics & Quantum State Engineering: With the advent of quantum state engineering the study of nonclassical properties of engineered quantum states has become important. nonclassical features in a quantum state can only provide quantum supremacy and are directly related to technology development; and (iv) Generation of multi-qubit states using short-pulsed Lasers.

Development of Homodyne detection: Wigner distribution of Coherent and Vacuum states.

## Optics and Photonics group

The group has been exploring fundamental as well as application specific research activities in optics and photonics. The present investigations include development of emerging technologies like Terahertz technology, Ultrafast Optical techniques, Time-resolved and Steady state spectroscopy, Fluorescence quantum efficiency, Optical Imaging and Mapping, Specialty Optical Fibers, Photonic Time Crystals, Sensing and Quantum Confinement inspired optical phenomena. The research activities and opportunities equally involve experimental as well as theoretical aspects. The group has globally competitive skill sets in the domains of optics and photonics and progressively contributing towards fundamental explorations as well as making a paradigm shift in technology development and proof-of-concept devices.





## Laboratories and Equipment

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 focused 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

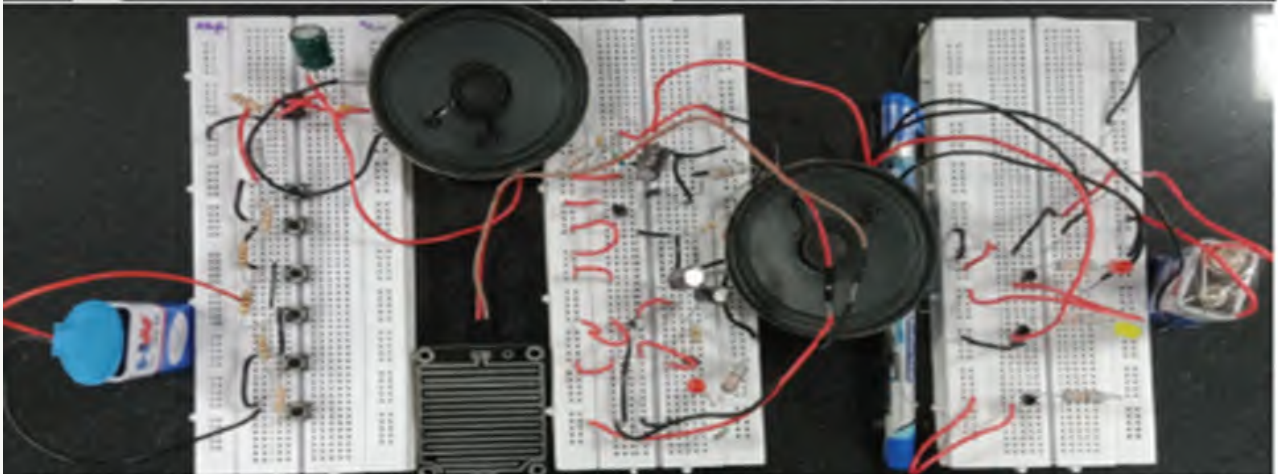


Basic Physics Lab

## 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 meters, 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. UV-Vis spectrophotometer has a wavelength range of 190–1100 nm



1. Vibrational spectrometer for Raman analysis
2. UV-Vis spectrophotometer has a wavelength range of 190–1100 nm



Vibrational spectrometer



UV-Vis spectrophotometer

### 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.



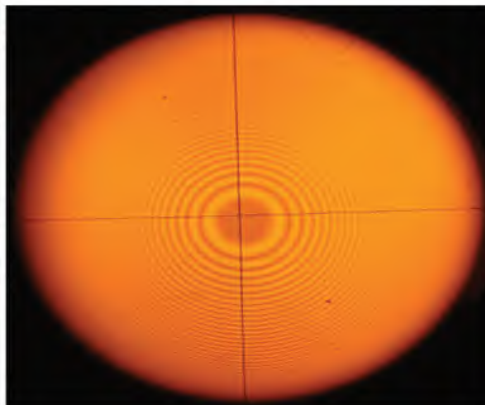
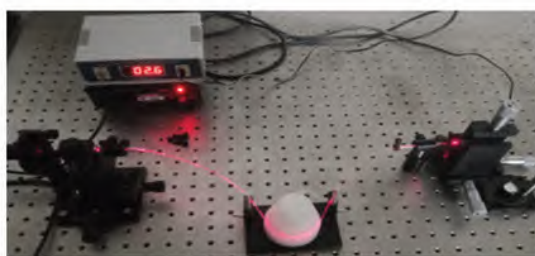
### Atomic & Nuclear Physics

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
6. Zeeman effect experiment
7. e/m ratio 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 refractometer, 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. Several 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.



## B. Research Laboratories

### 1. Thin Films and Device Lab

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



(1) Low temperature Scanning Tunnelling Microscope

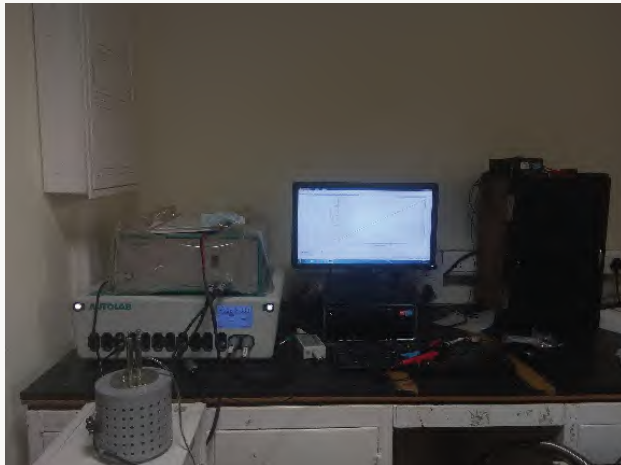
various substrates for different applications such as energy, water, health, and environment.

### 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.



(2) Electrical Transport Measurement system



(3) 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.



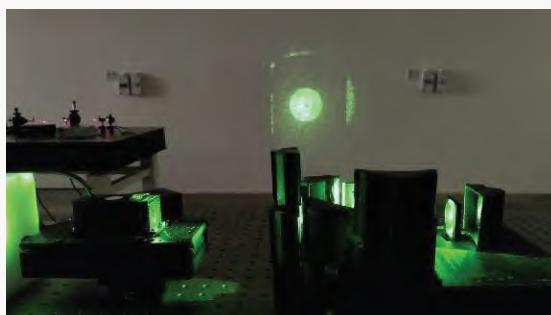
Synthesis and Functionalization of Quantum Dots



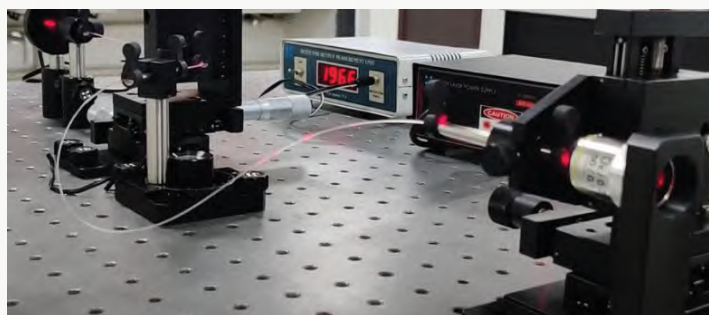
Three-port Glove Box system for the fabrication of Li-ion batteries

## 5. Nonlinear optics and Photonics 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.



(a) Experimental Design of Interferometry



(b) Optical guiding through visible fibers

## 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.



(a) Entangled photons generation using Femtosecond Laser along with single photon detectors (Insert: SPDC ring and GUI for Time-stamping)

## 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 Physics 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

A cold plasma applications lab is being developed to create a niche of high science and high technology by retaining the leadership achieved and aiming at global leadership in the area of non-thermal and non-equilibrium cold plasmas for a range of food, health, energy, medicine, and agricultural applications. The following new equipment have been added to the Cold Plasma Lab,



High Resolution UV-Visible Monochromator (Focal Length 500 mm, Aperture Ratio f/6.5, Wavelength coverage 190 nm- 900 nm, Spectral Resolution 0.05 nm with 10 mm wide slits)



Vacuum Sealing System for Quartz/Glass Pinching (Four Tubes at a time)

A test and characterization set up for Dielectric Barrier Discharge Based Cold Plasma Systems is also being developed.



Cold Plasma Lab Set-up is being built

## Publications

### Ambesh Dixit

- » “Ruddlesden-Popper 2D perovskites of type  $(\text{C}_6\text{H}_9\text{C}_2\text{H}_4\text{NH}_3)_2(\text{CH}_3\text{NH}_3)_{n-1}\text{Pb}_n\text{I}_{3n+1}$  ( $n = 1-4$ ) for Optoelectronic Applications”, Mohammad Rahil, Rashid Malik Ansari, Chandra Prakash, S. S. Islam, Ambesh Dixit and Shahab Ahmad, *Scientific Reports* 12 (2022) 2176.
- » Kiran, Ramavtar, Shivam Chaturvedi, Chandra Prakash, Ambesh Dixit, Deepak Fulwani, Ankur Gupta, Neha Jain, Vibhor Tak and Ram Prakash “Photocatalytic Oxidation Conveyor ‘PCOC’ System for Large Scale Surface Disinfection” *Rev. Sci. Instrum.* 93, 074101 (2022). <https://doi.org/10.1063/5.0082222>
- » P Pal, S Agarwal, A Tiwari, T Ichikawa, A Jain, A Dixit, Improved hydrogen desorption properties of exfoliated graphite and graphene nanoballs modified  $\text{MgH}_2$ , *International Journal of Hydrogen Energy* 47 (99), 41891-41897, (2022)
- » C Prakash, A Dixit, Multifunctional  $\text{BiFeO}_3$  Thin Film-Based Memristor Device as an Efficient Synapse: Potential for Beyond von Neumann Computing in Neuromorphic Systems, *ACS Applied Electronic Materials*, (2022)
- » C Tiwari, A Pandey, A Dixit, Precursor mediated and defect engineered  $\text{ZnO}$  nanostructures using thermal chemical vapor deposition for green light emission, *Thin Solid Films* 762, 139539 (2022)
- » AJ Kale, A Dixit Vacancy ordered  $\text{Cs}_2\text{SnX}_6$  ( $X = \text{Cl, Br, I}$ ) double perovskites as an absorber and antiferromagnetic  $\text{NiO}$  with GO as a hole transport layer for highly efficient heterojunction solar cell, *Solar Energy* 247, 330-345 (2022)
- » RM Sahani, A Dixit, A comprehensive review on zinc oxide bulk and nano-structured materials for ionizing radiation detection and measurement applications, *Materials Science in Semiconductor Processing* 151, 107040 (2022)
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### Ambesh Dixit

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### National Conference Papers

#### Ambesh Dixit

- » RamavtarJangra, Kiran Ahlawat, Ambesh Dixit and Ram Prakash “DBD Plasma Based High-

Efficiency Indoor Air Purifier” presented orally in the 37th National Symposium on Plasma Science and Technology (Plasma-2022) held at IIT Jodhpur during 12-14 December, 2022.

- » JyotiVerma, RamavtarJangra, Chandra Prakash, Ambesh Dixit, Ram Prakash “Synthesis of Nanostructure Materials for Non-equilibrium Cold based Packed Bed Reactor and their Comparative Analysis” presented poster in the 37th National Symposium on Plasma Science and Technology (Plasma-2022) held at IIT Jodhpur during 12-14 December, 2022.

#### Ram Prakash

- » Kiran Ahlawat, RamavtarJangra, VigyanGadodia, Ram Prakash “DBD Plasma Based Far UV-C Excimer Light Source: A New Paradigm for Safe Use of UV Light” presented poster in the 37th National Symposium on Plasma Science and Technology (Plasma-2022) held at IIT Jodhpur during 12-14 December, 2022.
- » Shikha Pandey, Sushma, Ritesh Mishra, Kiran Ahlawat, Ram Avtar, and Ram Prakash “Selective Reactive Nitrogen Species Rich Plasma Activated Water for Agricultural Applications” presented poster in the 37th National Symposium on Plasma Science and Technology (Plasma-2022) held at IIT Jodhpur during 12-14 December, 2022.
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- » Sushma, Abhijit Mishra, Shikha Pandey, Ritesh Mishra, Ram Prakash “Cold Plasma Seed Germination and Seedling Growth of Mung Bean Sprouts” presented poster in the 37th National Symposium on Plasma Science and Technology (Plasma-2022) held at IIT Jodhpur during 12-14 December, 2022.
- » Ritesh Mishra, Abhijit Mishra, Shikha Pandey, Sushma, Meenu Chhabra, Ram Prakash “Shelf-Life Study of Fresh-cut Fruits treated with



Non-equilibrium Cold Plasma” presented poster in the 37th National Symposium on Plasma Science and Technology (Plasma-2022) held at IIT Jodhpur during 12-14 December, 2022.

### Reetanjali Maharana

- » S. Dhara & R. Moharana, “Investigating Ultra Long Short GRBs Using Fermi-GBM Data”, Proceedings of the XXIV DAE-BRNS High Energy Physics Symposium, Jatni, India. Springer Proceedings in Physics book series (SPPHY, volume 277), pp-731-736, (Oral Presentation), DOI: 10.1007/978-981-19-2354-8\_132, 2022

### Shahab Ahmad

- » B Hariharan, S Ahmad, M Chakraborty, A Chandra, SR Dugad, SK Gupta, Y Hayashi, P Jagadeesan, A Jain, P Jain, VB Jhansi, S Kawakami, H Kojima, S Mahapatra, PK Mohanty, R Moharana, SD Morris, Y Muraki, PK Nayak, A Oshima, B Pant, D Pattanaik, G Pradhan, PS Rakshe, K Ramesh, BS Rao, LV Reddy, R Sahoo, R Scaria, S Shibata, K Tanaka, F Varsi, M Zuberi, “A Detailed Investigation of Thunderstorm

Events Recorded in GRAPES-3 Experiment”, Proceedings of the XXIV DAE-BRNS High Energy Physics Symposium, Jatni, India. Springer Proceedings in Physics book series (SPPHY, volume 277), pp-661-665, (Oral Presentation), DOI: 10.1007/978-981-19-2354-8\_120, 2022.

- » Shubham Chamola and Shahab Ahmad, “Photo-Enhanced Li-ion Batteries”, National conference on Energy Materials & devices (NC-EMAD-2022), Indian Institute of Technology Jodhpur, 16-18 December 2022 (Oral Presentation). (National Conference)
- » Rashid M. Ansari and Shahab Ahmad, “Ruddlesden Popper Perovskite-MoS<sub>2</sub> Hybrid Heterojunctions based Stable Lithium-Ion Batteries”, National Conference on Energy Materials & Devices (NC-EMAD-2022), Indian Institute of Technology Jodhpur, 16-18 December 2022 (Oral Presentation) (National Conference)

## Projects

Project Title	Funding Agency and Scheme	Total Cost (INR)	Role	Duration	Status
Sulphur nanoparticles Reinforced Hierarchical Assemblies of Carbon nanotubes for efficient Lithium-Sulphur Batteries	DST	86.86 Lacs	PI	09 Oct 2019 to 30 Sep 2023	Ongoing
Harnessing radiative excitons in 2D-TMDs for ultracompact nanolaser and on-chip photonic devices	Core Research Grant, Science and Engineering Research Board (SERB), India.	Rs. 49, 98, 397/-	PI	13 March 2023 to 12 March 2026	Ongoing
Theoretical and Computational Study of Phase Separation in Binary Mixtures in the presence of Surface Fields	DST-SERB Core Research Grant (CRG)	Rs. 28,34,590/-	PI	From 24/01/2023 to 23/01/2026	Ongoing
Dense matter inside the astrophysical compact objects consistent with gravitational-wave observations	DST-SERB Core Research Grant (CRG)	26,64,992 INR	PI	Sanctioned	Ongoing
Scanning tunneling microscopic study of single organic molecule for memristive devices in neuromorphic application	SERB CRG	49,14,525 INR	PI	Sanctioned	Ongoing
Centre for Rechargeable Energy Storage Systems for Augmenting Transportation and Electrification (CREATE),	SERB, DST,	65 lakhs	PI	2022 - 2027	Ongoing
High Voltage (~ 5V) ultrafast charging/ discharging cathode materials in bulk and nano geometries for high power Li ion rechargeable batteries,	SERB (DST)	42 lakhs	PI	2020 – 2023	Ongoing
Ion transport dynamics in nanostructured cathode materials for Lithium and Sodium battery materials: Application of solid state MAS NMR and electrochemical methods	STARS	70 lakhs	Co-PI	Sanctioned 2023 - 2026	Ongoing
Silicon Phthalocyanine Based Low Power Memristive Device for Neuromorphic Application	SERB SIRE	750000 INR	PI	sanctioned	Completed

Project Title	Funding Agency and Scheme	Total Cost (INR)	Role	Duration	Status
Study of very high energy gamma rays from Galactic sources with GRAPES-3 observatory	SERB SRG	26,07,044	PI	Sanctioned	Completed 26 Nov 2020-25 May 2023
Uniquely Identifying Lorentz structure of new physics in semi leptonic B Decays	SERB CRG	22,18,612	PI	From 25-12-2020 to 24-12-2023	Ongoing

## Patents

- » Ramavtar Jangra, Kiran Ahlawat, Ambesh Dixit, and Ram Prakash "Indoor Air Purifying Device" Indian Patent Application No., 202211042187 Dated 22/07/2022.
- » Ram Milan Sahani, Arun Pandya, Ambesh Dixit, "A doped ZnO nanorods scintillator and alpha radiation detector prepared thereof" Indian Patent No. 379542
- » Ram Milan Sahani, Arun Pandya, Ambesh Dixit, "A process of preparation of thermal neutron sensitive thin composite scintillator" Indian Patent filed on date 20/5/2021
- » L. Saini, M. K. Patra, S. R. Vadera, A. Dixit, "A Process for Preparing Z-type Hexaferrite Powder" Indian Patent 3946/DEL/2015, dated 03/12/2015
- » Dr. Appalakondaiah Samudrala delivered an invited talk on "Computational Exploration of New Paradigm in Moiré Structures" at the **International Union of Materials Research Society (IUMRS), International Conference in Asia-2022**, Indian Institute of Technology Jodhpur (19th-23rd Dec, Invited Talk)
- » Dr. Reetanjali Moharana delivered an invited talk on "Hadronic models for blazars" at the 4th National Conference on High Energy Emission from Active Galactic Nuclei held on 12-14 August 2022 at Farook College, Calicut, Kerala
- » Prof. Amitava Mitra delivered an invited talk on "Rapidly Solidified Magnetic Materials and Their Applications" at Birla Institute of Technology Mesra on 30<sup>th</sup> June, 2022
- » Prof. Amitava Mitra delivered an invited talk on "Thermal and Magnetic Characterisation of materials" at the Synergistic Training Programme Utilizing the Scientific and Technological Infrastructure (STUTI) held on 8-14 August, 2022 and Organised by Indian Institute of Technology Jodhpur Supported by Department of Science and Technology, Govt. of India
- » Prof. Amitava Mitra delivered an invited talk on "Non-destructive Evaluation of Materials- A tool for Structural Health Monitoring" at a Short-Term Course on Structural Health Monitoring 3<sup>rd</sup> -7<sup>th</sup> January, 2022 at Indian Institute of Technology Jodhpur, 3<sup>rd</sup> -7<sup>th</sup> January, 2022
- » Prof. Amitava Mitra delivered an invited talk on "Magnetic Barkhausen Emissions: A tool for Quality Control and Damage Assessment

## Outreach activities from the Department of Physics:

- » Dr. Shahab Ahmad delivered an invited talk on "Metal Halide Perovskites: From Optoelectronic to Optoionic Devices" at the **Perovskite Society of India Meet International Conferences (PSIM)-2023**, Indian Institute of Technology Roorkee (01<sup>st</sup>-03<sup>rd</sup> March 2023, Invited Talk)
- » Dr. Shahab Ahmad delivered an invited talk on "Photo-Enhanced Energy Storage Devices" at the **International Union of Materials Research Society (IUMRS), International Conference in Asia-2022**, Indian Institute of Technology Jodhpur (19th-23rd Dec, Invited Talk)

of Engineering Components” on 16<sup>th</sup> March, 2022 at Kalyani Center for Technology and Innovations (R&D of Bharat Forge, Pune

- » Dr. Prabhat K. Jaiswal delivered an invited talk on “Kinetics of Wetting: Universal Fast Mode and Potential-dependent Regimes” in Current Directions in Statistical Physics at JNCASR, Jakkur, Bengaluru during 5-6 August 2022.
- » Dr. Prabhat K. Jaiswal delivered an invited talk on “Kinetics of Wetting: Universal Fast Mode and Potential-dependent Regimes” in Discussion Meeting On Statistical Physics and Complex Systems at IIT Kharagpur during 18-20 July 2022.
- » Dr. Prabhat K. Jaiswal delivered an invited talk as an Eminent Speaker on “Modeling and Simulation of Phase-Separating Mixtures” for Online FDP on "Advances in Computational Science and Technology" at School of Applied and Life Sciences, Uttaranchal University, Dehradun during 17-23 May 2022.

## Award & Recognitions

### Faculty

- » **Dr. Ram Prakash** received the Year-2022 Jaidutt Saraswati Sodha PSSI Plasma Award for significant contributions to low-temperature plasma applications particularly for clean air, water purity, environmental safety, and efficient energy systems. The award is given to Indian Scientists annually by the Plasma Science Society of India, below the age of 50 years, who have made significant research contributions through publications in reputed journals in plasma physics (ranging from fundamental phenomena to novel applications, thermonuclear fusions, etc.).

### Students

- » **PhD Students Mr. Abhishek Yadav and Mr. Rashid M Ansari** supervised by Dr. Shahab Ahmad won "**Best Poster Presentation Award (1<sup>st</sup> position)**" at the "Industry Day-2023 (Theme: Hydrogen Economy)" organized by IIT Jodhpur (3<sup>rd</sup>-4<sup>th</sup> Feb 2023).
- » **PhD Student Mr. Bikram Mondal** supervised by Dr. Shahab Ahmad won "**Best Poster Presentation Award**" won at the 'International

Union of Materials Research Society (IUMRS), International Conference in Asia-2022' held at IIT Jodhpur (19<sup>th</sup>-23<sup>rd</sup> Dec 2022).

- » **PhD Student Mr. Shubham Chamola** supervised by Dr. Shahab Ahmad won "**Best Oral Presentation Award**" at the 'National Conference on Energy Materials and Device (NC-EMAD 2022)' held at IIT Jodhpur (16<sup>th</sup>-18<sup>th</sup> Dec 2022).
- » **PhD Student Mr. Shubham Chamola** supervised by Dr. Shahab Ahmad won "**Best Poster Presentation Award**" at the "International Conference on Advances in Chemical and Material Sciences (ACMS-2022)", organized on Platinum Jubilee celebration of 'Indian Institute of Chemical Engineers', held during April 14-16, 2022.
- » **PhD Student Mr. Ramavtar Jangra** supervised by Dr. Ram Prakash won "**Best PSSI Oral Presentation Award**" on research paper entitled "DBD Plasma Based High-Efficiency Indoor Air Purifier" authored by Ramavtar Jangra, Kiran Ahlawat, Ambesh Dixit, and Ram Prakash and presented orally in the 37<sup>th</sup> National Symposium on Plasma Science and Technology (Plasma-2022) held at IIT Jodhpur during 12-14 December, 2022.
- » **PhD Students Shikha Pandey, Sushma, and Ritesh Mishra** secured **2<sup>nd</sup> position** in the poster presentation for the theme "Technologies for Sustainability" of the Industry Day 2023 organized by the Indian Institute of Technology Jodhpur during 3<sup>rd</sup>-4<sup>th</sup> February, 2023.

## New Technology developed in the Department of Physics

- » A team of faculty members and students of the Department of Physics have designed and developed a novel geometry Cold-plasma Detergent in Environment (CODE) device under an industry sponsored project useful for Better Indoor Air Quality and COVID-19 Pandemic using non-equilibrium cold plasma in combination with nanotechnology. The technical know-how was transferred to M/s Divya Plasma Solutions Pvt. Ltd. on 9<sup>th</sup> September, 2021 (A start-up company incubated at IITJ-TISC and promoted by Dr. Ram

Prakash). The first product was launched on 2nd August, 2022 on the occasion of the Institute Foundation Day.

### **Department Academic Programs**

The Department of Physics offers following programs:

- » BS in Physics with Specialization
- » M.Sc. (Physics)
- » M.Sc.-M.Tech Dual Degree in Physics and Materials Engineering
- » M.Sc.-M.Tech Dual Degree in Physics and Materials Engineering (Specialization in Functional Materials)
- » M.Sc.-M.Tech Dual Degree in Physics and Materials Engineering (Specialization in Computational Materials Engineering)
- » Ph.D. Program with specialization in Physics.

# Inter- Disciplinary Research Platforms

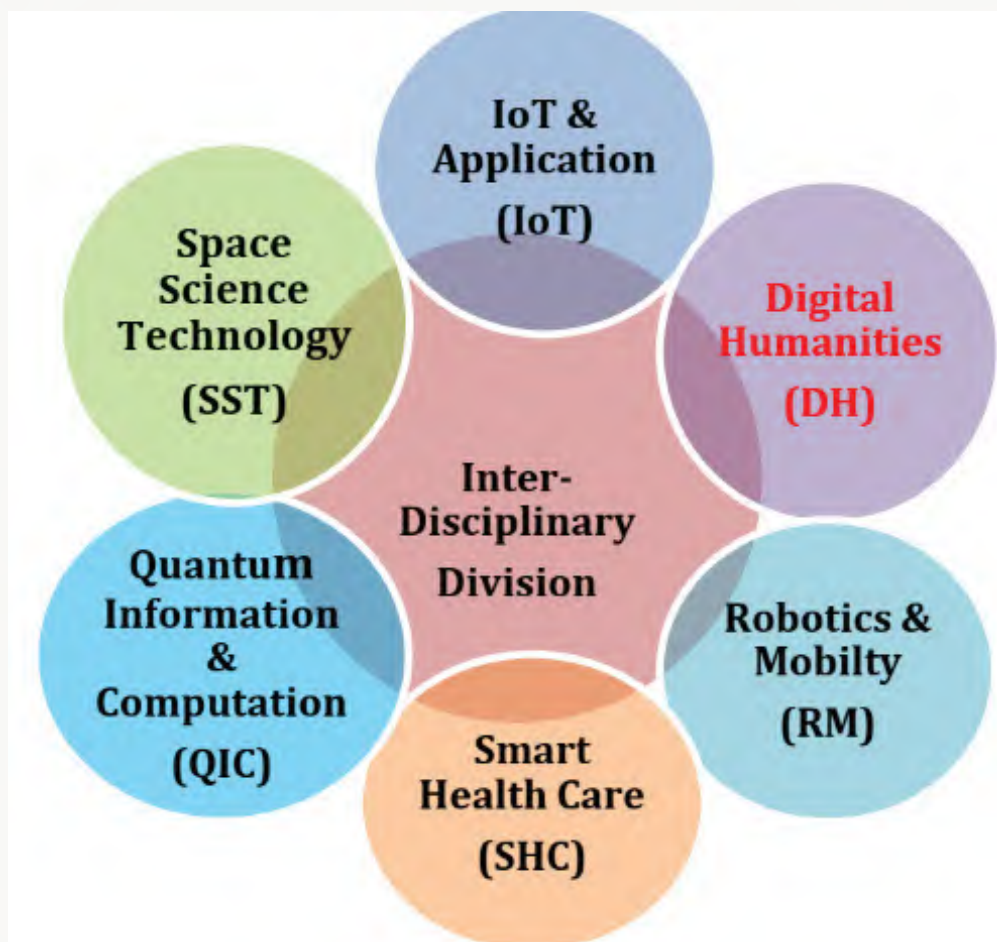


# Inter-Disciplinary Research Division

Division of Interdisciplinary Research has been established in IIT J since 2019 with the following objectives:

- » To create an environment to support interdisciplinary research platforms (IDRPs) in the contemporary areas of research and innovation.
- » To develop an ecosystem for competitive and cutting-edge research.
- » To encourage innovation and technology development in interdisciplinary fields
- » To have a structured process for conducting Ph.D and Post-Doctoral Research Programmes in interdisciplinary areas of IDRPs
- » To establish partnership with relevant industries and research organisations in the areas of mutual interest

The division comprises of six platforms:



# Digital Humanities

Digital Humanities at IIT Jodhpur is a unique interdisciplinary platform that offers a master's degree in DH, the latter being the first of its kind in India. It also runs a PhD program with number of scholars working in various issues starting from healthcare to traditional art and algorithmic accountability. The group has actively participated in existing and under consideration MoUs with other academic institutions both nationally and internationally.

**Faculties:** Twenty one faculties from different department, two adjunct professors and one professor of practice are associated with IDR-DH.

## Students Laurels:

### Sharanya Ghosh, PhD Student

1. Presented doctoral project at the doctoral consortium "Open Humanities, Open Culture"-annual conference of the Digital Humanities in the German-speaking countries/ DHd2023, Luxembourg/Trier. (April 2023)
2. Christ University, Lavasa, Pune invited Sharanya to conduct a training session on "Creative Writing in the Digital Age: Theory and Tools". (May 2023)
3. Contributed a Book chapter titled "**Sociocultural Learning and Literature Pedagogy: An Overview of Collaborative Digital Annotation**" in an edited book titled **Teaching English Literature in India: Pedagogy and Practice**, published by the English and Foreign Languages University Press, Hyderabad. (May 2023), ISBN 978-93-80425-04-7, Pages: 228 to 247
4. Successfully completed research stay at the Johannes Gutenberg University, Mainz, Germany, with international travel grant from the Indian Council of Social Science Research (ICSSR).

### Vasundhra Dahiya, PhD Student

1. Authored a chapter titled "**My year treating my self-diagnosed OCD with a chatbot that never was**" in the anthology "*Parables of AI in/from the Majority World*" curated by Ranjit Singh, Rigoberto Lara Guzmán, and Patrick Davison for Data & Society Research Institute, New York. Published in December 2022.

Publication Link: <https://datasociety.net/library/parables-of-ai-in-from-the-majority-world-an-anthology/>

2. Co-contributor to the book "**A Primer on AI in/from the Majority World: An Empirical Site and a Standpoint**", curated and edited by Sareeta Amrute, Ranjit Singh, and Rigoberto Lara Guzmán for Data & Society Research Institute, New York. Published in September 2022.

Available at Publication link: <https://datasociety.net/library/a-primer-on-ai-in-from-the-majority-world/>

## Conferences

- » Presented and won the Paul Fortier Prize (Best paper award) for the paper titled '**D or H – what leads in DH?: Envisaging the Digital Humanities Space in India**'. (*Publication under process*)

Authors: Vasundhra Dahiya, Sharanya Ghosh, Lavanya Dahiya & Aanya Chadha.



Conference: Digital Humanities 2023 (DH2023) Conference by Alliance of Digital Humanities Organisations (ADHO) (10-14 July 2023) at University of Graz, Austria.

Conference details at: <https://www.conftool.pro/dh2023/sessions.php>

- » Presented paper titled **'Brewing Anti-Caste Conscience: The DBA discourse of Justice'**.  
Authors: Steven S George, Vasundhra Dahiya  
Conference: 'Bearing Witness, Seeking Justice' (5-7th October 2022) at Massachusetts Institute of Technology (MIT), Cambridge, USA  
Conference details at: [https://drive.google.com/file/d/1fFEh2ASw2tMOKrHZD5rabsaED-0\\_tyR/view](https://drive.google.com/file/d/1fFEh2ASw2tMOKrHZD5rabsaED-0_tyR/view)
- » Acceptance of paper titled **'Digital Dating and its Discontents: AI, Masculinity and Consent'**.  
Authors: Lavanya Dahiya, Vasundhra Dahiya, Dibyadyuti Roy  
Conference: 'Digital Humanities Conference 2022' (25-29 July 2022) by Alliance of Digital Humanities Organizations (ADHO)  
Link to Book of Abstracts: <https://dh2022.dhii.asia/dh2022bookofabsts.pdf>
- » Presented paper titled **'The Unbearable Simplification of (Being) AI: Digital Dating and its Gendered Discontents in India'**.  
Authors: Lavanya Dahiya, Vasundhra Dahiya, Dibyadyuti Roy  
Workshop: 'The Social Life of Algorithmic Harms' Academic Workshop (March 10-11, 2022) by Data & Society.  
Details of workshop at: <https://datasociety.net/announcements/2021/10/28/the-social-life-of-algorithmic-harms/>
- » Presented paper titled **'Humanistic Enquiries for Responsible Socio-technical Systems'**.  
Author: Vasundhra Dahiya  
Conference: 'DHARTI 2022 Conference: The Digital Divides: Discontents, Debates and Discussions' (February 2022) by DHARTI (Digital Humanities Alliance for Research and Teaching Innovation)

Link to the Book of Abstracts:  
[https://hcommons.org/?get\\_group\\_doc=1003958/1645382477-abstractMergedNew.pdf](https://hcommons.org/?get_group_doc=1003958/1645382477-abstractMergedNew.pdf)

### Lavanya Dahiya, Master Student

### Publications

1. Publication under process at 'Digital studies' (<https://www.digitalstudies.org/>) published by ADHO (Alliance of Digital Humanities Organisations) and CSDH (Canadian Society for Digital Humanities)

### International collaborations:

1. HASTAC Scholar for 2021-2023 (Pronounced as "haystack" stands for *Humanities, Arts, Science and Technology Alliance and Collaboratory*.  
Official Website: <https://hastac.hcommons.org/> and Cohort program selected in: <https://hastac.hcommons.org/about/hastac-scholars/>)
2. Communications and Outreach Editor for Digital Humanities Quarterly (DHQ) Journal. List of People in DHQ: (<http://digitalhumanities.org/dhq/people/people.html>)

### Conferences:

1. Presented the paper titled **'What's the #realdeal with #boycottism?: A critical analysis of online activism to study social movements on digital platforms'**  
Authors: Lavanya Dahiya  
Conference: HASTAC 2023 Conference of theme 'Critical Making and Social justice' at Pratt Institute, Brooklyn, New York [8-10 June 2023];  
Link: <https://hastac2023.org/>
2. Presented the paper titled **'From tube top to a Dupatta, which Feminism is mine?'**  
Author: Lavanya Dahiya  
Conference: RC14 Conference titled "Gender and Media: Representations, discourses and practices" at XX International Sociological Association, World Congress of Sociology University of Melbourne, Australia [June 23-24, 2023];

Link: [https://www.rc14-isa.com/\\_files/ugd/6c5c13\\_d4ad6cedc77f46458d63b1198e569c76.pdf](https://www.rc14-isa.com/_files/ugd/6c5c13_d4ad6cedc77f46458d63b1198e569c76.pdf)

- 3. Acceptance of position paper titled “The Safety And Surveillance Of ‘Women In Distress’: Policy Lessons For Responsible AI And Gender Concerns”**

Authors: Lavanya Dahiya, Dr Rachel Philip, and Vasundhra Dahiya

Submission Details: Science20 (S20) subtheme of “Science for Society & Culture” at IIT Jodhpur (2023)
- 4. Presented the paper titled ‘#Hathras: The Socio-Political Identity of ‘Call for Justice’ Videography’**

Authors: Lavanya Dahiya, Vasundhra Dahiya

Conference: ‘Bearing Witness, Seeking Justice: Videography in the Hands of the People’ by Comparative Media Studies/Writing at Massachusetts Institute of Technology (MIT), Cambridge, USA [5-7 October 2022];  
Link: <https://bearing-witness.mit.edu/>
- 5. Acceptance of paper titled ‘Digital Dating and its Discontents: AI, Masculinity and Consent’**

Authors: Lavanya Dahiya, Vasundhra Dahiya, Dibyadyuti Roy

Conference: Digital Humanities Conference 2022 by Alliance of Digital Humanities Organizations (ADHO) [25-29 July 2022];  
Link: <https://dh2022.adho.org/>
- 6. Presented the paper titled ‘The Unbearable Simplification of (Being) AI: Digital Dating and it's (Gendered) Discontents in India’**

Authors: Lavanya Dahiya, Vasundhra Dahiya, Dibyadyuti Roy

Workshop: *The Social life of Algorithmic Harms* workshop scheduled by Data and Society, New York [10-11 March 2022];  
Link: <https://datasociety.net/announcements/2021/10/28/the-social-life-of-algorithmic-harms/>
- 7. Presented the paper titled ‘From tube top to a Dupatta, which Feminism is mine?’**

Author: Lavanya Dahiya

Conference: DH UNBOUND 2022 Conference sponsored by the Association for Computers and the Humanities (ACH) and Canadian Society for Digital Humanities (CSDH) [17-19 May 2022]  
Link: <https://dhunbound2022.ach.org/>
- 8. Presented Poster titled ‘From tube top to a Dupatta, which Feminism is mine?’**

Author: Lavanya Dahiya

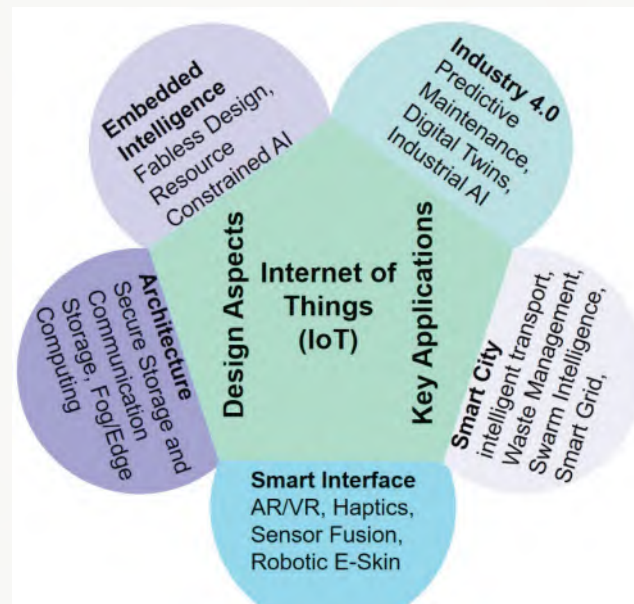
Conference: DHARTI 2022 Conference "The Digital Divides: Discontents, Debates, and Discussions" by DHARTI (Digital Humanities Alliance for Research and Teaching Innovations) [February 2022]; Link: <https://dhdharti.in/dharti-2022-conference/>

# IoT and Applications (IoT)

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 must be both highly sensitive and selective. On the other hand, the data collected from sensors must be analysed and used for making Processes and Systems smarter. IoT and applications area is a highly multidisciplinary area involving various areas of Materials, Devices, Sensors, Circuits, Communication, and Data Analytics, and their applications in IoT system development. Inter-Disciplinary Research Platform (IDRP) on the Internet of Things (IoT) & Applications is created

to work with a holistic approach for seamless integration of technologies.

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



The IDRP on IoT & Applications offers Ph.D. in a wide range of emerging and challenging interdisciplinary research areas such as AIoT, Industry 4.0, Smart City, Smart Infrastructure, Smart Grid, Environment Monitoring, Intelligent Transportation, etc. This

unique interdisciplinary Ph.D. program addresses the gap between real-life challenges and Technology by using a holistic approach. Please visit Research Area to know the associated research areas, facilities, and associated faculty members.

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

**Faculties:** Thirty Nine faculties from different department are associated with IDRPs-IoT and Application through their secondary affiliation.

**Academic Programs:** PhD program is offered by the platform.

### Approved Project Details

- » Point-of-use and in-line water quality sensors for smart water management: Detection of coliforms, fluoride and Biochemical Oxygen Demand (BOD)  
Team: Meenu Chhabra, Raviraj Vankayala, Arpit Khandelwal, Ravi Bhandari, Saakshi Dhanekar, Kamaljit Rangra  
Budget: 72 lakhs  
Funding Agency: Jal Jeevan Mission
- » Experimental study of flow mixing in RPV Plena  
Team: Hardik Kothadia, Arun Kumar R, Kamaljit Rangra, Saakshi Dhanekar  
Budget: 48.43133 lakhs  
Funding Agency: Ministry of Defence
- » Comprehensive (Environmental, Ecological, Anthropogenic, and others) Risk Assessment Data for Heritage Sites and Development of

Smart Heritage Management Systems

Team: Ajay Agarwal, Suchetana Chakraborty, Deepak Mishra from IIT Jodhpur, In collaboration with CEERI and NEERI

Budget: 296 lakhs

Funding Agency: Science and Heritage Research Initiative (SHRI)

- » Inventorization of the wildlife towards a sustainable campus

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

Budget: 2 Lakhs

Funding Agency: CETSD, IIT Jodhpur

Collaborating Organizations: ZSI and BSI

- » An endoscopic camera system

Team: Amandeep, Deepak

Budget: 49.7 Lakhs

Funding Agency: BIRAC – BIG

- » A Wellness Device for Real-time Non-contact Blood Oxygen Saturation Measurements

Team: Deepak Mishra (PI), Amandeep Kaur (Co-PI), Bibhudutta Satapathy (PhD student, EE)

Budget: 20 lakhs

Funding Agency: MSME

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

Team: Amandeep Kaur (PI), Deepak Mishra (Co-PI), Wilfred Kisku (PhD student, EE), Naali Sivaiah (PhD student, EE)

Budget: 20 lakhs

Funding Agency: MSME

### Other Activities

Libraries pertaining to three technology nodes UMC 65nm, UMC 40 nm and UMC 28nm have been procured to initiate fabless design activity as per one of the goals under mission 1 of the IoT-IDRP vision statement.

## Publications Details

1. A Photodetector-based Automated Light Intensity Controlling System using IoT, P. Shrivastava, M. Singh, V. Chalka, N. Vadera, S. Dhanekar and K. Rangra, 2022 IEEE Sensors, Dallas, TX, USA, 2022, pp. 1-4, doi: 10.1109/SENSORS52175.2022.9967288.
2. V. Mohan and A. Mathur, "Secrecy Analysis of DCSK-Based PLC Systems With Multiple Eavesdroppers," in IEEE Systems Journal, doi: 10.1109/JSYST.2022.3224982.
3. Pranay Ranjan\*, Gaur, S., Yadav, H., Urgunde, A.B., Singh, V., Patel, A., Vishwakarma, K., Kalirawana, D., Ritu Gupta\* and Prashant Kumar\*, 2D materials: increscent quantum flatland with immense potential for applications, Nano Convergence 9, 26 (2022). <https://doi.org/10.1186/s40580-022-00317-7>
4. A Das, S Chakraborty, S Chakraborty, "Where Do All My Smart Home Data Go? Context-aware Data Generation and Forwarding for Edge-based Microservices over Shared IoT Infrastructure", vol. 134, pages = 204-218, Future Generation Computer Systems, Elsevier, doi= <https://doi.org/10.1016/j.future.2022.03.027>, 2022, IF=7.187.
5. A Das, K Narayan and S Chakraborty, "Leveraging ambient sensing for the estimation of curiosity-driven human crowd," 2022 IEEE International Systems Conference (SysCon), 2022, pp. 1-8, doi: 10.1109/SysCon53536.2022.9773844
6. Prasad, S., Kumar, D., Kalra, S., Chiang, C. H., & Khandelwal, A. (2022, April). Automated and lightweight feature detection and matching towards real-time SHM of large structures. In Health Monitoring of Structural and Biological Systems XVI (Vol. 12048, pp. 317-328). SPIE.
7. Prasad, S., Kumar, D., Kalra, S., Chiang, C. H., & Khandelwal, A. An improved feature-based initial guess estimation technique for DIC. In Nondestructive Characterization and Monitoring of Advanced Materials, Aerospace, Civil Infrastructure, and Transportation XVI . SPIE.
8. Prasad, S., Kumar, D., Kalra, S., Chiang, C. H., & Khandelwal, A. A Feature-based Incremental DIC Approach to Measure Large Deformations of Soft Materials. In Michael Sutton International Student Paper Competition, SEM.
9. Prasad, S., Kumar, D., Kalra, S., Chiang, C. H., & Khandelwal, A. A Feature-based Incremental DIC Approach to Measure Large Deformations of Soft Materials. In Michael Sutton International Student Paper Competition, SEM
10. Lokendra Vishwakarma, Amritesh Kumar and Debasis Das, CrossLedger: A Pioneer Cross-chain Asset Transfer Protocol, The 23rd IEEE/ACM international Symposium on Cluster, Cloud and Internet Computing (CCGrid 2023): [ Core Ranking: Core A][ <https://ccgrid2023.iisc.ac.in/>]
11. Amritesh Kumar and Debasis Das, "IntelligentChain: Blockchain and Machine Learning based Intelligent Security Application for Internet of Vehicles (IoV)". In 2022 IEEE 95th Vehicular Technology Conference (VTC2022-Spring). IEEE. [Core Ranking: B](Accepted).
12. Amritesh Kumar, Debasis Das: TreeChain: A High Throughput and Efficient Search based Secure Application for Internet of Vehicles. 24th International Conference On Distributed Computing And Networking (ACM ICDCN) 4-7th January 2023, IIT Kharagpur, India: 349-353.
13. Kumar, Amritesh, Lokendra Vishwakarma, and Debasis Das. "R-PBFT: A secure and intelligent consensus algorithm for Internet of vehicles." Vehicular Communications 41 (2023): 100609.
14. Amritesh Kumar, Monu Nagar, Lokendra Vishwakarma and Debasis Das, HN-mPBFT: A Healthy Node based Modified Secure and Fast Consensus Mechanisms for Internet of Vehicles, The International Wireless Communications & Mobile Computing Conference (IWCMC 2023) (Accepted) [ Core B].
15. Koustav Kumar Mondal and Debasis Das, "FlameNet: A Real-Time, Lightweight Fire & Smoke Detection Solution for Internet of Vehicles," 2023 International Wireless

Communications and Mobile Computing (IWCMC), Marrakesh, Morocco, 2023, pp. 539-544, doi: 10.1109/IWCMC58020.2023.10182847.

16. Prasad, S., Chiang, C. H., Kumar, D., Kalra, S., & Khandelwal, A. (2023). Robust and efficient feature-based method for structural health monitoring of large structures. *Journal of Civil Structural Health Monitoring*, 1-22.
17. Kumar, D., Prasad, S., Chiang, C. H., An improved AI-based semantic filtering for marker-less DIC.

American Society for Non-Destructive Testing. (Accepted).

18. Prasad, S. Kumar, D., Kalra, S., & Khandelwal, A. A novel feature-based incremental digital image correlation method to measure large deformation of soft materials. *International Conference on Advances in Experimental Mechanics, British Society for Strain Measurement*. (Accepted)

### List of Webinars Conducted

S.No.	Title	Speaker	Date
1	Industrial-Internet-of-Things Network-Paradigm for the Next-Generation of Smart Grids	Prof. Georges Kaddoum, ETS Canada	26.10.2022

### Laurels and Achievements

S. No.	Participants / Team Members	Event Name	Topic	Date	Award
1.	Sneha PrasadA	iS3:iDeathon on Sustainable Smart Systems, In collaboration with ACM IIT Jodhpur, AVL India.	Smart Data Center for Compensating Chassis Vibration with Fog-Cloud Computing, iS3: iDeathon	August, 2022	Winner (First Prize)
2.	Sneha Prasad, Dr. Sumit Kalra, Dr. Arpit Khandelwal, Dr. Amit Goyal, Dr. Abhinav Dixit, Dr. Nithin Prakashan, Virendra Singh	Tech4Seva Virtual International Summit-2022 by the Unnat Bharat Abhiyan RCI, IIT Jodhpur	Talking Gloves: A language Independent Speech Generation Wearable Device	July, 2022	Winner (First Prize)
3.	Sneha Prasad, Ajay B. Dr. Sumit Kalra, Dr. Arpit Khandelwal, Dr. Amit Goyal, Dr. Abhinav Dixit, Dr. Nithin Prakashan, Virendra Singh	Global Indian Young Scientist Research and Innovation Conference-2023 by Global Indian Scientist and Technocrats	Talking Gloves: A language Independent Speech Generation Wearable Device	June, 2023	Young Rural Innovator Award Top Innovator all over India

# Quantum Information & Computation (QIC)

## Introduction

Over the last century, Quantum Mechanics has emerged as a fundamental ingredient for understanding various facets of nature such as atomic and sub-atomic physics, quantum optics and a plethora of phenomena in condensed matter physics. Modern developments in computing could be said to have started from the work of Alan Turing, while information theory was put on the pedestal of modern science by the efforts of Claude Shannon. The amalgamation of quantum physics with computing and information theory could be historically traced from the works of EPR (Einstein, Podolsky and Rosen), followed by that of John Bell and culminating in efforts made by Charles Bennett. This was further cemented by the efforts of William Wootters. In the last three decades, the world has witnessed enormous progress on the theoretical front to investigate the foundations of quantum information, and to analyse the potentials offered by entanglement and nonlocal correlations towards computing. The ongoing debates, studies and creative intellect paved the way for a new computing paradigm with a promise of speed-up, efficiency, and enhanced security. In fact, the experimental developments over the last few decades have brought the subject of quantum information and computation to the threshold of technology development.

Handling, manipulating, and processing quantum information require control and protection of nonlocal correlations over quantum channels. The fragile nature of these correlations coupled with uncontrollable interactions with surroundings make the problem of scalability exponentially challenging. The increase in technological difficulties with the increase in number of qubits should not be surprising considering that complexity is the

characteristic trait of the theory in place. In fact, it is the complexity and potentials therein that motivate the academicians, industries and entrepreneurs to invest in the intellect and generate funding to resolve theoretical and technological challenges. Apart from academia across the globe, tech giants such as IBM, Google, Microsoft, D-Wave, Intel, Regetti, QuintessenceLabs, Hewlett Packard, Ion Q, Cambridge quantum computing Quantum Biosystems, and many more are addressing the issues related to control, gate fidelity and scalability- quantum error correction. Moreover, the Government of India has taken the cognizance of the area and initiated a new research program on Quantum Enabled Science & Technology (QuEST) and in the similar way the Ministry of Electronics and Information Technology (MeitY) has taken various initiatives.

**Faculty details:** Eleven (11) faculties from different department of IIT J are associated with IDRQ-QIC through their secondary affiliation.

## Description of Research Groups

The Quantum Information and Computation (QIC) group at IIT Jodhpur is working towards analysing 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. Some of the key issues in characterizing multiqubit entanglement are being addressed by the group. 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.

## Academic Programmes

- » BS program with a specialization in Quantum Technology (started in AY 2022-23)

## Publications

- » Subhashish Banerjee, K. G. Paulson, "Quantum speed of evolution of neutral mesons": *Eur. Phys. J. Plus* 138, 597 (2023).
- » Devvrat Tiwari, Subhashish Banerjee, "Impact of non-Markovian evolution on characterizations of quantum thermodynamics": *Front. Quantum. Sci. Technol.* 2, 1207552 (2023).
- » Jai Lalita, K. G. Paulson, Subhashish Banerjee, "Harnessing quantumness of states using discrete Wigner functions under (non)-Markovian quantum channels": *Annalen der Physik*, 202300139 (2023).
- » Ramniwas Meena, Subhashish Banerjee, "Characterization of Quantumness of non-Gaussian states under the influence of Gaussian channel": to appear in *Quantum Information Processing*
- » Devvrat Tiwari, Subhashish Banerjee, "A study of the quasi-probability distributions of the Tavis-Cummings model under different quantum channels": *Ann. of Phys.* 455, 169390 (2023).
- » Ashutosh Kumar, Trilochan Bagarti, Sourabh Lahiri, Subhashish Banerjee, "Thermodynamics of one and two-qubit nonequilibrium heat engines running between squeezed thermal reservoirs": *Physica A*: 623, 128832 (2023)
- » Devvrat Tiwari, K. G Paulson, Subhashish Banerjee, "Quantum correlations and speed limit of central spin system": *Annalen der Physik* DOI:10.1002/andp.202200452:
- » K. G. Paulson, Subhashish Banerjee, "Quantum speed limit time: role of coherence as a dynamical witness to distinguish multi-qubit entangled states": *J. Phys. A: Math. Theor.* 55, 505302 (2022)
- » Riya Baruah, K. G. Paulson, Subhashish Banerjee, "Phase covariant channel: Quantum speed limit of evolution": *Annalen der Physik* <https://doi.org/10.1002/andp.202200199>; arXiv:2204.08149:.
- » Devvrat Tiwari, Shounak Datta, Samyadeb Bhattacharya, Subhashish Banerjee., "Dynamics of two central spins immersed in spin baths": *Phys. Rev. A*: 106, 032435 (2022)
- » Srishty Aggarwal, Subhashish Banerjee, Arindam Ghosh, Banibrata Mukhopadhyay, "Non-uniform magnetic field as a booster for quantum speed: faster quantum information processing": *New Journal of Physics* 24, 085001 (2022)
- » Parvinder Singh, Jyoti Faujdar, Maitreyee Sarkar and Atul Kumar, Bell's inequality with Biased Experimental Settings, *Quantum Information Processing* **21**, 167 (2022)
- » Jyoti Faujdar, Hargeet Kaur, Parvinder Singh, Atul Kumar and Satyabrata Adhikari, Nonlocality and efficiency of three-qubit partially entangled states, *Quantum Studies: Mathematics and Foundation* **10**, 27 (2022)
- » M.Tech. in Quantum Technologies (to be introduced in AY 2023-2024)
- » B.Tech. minor in Quantum Information and Computation (QIC)
- » PhD in IDR-P-QIC
- » A Science-linked elective titled "Fundamental of Quantum Information" offered to 2nd year undergraduate students



- » Diksha Sharma, Parvinder Singh and Atul Kumar, The role of entanglement for enhancing the efficiency of quantum kernels towards classification, *Physica A* **625**, 128938 (2023)

## Projects

1.	Quantum Heat Engines	2019-2023	ICPS, New Delhi
2.	Generation of Entangled Photons and its application to Quantum Computation and Information Processing	2019-2023	ICPS, New Delhi
3.	Multiparticle Entanglement, Nonlocality and Quantum Information processing	2019-2022	SERB, New Delhi
4.	Modelling and comparative analysis of approaches, protocols, atmospheric effects and components of LEO satellite based Quantum Key Distribution	2022-2023	DRDO, Pune
5.	Quantum cryptanalysis of symmetric cryptosystems.	2022-2023	DRDO
6.	To Study potential protocols for satellite based secure communication under ambient conditions.	2023-2025	ISRO

# Robotics & Mobility Systems (RMS)

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

### The vision of IDRPs 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 system to solve technological challenges in civil and military sectors to develop state-of-the-art applications.

### The missions of IDRPs on RMS are:

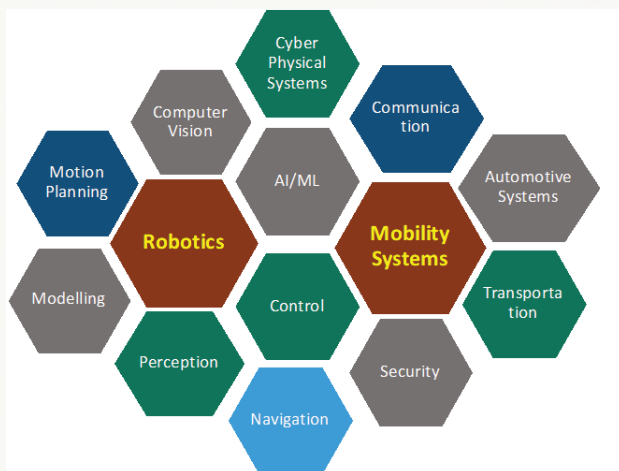
- » Develop an ecosystem to promote research and technology development in ground-, air- and

water-based mobile robots, and collaborative robots for defence and civilian applications.

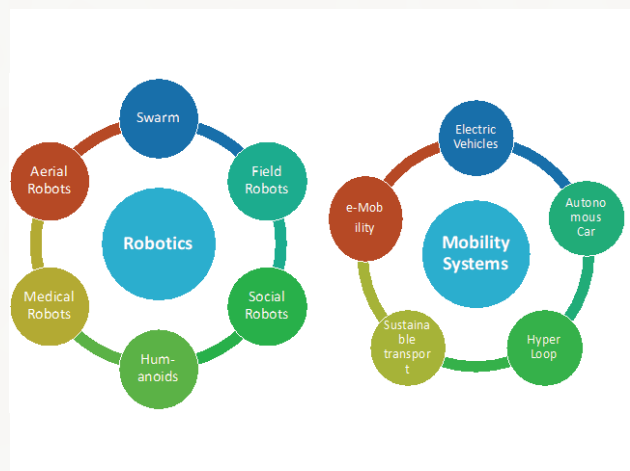
- » To pursue indigenous research to cultivate technological solutions addressing growing demands in electric vehicles, autonomous vehicles, and drones.
- » To produce professionals with in-depth knowledge and analytical and experimental research skills to handle Robotics and Mobility Systems problems.
- » 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 IDRPs on RMS.

### Scope of RMS-IDRP



### Application Area



## Faculty Details:

There are 22 faculties associated with IDRP-RMS. They are engaged in following technical activities:

- » Computer Vision and Haptics
- » Robotics and Control
- » Dynamics, Design and Manufacturing
- » Communication
- » Drives and Battery Technology for Electric Vehicle, Traffic Management Systems

## The Thematic Areas of Research in this IDRP are:

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

## Academic Programmes

Phd Program: 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.

**M.Tech. Program (Regular and Executive):** To meet the increasing demand for engineers with diverse backgrounds in the field of robotic and mobility systems, and to support relevant research and development, an M.Tech. Programme in Robotics and Mobility System is designed. The M.Tech.programme provides interdisciplinary

learning opportunities to participate in one of the most challenging advanced technology areas. It is also envisaged that the programme serves as a platform to test innovative ideas in the design, development, and testing of the Robotics and Mobility systems. Currently, we are offering the M.Tech. program in Robotics and Mobility Systems with micro specialisations in

1. Autonomous Mobile Robots [AMRs]
2. Unmanned Aerial Vehicles [UAVs]
3. Electric Vehicles (EVs)

**B.Tech. Specialization:** To provide an understanding of the interdisciplinary field of robotics to undergraduate students interested in pursuing careers or post graduate degrees in this field of interdisciplinary specialization in robotics for B.Tech. Students.

## Laboratories and equipment

The IDRP RMS developed a Lab for Unmanned Vehicles. The primary focus of this Lab is to pursue research on Unmanned Vehicles. The Lab facility is also used for the M.Tech. Students.

## Outreach activities

IDRP RMS organized a two days' workshop on Field Robotics. With the increase in applications of robots, the field of robotics has taken greater strides in the past two decades. One specific area, which has gained the attention of the community, is Field Robotics. The workshop had talks in the above areas by eminent speakers from academia, industry, and R&D organization. It was also aimed to have a poster session which provided an opportunity to the participant to get valuable feedback from the experts in the area. The workshop concluded with a panel discussion on opportunities in Field Robotics by experts.

# Smart HealthCare

**Faculties:** Forty two faculties from different department through their secondary affiliation, one adjunct professor and one professor of practice are associated with IDRPs-SHC. They are engaged primarily in following research areas:

- » AI in Health Care
- » Sensor and IoT for smart healthcare
- » Nanomedicine
- » Adaptive medical platforms and tissue engineered products for personalized medicine.

## Publications

### Dr. Raviraj Vankayala

- » Singh S K, Mazumder S, Vincy A, Hiremath N, Kumar R, Banerjee I, **Vankayala R\*** "Review of Photoresponsive Plasmonic Nanoparticles that Produce Reactive Chemical Species for Photodynamic Therapy of Cancer and Bacterial Infections", *ACS Applied Nanomaterials* **2023**, 6, 3, 1508, doi.org/10.1021/acsnm.2c04551
- » Vincy A, Mazumder S, Banerjee I, Hwang K C, **Vankayala R\*** "Recent Progress in Red Blood Cells-Derived Particles as Novel Bioinspired Drug Delivery Systems: Challenges and Strategies for Clinical Translation", *Frontiers in Chemistry* **2022**, 10, 905256, doi.org/10.3389/fchem.2022.905256
- » Arnab Maity, Yael Hershkovitz-Pollak, **Ritu Gupta**, Weiwei Wu, and Hossam Haick\* Spin-Controlled Helical Quantum Sieve Chiral Spectrometer, *Advanced Materials*, 2023 <https://doi.org/10.1002/adma.202209125> (IF =25.8)
- » Verma, M.; Bahuguna, G.; Arpit, Snehraj Gaur, Hossam Haick and **Ritu Gupta\***, Room Temperature Humidity Tolerant Xylene Sensor using Sn-SnO<sub>2</sub> Nanocomposite, *ACS Applied Materials and Interfaces*, 2023 <https://doi.org/10.1021/acsmi.2c22417> (IF =10.3)
- » S. Kiruthika, Sneha Namuni, **Ritu Gupta\*** Visibly Transparent Supercapacitors, *Journal of Materials Chemistry A*, 2023, **11**, 4907-4936, <https://doi.org/10.1039/D2TA07836H> (IF= 12.7).
- » Verma, M.; Bahuguna, G.; Shukla S. and **Ritu Gupta\*** SnO<sub>2</sub>-rGO Hybrids for Highly Selective and Sensitive NO<sub>2</sub> Sensor Fabricated using Component Combinatorial Approach, *ACS Applied Nanomaterials*, 2022, <https://doi.org/10.1021/acsnm.2c05117>
- » Snehraj Gaur, Ajay B. Urgunde, Gaurav Bahuguna, S. Kiruthika,\* **Ritu Gupta\*** Scalable Supercapacitors (Book Chapter), *Handbook of Nanocomposite Supercapacitor Materials IV*, ISBN 978-3-031-23700-3, 2023.
- » Gaur, S., Urgunde, A.B., Shanmugam, K., and **Ritu Gupta\***, Nano Inks for Supercapacitors, *Smart Multifunctional Nano-inks: Fundamentals and Emerging Applications*, Elsevier, 2022, ISBN: 978-0-323-91145-0 (Book Chapter)

### Dr. Ram Prakash

- » Shikha Pandey, Ramavtar Jangra, Kiran Ahlawat, Ritesh Mishra, Abhijit Mishra, Sushma Jangra, Ram Prakash, "Selective generation of nitrate and nitrite in plasma activated water and

its physicochemical parameters analysis," *Phys. Lett. Sect. A Gen. At. Solid State Phys.*, vol. 474, p. 128832, 2023, doi: 10.1016/j.physleta.2023.128832

## Faculty Laurels

- » Dr. Ram Prakash, Associate Professor, Department of Physics has been invited to join the Editorial Board of Nature Scientific Reports as an Editor
- » Dr. Ram Prakash, Associate Professor of the Department of Physics received the Year-2022 Jaidutt Saraswati Sodha PSSI Plasma Award
- » Dr. Ritu Gupta, Associate Professor of Department of Chemistry received SERB-SIRE fellowship for collaborative research with Prof. Hossam Haick at Technion-Institute of Technology, Haifa for 6 months.
- » Dr. Ritu Gupta Associate Professor of Department of Chemistry is selected as Advisory Board Member of prestigious RSC journal- Materials Horizon (Impact Factor= 14.3)

## Student Achievements

- » **Ritesh Mishra**, Shikha Pandey and Sushma secured 2nd position in the poster presentation for the theme "Technologies for Sustainability" of the Industry Day 2023 organized by Indian Institute of Technology Jodhpur during 3-4 February 2023.

## Med-Tech Program

- » As a part of IDRPs-SHC, joint MedTech program between IIT Jodhpur and AIIMS Jodhpur is running since 2020. The program offers Master's, Master's-PhD and PhD programs in Medical Technologies with the aim to provide a common platform for doctors and engineers, fostering knowledge sharing and innovation leading to the development of indigenous healthcare devices and systems through the process of incubation and entrepreneurship. This is a **multi-disciplinary program to produce**

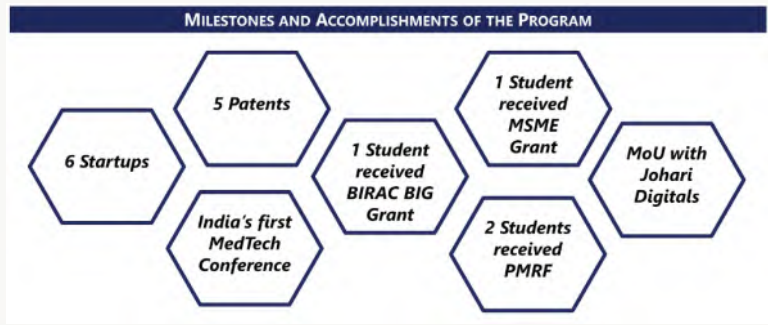
**deep-tech innovators in the field of Medical Technologies** fuelled by the need for disruptive healthcare technologies, interdisciplinary breakthroughs, the global and national need for healthcare innovation, and a fast pace of technology development for self-reliance in the spirit of **Atmanirbhar Bharat, Digital Health Mission** and **Make in India**.

### The Scope of the Joint Medical Technologies Programmes:

1. The programs provide opportunities to assimilate cutting-edge knowledge in the domain of medical and technological science to address the current and future challenges in the global problems of healthcare sectors
2. The program also encourages health-techno innovators to initiate a start-up and venture into entrepreneurship.
3. The program encompasses broad areas related to but not limited to: bio-device development, imaging-based diagnostics, deep-tech solutions, and telemedicine
4. The program utilizes the individual interests of students and tailor make the course work to enable the doctors and engineers to work jointly to meet the challenges of healthcare.

The first batch of master's student graduated out in 2022.

This year a yearly conference has been initiated called the Indian Conference on MedTech Innovations (ICMI), jointly offered by IIT Jodhpur, AIIMS Jodhpur and JCKIF in February 2022. This conference is the first exclusive MedTech conference in India. 300 attendees attended the first edition of ICMI 2023. It brought together industry, entrepreneurs, innovators, Start-ups and Investors with unique opportunities to build a collaborative ecosystem at Jodhpur.



Students of joint MedTech program who were selected as winners at MEDHA 2023 (AIIMSJ IITJ hosts) also won awards at BETIC, IIT Bombay

# Space Science & Technology (SST)

## Introduction to the Space Science & Technology (IDRP-SST)

The space science and technology (SST) interdisciplinary research platform (IDRP) at IIT Jodhpur has been formed in 2019 to cater the growing demands on space sector research in the country. The proposed research programme on Space Science and Technology will be a collective multidisciplinary effort to address key scientific and engineering issues in understanding and exploiting space. The space being so vast and varied with almost infinite number of stellar objects and perhaps a greater number of unknowns than knowns, offers huge opportunities to carry out fundamental research to develop better understanding of the Universe. Further, space also offers wide range of opportunities for its exploitation for a number of technological applications such as space vehicles, satellite technologies, remote sensing using sensors operating over a range of wavelength regions including visible, infrared, microwave, etc. It comprises of both the science as well as engineering/technology components. These can be thought as the following:

1. Develop scientific and technological tools including certain specialized payloads for the furtherance of research in basic or fundamental science, particularly in the exploration of the Universe.
2. Technology advancement can be achieved with
  - » Pure technological development
  - » Translation of basic research into technology.
  - » The program will be based on system approach involving multidisciplinary subjects wherein a set of complex problems pertaining to the Space Science and Technology will be taken up involving several sub-activities such as design and development of sub-components including materials modelling, experimental realization, component modelling and fabrication, integration, and its validation as a complete system/sub-system.

## Faculty Details:

There are 15 faculties associated with IDRP-SST through their secondary affiliation and are carrying out various aspects related directly and indirectly to space science technology.

## Publications:

### Journal Publications in IDRP-SST

- » Singh, S. K., & R, Arun. K. (2021). A parametric study on the fluid dynamics and performance characteristic of Micronozzle flows. *Journal of Fluids Engineering*, ASME, *144*(3). <https://doi.org/10.1115/1.4052546>
- » Nipun Sharma, Adarsh Nigam, Dimitry Lobanov, Ankur Gupta, Alexey Novikov, and Mahesh Kumar. "Mercury (II) Ion Detection using AgNWs MoS<sub>2</sub> Nanocomposite on GaN HEMT for IoT Enabled Smart Water Quality Analysis". *IEEE Internet of Things* <https://doi.org/10.1109/JIOT.2021.3071382>
- » Nipun Sharma, Adarsh Nigam, Ankur Gupta, Sudhiranjan Tripathy, and Mahesh Kumar. "1T and 2H Heterophase MoS<sub>2</sub> for Enhanced

- Sensitivity of GaN transistor-based Mercury ions Sensor". IOP Nanotechnology <https://doi.org/10.1088/1361-6528/ac5cff>
- » Nipun Sharma, Sumit Kumar, Ankur Gupta, Surani Bin Dolmanan, Dharmraj Subhash Kotekar Patil, Swee Tiam Tan, Sudhiranjan Tripathy, and Mahesh Kumar "Influence of gas molecules on 2D electron gas of AlGa<sub>N</sub>/Ga<sub>N</sub> transistor: Room temperature NO<sub>2</sub> gas sensor". Sensors and Actuators: A <https://doi.org/10.1016/j.sna.2022.113647>
  - » Nipun Sharma, Vikas Pandey, Ankur Gupta, Swee Tiam Tan, Sudhiranjan Tripathy, and Mahesh Kumar. "Recent progress on Group III-nitride based Gas Sensors: A Review" <https://doi.org/10.1039/D2TC02103J>
  - » Nigam Adarsh, Nipun Sharma, Dmitry Lobanov, Alexey Novikov, and Mahesh Kumar. "Ultrasensitive Detection of Mercury Ions Under UV Illumination of MoS<sub>2</sub> Functionalized AlGa<sub>N</sub>/Ga<sub>N</sub> Transistor." 67, no. 12 (2020): 5693- 5700. IEEE Transactions on Electron Devices <https://doi.org/10.1109/TED.2020.3030000>
  - » Adarsh Nigam, Nipun Sharma, Sudhiranjan Tripathy and Mahesh Kumar "Development of Semiconductor Based Heavy Metal Ion Sensors for Water Analysis: A Review" Sensors and Actuators: A <https://doi.org/10.1016/j.sna.2021.112879>

### Conferences Attended/Paper present in IDRPs-SST

- » Himanchal Aman Meena, Sunil Duhan, Meraj Ahmad, Pankaj Jakhar, Aswathy Puthukkulam, Vinayak Shedekar, Asmita Murumkar, Anand Plappally, Plappally, "Modelling of Jojari river in semi-arid western Rajasthan, India using the geospatial techniques and 1 D flow model Analysis" BRICS NUs Water Resource and Pollution Treatment [WRPT21] 6 th 8 th July, 2021, NIT Jodhpur, IIT Kanpur.
- » Attendee at IEEE-ICEE 2020 (5th International Conference on Emerging Electronics) scheduled on 26th to 28th November 2020 hosted by IIT Delhi.
- » Attendee at International Winter School-2020 on "Frontiers in Materials Science", hosted at the

Jawaharlal Nehru Centre for Advanced Scientific Research, scheduled on December 07-11, 2020.

- » Oral Presentation in MRSI AGM, IIT Madras (20<sup>th</sup> December-23<sup>rd</sup> December 2021).
- » Poster Presentation in IEEE IWPSD, IIT Delhi 2021(14<sup>th</sup> December-17<sup>th</sup> December 2021).
- » Participated in Online Elementary FDP on "Nano-Sensors" at IIT Jodhpur conducted by AICTE Training And Learning (ATAL) Academy from 5<sup>th</sup> July- 9<sup>th</sup> July 2021.
- » Anupam Kumari, Ajay Agarwal, Angan Sengupta, Yuvraj Garg, "Conducting Yarn based Capacitive Humidity Sensor"; IEEE APSCON, 2023, DOI: 10.1109/APSCON56343.2023.10101251

### Academic Programmes

- » The SST IDRPs is currently offering only PhD program and there are currently 5 students pursuing PhD under this program.

### Faculty Laurels

- » Dr. Ankur been selected for the prestigious "ISSS Young Scientist Award 2022." ISSS (Institute of Smart Structures and Systems) is a Professional Society located in IISc Bengaluru

### Laboratories and equipment

#### Shock Waves and High-Speed Flow (SWAHS) Lab

The SWAHS lab tries to advance the frontiers of research activities and technology development in the field of Aerospace and Defence sector. We also focus on extending the high-speed flows and shock waves research to other applications such as Refrigeration systems, Bio-Medical engineering, Industrial processing, Water processing etc. Some of the existing research activities undertaken in these directions are, Supersonic Intakes, Supersonic Air-Fuel Mixing in Scramjet Combustors, Flow control and Actuators, Gas Turbine Cooling, Electric Propulsion Systems, Shock & Blast Wave Attenuation, Shock waves applications in Bio-Medical Engineering, Solar Ejector Refrigeration, Steam Ejector based Water Purification etc.





High Speed Imaging

### Outreach activities

- » Mentoring students for the prestigious CANSAT competition organized by Astronautical Society of India (ASI) and INSPACE.

### Sponsored/consultancy projects

#### On-going Projects

Project title	PI/Co-PI	Sponsoring agency	Amount in Lakhs	Start date	End date
1. Project title Cross Flows Flapping Jets for Supersonic Mixing Enhancement	PI: Dr. Arun Kumar R Co-PI: Dr. Hardik.B. Kothadia	Aeronautics Research Development Board – DRDO	24.89 Lakh	30th Sep 2020	30th Sep 2023
2. Film Cooling for Ejector Diffuser System in High Altitude Testing Facility	PI: Dr. Arun Kumar R Co-PI: Dr. Hardik.B. Kothadia	ISRO Respond	27.9 lakh	24th March 2021	24th March 2023
3. Radiation hard Gallium Nitride transistor for IoT enabled dosimeter	PI: Dr. Mahesh Kumar	DRDO	92.08 Lakh	7th Feb 2022	7th Feb 2025

# School



# School of Artificial Intelligence and Data Science



## Introduction to the School

Breakthroughs in AI and Data Science are key to shaping the future technological landscape. AI and Data Science is impacting progress of diverse disciplines of natural sciences, different fields of engineering and medicine, social sciences, and economics. In order to be at the forefront of this emerging technological frontier, School of Artificial Intelligence and Data Science (AIDE) was established at IIT Jodhpur in July 2020 with the vision to advance the field of AI and Data Sciences for the good of humanity.

The School aims to play a leading role in research, teaching and training in AI and its applications. The School also focuses on developing AI based technologies aligned to the locally and nationally relevant problems and challenges.

AIDE School brings together faculty from diverse disciplines with shared interests in fundamental challenges in AI and Data Science to make significant contributions in this field. Currently there are 54 faculty in the School which includes 46 affiliated faculty from 10 different departments and schools. Additionally, there are 4 adjunct faculty from different national and international institutes.

Currently the School of AI and Data Science has four transdisciplinary Centers of Excellence.

1. Brain Science and Applications
2. Mathematical and Computational Economics
3. Intelligent Infrastructure
4. AI based Precision Health

Following Centers of Excellence are envisioned in the next phase:

1. Language Technology
2. Human Centered AI
3. Guarantees for Machine Learning
4. Ethics of AI
5. Quantum AI

## Faculty at School of AIDE

<p><b>Neeraj Jain</b> Professor, <i>Head of School</i> Department: Biosciences &amp; Bioengineering Affiliation: Center for Brain Sciences &amp; Applications Neuroscience/Mammalian Sensory and Motor Systems; Tactile Information Processing; Brain Plasticity; Spinal Cord Injuries; Brain-Computer Interface; Brain Networks</p>	<p><b>Abhinaba Lahiri</b> Assistant Professor Affiliation: Center for Mathematical and Computational Economics Social Choice Theory, Mechanism Design, Game Theory</p>
<p><b>Dipanjan Roy</b> Associate Professor Affiliation: Center for Brain Science and Applications Coordinator: Center for Brain Science and Applications Network Neuroscience, Multimodal data fusion and EEG-MEG, fMRI brain signal decoding, Eye tracking and Human behavior, Cognitive aging and brain flexibility</p>	<p><b>Dweepobotee Brahma</b> Assistant Professor Affiliation: Center for Mathematical and Computational Economics Coordinator: Center for Mathematical and Computational Economics Econometrics, Causal Inference and Machine Learning, Health Economics</p>
<p><b>Ganesh Manjhi</b> Assistant Professor Affiliation: Center for Mathematical and Computational Economics Macroeconomics, Political Economy, Growth Economics, Applied Econometrics and Forecasting</p>	<p><b>Manish Aggarwal</b> Associate Professor Preference learning, multi criteria decision making</p>
<p><b>Shilpa Dang</b> Assistant Professor Affiliation: Center for Brain Science and Applications Computational Cognitive Neuroscience; Connectomics; fMRI; Pupillometry</p>	<p><b>S. Srivatsa Srinivas</b> Assistant Professor Affiliation: Center for Mathematical and Computational Economics Queueing Game Theory, Service Operations, Game Theory Applications, Public Policy Modeling</p>
<p><b>Vignesh Muralidharan</b> Assistant Professor Affiliation: Center for Brain Science and Applications Cognitive neuroscience of action control, Computational neuroscience, Impulse-control disorders, Non-invasive brain stimulation (TMS), Brain-imaging (EEG)</p>	

## Affiliated Faculty

### Department of Bioscience & Bioengineering

<p><b>Mitali Mukerji</b> Professor Affiliation: Center for Excellence in Integrative Precision Health Genomics, Human molecular genetics, functional genomics of Alu repeats, Ayurgenomics, genetics of rare diseases</p>	<p><b>Neeraj Jain</b> Professor Affiliation: Center for Brain Sciences &amp; Applications Neuroscience/Mammalian Sensory and Motor Systems; Tactile Information Processing; Brain Plasticity; Spinal Cord Injuries; Brain-Computer Interface; Brain Networks</p>
<p><b>Pankaj Yadav</b> Assistant Professor Affiliation: Center for AI and Precision Medicine Statistical Genetics, Deep Learning and Big Data Analytics</p>	<p><b>Sucharita Dey</b> Assistant Professor Structural Bioinformatics</p>

### Department of Chemical Engineering

<p><b>Pradip Kumar Tewari</b> Visiting Professor AI/ ML based Performance Analysis of Process Equipment and Chemical Industries, Smart Water Grid.</p>	<p><b>Angan Sengupta</b> Assistant Professor Multiscale Modeling and Simulations, Computational Material Design, Fire and Explosion Dynamics and Safety Modeling, Transport Processes Modeling and Simulations</p>
<p><b>Krunal M. Gangawane</b> Assistant Professor Numerical simulation, Modelling and Optimization, Lattice Boltzmann method, Nanoparticles, Thermal Energy Storage</p>	

### Department of Civil and Infrastructure Engineering

<p><b>P. Ravi Prakash</b> Assistant Professor Affiliation: Center for Intelligent Infrastructure Computational Mechanics, Structural Fire Engineering, Discrete Element Method</p>	<p><b>Ranju Mohan</b> Assistant Professor Affiliation: Center for Intelligent Infrastructure Traffic flow modelling and simulation, Driver behavior analysis, connected and autonomous vehicles</p>
<p><b>Saran Aadhar</b> Assistant Professor Affiliation: Center for Intelligent Infrastructure Surface Hydrology; Hydroclimatic extremes; Hydrologic modeling in natural and anthropogenic climate; Climate change and resilience</p>	

### Department of Computer Science & Engineering

<p><b>Anand Mishra</b> Assistant Professor Computer Vision; Deep Learning; Knowledge Graph; Multimodal Machine Learning</p>	<p><b>Debasis Das</b> Assistant Professor Affiliation: Center for Intelligent Infrastructure Networking, IoT and Machine Learning</p>
<p><b>Deepak Mishra</b> Assistant Professor Medical Image Analysis, Machine Learning, Resource Constrained AI</p>	<p><b>Dip Sankar Banerjee</b> Associate Professor Affiliation: Center for AI and Precision Medicine High Performance Computing, Computer Architecture, Data Analytics</p>
<p><b>Mayank Vatsa</b> Professor Computer Vision, Machine Learning (deep learning)</p>	<p><b>Richa Singh</b> Professor Affiliation: Center for AI and Precision Medicine Machine Learning and Trustable AI</p>
<p><b>Romi Banerjee</b> Assistant Professor Affiliation: Center for Brain Sciences &amp; Applications Natural Language Understanding, Creativity in Children, Embodied Systems</p>	<p><b>Santanu Chaudhury</b> Professor Affiliation: Center for Brain Sciences &amp; Applications, Center for AI and Precision Medicine Computer Vision, Computational Intelligence, Robotics, Multimedia Systems</p>
<p><b>Somitra Sanadhya</b> Associate Professor Cryptography; Quantum Computation</p>	

### Department of Electrical Engineering

<p><b>Ajay Agarwal</b> Professor Affiliation: Center for AI and Precision Medicine Microelectronics; Micro- Nano-technologies; Sensors; Micro-fluidics, Point-of-Care devices and Early diagnostics</p>	<p><b>Amit Bhardwaj</b> Assistant Professor Affiliation: Center for Brain Sciences &amp; Applications Haptics, Perception, Teleoperation, Applications of Machine Learning and Augmented and Virtual Reality</p>
<p><b>Anil Kumar Tiwari</b> Associate Professor Affiliation: Center for Brain Sciences &amp; Applications Neuroscience, Image and video processing, Healthcare devices</p>	<p><b>Arun Kumar Singh</b> Associate Professor Wireless Communications, Spread Spectrum Systems, ML for communications</p>
<p><b>Manish Narwaria</b> Assistant Professor Multimedia signal processing</p>	<p><b>Manoj Choudhary</b> Professor Affiliation: Center for AI and Precision Medicine Communication Systems (Wireless - 4G/5G/6G, Modem/WLAN/WPAN/UWB) and networks; System on Chip; Embedded Systems &amp; Software; Image Sensors and signal processing; Internet of Things and smart homes; AI, ML and computer vision</p>

<p><b>Nishant Kumar</b> Assistant Professor</p>	<p><b>Rajendra Nagar</b> Assistant Professor Affiliation: Center for AI and Precision Medicine Computer Vision, Computer Graphics, Digital Geometry Processing</p>
<p><b>Ravi Yadav</b> Assistant Professor Power system dynamics, wide area monitoring systems, anomaly detection and characterization, AI/ML applications to power systems, power</p>	<p><b>Sandeep Kumar Yadav</b> Associate Professor Signal Processing, Condition Monitoring, Image Processing, Data Compression, Blind Source Separation, Artificial Neural Network</p>

### Department of Mathematics

<p><b>Dilpreet Kaur</b> Assistant Professor Group Theory</p>	<p><b>Gaurav Bhatnagar</b> Associate Professor Multimedia Security, Image Fusion, Floor Plan Analysis, Image Segmentation, Image Completion</p>
<p><b>Nil Kamal Hazra</b> Assistant Professor Reliability, Time series Analysis</p>	<p><b>Md Abu Talhamainuddin Ansary</b> Assistant Professor Numerical optimization, Interval analysis</p>
<p><b>Puneet Sharma</b> Associate Professor Dynamical Systems</p>	<p><b>Vivek Vijay</b> Assistant Professor Financial Risk Analysis, Categorical Data Analysis, Regression</p>
<p><b>V.V.M.S. Chandramouli</b> Assistant Professor Smooth Dynamical Systems, Renormalization of Unimodal maps and Henon-like maps</p>	

### Department of Mechanical Engineering

<p><b>Anand Krishnan Plappally</b> Assistant Professor Wetlands, geospatial applications, agriculture</p>	<p><b>Harshal Akolekar</b> Assistant Professor Aerodynamics; Computational fluid dynamics; Machine learning; Submarine hydrodynamics; Turbulence Modeling</p>
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### Department of Physics

<p><b>Reetanjali Moharana</b> Assistant Professor Astroparticle Physics, High energy Cosmic rays, Gamma rays and Neutrinos</p>	<p><b>V. Narayanan</b> Assistant Professor Experimental Quantum Optics, Optical Coherence Tomography (OCT) and Quantum Imaging</p>
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### School of Liberal Arts

<p><b>Ankita Sharma</b> Associate Professor Affiliation: Center for Brain Science and Applications Advance form of human behavior as an integration for cognition, emotional, social, moral and self aspects</p>	<p><b>Chhanda Chakraborti</b> Visiting Professor Bioethics, Public Health Ethics, Logic, Philosophy of Mind.</p>
<p><b>Ruhi Sonal</b> Assistant Professor Affiliation: Center for Mathematical and Computational Economics Decision Theory, Game Theory, Economics of Networks</p>	<p><b>Suman Dhaka</b> Assistant Professor Affiliation: Center for Brain Science and Applications Cognitive Neuroscience</p>

### School of Management and Entrepreneurship

<p><b>Sankalp Pratap</b> Associate Professor Practices that aid entrepreneurs and their contexts</p>	<p><b>Krishna Kumar Balaraman</b> Associate Professor Foresight, Microfoundations of Strategic Capability Building</p>
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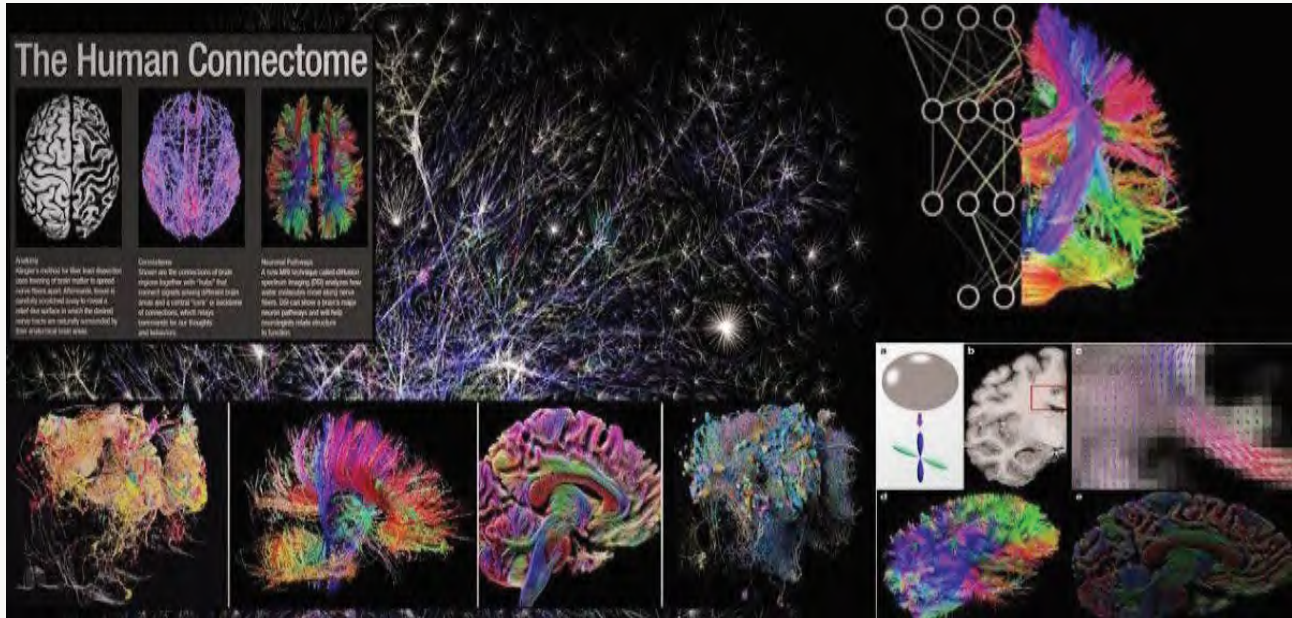
### Adjunct Faculty

<p><b>Abhimanyu Kumar</b> Professor Primary Affiliation: DSRRAU, Jodhpur Secondary Affiliation: Center for AI based Precision Medicine, School of AIDE Ayurveda Pediatrics &amp; concept of Prakriti, Child Mental Health, Respiratory Allergy, Prakriti (Ayurveda body-mind profiling) techniques</p>	<p><b>Saptarshi Mukherjee</b> Associate Professor Primary Affiliation: HSS, IIT Delhi Secondary Affiliation: Center for Mathematical and Computational Economics, School of AIDE Mechanism Design, Social Choice, Game Theory, Bounded Rationality</p>
<p><b>Sylvain Baillet</b> Professor Primary Affiliation: Faculty of Medicine &amp; Health Sciences, McGill University Secondary Affiliation: Center for Brain Science and Applications, School of AIDE Systems Neuroscience</p>	<p><b>Tapan K. Gandhi</b> Associate Professor Primary Affiliation: Electrical Engineering, IIT Delhi Secondary Affiliation: Center for Brain Science and Applications, School of AIDE Computational Neuroscience, Human-Machine Interaction, Medical Signal/Image Processing, ML/AI, AR/VR/MR, Assistive Technology</p>



## 1. Centers of Excellence and the Current Research Work

### 1.1 Center for Brain Sciences & Applications



Faculty: Prof. Neeraj Jain (Coordinator), Dr. Amit Bhardwaj, Dr. Anil Kumar Tiwari, Dr. Ankita Sharma, Dr. Dipanjan Roy, Dr. Romi Banerjee, Prof Santanu Chaudhury, Dr. Shilpa Dang, Dr. Suman Dhaka, Dr. Vignesh Muralidharan; Adjunct faculty: Prof Sylvain Baillet, Prof Tapan Gandhi

Center for Brain Science and Applications (CBSA) envisages bringing together practitioners of diverse disciplines to work on understanding the brain, developing technologies to study the brain, developing brain inspired AI and other technologies. This interdisciplinary center brings together biologists, physicists, engineers, mathematicians, psychologists. The neurobiologists interrogate the brain at the microscale (determining connectivity and functioning of individual neurons), mesoscale (studying network of groups of neurons such as a single sensory system or multiple sensory systems) and mega scale (studying the entire brain and interactions of brain in the context of inter-individual interactions). Other groups develop tools for data analysis and visualization, and work on next-gen AI and hardware architecture inspired from the knowledge of the brain structure and function. Use of knowledge from research on sensation, perception, intelligence, cognition and consciousness and how these relate to functional architecture of the brain would lead to development of, for example, brain inspired

machines, intelligent technology for prediction and diagnosis of diseases, brain-computer interface devices, intelligent prosthetics. One of the major goals of this Center is to work at the interface of neuroscience and AI dedicated to the study of human cognition and develop brain inspired algorithms to design cognitive machines. Teaching and training at the graduate and undergraduate levels is an important component of the Center's activities.

The ongoing research activities of the center are as follows:

- » Cognitive flexibility and healthy aging using signal processing techniques applied on EEG/MEG/fMRI data
- » Developing theoretical models based on the principles of dynamical systems and Bayesian theories to track developmental changes, cognitive flexibility, and brain network dynamics
- » Comparative Mapping of Common Mental Disorders over lifespan
- » Understanding psychology of wisdom

- » Role of sensory modality in enhancing spatial cognition for STEM education
- » Computational modeling of value-based decision-making
- » Understanding internal and external directed cognition
- » Atypical Brain Network Development and Impact on Theory-of-Mind
- » Psychobehavioral Plasticity in Cognitive Performance and its Influence on Fluid Intelligence among Healthy Aging Adults in India
- » Computational models of curiosity and creativity - drawing inspiration from brain mechanisms
- » Understanding effects of sleep on cognition
- » Machine learning approach for kinesthetic perception
- » Virtual/Augmented reality and applications for multimodal perception
- » Developing strategies that can modulate inhibitory control over our actions and thoughts

### 1.2 Center for Mathematical and Computational Economics



Faculty: Dr. Dweepobotee Brahma (Coordinator), Dr. Abhinaba Lahiri, Dr. Ganesh Manjhi, Dr. Ruhi Sonal; Dr. S. Srivatsa Srinivas; Adjunct faculty: Dr. Saptarshi Mukherjee

The Center for Mathematical and Computational Economics (CMCE) was established in 2020 as a specialized center dedicated to improving our understanding of the evolving nature of economics in the internet era. CMCE is an interdisciplinary unit that combines knowledge across the disciplines of computer science, engineering, mathematics, and statistics. It is a specialized unit for the research and teaching of economic theory combined with the use of modern tools of artificial intelligence and specializes in the following areas: Decision theory,

Social and Economic Networks, Mechanism design, Social choice theory, Auction theory, Optimization theory, Operations Research, Game Theory, Artificial Intelligence, reinforcement learning and mechanism design, Computational social choice, Algorithmic game theory, Big data and consumer choice, Applications of Machine Learning and Artificial Intelligence in Economics, AI for social good, Macroeconomic Theory, Growth theory and Political Economy.

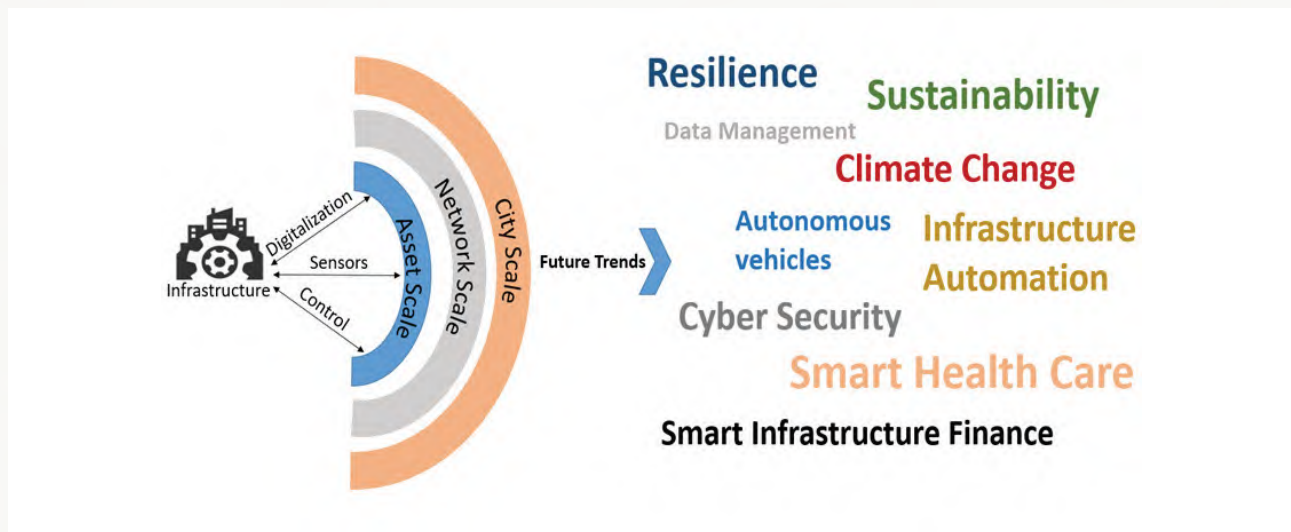
This center is focused on cutting edge research in mathematical and computational economics. Current on-going research projects include:

- » Measuring manipulability of social choice functions
- » Defining fairness in a two sided matching markets and investing the compatibility of this axiom with usual notions of stability
- » Using multi-objective optimisation techniques to unify efficient and Rawlsian auction schemes
- » Understanding the roots of child health inequities in India using Machine Learning.
- » Studying the nexus of poverty and health expenditure using Machine Learning
- » Game-theoretic models in last-mile logistics management
- » Product attributes and inter-firm competition

- » Choice behavior and Games with Graphs
- » Belief Structures and uncertain games
- » Political Budget Cycles in New Keynesian Framework
- » Focal Points and Median Voters
- » Modeling Exchange Rate Return
- » Overlapping Generation Model and the market for Insurance

The Center also has an active Ph.D. programme and a minor programme in mathematical and computational economics for undergraduate students. The objective of these programmes are to inculcate the interdisciplinary nature of economics with mathematics, statistics and computer science and prepare students for both academia and industry.

### 1.3 Center for Intelligent Infrastructure



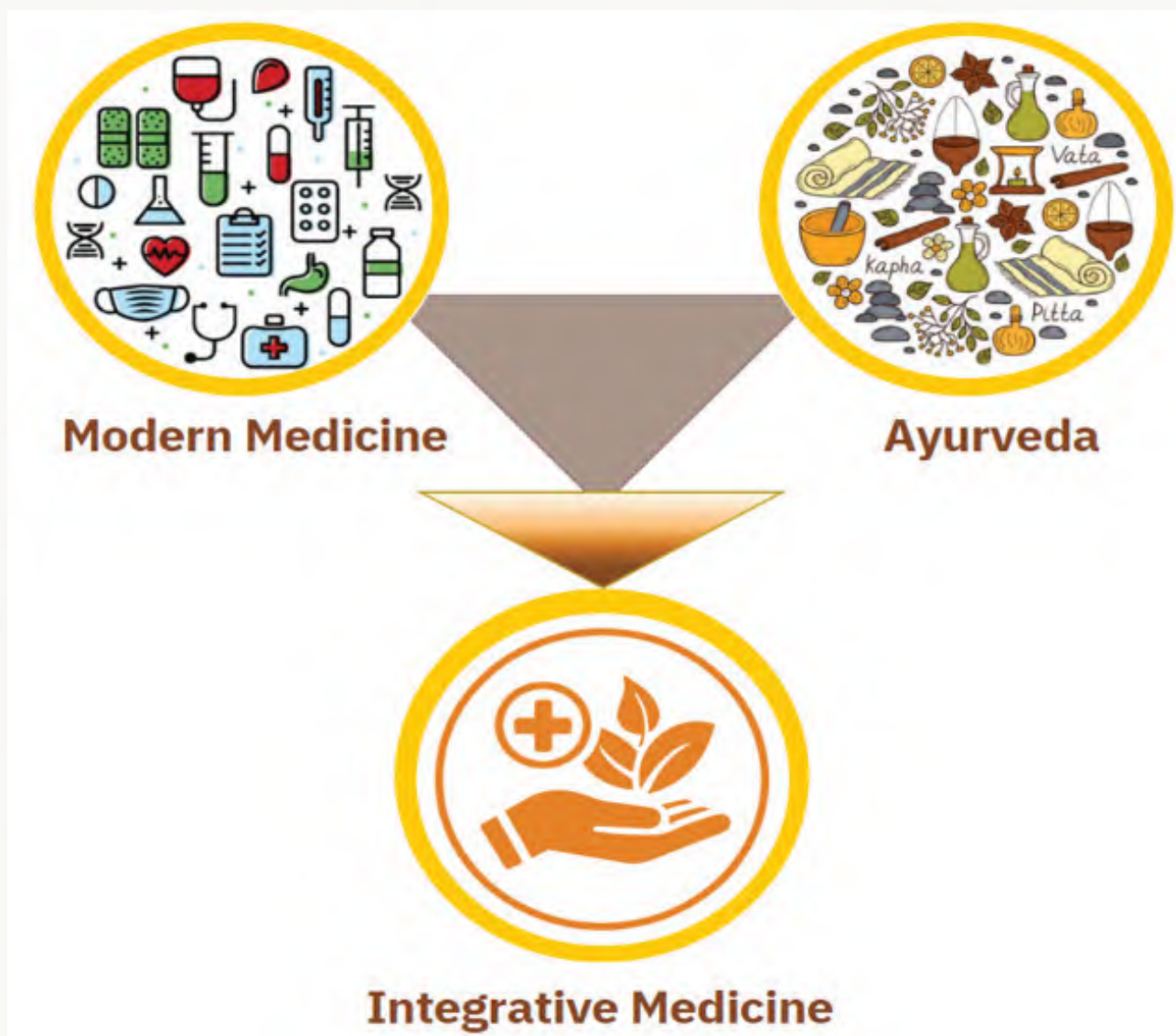
Faculty: Dr. P. Ravi Prakash (Coordinator), Dr. Ranju Mohan, Dr. Saran Aadhar, Dr Debasis Das, Dr Ravi Yadav

The Center for Intelligent Infrastructure (CII) is a transdisciplinary research center to foster research in smart, sustainable, and resilient infrastructure. CII is established to advance the vision of IITJ to nurture a vibrant ecosystem equipped with a highly qualified workforce with novel ideas and innovative research. The prime focus of the center is to integrate artificial intelligence and machine learning (AI & ML), big data analytics, automation, and finance into the life-cycle assessment, performance prediction, risk analysis, and resilience of infrastructure systems.

Following are some of the research areas with major thrust on AI & ML based research.

- » Climate Change Sustainability and Resilience
- » Cyber-physical systems
- » Cyber-Security
- » Digital Twins
- » Intelligent Transport Systems
- » Smart Cities
- » Smart Infrastructure Finance

### 1.4 Center of Excellence in AI based Precision Medicine



Faculty: Prof Mitali Mukerji (Coordinator); Prof Ajay Agarwal, Dr. DipSankar Banerjee, Prof Manoj Chowdhary, Dr. Neha Jain, Dr. Pankaj Yadav, Dr. Rajendra Nagar, Dr. Ravirai Vankayala, Dr. Rohan D. Erande, Dr. Sudipta Bhattacharya, Dr. Sushmita Jha, Dr. Sumit Kalra

There is a continuous rise in the prevalence of common and complex diseases with a substantial reduction in health longevity, which poses a considerable economic burden on the families and the country. In the precision medicine era, there has been a paradigm shift in healthcare wherein we are moving from a reactive to more proactive management with a precision component in all aspects of P5 (Predictive, Preventive, Personalized, Participatory, Promotive) medicine. Traditional medicine systems such as Ayurveda provide a system's understanding of an individual wherein individual-specific health baselines inform about

response and trajectory in geo-spatio-temporal dimensions for pre-emptive management of lifestyle and nutrition. Disease trajectories assessment and treatment are individual centric manners and are dealt with as moving targets. There are also unique therapeutic modalities such as Panchakarma, multicomponent single and poly herbo-metallic formulations along with different preparations and modes of administration for diverse therapies. Thus, multiple options are now available from modern and traditional AYUSH systems for the management of diseases. However, due to limited cross-talk, most often a patient who

has the least expertise self-evolves an integrative approach to the management of health.

**AyurTech:** A formalized framework that allows one to assess outcomes and enables crosstalk between traditional systems and modern medicine through a common interface could increase individuals' health and disease management options and provide affordable healthcare solutions. At the Transdisciplinary Centre of Excellence in AI-based Precision Healthcare a Centre of Excellence in AyurTech supported by the Ministry of AYUSH has been recently established. Through this center, we aim to create a first-of-its-kind unique initiative of combining Functional Genomics, Nanotechnology, Electronics, Digital health, and AI for realizing Evidence based Ayurveda solutions. This has the participation of collaborators from JCKIC network institutions Dr. SR Rajasthan Ayurved University Jodhpur and AIIMS Jodhpur. This is a transdisciplinary program that also has the participation of faculty from diverse engineering sciences from IIT Jodhpur which includes bioscience and bioengineering, computer science and engineering, electrical engineering, and chemistry. This is a unique initiative combining electronics, Digital health and AI & Multiomic technologies for realizing "Evidence based Ayurveda" solutions. The broad objectives of the CoE-AyurTech include four thematic areas and capacity building as an integrative approach are described below:

- » Computer-based phenomics, IoT-based digital devices & AI-powered Prakriti assessment and Vikriti diagnosis
- » Interoperable platform for unifying ontologies
- » Devices & systems for Ayurveda drug standardization and quality control
- » Drug-disease networks compendium for drug signatures & Ayurveda based formulations for poly-pharmacology & repurposing
- » Capacity Building

### Projects have been initiated in the following areas:

- » Digital devices integrated with IoT, AI and computer vision for rapid, objective and accurate assessments of Ayurveda parameters and tailoring interventions

- » Blockchain powered highly secure and privacy preserving smart phone platforms, for large scale Ayurveda parameter screening, health and intervention monitoring
- » Laboratory and Point-of-Care (PoC) deployable sensors/ devices, systems and frameworks will be developed for Ayurveda drug standardization
- » Open source platforms of drug-disease networks using a compendium of molecular signatures of drugs, medicinal plants and Ayurveda based formulations for discoveries, poly-pharmacology and repurposing.
- » Ontological frameworks based on Natural Language Processing for integration of knowledge base of Ayurveda with contemporary terminologies and description

## 2. Academic Programs

### A. Ph.D. program in AI & Data Sciences

#### B. M.S. by Research Programs (to be started from AY 2023-24)

- a. M.S. by Research on brain-inspired next-generation AI and its application in different domains of brain sciences.
- b. M.S. by Research on Mathematical and Computational Economics
- c. M.S. by Research on Precision Health and Integrative Medicine
- d. M.S. by Research on Intelligent Infrastructure

#### C. M.Tech. Programs for Regular Candidates and Working Professionals

- a. M.Tech. in AR VR (Regular)
- b. M.Tech. (Executive) in AR VR
- c. M.Tech. (Executive) in Data and Computational Science

#### D. Minor Programs for B.Tech.

**Minor Program in Science of Intelligence (offered by CBSA) for all interested students from any UG branch:**

**Description:** World is witnessing a revolution where computers are performing many tasks that until recently could only be done by humans. Although recent

successes have been phenomenal, there is still a wide gap between the capabilities of humans and computers. For example, we do not know 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 human being. To build next-generation AI systems, we need to understand the computation algorithms used by the brain, and the brain hardware and circuitry that efficiently runs these algorithms and implement these in artificial environment. Therefore, engineering intelligence must be complemented by scientific investigations of natural intelligence. Thus seeking answers to the core questions about natural intelligence – its nature, how it is manifested in the brain, and how it could be implemented in machines, is paramount.

#### **Objectives of the specialization**

- » Provide fundamental knowledge of natural intelligence and implementation in artificial systems.
- » Provide multidisciplinary tools and techniques to work in the interdisciplinary field of Science of Intelligence.
- » Make aware of scientific language to follow the discourse in emerging and fast-growing fields.

#### **Outcome: The student will:**

- » Have the introductory knowledge of brain and behaviour interrelationships.
- » Learn the basics tools and techniques to handle biological and behavioural data.
- » Learn the application in diverse fields such as designing experience.

#### **Minor Program in Mathematical and Computational Economics (offered by CMCE):**

**Objective:** The minor program in mathematical and computational economics

is designed to enable the students to model various individual, business, strategic and socio-economic decision-making situations. Fundamental theories and tools are taught along with renewed focus on applications. The program is a platform for the students to identify the social and business needs where they can apply technologies they learn in their B.Tech. programs. The emphasis is on incentive design in economic models and formulation of real time and practical strategic situations, and provide a solid training for undertaking further studies in these areas. These theories will also come in handy in formulating real world scenarios, and providing economic interpretation of different analytical and optimization models.

#### **Graduate Attributes:**

- » Inculcate the skill of economic reasoning and strategic thinking among the students.
- » Provide a thorough understanding of economic theory with a focus on formal modeling and its intersections with AI.
- » Provide training in economic tools, techniques and methods that are of current relevance and to familiarize students with their varied applications.
- » Formulate real world scenarios mathematically and use computational tools to analyze them.

#### **Learning outcomes:**

- » Students will be well-versed in foundational knowledge of economic theory and decision making.
- » Students will be adept in the mathematical tools in formal modeling of a wide range of economic phenomena.
- » Students will acquire the skills to analyze nuanced real world problem settings encountered in industry, think-tank, public policy space etc.

## Publications

1. Kaman, S., Sharma, A., & Banerjee, R. (2022). Associativity between COVID-19 Pandemic and Serious Mental Illness: Rapid Systematic Review within Salutogenesis Model for Public Health Management. *Current Psychiatric Research and Reviews*, 18.
2. Sigar, Priyanka, Lucina Q. Uddin, and Dipanjan Roy. "Altered global modular organization of intrinsic functional connectivity in autism arises from atypical node-level processing." *Autism Research* 16.1 (2023): 66-83.
3. Majumdar, Gargi, Fahd Yazin, Arpan Banerjee, and Dipanjan Roy. "Emotion dynamics as hierarchical Bayesian inference in time." *Cerebral Cortex* 33, no. 7 (2023): 3750-3772.
4. Sastry, Nisha Chetana, Dipanjan Roy, and Arpan Banerjee. "Stability of sensorimotor network sculpts the dynamic repertoire of resting state over lifespan." *Cerebral Cortex* 33.4 (2023): 1246-1262.
5. Kumar, Neeraj, Amit Jaiswal, Dipanjan Roy, and Arpan Banerjee. "Effective networks mediate right hemispheric dominance of human 40 Hz auditory steady-state response." *Neuropsychologia* (2023): 108559.
6. Pathak, A., Roy, D., & Banerjee, A. (2022). Whole-brain network models: from physics to bedside. *Frontiers in Computational Neuroscience*, 16.
7. Nair, Indrajith R., Guncha Bhasin, and Dipanjan Roy. "Hippocampus Maintains a Coherent Map Under Reward Feature–Landmark Cue Conflict" *Frontiers in Neural Circuits* (2022): 31.
8. Pathak, Anagh, Vivek Sharma, Dipanjan Roy, and Arpan Banerjee. "Biophysical mechanism underlying compensatory preservation of neural synchrony over the adult lifespan." *Communications Biology* 5, no. 1 (2022): 1-12.
9. Dash, A., Bapi, R. S., Roy, D., & Vinod, P. K. (2022, July). Characterizing the Dynamic Reorganization in Healthy Ageing and Classification of Brain Age. In 2022 International Joint Conference on Neural Networks (IJCNN) (pp. 1-7). IEEE.
10. Srivatsa Srinivas, S (2023). To increase or to decrease the price? Managing public transport queues during COVID-19 in the presence of strategic commuters. *Public Transport*, Vol. 15, 275-285.
11. M. Aggarwal, "On Agent-Specific Fuzzy Entropy Functions," in *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, vol. 53, no. 1, pp. 2-11, Jan. 2023, doi: 10.1109/TSMC.2022.3163515.
12. R. Krishankumar, D. M. Deveci, M. Aggarwal, K. S. Ravichandran, Assessment of renewable energy sources for smart cities' demand satisfaction using multi-hesitant fuzzy linguistic based choquet integral approach, *Renewable Energy*, Volume 189, April 2022, Pages 1428-1442.
13. R. Banerjee, S.K. Pal, J.K. Pal, A decade of Z-numbers, *IEEE Transactions on Fuzzy Systems*, vol. 30 (8) (2022), pp. 2800-2012.
14. S. Kaman, A. Sharma, R. Banerjee, Cortical Circuits of Context Adaptability: Understanding Neurobehavioral Mechanisms Underlying Flexible Behavior, *Cogsci* 2023.
15. Km. Bhavna, Romi Banerjee and Dipanjan Roy, Theory-of-Mind Fingerprints to Distinguish Autistic and Neuro-Typicals: An Explainable-AI Model, 2023 OHBM Annual Meeting.
16. Prachi Soni, Sarvar Singh, Ajay Agarwal, "Molecular analysis of Sweat for Evidence based Ayurvedic Diagnosis", 2023 IEEE Applied Sensing Conference (APSCON), 2023, Pg. No.1-3
17. Sarvar Singh, Sambit Kumar Keshi, and Ajay Agarwal, "Trace Level Molecular Detection in Organic Honey Relevant for Therapeutic Applications", 2023 IEEE Applied Sensing Conference (APSCON), 2023, Pg. No.1-3
18. P. Nandi, S. Singh, A. Agarwal, "Salivary Analysis for Evidence based Ayurvedic Diagnosis," 2023 IEEE Applied Sensing Conference (APSCON), Bengaluru, India, 2023, Pg. No.1-3
19. Pal A, Chakrabarti P, Dey S\*. ProDFace: A web tool for the Dissection of Protein-DNA

- Interfaces. *Front. Mol. Biosci.*, 2022, 9:978310. doi: 10.3389/fmolb.2022.978310.
- 20 Schweke et al. Discriminating physiological from non-physiological interfaces in structures of protein complexes: a community-wide study. *Proteomics*. 2023
- 21 S. Dang, J.E. Antono, I. Kagan, A. Pooresmaeili. Modality-specific and modality-general representations of reward value in frontal cortex Pre-print - bioRxiv, 2022.12. 25.521898
- 22 J.E. Antono, S. Dang, R. Auksztulewicz, A. Pooresmaeili. Distinct mechanisms underlie value-driven modulation of visual cortex by previously rewarded visual and auditory stimuli Pre-print - bioRxiv, 2023.01. 25.525484

#### 4. Ongoing Sponsored/Consultancy Projects

S. No.	Title	Cost in Lakh	Start Date	End Date	Role as PI/Co-PI	Agency
1.	Comparative Mapping of Common Mental Disorders (CMD) over lifespan	470 Lakhs	22/12/2019	23/12/2024	Co-PI: Dipanjan Roy	Department of Biotechnology (DBT) Government of India
2.	Identification and classification of Hub genes downstream to let-7 using network approach in C-elegans neuron regeneration	350 Lakhs	01/08/2022	01/08/2027	Co-PI: Dipanjan Roy	Department of Biotechnology Senior Wellcome Trust Fellowship
3	Center of Excellence in "AYURTECH" for integrative precision health and medicine	10 Crore	25.02.2022	24.02.2025	PI – Mitali Mukerji, Ajay Aggarwal	Ministry of AYUSH
4	Studying the nexus of poverty and health expenditure using Machine Learning	25 Lakhs	02.02.2023	01.02.2026	PI - Dweetobotee Brahma	IITJ Seed Grant
5	Harnessing protein quaternary structure to unveil new principles of mutational robustness and allostery	42.5 Lakhs	22.10.2021	21.10.2026	PI - Sucharita Dey	DBT
6	An interdisciplinary study of Technologically manipulated Information: Its ecosystem and its psycho-social impact.	18.9 Lakhs	03.2022	03.2024	Co-PI: Ankita Sharma	ICSSR



## Faculty Laurels and Achievements

### Dipanjan Roy

- » International Autism Society Membership and best paper award.
- » Selected for Journal Cover March 2023 in Cerebral Cortex (Stability of sensorimotor network sculpts the dynamic repertoire of resting state over lifespan)
- » OHBM Travel and Merit Award (2023)
- » Journal Editorship: joined the editorial board of Frontiers in Cognition: learning and Cognitive Development and presently serving as Associate Editor.
- » Review Editor: Frontiers in Brain Imaging Methods and Frontiers in Psychology
- » Associate Editor: Frontiers in Neurology: Stroke and Frontiers in Computational Neuroscience
- » Major Research Outcomes:
  - » Effective networks mediate right hemispheric dominance of human 40 Hz auditory steady-state response.
  - » Vigyan Parser India covers research highlights that show how the right brain specializes in rhythmic tone processing.
  - » Emotion dynamics as hierarchical Bayesian inference in time.
  - » Nature India's coverage of recent work using fMRI and naturalistic stimuli reveals how state uncertainty parameters modulate evolving state of emotion processing.
  - » Altered global modular organization of intrinsic functional connectivity in autism arises from atypical node-level processing.

### Dweepobotee Brahma

- » Masterclass in 'Economics and Machine Learning' to prospective students for MS-CSS, School of Liberal Arts, IIT Jodhpur
- » Discussant at the Inaugural Conference on 'Public Policy: An Indian Perspective' at IIT Kanpur.

### Ganesh Manjhi

- » Resource person for 'Workshop on R Programming' at the department of Economics,

Indian Institute of Foreign Trade: April 18, 19, 20, 2023.

- » Resource person for 'Time Series and Panel Data Analysis using STATA Software' Workshop at Christ University: March 20-24, 2023.

### Ankita Sharma

- » Panel Member of Rajasthan Public Service Commission For Recruitment 2023
- » Paper setter GATE (Psychology) 2022
- » PhD thesis examiner IITB, PDEU 2022, 2023
- » Co-chair (along with Dr. Romi Banerjee), Special session on 'Where natural wisdom meets artificial wisdom' approved for 10th International Conference on Pattern Recognition and Machine Intelligence (PReMI'23), scheduled at ISI Kolkata during December 12-15, 2023.
- » Co-coordinator, International conference on 'Next Gen-AI: Inspiration from Brain Sciences'. Organized by CBSA, 26-28 January 2023
- » Recognition & Media Coverage:
  - o <https://cbmm.mit.edu/news-events/news/iit-jodhpur-concludes-naibs-2023-%E2%80%9Cnext-gen-ai-inspiration-brain-science%E2%80%9D>
  - o <https://www.todaypostimes.com/iit-jodhpur-concludes-naibs-2023-international-conference-next-gen-ai-inspiration-from-brain-science/>
  - o <https://www.tice.news/tice-dispatch/iit-jodhpur-naibs-2023-artificial-intelligence>
  - o <https://www.thehindu.com/education/news-from-the-world-of-education-february-1-2023/article66460589.ece>

### Sucharita Dey

- » Faculty advisor at the cultural fest SPANDAN organized by IIT Jodhpur in 2023

### Romi Banerjee

- » Organizing Committee - Conference of NAIBS (Next-gen AI: Inspiration from Brain Science) 2023

### Mitali Mukerji

- » Presented the Ayurtech initiative in the 4th Board Meeting of the International Human Phenomics Consortium held online in 2022.
- » Ayurtech and precision medicine in One day workshop on the IITJ-University of Buffalo collaboration

### Ajay Agarwal

- » As a focused session chair developed and chaired a special session on “Sensors and Systems for Alternative Diagnosis and Therapies” at 2023 IEEE Applied Sensing Conference (APSCON), Bengaluru.

## Student Laurels and Achievements

Student Name	Achievements
Km. Bhavna	“Best Poster” award in Next Gen AI: Inspiration from Brain Science (NAiBS) 2023.
Km. Bhavna	Work “End-to-End Explainable Artificial Intelligence: Derived Theory-of-Mind Fingerprints to Distinguish Between Autistic and Neuro-Typical”, accepted in international conference Organization of Human Brain Mapping 2023 to be held in Montreal, Canada 2023.
S. Kaman	Paper Presentation: S. Kaman, A. Sharma, R. Banerjee, “Neural correlates of non-verbal response and wisdom”, Psychological Science and Well-being Conference, organized by James Cook University, Singapore.
S. Kaman	Poster Presentation: Sweta Kaman, Ankita Sharma, Romi Banerjee, “Understanding the neurobehavioral mechanisms underlying adaptive behavior while performing wisdom related tasks”, Cognitive Science Society, Sydney.

## 7. Outreach Activities

### a. Invited/Selected talks by faculty

Faculty	Conference Details
Dipanjan Roy	<ul style="list-style-type: none"> <li>» Invited talk titled “Electrophysiological and neuroimaging evidence of how the brain handles salient distraction, surprise, and uncertainty” at “Brain, Computation, and Learning (BCL)”, Indian Institute of Science Bangalore scheduled on 09.01.2023 - 13.01.2023</li> <li>» Invited talk titled “Bayesian Inference in Time and Disruption of the Prefrontal Code of Emotion Dynamics with Aging” at International conference on “Next Gen-AI: Inspiration from Brain Sciences” CBSA-SAIDE, IIT Jodhpur scheduled on 26.01.2023 - 28.01.2023</li> </ul>
Dweepobotee Brahma	<ul style="list-style-type: none"> <li>» Invited talk on “Econometrics and Machine Learning: Two Old Friends” at Indian Symposium on Machine Learning (IndoML) 2022, IIT Gandhinagar</li> <li>» Short-term research visit as Visiting Scientist to Economic and Policy Unit, Indian Statistical Institute, Delhi, March 6-15, 2023.</li> </ul>
Ganesh Manjhi	<ul style="list-style-type: none"> <li>» Invited talk on “Contesting Rationality and Logic of Natives’ Collective Action”, Dr. Ram Dayal Munda Tribal Research Centre, Ranchi, Jharkhand, 9th-10th August, 2022.</li> </ul>
Ankita Sharma	<ul style="list-style-type: none"> <li>» Invited Speaker at Jai Narain Vyas University, Jodhpur under the Flagship of RAJIV GANDHI NATIONAL INSTITUTE OF YOUTH DEVELOPMENT on 13 March 2022.</li> <li>» Plenary talk at National seminar on ‘Psychology and society today: Issues, challenges and intervention’ organized by Dept. of Psychology, MG Kashi Vidyapith sponsored by Dept. Higher Education, Govt. of UP on March 2023</li> </ul>

Faculty	Conference Details
Mitali Mukerji	<ul style="list-style-type: none"> <li>» Delivered a talk on “Ayurtech for next-generation P5 medicine: Integrative and technology-enabled in Ayurcon 2022” held at Interdisciplinary Institute of Indian System of Medicine(IISM, SRM Institute of Science and Technology, Chennai).</li> <li>» Delivered a talk on Ayurgenomics-based framework in precision and Integrative medicine: Translational opportunities at National Symposium Ayurdhara the Ayurveda Continuum held at IIT Kharagpur in 2022.</li> <li>» Delivered a talk on “Evidence based solutions for drug repurposing and discoveries from ayurveda for integrative medicine setting in workshop on Ayurvedic Phytochemicals held at IIT Gandhinagar in 2022.</li> <li>» Delivered a talk on “Integrative health and personalized medicine through Ayurgenomics” organized by MUHS,Nashik at NCCS Pune in 2023.</li> <li>» Delivered a talk on “Ayurveda and Modern medicine the beginning of a molecular conversation on 19th February 2023 at Science at the Sabha 2023” organized by The Institute of Mathematical Sciences,Chennai.</li> <li>» Delivered a talk on “Building a transdisciplinary ecosystem for integrative precision health and medicine in Women Lift Health Leadership Journey Lift-off” at Dehradun on 15-16th March,2023</li> </ul>
Ajay Agarwal	<ul style="list-style-type: none"> <li>» Delivered a talk on “Micro Nano Sensors for Sensory Perception Based Ayurvedic Diagnosis” at DSRRAU, Jodhpur in 2022.</li> <li>» Delivered a talk on “Sensors for Alternative Diagnostics &amp; Therapies” at 2023 IEEE Applied Sensing Conference (APSCON), Bengaluru</li> </ul>
Manoj Choudhary	<ul style="list-style-type: none"> <li>» Delivered a talk on “Technology-Based Evidence for Ayurved Solutions in Precision Health” lecture at DSRRAU, Jodhpur in 2022</li> </ul>
Srivatsa Srinivas S	<ul style="list-style-type: none"> <li>» Presented a paper titled “Strategic Queueing and Pricing Decisions in Passenger Transportation Systems during COVID-19.” at XXV Annual International Conference of the Society of Operations Management</li> <li>» IIM Indore hosted at IIM Indore in 16-18 December, 2022</li> </ul>
Abhinaba Lahiri	<ul style="list-style-type: none"> <li>» Presented a paper titled “Optimal Stopping in List-based Decisions” at 17th Annual Conference on Economic Growth and Development hosted at Indian Statistical Institute, Delhi in 19 - 21 December, 2022.</li> </ul>

## b. Conferences and invited talks organized at IITJ

Thar Talk Series: AI and Beyond, in collaboration with Jodhpur City Knowledge and Innovation Foundation

The Thar Talk Series aims to organize webinars on the role of Artificial Intelligence and Data Science in solving the current problems and shaping the future technological landscape of various fields of science, engineering, and public health. The series focuses on multidisciplinary emerging themes and fundamental issues, and explores pathbreaking possibilities in various disciplines of Engineering and Sciences. Under the Thar Talk series, we invite distinguished speakers from around the world working in the areas of but not limited to: Brain Science, Intelligent Infrastructure, Mathematical and Computational Economics, Smart Business Analytics, Autonomous Robot Systems, Computer Vision, AI Hardware, Chemical Process Modeling, Computational Material Science, AI for Social Good, AI and Emotion, etc. In the past year, we organized twelve talks which were open to the national and international audiences. The details of past talks are available on AIDE School website (<https://aide.iitj.ac.in/index.php/talk>). Full recordings of the talks are available publicly on YouTube. (Link: [https://www.youtube.com/playlist?list=PLHASPzwmCK-ELDjbqJu91\\_uf2K4zUKl6R](https://www.youtube.com/playlist?list=PLHASPzwmCK-ELDjbqJu91_uf2K4zUKl6R)).

This year the 13th talk was organized related to the field of AI & Genomics by Prof. Greg Gibson of Georgia Institute of Technology, USA titled “Geographical Genomics and Predictive Health” on 16.12.2022.

### c. Conferences organized by the school

S. No.	Name	Organizer	Date	Speakers
1	International conference on ‘Next Gen-AI: Inspiration from Brain Sciences’	CBSA	26.01.2023 - 28.01.2023	<ul style="list-style-type: none"> <li>» Nancy Kanwisher</li> <li>» Tomaso Poggio</li> <li>» Susan Goldin-Meadow</li> <li>» Jinjung Xiong</li> <li>» Joscha Bach</li> <li>» Saket Navlakha</li> <li>» Arjun Ramakrishnan</li> <li>» S.P. Arun</li> <li>» Richa Singh</li> <li>» V. Srinivasa Chakravarthy</li> <li>» Dipanjan Roy</li> <li>» Tapan Gandhi</li> <li>» V. Ramaswamy</li> <li>» Amit Bhardwaj</li> <li>» Dip Sankar Banerjee</li> <li>» Chhanda Chakraborti</li> <li>» Rohan Paul</li> <li>» Santanu Chaudhury</li> <li>» Subbarao Kambhampati</li> <li>» B. Ravindran</li> </ul>
2	Conference on Mathematical and Computational Economics	CMCE	02.12.2022 - 04.12.2022	<ul style="list-style-type: none"> <li>» Shubhro Sarkar</li> <li>» Saptarshi Mukherjee</li> <li>» Mihir Bhattacharya</li> <li>» Anup Pramanik</li> <li>» Gopakumar Achuthankutty</li> <li>» Vipin B</li> <li>» Brishti Guha</li> <li>» Ratul Lahkar</li> <li>» Moumita Roy</li> <li>» Jeevant Rampal</li> <li>» Aparna Taneja</li> <li>» Anuj Bhowmik</li> <li>» Matthew Kovach</li> <li>» Parikshit De</li> </ul>

## CMCE seminar series. CMCE regularly invites faculty from around the country to give talks at IIT Jodhpur. Following talks were organized during 2022-23

S. No.	Title	Speaker	Date
1	To Jab or not to Jab? A study on Covid 19 vaccine hesitancy in India	Dr. Shagata Mukherjee	12.08.2022
2	On Verifiable Communication and Propagation of Fake News	Dr. Raghul S. Venkatesh	26.08.2022
3	Technological Changes, Social Norms and Fertility Choices	Dr. Sounak Thakur	09.09.2022
4	Market Design Through Auctioning of Entry Licenses with Downstream Cournot Competition	Dr. Shubhro Sarkar	23.09.2022
5	Budget-Balanced Mechanisms for Single Object Allocation Problems with Interdependent Values	Dr. Aditya Vikram	28.10.2022
6	Transforming Rural Prosperity Through Tertiary Education: Evidence from India	Prof. Abhiroop Mukhopadhyay	25.11.2022

### e. Events and workshop organized by Center on AI & Precision Medicine

- » A five days workshop from 9-13th January, 2023 on Capacity Building and Continuing Medical Education in AYUSH
- » Poster presented by CoE: Ayurtech at Pashimi Rajasthan Hastshilp Utsav
- » Posters were presented during the "Third meeting of the Project Review and Monitoring Committee (PRMC) of O/o PSA which was held in IIT Jodhpur to review the work of Jodhpur City Knowledge and Innovation Foundation (JCKIF)".

## 8. Laboratories and Equipment

### Center on Brain Science & Applications

Cognitive Engineering Lab facility at IIT Jodhpur - This lab is equipped with 128 channel high density EEG recording system, Tobii pro fusion Eye-tracker system with high sampling frequency, Neurostimulation devices including neurostym tES system with various low intensity electrical stimulation protocols tDCS, tACS & tRNS and a variety of stimulus presentation software for stimulus design for behavioral recordings and assessment. The facility is currently being used to study naturalistic image and audio-visual stimulus processing, Visual and Auditory perception and steady state processing, working and episodic memory processing and developmental changes associated with speech, language, perceptual processing in children, adolescents, adults of different age groups to record and analyze brain signals and study systematically behavior coupling and developmental alterations in cognitive processes.



### Center on AI & Precision Medicine

A built-up space of approximately 3760 sqft for an Ayurtech facility for phenotyping, molecular biology, chemistry and device development fabrication and characterization area has been provided by IIT Jodhpur. This space for technological immersion will enable capacity building in different domains of Ayurveda, increase employability in Transdisciplinary Settings, provide innovation and entrepreneurship opportunities and help in trans-disciplinary research programs. Besides leveraging the setups in the individual PIs laboratories and the central instrumentation facilities the AYurtech CoE has also provided funds to upgrade some of the activities of existing facilities. The list of some of the equipment that have been procured are listed below:

- a. Table-top Raman Spectrometer
- b. Central accelerated computing cluster and extended storage
- c. High vacuum pump
- d. Oil-Free Vacuum Pump
- e. Minor laboratory equipment for molecular biology and chemistry

# School of Management & Entrepreneurship (SME)

## Introduction

The School of Management & Entrepreneurship (SME) is a forward-looking initiative to create and deliver a novel value proposition in the management and entrepreneurship education sector in India. Underlying this bold step 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 an MBA program which integrates technology, management and entrepreneurship through an institutional framework which leverages various engineering disciplines, interdisciplinary programs, its own innovation and incubation centre, and school of liberal arts, apart from management faculties. From June 2023, SME is offering a one-of-

its-kind MBA in FinTech and Cyber Security, in three pathways one of which is in collaboration with SUNY Albany.

## Key highlights

- » 42 practitioner sessions as part of the courses
- » 26 active collaborations of SME faculty with foreign faculty
- » 35 participations by SME students in external events
- » 80% of the course has a 'tech-linkage'
- » 12 IITJ Tech startups being mentored by faculty
- » 40 students doing live projects in start-ups
- » Minimum, Average, Median, Maximum salary package offered (in lakhs): Min: 10, Average: 12.96, Max: 23.78
- » 47 new recruiters were onboarded in the year
- » 35 industry talks organized by SME

## Faculty Members

Following were the faculty members associated with the School for Academic Year 2022-23.

<b>Prof. Sangeeta Sahney</b> (Professor, Head of the Department)	<b>Dr Krishna Kumar Balaraman</b> (Associate Professor)
<b>Dr Sankalp Pratap</b> (Associate Professor)	<b>Dr. Bhargab Chattopadhyay</b> (Associate Professor)
<b>Dr. Nimish Vohra</b> (Professor of Practice)	<b>Prof. Sunanda Sangwan</b> Visiting Faculty
<b>Amit Singh</b> (Assistant Professor)	<b>Anuj Pal Kapoor</b> (Assistant Professor)
<b>Dr Bhushan Praveen Jangam</b> (Assistant Professor)	<b>Deepak Saxena</b> (Assistant Professor)
<b>Devi Prasad Dash</b> (Assistant Professor)	<b>Jitesh Mohnot</b> (Assistant Professor)
<b>Mithu Rani Kuiti</b> (Assistant Professor)	<b>Monika Tanwar</b> (Assistant Professor)

<b>Venkat Ram Reddy Ganuthula</b> (Assistant Professor)	<b>Venkatesha Murthy</b> (Assistant Professor)
<b>Yerasani Sinjana</b> (Assistant Professor)	

## Research Groups

Research Group	Members	Primary Research Topics
Digital Transformation and Business Intelligence	Amit Singh, Bhargab Chattopadhyay, Deepak Saxena, Monika Tanwar	AI Ethics, Cyber Physical Systems, Corset construction, Digital Transformation, Enterprise Systems (on-premise and cloud-based), Industry 4.0, Sentiment Analysis, Sequential analysis, Text Analytics, Digital twin
Economics	Devi Prasad Dash, Bhushan Praveen Jangam	Urban Economics, Economics of Crime, Climate Change Economics
Entrepreneurship	Venkatesa Murthy, Jitesh Mohnot, Nimish Vohra, Sankalp Pratap	Art entrepreneurship, Corporate Entrepreneurship, Design thinking, Entrepreneurship ecosystems, Entrepreneurial failure, Healthcare Entrepreneurship, Indigenous entrepreneurship, Micro-Small-Medium Scale Enterprises, New venture creation and associated practices/issues, Practices in incubation centers, Start-up team dynamic, The art of Pitching and fundraising
Human Capital Management	Sangeeta Sahney, Venkat Ram Reddy	Science and practice of Behavior Change, Managerial Judgment and Decision Making, human Resource Management
Marketing	Anuj Kapoor, Sangeeta Sahney, Sunanda Sangwan	Multi Sensory Experiences, Design Aesthetics, Neuro-marketing and Collaborative consumption. Consumer Behavior, Services Marketing, Internet Marketing, Cross-cultural Marketing and Rural Marketing, Educational Leadership, Socio-Technical Design systems and Organizational Culture.
Operations	Amit Singh, Mithu Rani Kuiti, Tanmoy Kundu, Yerasani Sinjana, Monika Tanwar	Green supply chain management, e-Commerce Logistics, Humanitarian Logistics, Intelligent Logistics, Last-mile Logistics, Multimodal (Air/Maritime/Surface) Transportation, Sustainable Supply Chain Management, Diagnostics, Prognostics and Health Management, Failure and Reliability Analysis
Strategy and Public Policy	Krishna Kumar Balaraman, Jitesh Mohnot	Business Models, Strategic Alliances, Strategic Decision Making, Strategic Foresight, Strategizing practices of indigenous business communities

## Centre of Excellence in IP

On 1<sup>st</sup> of March, 2023, the Senate approved the creation of the Centre of Excellence in IP to be part of the School of Management & Entrepreneurship (SME). The CoE will function as a focal point for the exploration of avenues for inter-institutional synergistic collaborations in human resource and capacity building programmes to enhance the value

of the combined creative potential and output of these institutions. Further, the CoE would also serve as a continual learning group not only to identify the current and emerging unmet national and regional needs to be addressed but also to research on the impact of evolving technologies and socio-economic frameworks to plan and flag off what lies ahead. The core focus would lie on issues



about IP management, viz., patent search, patent technologies, patent analysis, patent landscaping, and commercialization. The CoE would indulge in academic and applied research in the area of IPR.

Recently IIT Jodhpur was awarded IPR-Chair Professor by the Department of Industrial Policy & Promotion under SPRIHA (Scheme for Pedagogy & Research in IPRs for Holistic Education & Academia) for a 5-year period commencing 2023-24.

## Academic Programs

### PhD Program

The PhD program at SME is rigorous and demanding. It has been designed to produce candidates with skills and achievements, enabling them to meaningfully shape their career for full-time faculty positions in premier management institutes across the country.

The PhD program currently provides an opportunity for focused research in all areas of specialization that the school offers. The program emphasizes pursuing research work that connects with the world of practice, with any of the national or global programs that speak to contemporary issues in our society and their management, particularly those that have an overlay of technology and entrepreneurship.

### Minor in Management

The undergraduate students at IITJ are offered minor programs to complement their Majors. The minor program must be completed simultaneously with a major degree program.

### Students can opt for:

- » Minor in Management
- » Minor in Entrepreneurship

### MBA Technology / MBA

It is a flagship two year MBA program leading to:

- » Track I – Leading to MBA-Technology Degree
- » Track II – Leading to MBA Degree
- » Track III – Dual Degree (SME, IIT Jodhpur has tie-ups with some of the leading business schools in the world and jointly offers dual degree programs. The students would successfully complete their foundational courses in the 1st year at SME, IIT Jodhpur, and thereon would study specialized Master's degree offerings in the 2nd Year at one of the partner B-School abroad. The students would go to earn an MBA/ MBA-Technology degree from IIT Jodhpur and a specialized Master's degree from the partner B-School).

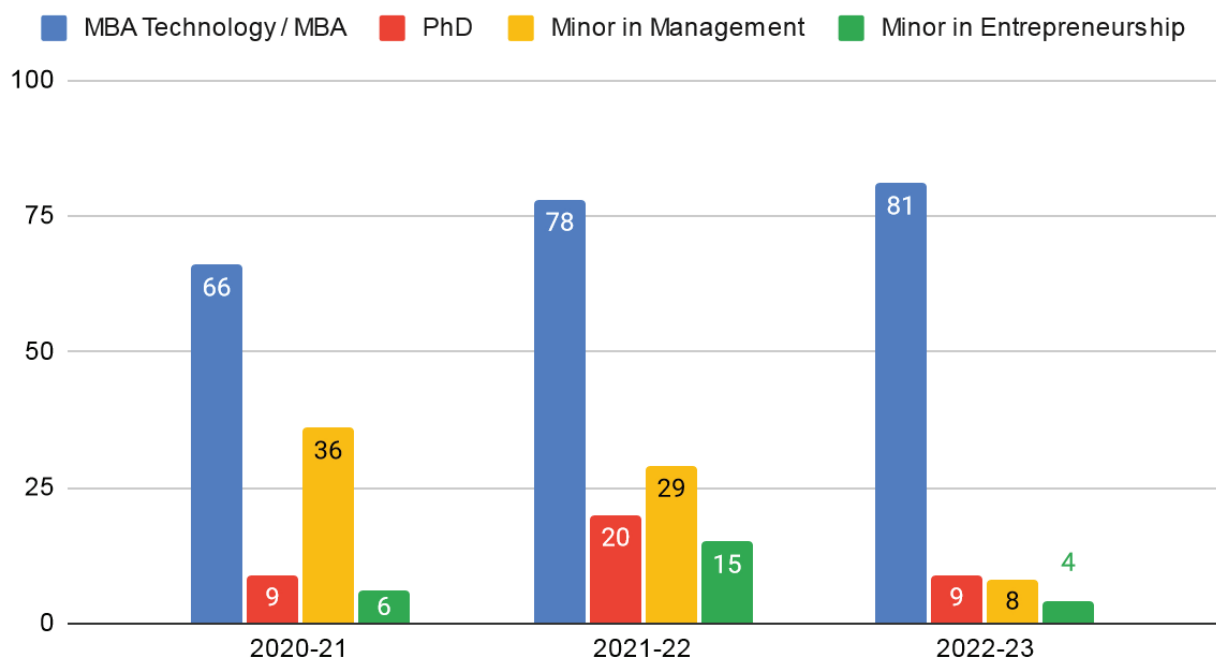


MBA students participating in a Yoga exercise as part of their induction program

### MBA in FinTech and Cybersecurity

Catering to emerging industry demands, SME is offering an MBA in FinTech & Cyber Security from Academic Year 2023-24. It is a unique program to be offered by IIT Jodhpur. Students would have the option to pursue a joint MS degree program with SUNY Albany in their second year. The courses will be taught with an application-oriented pedagogy with case studies and examples. The courses are intended to first build a foundation in the management discipline, with specialized and advanced courses in FinTech and Cyber Security. In the second year of the program, students will have the option to either join SUNY Albany to pursue an MS, or continue at IIT Jodhpur to complete their second year of MBA.

#### Yearly enrollment in different programs offered by SME



# Research Achievements

## Faculty Publications

1. **Balaraman**, K. K., & Sundarraj, R. P. (2023), Exploring Foresight Influence on Alliance Management by MNEs, AIB-SOUTH ASIA CONFERENCE 2023, January 2023, JGU, Sonapat.
2. **Chattopadhyay**, B., Bandyopadhyay, T., Kelley, K., and P., J. (2023): A Sequential Approach for Noninferiority or Equivalence of a Linear Contrast Under Cost Constraints. Accepted in Psychological Methods.
3. Darku, F.B., Ofori-Boateng, D., and **Chattopadhyay**, B. (2023). Comparison of Gini Indices Using Sequential Approach: Application to the U.S. Small Business Administration data. Accepted in Sequential Analysis.
4. Zhang, F., Wichitaksorn, N., and **Chattopadhyay** B. (2023): Coreset Construction for Extra binomial Variation in Binomial Regression. 2023 International Conference on Information Networking (ICOIN), 2023, pp. 366-369.
5. Ganguly, S., **Kuiti**, M. R., Das, P., & Maiti, M. (2023). Effect of fairness and overconfidence on pricing strategy of substitute bundles in a two-echelon supply chain. *RAIRO-Operations Research*, 57(2), 401-425.
6. Navaratna, A. R., & **Saxena**, D. (2023). An Indian Approach to AI Policy: A Comparative Study Between Three Sectors. *Handbook of Evidence Based Management Practices in Business*, 440.
7. Brown, S., **Saxena**, D., & Wall, P. J. (2023). Data collection in the global south: practical, methodological, and philosophical considerations. *Information Technology for Development*, 1-21.
8. **Saxena**, D., & Verma, J. K. (2023). ERP on the Cloud: Evolution, Benefits, and Critical Success Factors. In *Cloud IoT* (pp. 35-44). Chapman and Hall/CRC.
9. Arora, S., **Sahney**, S. and Parida, R.R. (2022), "Drivers of Showrooming Behaviour: Insights from Integrated Perspectives," *International Journal of Retail and Distribution Management*, Vol. 50, No. 3, pp. 398-413, Emerald.
10. Dutta, V. and **Sahney**, S. (2022), "Relation of Principal Instructional Leadership, School Climate, Teacher Job Performance, and Student Achievement", *Journal of Educational Administration*, Vol. 60, No. 2, pp. 148-166, Emerald.
11. Arora, S., **Sahney**, S. and Pradhan, D. (2022), "Potential Benefits and Descriptive Norms on Webrooming: Applying an Extended Model of Goal-Directed Behaviour", *International Journal of Retail and Distribution Management* Vol. 50, No. 3, pp. 377-397, Emerald.
12. Saha, M.D. and **Sahney**, S. (2022), Exploring the relationships between Socialization Agents, Social Media Communication, Online Shopping Experience, and Pre-Purchase Search: A Moderated Model, *Internet Research*, Vol. 32, No. 2, pp. 536-567, Emerald.
13. Kumari, B., **Sahney**, S. and Madhukar, A. (2022), "Aligning Individual and Organizational R&D Goals for Self-Sustainability: Investigating Preferences Researchers in Selected CSIR-Laboratories, India", Earlycite, *International Journal of Productivity and Performance Management*, Vol. 71, No. 5, pp. 536-567, Emerald.
14. **Balaraman**, K. K. & Rose, E. (2022). Microfoundational Framework of Institutions: Knowledge Transfer in Traditional Crafts Industry, Strategic Management Society (SMS) Annual Conference, London, September 2022.
15. **Murthy**, V., & Paul, B. (2022). Entrepreneur and employee negotiated labour market flexibility in small firms. *Labour and Industry*, 1-36.
16. Bhattacharya, S., **Murthy**, V., & Bhattacharya, S. (2022). The social and ethical issues of online learning during the pandemic and beyond. *Asian Journal of Business Ethics*, 1-19.

17. **Saxena**, D., Brady, M., Lamest, M., & Fellenz, M. (2022). Bridging the marketing-finance divide: use of customer voice in managerial decision-making. *Qualitative Market Research: An International Journal*, 25(3), 361-382.
18. **Saxena**, D., Muzellec, L., & McDonagh, J. (2022). From Bureaucracy to Citizen-Centricity: How the Citizen-Journey Should Inform the Digital Transformation of Public Services. *International Journal of Electronic Government Research (IJEGR)*, 18(1), 1-17.
19. **Saxena**, D., & McDonagh, J. (2022). Communication breakdowns during business process change projects—Insights from a sociotechnical case study. *International Journal of Project Management*, 40(3), 181-191.
20. Brown, S., **Saxena**, D., & Wall, P. J. (2022). The role of information and communications technology in refugee entrepreneurship: A critical realist case study. *The Electronic Journal of Information Systems in Developing Countries*, 88(1), e12195.
21. Ramachandran, S., Rani, L., & **Saxena**, D. (2022). Literature Survey on Information and Communication Technology's role in reducing inequalities. *PACIS 2022 Proceedings*. 3.
22. Chawla, R. N., **Saxena**, D., & Goyal, P. (2022). The Critical Role of the Chief Information Officer in Smart Management of Digital Transformation. In *Handbook of Research on Smart Management for Digital Transformation* (pp. 165-189). IGI Global.
23. Rega, F., & **Saxena**, D. (2022). Free-roam virtual reality: A new avenue for gaming. In *Advances in Augmented Reality and Virtual Reality* (pp. 29-34). Springer, Singapore.
24. **Saxena**, D., & Verma, J. K. (2022). Recreating Reality: Classification of Computer-Assisted Environments. In *Advances in Augmented Reality and Virtual Reality* (pp. 3-9). Springer, Singapore.
25. Verma, J. K., & **Saxena**, D. (2022). Towards Energy Efficient Cloud Computing: Research Directions and Methodological Approach. In *IoT and Cloud Computing for Societal Good*, 3-13.
26. Murphy, N., & **Saxena**, D. (2022). Understanding the Effect of Social Media Use on Psychological Stress During the COVID-19 Pandemic. In *Digital Innovations for Mental Health Support* (pp. 228-249). IGI Global.
27. **Kundu**, T., Sheu, J-B., Kuo, H. T., (2022). Emergency Logistics Management—Review and Propositions for Future Research. *Transportation Research Part E: Logistics and Transportation Review*, 164, 102789. <https://doi.org/10.1016/j.tre.2022.102789>.
28. Sethi, N., & **Dash**, D. P. (2022). A Perspective on Energy Consumption Balance: Quality of Life, Governance, and Carbon Emissions in APEC. *Energy RESEARCH LETTERS*, 3(Early View), 32621.
29. Panda, C., **Dash**, A. K., & Dash, D. P. (2022). Assessment of risk factors of road traffic accidents: a panel model analysis of several states in India. *Vision*, 09722629221113251.
30. **Kuiti**, M. R., Basu, P., & Ghosh, D. (2022). Incentive conflict and supply contracts under carbon cap policy. *Plos one*, 17(11), e0277777.
31. Chen, M. C., **Yerasani**, S., & Tiwari, M. K. (2022). Solving a 3-dimensional vehicle routing problem with delivery options in city logistics using fast-neighborhood based crowding differential evolution algorithm. *Journal of Ambient Intelligence and Humanized Computing*, 1-14.
32. Sreekumar, H., & **Pratap**, S. (2022). Forging the nation state: an advertising history of Tata Steel, India. *Journal of Historical Research in Marketing*, (ahead-of-print). [ABDC B]
33. Ahmed, M., & **Pratap**, S. (2021). Constraint absorption in emerging economies: the role of business groups. *International Journal of Organizational Analysis*.
34. Renu Tyagi, Meenal Dhall, Mary Grace Tungdim, Urvashi Gupta, Kshetrimayum Surmala Devi, Jaisleen Kaur, Anuj Pal **Kapoor**, Monika Saini, Purnima Dhall, Peteneinuo Rulu, Purna Bhasin, Satwanti Kapoor, Nutrition, physical activity and psychological status during lockdown due to covid-19, *Acta Scientiarum. Health Sciences*, 44, e57231-e57231, 2022.

## Books by Faculty Members

- » Jitendra Verma, Deepak **Saxena**, & Vicente González-Prida (Eds.). *IoT and Cloud Computing for Societal Good*, 2022, EAI/Springer Innovations in Communication and Computing (EASICC)
- » Sébastien Ronteau, Laurent Muzellec, Deepak **Saxena**, & Daniel. Trabucchi (2022). *Digital Business Models: The New Value Creation and Capture Mechanisms of the 21st Century*. Walter de Gruyter GmbH & Co KG.

## Publication from PhD Students

- » Ali, W., & Dash, D. P. (2023). Examining the Perspectives of Gender Development and Inequality: A Tale of Selected Asian Economies. *Administrative Sciences*, 13(4), 115.

## PhD students presented the following conference papers

- » Wajid Ali, Ambiya (2022). The Inter Linkage of ICT Product Trade and Public Institutions - Does corruption matter? *National Conference on HR Mgt & International Business Transformation in Digital Era*, Jamia Millia Islamia, New Delhi, 21 September 2022.
- » Snehaprava Sahoo, Dr. Devi Prasad Dash (2022). Impacts of Natural Disasters on Agricultural Yields: Evidence from the Tropics, *International Conference on Sustainable Goals (ICSG-2022)*, IIM-Bodh Gaya, 16- 17 September, 2022.
- » Drave, V. A., Rahman, A., Drave, J. K., Kumar, S., Sharma, G. M., & Lai, K. K. (2021). Implementation of AI in business models: A conceptual study, In *Proceedings of the International Conference on Industrial Engineering and Operations Management*, Bangalore, India, August 16-18, 2021
- » Sharma, RRK, Drave, J.K. Drave, V. A. and Rahman, A., (2021) A new approach to two stage capacitated warehouse location problem (TSCWLP). In *International Conference on Industrial Engineering and Operations Management*, August 16-18, 2021, Bangalore, India.

## Faculty Laurels

- » Prof. Sangeeta Sahney developed a MOOC Course (30 hours: Equally shared with 2 other faculty) for Organizational Behaviour II (SWAYAM linked NPTEL Online Certification programme of MHRD) in 2021.
- » Prof. Sangeeta Sahney developed a MOOC Course (20 hours) for Sales and Distribution Management (SWAYAM linked NPTEL Online Certification programme of MHRD) in 2019. RERUN in 2020, 2021 and 2022.
- » Prof. Sangeeta Sahney was nominated as Expert Committee member by UGC to frame the Credit and Curriculum Framework for the Master's programme as per National Education Policy 2020
- » Dr. Deepak Saxena is appointed Associate Editor of Electronic Journal of Business Research Methods (Scopus-indexed)
- » Dr. Deepak Saxena is appointed Senior Editor of Electronic Journal of Information Systems in Developing Countries (Scopus, ESCI -indexed)
- » Dr. Mithu Rani Kuiti and Dr. Deepak Saxena qualified for the final round of Moonshot 2022 competition, organized by IIT Jodhpur.
- » Dr. Krishna Kumar Balaraman was invited to the Editorial Review Board of IEEE Transactions on Engineering Management (ABDC- A, IF 2.8).
- » Dr. Krishna Kumar Balaraman was invited to the Editorial Board of The IUP Journal of Entrepreneurship Development.
- » Dr. Krishna Kumar Balaraman's paper, Microfoundational Framework of Institutions: Knowledge Transfer in Traditional Crafts Industry, was nominated for the SMS 2022 Annual Conference Responsible Research Paper Prize by Strategic Management Society (SMS) 2022.
- » Dr. Anuj Pal Kapoor being the sole contributor from India for Neuromarketing Handbook, 2023.
- » Dr. Sinjana Yerasani is appointed as Associate Editor for OPSEARCH Journal.
- » Dr. Bhargab's paper "Impact of Data Visualization on accurate interpretation of Data Analysis" got the best paper award at the ICTIS 2023 conference organized by Middlesex University Dubai.
- » Dr. Deepak Saxena visited Trinity College Dublin to develop a course on sustainable development.

## Student Laurels

Chandreyee Bhattacharjee, Sai Shanmukh, Richik Mukharjee	Winner in the Product Management Case Competition organised by BITS Pilani.
Anisha Mehta	Gold Medal in Intellia: Inter-Departmental Cricket Competition Silver Medal in Intellia: Inter-Departmental Technical Quiz
Abhishek Kumar Singh	Silver Medal: Inter-IIT Tech Meet 10.0 2022- Blue Yonder Sustainable Supply Chain High Prep Team Event; Winner: IITJ Parliamentary Debate Competition 2023 (Team with Prakash Kumar Singh)
Adarsh Totla	Paper Presentation Competition 'Aniveshak' by Anvesh, The Research cell of IIM Amritsar - Second Runner Up (2023)
Arunika Khaitan	Corporate Chanakya IIM Rohtak Finalist
Ayush Sharma	Product Quest at IIT Delhi; Position - Finalist; Team Name - Zenith
Ayush Sisodia	Winner of IPL Fever Quiz kn D2c. 21st Rank in the Marketer's Edge quiz organised by Business Hub.
Deepika Gupta	Productivitea - Product Management Competition by LBSIM: reached finals
Disha Joshi	Invictus-Silver medal Badminton captain - Institute Badminton team, Contingent leader- InterIIT sports meet Quarter-Finalist - InterIIT sports meet
Harshit Makhijani, Himansh Mittal, Hitesh Bansal	Competition Name - Product Quest Organizing Institute Name - IIT Delhi Position - Finalist Team Name - Zenith Competition Name - Strat-Jack Organizing Institute Name - IIM Ahemdabad Position - Semi-Finalist Team Name - Zenith
Madhavi	Quater Finals In Inter IIT sports held at IIT Roorkee in Squash (Captain)[Dec 2022], Gold Medal in Intellia: Inter-Departmental Cricket Competition Quater Finals In Inter IIT sports held at IIT Roorkee in Squash (Captain), Kridansh Chess gold medal
Niladri	Gold medal for tug of war Kridansh 2023 ( captain) Gold medal in tug of war Intellia 2023(captain), Golden trophy in power Games as captain Kridansh 2023 Mr Ignus finalist Ignus 2023 Bronze medal kho kho Intellia 2023
Prakhar	Invictus- Silver Medal in Table Tennis Gold medal in Intellia in Table Tennis
Prachiti Dad	1st Runner-Up in HRace organized by IIM Indore
Preeti Singh	Flipkart 5.0 organised by D2C, Reached 2nd round Team name -Preeti Singh (Team leader), Prakash Kumar Singh, Sakshi Sharma

Prakash Kumar Singh	First Rank - IITJ Parliamentary Debate Competition 2023 organised by Literature society National Finalist (Third rank out of 17000 Participants) - Rupay Designathon organised by Unstop and NPCI (National Payment corporation of India)
Riya Bansal	Productivitea - Product Management Competition by LBSIM: finals
Sakshi Sharma	Equity research challenge, IIM Kashipur
Suchita Goel	Secured 3rd position in the "Tax Mafia" event Conducted by the finance Club of Amity University Business School.
Vanshika Bansal	Adhishtatha- The Best Manager Competition (Reached final round, 3 rounds in total). Pro Marketing Competition by Pregrad (2nd Rank) Corporate Chanakya under Synopia by SSBF (1st Rank)
Vishal Gupta	Marketer's Edge - The Marketing Quiz Competition Business Hub -> Rank 21 (Ayush Sisodia, Vishal Gupta) CEO,000,000 for a day LBSIM, Delhi -> Semifinalist (Anupreet Dubey, Vishal Gupta)
Yashi Jain	second position in HRace- IIM Indore

## Outreach and Events

- » **Prof. Sangeeta Sahney served as a Chairperson** for National seminar, "Impact of Covid-19 on Indian Industry and Economy", organised at Rajiv Gandhi University, Rono Hills, Doimukh, Arunachal Pradesh: on 18th Nov, 2022 (Online)
- » **Prof. Sangeeta Sahney served as a Chair,** "International Society for Data Sciences & Innovation – Global (ISDSI-G)", IIM Nagpur, 27-12-2021 to 30-12-2021 (Online)
- » **Prof. Sangeeta Sahney served as a Chair,** "Indian Academy of Management (INDAM) Conference", IIM Rohtak, 07-01-2022 to 09-01-2022 (Online)
- » **Prof. Sangeeta Sahney served as Chair,** "Management Doctoral Colloquium and VGSOM research scholars' day", VGSOM, IIT Kharagpur, 02-02-2022 to 03-02-2022 (Online)
- » **Prof. Sangeeta Sahney served as a resource person** for "Research Methodology and Data Analysis" - AICTE STTP at the Centre for Management Studies, 16-08-2021 to 21-08-2021, NERIST, Nirjuli NERIST, Arunachal Pradesh (Online)
- » **Prof. Sangeeta Sahney acted as a resource person** "Sustainable Change Management in Technical Institutes for NEP – 2020 Implementation", ATAL FDP at Government Engineering College, 23-08-2021 to 27-08-2021, Bilaspur, Government Engineering College, Bilaspur
- » **Dr. Krishna Kumar Balraman was an invited Speaker** at PES University's Entrepreneurial Symposium - Anthah Prerana 2022 - on July 1st, 2022 on the theme 'Discovering New Entrepreneurial Frontiers'.
- » **Dr. Tanmoy Kundu was invited as a speaker** on the topic of procurement & warehousing for NTPC executives hosted by IIT Delhi.
- » **Dr. Devi Prasad Dash delivered a lecture** in hypothesis testing," Workshop on Research Methodology", organized by Dept of Economics, MANUU, Hyderabad 21-27 March, 2022 (Virtually).
- » **Dr. Amit Singh chaired a session** in International Conference on Operations Management (ICOM 2022) organized by The Department of Operations and IT, IBS Hyderabad, India
- » **Dr. Anuj Pal Kapoor acted as faculty in-charge** for Prometeo 2022 (Technical Fest, IIT Jodhpur) and hosted over 36 CXOs as part of corporate outreach.
- » **Dr. Anuj Pal Kapoor worked as a core team member** in conducting Padharo IIT, the open house event of IIT Jodhpur, which received over 10,000 footfall.

- » **Dr. Anuj Pal Kapoor acted as Chair,** “Management Doctoral Colloquium and VGSOM research scholars’ day”, VGSOM, IIT Kharagpur, 02-02-2022 to 03-02-2022.
- » **Dr. Monika Tanwar was invited as Speaker** to the Public Systems Planning and Optimization for researchers at IIT Delhi.
- » **Dr. Jitesh Mohnot was invited as speaker** at IXI summit, organized by Uincept, a leading ed-tech accelerator.
- » **Dr. Anuj Pal Kapoor organised the first TEDx** IIT Jodhpur Event and acted as a Faculty Advisor for Ignus 2023.
- » **Dr. Anuj Pal Kapoor Organised Neuromarketing and Technology Track** at the Industry Day 2023.
- » **Dr. Deepak Saxena delivered a keynote** in the International Social Sciences Congress held on 3-5 May 2023 by Social Sciences Institute and UFUK University at Ankara, Turkiye.
- » Students of the *Social Entrepreneurship* course, taught by **Dr. Venkatesha Murthy R.**, visited Barefoot College Tilonia.



Class of Social Entrepreneurship during their visit to Barefoot College



## Doctoral Colloquium

PhD Students organised and participated in First Management Doctoral Colloquium - organised in December 2023.

## Seminars/ Workshops/ Conferences organized

Dr. Sankalp Pratap, Dr. Jitesh Mohnot, Dr. Krishna Kumar Balaraman, Dr. Nimish Vohra, Dr. Sunanda Sangwan, Dr. Monika Tanwar, and Dr. Tanmoy Kundu organised the conference on Entrepreneurship as a social movement.

## Lecture Series and Student Seminars

As part of its admissions campaign, SME conducted a series of online masterclasses to raise awareness of the role of technology in management and the management of technology. More than 15 masterclasses were conducted on topics ranging from Digital Platforms, Digital transformation, the Role of Technology in Management, Technology foresight, Changing Landscape of E-Commerce and Last-Mile Logistics etc.

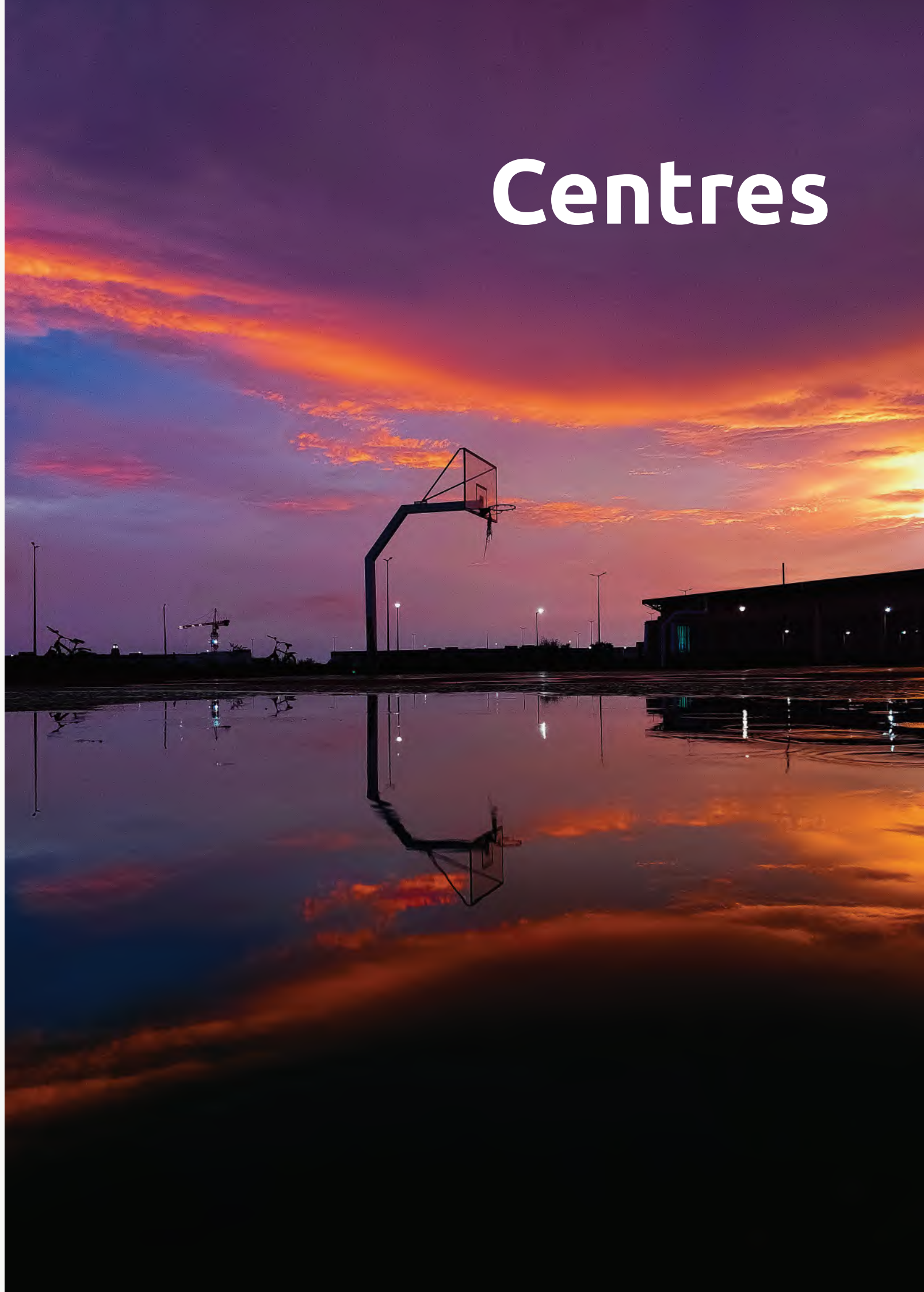
## Contribution of Department Faculty members to Section 8 companies promoted by the institute.

- » Dr. Sankalp Pratap is the Faculty-in-Charge for TISC.
- » Dr. Sankalp Pratap is the PI for the Project Craft at JCKIF
- » Dr. Venkatesha Murthy has been a member of TISC's coordination committee.
- » Dr. Krishan Kumar Balaraman is the ex-officio member of the TISC Proposal Review Committee.
- » Dr. Jitesh Mohnot volunteered for the UDBHAAS event of JCKIC.
- » Dr. Nimish Vohra is working with JCKIC on CRAFT project.
- » Dr. Venkat Ram Reddy is advisor of two startups incubated at leading incubation centres.

## Consultancy Projects

- » Devi Prasad **Dash** (PI) and Anuj Pal **Kapoor** (Co-PI): Wage Discrimination across Sectors amidst COVID-19 Pandemics- A Gendered Perspective of the Selected Northern Indian States. (18.64 lakhs)
- » Sankalp **Pratap** (PI): JCKIF (over 1.5 Cr) Venkat Ram **Reddy** (PI): Unwrapping structure and funding of informal labor addas (8000 USD)

# Centres



# Centre for Emerging Technology 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, Professor, Department of Mechanical Engineering. The center works towards attainment of sustainable development goals (SDGs) 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 SDGs.
- » 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

### Active Collaborations

- » The MoU was signed between IIT Jodhpur and Arpan Seva Sansthan, NGO, India
- » The MoU was signed between IIT Jodhpur and University of Agriculture, Mandore, Jodhpur.
- » IIT Jodhpur joined Higher Education Sustainability Initiative (HESI) of the United Nations in March 2023.

### External Major Projects

- » Science Technology and Innovation Hub in IIT Jodhpur, Karwar, Jodhpur, Rajasthan State, Project Fund - 2.1 Crores (2023-2026)
- » DST INSPIRE Faculty Project titled “Hybrid organic-inorganic membranes with tunable pore sizes and physio-chemical properties for energy-efficient separation technologies” Project Fund - 35 Lakhs (2023-2028)
- » Higher Education Financing Agency - Corporate Social Responsibility (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. Project Fund - 40 Lakhs (2021-2023)
- » Unnat Bharat Abhiyan -Regional Coordinating Institute (UBA-RCI) IIT Jodhpur is one of the regional coordinating institutes of the MHRD flagship program of UBA. The Abhiyan is coordinated by IIT Delhi. Presently IIT Jodhpur is mentoring 41 institutions in 11 districts across Rajasthan. (2019-2026) – Project Fund - 10 Lakhs per year until 2026.

## Scientific Social Responsibility Projects

Installation of Water Wheel on River Sajnam at Semera Bujurg Village, Lalitpur, Uttar Pradesh. 2022-23. IIT Jodhpur initiative to help farmers | Affordable and Sustainable Irrigation [https://youtu.be/\\_yyyNnbb0F8](https://youtu.be/_yyyNnbb0F8)

Installation of ultrafiltration for Re-use and Recycle of wastewater at 8 different rural government schools was performed in 2022-23. This was performed under the guidance of Prof. Pradip Tewari, Head, Department of Chemical Engineering.

## ETSD Seminar Series 11

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. Seminars were conducted on the following topic:

Lumpy Skin Disease Awareness - UBA with Podar College, Nawalgarh

- » Dr. Rajesh Nehra, College of Veterinary and Animal Sciences, Bikaner
- » Dr. Kashi Nath, ICAR- National Research Center on Camel, Bikaner
- » Dr. Dau Lal Bohra, Podar Educational Institute.

## Faculty members

**Mentor:** Prof. Santanu Chaudhury, Director

Dr. Sumit Kalra	Computer Science and Engineering
Dr. Krishna Kumar Balaraman	School of Management & Entrepreneurship
Dr. Pradip K Tewari	Chemical Engineering
Dr. Arun Kumar Singh	Electrical Engineering
Dr. Mahesh Kumar	Electrical Engineering
Dr. Preeti Tewari	School of Management & Entrepreneurship
Dr. Sudipta Das	Adjunct professor of practice
Dr. Farhat Naz	Humanities & Social Sciences
Dr. KJ George	Humanities & Social Sciences
Dr. Anand K Plappally	Mechanical Engineering
Dr. Vivek Vijay	Mathematics
Dr. Bhanu prasad	Adjunct professor of practice
Dr. Sandeep Yadav	Electrical Engineering
Dr. Vikky Anand	Chemical Engineering
Dr. Suchetana Charkraborty	Computer Science and Engineering
Dr. Dabasis Das	Computer Science and Engineering
Dr. Mitali Mukeji	Bioscience & Bioengineering
Dr. Ramesh Asapu	Chemical Engineering
Dr. Deepak Arora	Chemical Engineering
Dr. Sudipto Mukhopadhyay	Mechanical Engineering
Dr. Meenu Chabra	Bioscience & Bioengineering
Dr. Abdul Gafoor Shaikh	Electrical Engineering
Dr. Debanjan Guha Roy	Civil & Infrastructure Engineering
Dr. Angan Sen Gupta	Chemical Engineering
Dr. Saran Aadhar	Civil & Infrastructure Engineering
Dr. Manish Narwaria	Electrical Engineering
Dr. Sumit Kamal	Chemical Engineering
Dr. Jai Narayan Tripathi	Electrical Engineering
Dr. Ayan Sadhukhan	Bioscience & Bioengineering

Dr. Neha Jain	Bioscience & Bioengineering
Dr. Mayank Suman	Civil & Infrastructure Engineering
Dr. Akanksha Choudhary	School of Liberal Arts
Dr. Krunal M. Gangawane	Chemical Engineering
Dr. Gopakumar K U	School of Liberal Arts
Dr. Deepak Saxena	School of Management & Entrepreneurship
Dr. Jaiveer Singh	Metallurgical & Materials Engineering
Dr. Rachel Philip	School of Liberal Arts
Dr. Kirti Sankhala	DST INSPIRE Faculty, CETSD

## Faculty Recruitment

CETSD called for the first round of faculty Recruitment in June 2023 and it also conducted a special recruitment drive in the Fall of 2022. It received large interest from faculty applicants all over the world.

## UBA SEG Projects Completed and Ongoing

S. No.	Title	UBA PIs	Financial Support	Completed or Ongoing/ Timelines
1.	Virtually connecting villages to nearby doctors including PHC through Video conferencing of NCI-IIT Delhi. While examining the Project registration form, the following observation has been found	Dr. Vivek Vijay	Rs. 80,000	Completed in March 2023

## Schemes to which Proposals Submitted in 2022-2023

S. No.	Scheme/ Program	Submission Date	Initiator	Title
1.	LBI-ASPIRE Scheme of MSME	24 April 2022	CETSD	Proposal towards setting a training center for rope and Geo- textile mat manufacturing at IIT Jodhpur – Final Stage
2.	RuTAG 2.0	02 May 2023	CETSD	RuTAG At IIT Jodhpur

## Programs and Collaboration

S. No.	Program/ Request for Collaboration	Date of Initiation	Initiator	Remarks
1.	Letter from Semra Bujurg Village, Uttar Pradesh	15 March 2022	Director, IITJ	Completed restoration of water wheel at Sajnam River, in Semra Bujurg village, Bar block, Lalitpur Uttar Pradesh. <a href="https://youtu.be/_yyNnbb0F8">https://youtu.be/_yyNnbb0F8</a>

## Outreach Activities

- The Faculty Development Program was organized by UBA-RCI, IIT Jodhpur under CETSD with the help of Mahatma Gandhi National Council for Rural Education (MGNCRE) and University Grants Commission - Human Resource Development Center (UGC-HRDC), Jodhpur, on 5th- 10th December 2022.



2. UBA-RCI, IIT Jodhpur organized a Science Fair Exhibition with Seth GB Podar College Nawalgarh, Rajasthan from 17 January 2023 to 19 January 2023.



3. Nandiyan Kalan village visit was organized by CETSD for Prof. Patrick Wall and Prof. Timothy Savage from Trinity College, Dublin on 20th February 2023.







4. Top 3 selected technologies under the Tech4Seva program were demonstrated at IIT Delhi in the Unnati Mahotsav and Expo organized by UBA NCI, IIT Delhi on 17th and 18th March 2023.

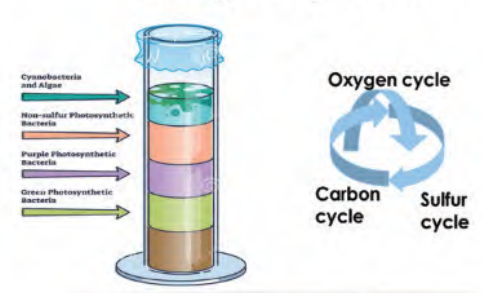


5. Trained 10 female students from PG Mahila Mahavidyala, Jodhpur. The students did a three months project where they prepared Winogradsky column from the soil from different parts of Jodhpur and analyzed the different layers of soil for their antimicrobial activity, nanoparticle formation and biofuel generation.

**Column prepared by college students of Jodhpur**


(soil)	Agriculture	Freshwater	Polluted soil
			
(week)	(0 → 4)	(0 → 4)	(0 → 4)

**Winogradsky column**



**Future bioprosects**

- Treatment of mine waste
- Reduction of harmful organic compounds
- Bioremediation and biodegradation
- Indicators of ecosystem



## Journal articles

1. Rani K, Pippal B, Singh S K, Karmakar A, Vankayala R and Jain N. Effects of Aspect Ratio of Plasmonic Gold Nanorods on the Inhibition of Lysozyme Amyloid Formation. *Biomater. Sci.*, 2023, Advance Article. Selected for front cover.
2. Pippal B, Chaudhuri P, Rani K, Yadav JK and Jain N Discerning Modulation of  $\alpha$ -Synuclein Amyloid Assembly by  $\alpha$ -Crystallin ACS Chem Neurosci. 2023, 14, 9, 1659–1671. Selected for front cover.
3. Alok Ranjan, Prithivi Prakash, Elderly Health in different States of India: learnings from 75th Round National Sample Survey, 2017-18. *Journal of Health Management*, 2023
4. Brown, S., Saxena, D., & Wall, P. J. (2023). Data collection in the global south: practical, methodological, and philosophical considerations. *Information Technology for Development*, 1-21.

## Conference presentation

Duhan S., Ahmad M., Jakhar P., Sharma Y., Nighojkar A., Himanchal, Shedekar V., Plappally A. K., Suitability of Clayey soils from Jalore and Jodhpur, Rajasthan India for production of frustum shaped 3-Litre ceramic water filters, International Conference on Advances in Chemical and Material Sciences ACMS-2022, April 14-16, 2022, IICE, Kolkata, India.

## Book chapter

Ravi Bhandari and Anand Krishnan Plappally, Affordable ICT Solutions for Water Conservation Using Sensor-Based Irrigation Systems for Use in Arid Agriculture in Thar Desert Region of India, Chapter 8 of *Smart Agriculture for Developing Nations Status, Perspectives and Challenges*, 2023, Advanced Technologies and Societal Change Series, Springer, Centre for Science and Technology of the Non-aligned and Other Developing Countries, 95-118. [https://doi.org/10.1007/978-981-19-8738-0\\_8](https://doi.org/10.1007/978-981-19-8738-0_8)

# Center for Technology Foresight and Policy (CTFP)

The Center for Technology Foresight and Policy (CTFP) came into existence on 14 January 2020. The center plans to focus on evolving areas of technology - such as metaverse, quantum technologies, future of mobility – with an aim to provide future roadmaps and policy recommendations. The center also plans to promote foresight and its methodologies in the public and private sectors.

The rich ecosystem of IIT Jodhpur is an aid in creating technology foresight-based research agendas and view of alternate futures. CTFP has been building its resources and relationships the past year. CTFP is developing by creating focus groups involving faculty from multiple disciplines such as the Future of Cities and Metaverse focus groups. A team from IIT Jodhpur presented the concept of future cities to the Chief Secretary of UP and his team in March 2023.

CTFP has recruited two faculty with interest in technology and foresight who are joining in June 2023. CTFP is also offering academic programs from the center. CTFP has also launched a call for post-doctoral positions at the center and the MS by research program in Foresight.


CTFP is in discussions with organizations such as Technology Information, Forecasting and Assessment Council (TIFAC), DRDO, and Central Detective Training Institute, Jaipur (part of BPR&D), and National Capital Region Planning Board. The futuristic focus of CTFP is in line with the needs of these organizations and discussions in May 2022, July 2022 and May 2023 indicate areas of mutual synergy. CTFP also plans in the future to look at future roadmaps, applications, and policy

implications of technologies such as terahertz, photonics, cyberwarfare, hypersonic systems. CTFP represented by Dr. Krishna Kumar Balaraman was invited to participate in a National Webinar on Technology Foresight in Police conducted on 07 Sep, 2022.


CTFP anchored Moonshot 2022 that will take place in two stages. The results of the first round were announced on the Institute Foundation Day (2nd August 2022). There were 21 submissions of which 6 have been selected to proceed to the next stage. The top entries will receive the prize money of Rs 5000. These qualified teams submitted a foresight-based technology feasibility roadmap of the idea and impact analysis by November 05, 2022. The top 2 teams received a prize of Rs 20000. Results were announced in a special event on the eve of IITJ convocation (2022).


CTFP members visited CDTI, Jaipur on July 27, 2022, for a roundtable to discuss “Technology Infusion in Policing” (Two Photos Attached - Dr. Amandeep Singh Kapoor, IPS, Director, CDTI, Jaipur felicitating CTFP members). Discussion points that need to take forward include an MoU with CDTI/BPR&D, field research on impact of community policing, and a joint conference on Metaverse. There is also interest in conducting futuristic programs involving predictive methods for policing. CTFP also anchored the collection of position papers for S20 subtheme of “Science for Society & Culture”.






## CENTRAL DETECTIVE TRAINING INSTITUTE (BPR&D), JAIPUR







**National Webinar**  
on  
**Technology Foresight in Police**  
Wednesday, 07 Sep, 2022 1100 hrs to 1315 hrs




**Sh Rakshit Tandon**  
Cyber Security Expert.  
New Delhi




**Dr Amandeep Singh Kapoor, IPS**  
Director , Central Detective  
Training Institute , Jaipur



**B. Shanker Jaiswal, IPS**  
Joint Commissioner of Police,  
Operations, Technology &  
Project Implementation Division,  
Delhi Police



**Prof. Krishna Kumar Balaraman**  
School of Management &  
Entrepreneurship,  
Head-Centre for Technology  
Foresight & Policy  
IIT, Jodhpur



**Sh Rajesh Kumar**  
Vice Principal Central  
Detective Training  
Institute , Jaipur

[Connect with Webex link](#)



## Faculty Members

S. No.	Name	Designation	Department
1.	Dr. Krishna Kumar Balaraman	Associate Professor	School of Management & Entrepreneurship
2.	Dr. Ankita Sharma	Associate Professor	Department of Humanities & Social Sciences
3.	Dr. Anand Krishnan Plappally	Associate Professor	Department of Mechanical Engineering
4.	Dr. Deepak Kumar Maganlal Fulwani	Associate Professor	Department of Electrical Engineering
5.	Dr. Farhat Naz	Assistant Professor	Department of Humanities & Social Sciences
6.	Dr. Kirankumar Hiremath	Associate Professor	Department of Mathematics
7.	Dr. Sumit Kalra	Assistant Professor	Department of Computer Science & Engineering
8.	Dr. Kothadia Hardikkumar Bhupendra	Assistant Professor	Department of Mechanical Engineering
9.	Dr. Prasenjeet Tribhuvan	Assistant Professor	Department of Humanities & Social Sciences
10.	Dr. K. J. George	Associate Professor	Department of Humanities and Social Sciences

### Advisor:

#### Dr. Anurag Goel

M.Sc. (Physics): University of Allahabad

Master's (Management/Public Administration): Carleton University, Ottawa

Ph.D. (Computer Science): University of Waterloo, Canada

IAS (Retd)

Former Secretary, Ministry of Corporate Affairs

Former Member, Competition Commission of India

## Centre for Research & Development of Scientific Instruments (CRDSI)

The state-of-the-art central instrumentation facility of IIT Jodhpur which was established in the year 2018 under the name of Centre for Advanced Scientific Equipment (CASE) has been renamed as the Centre for Research & Development of Scientific Instruments (CRDSI), with the aims as:

1. Advanced scientific instrumentation service to researchers from both academic and industrial organizations.
2. R & D for advanced scientific instrumentation.
3. Technology development and innovation in the area of scientific instrumentation and
4. Encouraging start-ups for scientific instrumentation

At present a total number of 93 high end instruments are under the CRDSI facility. Currently, the space allotted for CRDSI 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. The rest of the instruments under the facility are located at various departments of the institute. The overall day to day activities and the policy of the Centre is determined by a committee of faculty of this institute. Dedicated technical staff members under the guidance of a scientific officer are available at the center for smooth management of the facilities. The center at present is looking forward to expand its resources both in terms of infrastructure and manpower. The institute has allotted a new building for housing a series of newly procured sophisticated instruments. Further, under the HEFA scheme of MOE the center is in the process of procuring high end equipment for augmentation of multi-disciplinary research endeavors of the Institute.

**Policies at place:** The main objective of CRDSI is to offer users of IIT Jodhpur as well as external users a smooth access to various high-end equipment for their research activity in the multidisciplinary field. To fulfill this objective CRDSI facility provides its users a transparent and well maintained booking system through which users can book slots for measurement on any equipment under

the facility persuasively. CRDSI, IIT Jodhpur is registered with the I-STEM portal of the Govt. of India and also manages an external booking system allowing users from various parts of India to use the instruments. The CRDSI committee appointed a faculty in charge for each of the instruments for smooth running and maintenance of the equipment. Moreover, CRDSI has an endeavor to provide hands-on training for students of IIT Jodhpur as well as external users by arranging training programs and workshops on various sophisticated instruments for their professional growth. Faculty-in-charge organize training programs periodically on various equipment such as NMR, Raman spectrometer, SEM etc. for internal students. In addition to this CRDSI has organized a DST funded week long (8th August-14th August, 2022) workshop "Synergistic Training Utilizing the Scientific and Technological Infrastructure" (STUTI) on instrumentation to provide training towards the underprivileged students from all over the country. It was inaugurated by The Director, IIT Jodhpur Prof. Santanu Chaudhary on 8th August, 2022. A total number of 45 students were shortlisted for participating in this program from the 300 students registered online for STUTI. Students from twelve different states of the country namely Tamil Nadu, Delhi, MP, Maharashtra, Bihar, UP, Kerala, Rajasthan, Haryana, Uttrakhand, Gujarat and Punjab participated in the program. By providing such opportunity towards the external users CRDSI facility is thriving to extend its service to all national institutes and R & D organizations across the country for accessing this facility on a minimal chargeable basis.

**Future prospects:** The center plans to come up with academic training programs, PG diploma and certificate courses for creation of dedicated manpower for handling, repair and maintenance of high end equipment. In future the center will plan to organize several short term workshops and training programs on specific instruments for the region to popularize the use and handling of sophisticated equipment. The center will also register government funded projects owned by faculty and staff associated with the center. At present one DST-SERB funded project entitled "Crafting Potential Broad Spectrum Antimicrobial Leads from Pyrophosphate Moiety of Lipid-II Precursor of Bacterial Cell Wall Peptidoglycan" is registered.



# Section-8 Companies

Conforming to its Vision and Mission, IITJ established various Special Purpose Vehicles (with autonomous functionalities but closely linked to the institute) to attain the cherished goals, and also set up various administrative bodies (with specified charter of activities) to shape a dynamic ecosystem conducive to appraisal of inventions, commercial value addition through Incubation and nurturing/ promoting Innovations. In subsequent sections, (i) the roles played by such intermediaries in harnessing the institute policies/directives for supporting / promoting incubation & innovation, and (ii) few results, impacts; are elaborated.

# IITJ Technology Innovation & Start-up Centre (TISC)

TISC has been promoted by IITJ as a legal entity - a Section 8 company, functionally independent but closely linked to the institute and endowed primarily with functions contributing to the extension activities of IITJ viz. enabling the reach-out of the knowledge / knowledge workers with the appropriate value addition in the service of the society. TISC plays a vital role in IITJ's vibrant entrepreneurial ecosystem by enabling freedom to innovate through R&D intensity, industry interaction, IP protection, partnerships with various actors in the startup ecosystem and institutional setup to hand hold entrepreneurs. It houses incubation projects supported by the Ministry of MSME and Ministry of Electronics and Information Technology (MeitY). It also implements the BioNest programme of BIRAC, DBT.

TISC has been set up with the intent to create an environment of critical thinking and entrepreneurial education, to build competent hands to innovate products, give fellows immersive experience and cutting-edge training they require to thrive in building enterprises. The infrastructure lent by IITJ to TISC and the MoU established between them, enables the nurturing of an ecosystem conducive to innovation, incubation and techno-entrepreneurship wherein academic experts/ infrastructure can be leveraged by students, faculties, industries, R&D Institutions and budding entrepreneurs / start-ups towards the synergistic outcome TISC has established norms for project implementation - particularly those addressing technology development for new products, process, or service. Such projects shall be taken up in association with the academics in IITJ - as the primary investigator, along with investigators from other organizations, if needed, with industry as the collaborator or the end-user. TISC works in close association with various student fora

as well including the Board of Innovation and Entrepreneurship in activating / motivating the student community in adopting Entrepreneurship as a Career option.

Programs/ workshops by domain experts are organized for incubatees / pre-incubatees. Regular sessions are conducted on IP awareness and capacity building of the incubatees/ applicants for filling relevant patents. Various awareness programs are continuously conducted in association with the Institution Innovation Council and Entrepreneurship Cell of IITJ.

IITJ Faculties involved as inventors and innovators in various projects get appropriate opportunities for incubation at TISC. IITJ has the Faculty Entrepreneurship Policy in place which encourages various faculties for promoting their start-ups through incubation. Policy documents for start-up activities by student entrepreneurs during the academic tenure i.e. Students Entrepreneurship Policy is also in the process of adoption/ implementation. Also, based on the field of work Faculties are associated with student-led start-ups incubated at TISC as Faculty mentors. For initiating and executing various programs and projects funded by external agencies IITJ faculties are associated as Principal Investigator (PI) and give their valuable inputs and efforts till the completion of such programs/ projects. In addition to these, Faculties are associated in various training programs, certificate courses, entrepreneurship awareness program, and Hackathons being conducted by TISC from time to time. Engagement of the faculties in various initiatives being taken through the Institution Innovation Council (IIC) and Board of Innovation and Entrepreneurship is also acting like a bridge for bringing potential ideas for preincubation/ incubation at TISC.

## 1. Management of Intellectual Property

While the ownership of the Intellectual Property generated as the outcome of academic activities in the institute shall rest with IITJ, the institute may outsource the interfacing process of managing the Intellectual Property viz. registration, maintenance, renewal, licensing, assignment etc. to TISC on a mutual beneficial basis. TISC shall play the role of an interface organization - assisting IITJ in the process of empaneling Patent Attorneys, engaging Attorney for specific IP registration for cases recommended by the Institute IP Management Group (IIPMG), executing License/Technology Transfer Agreements for licensing of Technology / knowledge recommended by the Technology / Knowledge Transfer Group (TKTG) in IITJ, custodian of proceeds of licensing / technology transfer and distribution thereof among the beneficiaries. TISC will play a key role in commercializing IP's generated by faculty and students in the Institute and various Special purpose Vehicles (SPVs) in the Institute.

## 2. Management and Operation of the Technology Business Incubator

TISC manages and operate the Incubator for incubating ventures leveraging IITJ developed

technologies, IPs licensed out to ventures - led/ promoted/mentored primarily by IITJ academicians/ graduates/alumni and / or entities closely linked with the institute, are subject to exploration of new knowledge-based business. TISC supports incubation of tech.-based start-ups - both in the physical and the virtual based. TISC also accommodates student/faculty entrepreneurs in pre-incubation of an innovative product/process idea so as to work out a Business Plan for a MVP which can be subsequently taken up for incubation through the start-up route.

### 2.1 Current status of Incubation progress at TISC Incubator:

TISC provides all the common infrastructure facilities during the incubation /pre-incubation period like Work stations, lab benches, meeting rooms, conference hall, common area, cafeteria, and printing facilities. The complete building is WiFi-enabled. The start-ups - at the instance of the faculty mentor in each, are allowed usages of institute facilities, library etc.

### Start-ups under Incubation

Name of the Incubatee	Status	Product Description
Divya Plasma Solutions Pvt. Ltd	Existing	Indoor Air Sterilizing Systems
Novealthy Innovations Pvt. Ltd	Existing	Telemedicine Solutions
Healyantra Pvt. Ltd	Existing	Smart Dental Handpiece
Caldor Health Technologies Pvt. Ltd	Existing	Minimally invasive treatment device for Deviated Nasal Septum
Medvocare Pvt. Ltd.	Existing	Automated oral care irrigation device for mechanically ventilated patient to reduce risk of ventilator associated pneumonia
Cellverse Pvt. Ltd.	Existing	Bio-printed sustainable and viable bio-construct for oral precancerous and cancerous treatment
Niranthar Care Pvt. Ltd.	Existing	Neck patch device for management of hypertension

M/s Divya Plasma Solutions, a IITJ Faculty promoted start-up has launched a product on cold plasma based indoor air purification which has been shown to eliminate microbial and virus load from standard environment through testing in NABL accredited labs. This is now going through end user trials.

## Pre-incubation of Innovative ideas by Faculties/Students

Name of the Innovator	Status TRL 3	Product Description
Dr Saakshi Dhanekar	Existing	Indigenous alcohol breath analyser for prevention of drink and driving case
Dr Amandeep Kaur	Existing	An Endoscopic Camera System
Dr Indranil Baneerje	Existing	Edible emul-gel based novel, cost-effective formulation for colon targeted symbiotic- drug delivery
Mr. Vigyan Gadodia	Existing	Small-scale Milk Disinfection System
Mr. Wilfred Kisku	Existing	Human Perception driven on-chip compression for power efficient CMOS image sensors
Mr. Bibhudutta Satapathy	Existing	Non-Contact Blood Oxygen Saturation Measurements
Mr. S.Subburayalu	Existing	Self-cleaning of Endoscope & Developing Socket- Based Anti-Fogging Lens for ENT Endoscopes
Neha Nagarkoti	Existing	Development of Neonatal Transport Incubator for affordable, effective, and safe transport of premature/sick infants
Ajmal Jaleel	Existing	Trocar device for safe cannula insertion

### 3. Sourcing of Funds for Incubator and Incubatees

TISC leverages various government promoted schemes for funding and submit bids in the right earnest as one of the priority activities. Towards this end, TISC has already leveraged the fundings from BIRAC - a unit of the Department of Biotechnology, Govt. of India; in the setting up the BioNest (A Biotechnology Incubator) in the Institute campus for incubating start-ups leveraging technologies in the applications sectors - healthcare, agriculture, environment, medical devices and related areas. This Incubator is the first of its' kind in the state of Rajasthan and is of great support for budding entrepreneurs in the state, regions within - cutting across the entrepreneurial ecosystem developed and expanding by IITJ The incubator is equipped with the state-in-art equipment for supporting the resident incubatees The incubator so established out of the government funding, will now render TISC eligible for the beneficiary of corporate CSR funding for the activities mandated in the Companies Act 2013 Eligible students in institute may undertake preincubation of technology-centric development pursued in their PG/PhD work. TISC is simultaneously gearing up the entrepreneurs within the institute in isolation or in association with other stakeholders in the ecosystem, for seeking funding on carefully ideated projects in various Call for Proposals under various funding schemes of

DBT, DST and other institutions. There are number of Government agencies/schemes offering financial grants for the start- ups/entrepreneurs e.g., MSME, MeitY, NIDHI PRAYAS, BIG & SIBRI (BIRAC scheme) besides grants under various Grand challenges offered from time to time. These activities are pursued relentlessly round the year for promoting TISC as the destination for aspiring incubatees / entrepreneurs from the alumni and other members of the society in the region/nation - besides members in the academic community of IITJ.

### 4. Collaborating with Stakeholders in the Ecosystem

Student fora: TISC works closely with various student fora linked to entrepreneurship in the Institute viz. Board of Innovation and Entrepreneurship (BIE), Institute Innovation Council (IIC) and the likes to open formal communication channels through discussion, brainstorming sessions for a focused dissemination on the various facets of entrepreneurship viz. Business Plan, Intellectual Property, Angel/Venture funding, start-up as a career option, value offerings at TISC etc.

Alumni Association: TISC is setting up a close link with the Alumni Association of IITJ for frequent interactions, seeking inputs from each other on programs of respective entities. Alumni entrepreneurs and Alumni holding senior positions in industry units are reckoned as valuable

stakeholders in various programs of TISC like incubator membership, CSR funding on specified technology-leveraged affordable products/ processes by incubatees in TISC, Workshops & seminars etc.

Other Sec 8 companies in the IITJ system: TISC leverages the mandates of other Section 8 companies in the IITJ system (JCKIF, Technology Innovation Hub (TIH)) on a win-win basis - be it the operation of Endowment fund, or operation of Technology Park or Research translation / Technology Development activities.

Institutes and R&D organizations in the neighborhood: TISC participates in various bids - on careful appraisal of the scope and deliverables, for specified projects/program from third parties within/outside the country in a collaborative/ consortium mode - involving faculties from IITJ, together with faculties/Technologist/scientists from other institutes, industries, R&D setups. TISC responds to such calls in consultation or at specific instances of IITJ faculty(ies) after careful appraisal of such Request For Proposals with due care for the IP issues and the commercialization prospects. TISC front-ends all such bidding exercises including the contract execution, project implementation, fund management, IP & technology Transfer issues - in case of a bid success.

## 5. Homology with other SPVs in the Institute

IITJ along with AIIMS Jodhpur and other stakeholders including RIICO are exploring the setting up of a Medical Technology (MED-TECH) Industrial Park in the neighborhood of Jodhpur. In a limited scale IITJ has already set up and operationalized a Mini Technology Park on the campus. This is poised to be the destination of startups incubated at TISC including the BioNEST-Bioincubator. Besides, other established industries - on selected criteria, are allowed to setup Centers-of-Excellence in this Tech-park to take advantage of the IITJ ecosystem. The MED- TECH park will assume the premise that good in-house scientific facilities can help manufacturers reduce the manufacturing costs by 40-50 % easily in India. Medical technologies combined with IoT and Artificial Intelligence for new generation medical technology in the state is the need of hour. It will encourage local manufacturing and reduce the country's dependence on imports. The park eco-system will help small enterprises in

all the Technology verticals including MedTech to be taped into the expertise of larger companies. At the Tech Park, companies will access to engineering services, laboratory facilities, rich IITJ & other partner institutions knowledge resources, quality control units, import and export facilitation centers, regulatory offices, etc.

**5.1** Incubation for technologies originating from Jodhpur City Knowledge and innovation Cluster (JCKIC): Six cities — Jodhpur, Bhubaneswar, Chandigarh, Pune, Ahmedabad and Hyderabad are being developed as City Knowledge and Innovation Clusters. The project is led by the office of the Principal Scientific Advisor (PSA) on a priority basis and IIT Jodhpur has been chosen as a leading organization for Jodhpur City Knowledge and Innovation Cluster. This cluster will provide a connection between the existing research and knowledge setups at the nearby institutions and various industries that exist in the city Jodhpur in particular and Rajasthan State in general.

**5.2** Incubation for start-ups promoted on technologies from i-HUB Drishti Foundation(TIH) : TIH is an autonomous Section 8 company promoted by IIT Jodhpur for implementing the National Mission project of the Government on the Cyber-Physical Systems as per a tripartite agreement between IITJ, DST and TIH. TISC has executed a MoU with TIH for incubating start-ups promoted/ supported by TIH on various technology domains for the technology commercialization.

**5.3** Bid for a Generic Technology Park with DST/ MHRD: The Technology Park will encompass all other entrepreneurial programs and parks in specified technologies practiced / setup in the past and will also include host of programs from the DST, Govt. of Rajasthan as well.

**5.4** Leveraging Delhi Mumbai Industrial Corridor (DMIC): TISC shall look for opportunities for association/collaboration in the forthcoming Delhi Mumbai Industrial Corridor (DMIC):

- DMIC is World's largest infrastructure projects investment ~ USD 90 billion
- A high-tech industrial zone spread across six states is foreseen.
- Proposed investment regions development in the first Phase includes Khushkhera- Bhiwadi-Neemrana and Jodhpur-Pali-Marwar (in Rajasthan), which is very well aligned with IITJ-TISC



# Jodhpur City Knowledge and Innovation Foundation (JCKIF)

## 1. Introduction

Jodhpur City Knowledge and Innovation Foundation (JCKIF), is an IIT Jodhpur promoted Section-8 non-profit company established on 31st March, 2021 to carry out and sustain the activities of Jodhpur City Knowledge and Innovation Cluster (JCKIC). The cluster is an initiative of the Office of the Principal Scientific Adviser to the Government of India on the recommendation of the Prime Minister's Science, Technology and Innovation Advisory Council.

The primary objective of JCKIF is to create strong linkages among Academic Institutions, R&D Institutes, National & State Research Laboratories, Government Agencies and Industries of the city of Jodhpur and its surroundings. JCKIF has been working on six verticals namely Medical Technologies, Handicrafts and Handlooms, Water & Environment, I-Governance, Artificial Intelligence of Things (AIoT) Innovation Hub and Thar DESIGNS.

## 2. JCKIF Verticals

The action plans for each of the verticals along with the actions undertaken are provided below:

### 2.1 Medical Technologies (MedTech)

Action Plan: Joint Academic Programs by AIIMS and IIT in the area of Medical Technologies initiated for ensuring supply of requisite manpower for innovations and entrepreneurship.

Action Plan: Collaborative product development platform involving AIIMS, IIT, ICMR-NIIRNCD and other institutions along with participation of Industries.

Action Plan: Setting of Common Facility Centre in the domain of Medical Technologies supporting R&D, Prototyping, and Testing facilitating all the stakeholders

## Action Plan: Setting of MedTech Park

Actions undertaken: A joint programme was initiated by Indian Institute of Technology Jodhpur and All India Institute of Medical Sciences, Jodhpur in 2020 with the aim to provide a common platform for doctors and engineers fostering knowledge sharing and innovation leading to the development of indigenous healthcare devices and systems through the process of incubation and entrepreneurship. Under the MMT Program, currently there are 58 Registered Students. JCKIF has provided stipend to some of these students and 11 of them with research grants worth Rs. 13,15,463/-. JCKIF is playing important role in establishing linkages with industries as well as for setting up Common Facilities Center for medical devices.

## Major Achievements and Activities

- » Seven start-ups are incubated and 8 Patent applications have been provisionally granted since the inception of the MMT Programme.
- » MedTech students have been awarded government funding, and fellowships (BIRAC BIG grant, MSME grant) and MedTech faculty and student teams have won national Medtech awards (NBEC 2022 conducted by BIRAC and cCAMP Bangalore, technology readiness at BETIC IIT Bombay 2022).
- » Established Center of Excellence in Ayurtech supported by Ministry of AYUSH with Rs 10 crores grant to perform evidence based research and integrate Ayurveda with Internet of Things (IoT) and Artificial Intelligence (AI) to boost public health measures.
- » Established Multi-disciplinary DeepTech Biodesign Center supported by DBT to train, nurture and transform clinicians and engineers

into Deep-Tech innovators in the field of Medical and Healthcare Technology.

- » Established BioNest (Bioincubators Nurturing Entrepreneurship for Scaling up Technologies) incubation centre supported by DBT to promote and nurture entrepreneurship in Healthcare / Medtech/ AgroTech/ Pharma segment and allied areas.

## 2.2 Water and Environment

Action Plan: Provide solutions using technology intervention for clean drinking water, wastewater management and air pollution mitigation.

### Actions Undertaken:

(i) Centre for Sustainable Drinking Water (sponsored by Jal Jeevan Ministry) has developed G-filter technology and Ultra-filtration membranes for water purification that are being used in various parts of Rajasthan.



(ii) JCKIF has supported with Rs. 40 Lakhs grant to IIT Jodhpur for Smart Graded Water Supply Grid Project with the aims to develop and demonstrate AIoT enabled Smart Graded-Water Supply Grid at IIT Jodhpur and deliver graded water supply inside the campus.

(iii) JCKIF also supported with Rs 10 lakhs to ICMR-NIIRNCD to understand ambient Air quality in indoor environments.

### Major Achievements and Activities

(i) JCKIF has received sanction of CSR Grant of Rs. 2.51 Crores from REC foundation (Ministry of Power, Govt. of India) for the project “Green Orphanages for Children”. The objective of this project is to collect and recycle plastic waste for making Benches, Bunk beds and T-shirts for Children and supply to Child Care institutions of Rajasthan.

(ii) CSR Grant of Rs. 25 Lakhs received from Siemens.

## 2.3 Handicrafts and Handlooms

- » Action Plan: Creation of a Crafts Museum
- » Action Plan: Design and Craft Visualization
- » Action Plan: Assistance in obtaining GI tag

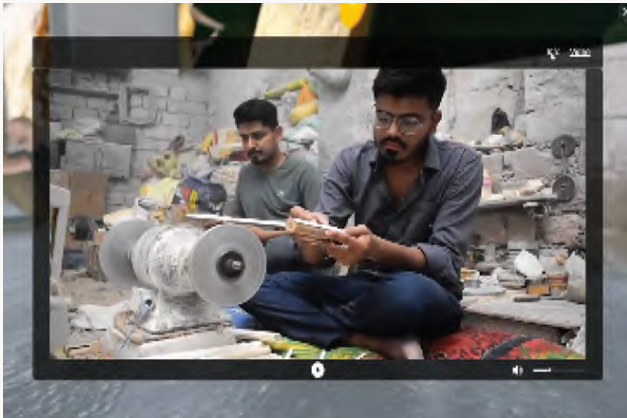
Actions undertaken: JCKIF has been playing an active role in the upliftment of local craft artisans and promoting their crafts by means of various trust building exercises, exhibitions, and awareness exercises.

### Major Achievements and Activities

(i) JCKIF supported project worth Rs.1,12,84,812/- on Data Acquisition, Design and Development of a web Portal enhanced with AR/VR Features has been developed.

(ii) JCKIF supported project worth Rs. 1,62,25,000/- on Design, Development and Maintenance of E-Commerce Platform for Jodhpur Craft Clusters is under development.

(iii) Dharohar - Phygital museum has been setup in JCKIF premises.



(iv) Bone & Horn Craft exhibition organized by JCKIF and IIT Jodhpur on July 2 and 3, 2022 in IIT campus to support artisans of unorganized sector.

(v) UDBHAAS - JAL AUR JEEVAN event was organized from September 24-26, 2022. As a part of Udbhaas, Centre for Sustainable Drinking Water, Handicraft exhibition and Dharohar (Phygital museum) were inaugurated by Hon'ble Minister of Jal Shakti, Shri Gajendra Singh Shekhawat.

(vi) A series of outreach sessions with the local craft artisans.

(vii) A series of IP sessions focused at GI tagging and other forms of IP protection available for Craft products.

## 2.4 I-Governance

Action Plan: AI based Innovation in Public Services

Actions undertaken: Smart solutions using Artificial Intelligence to detect Traffic violations such as Wrong Lane detection and Helmetless driving have been developed. Vehicle counting and classification algorithms are also developed which could become a building block for Traffic management and planning. Studies on Traffic volume and speed variation analysis, as well as roundabout analysis are under exploration.



(i) JCKIF supported study worth Rs. 45,00,000/- on "Detecting non-conformance of traffic rules from surveillance videos" is ongoing on a co-development model with a Industry partner for implementing traffic planning and detecting traffic rule violations for the city of Jodhpur and scaling to other cities of India as well.

## Major Achievements and Activities

(i) MoU has been signed for video data sharing between DoIT, Govt. of Rajasthan, Rajasthan Police, JCKIF and IIT Jodhpur.

(ii) A series of discussion meetings with the civic administration.

(iii) JCKIF showcased a demo of its ongoing activities to various stakeholders related to Traffic management of Jodhpur.

## 2.5 Thar Designs

Action Plan: Pursue integrated study of the desert ecosystem to propel discoveries, inventions and innovation for mitigating water and health challenges and catalyzing growth of industry and agriculture for sustenance and livelihood, and to evolve strategies for sustained management of natural resources and ecological development in arid regions.

Actions undertaken: Several studies around Rs. 60,00,000/- are being supported by JCKIF to raise awareness about local Flora and Fauna characteristic of this region and understand ecosystem.

- (i) Ethnogetic mapping of Crafts on Thar desert.
- (ii) Camel and Bat phenomics guided bioengineering: Design prospecting & bioinspired solutions;
- (iii) Bioprospecting from Biological soil crusts – Ecological engineers of the Thar;
- (iv) Design Synthesis and Evaluation of Therapeutic Properties of Bioactive Metabolites from Desert Medicinal Plants;
- (v) Bioprospecting stress tolerance-promoting microbes from the rhizosphere of keystone Thar plants;

(vi) Citizen Science of the Thar Ecosystem- “Desert Ecosystem Knowledge Grid.”

## Major Achievements and Activities

(i) JCKIF under its Thar DESIGNS vertical, initiated a citizen science program, named “IITJ-BioBlitz”, to connect and aggregate local ecological information through crowdsourcing.

(ii) The webinar

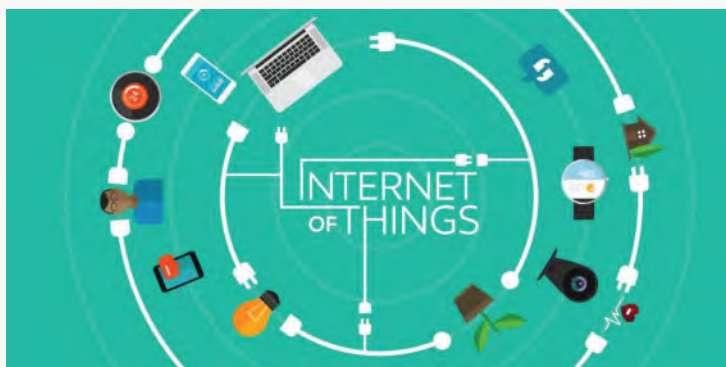
(iii) JCKIF has received sanction of Rs. 31,00,000/- from IFFCO for the project titled “To understand the molecular mechanisms of growth promotion by IFFCO nano-urea in the model plant Arabidopsis thaliana”.

(iv) Smartphone application named “Prakriti” has also been developed as part of this programme.

## 2.6 AIoT Innovation Hub

Action Plan: To foster and nurture innovations in the area of Artificial Internet of Things (AIoT).

Actions undertaken: In this regard, setting up of a state-of-the-art fabrication facility as a joint venture between JCKIF and RajComp Info Services Ltd (RISL) is underway at IIT Jodhpur campus. The facility aims to create a sustainable and advanced ecosystem to facilitate end-to-end design, development, prototyping, and pilot production of AIoT systems.



## Following Studies supported worth Rs. 15,25,000/- by JCKIF

1. Developing proof-of-concept for a Novel POC device for diagnosing sepsis.
2. Developing Fabric based wearable sensors.
3. AI enabled identification of organic honey using ultrasensitive and selective nano-sensing platforms.

**Achievements:** A joint venture between JCKIF and RISL, Govt. of Rajasthan is being launched. Govt of rajasthan has approved Rs 72 Crores for the same.

## 3. JCKIF other Activities and Initiatives

3.1 Since its inception, JCKIF has signed MoUs with several notable Institutions, Organizations and Industries from Jodhpur and nearby areas viz. IIT, AIIMS, DRDO, Central Arid Zone Research

Institute (ICAR-CAZRI), National Institute on Implementation Research (ICMR-NIIRNCD), Dr. Sarvepalli Radhakrishnan Rajasthan Ayurved University Jodhpur, Dr. Sampurnanand Medical College, Jodhpur Industries Association, Rao Jodha Park, Podar Educational Institutions, Rajasthan State Industrial Development & Investment Corporation Limited (RIICO), RajCOMP Info Services Pvt. Ltd.

(RISL), REC, IFFCO, Contact Base and Electronics Sector Skills Council of India.

3.2 JCKIF along with IIT Jodhpur and other IIT promoted Section 8 companies showcased at Paschimi Rajasthan Hastshilp Utsav at Ravan ka Chabootra, Jodhpur on January 06, 2023. Hon'ble Chief Minister of Rajasthan Shri Ashok Gehlot visited the site.



Hon'ble Chief Minister of Rajasthan, Shri Ashok Gehlot visited IIT Jodhpur stall on January 06, 2023 during Paschimi Rajasthan Hastshilp Utsav at Ravan ka Chabootra, Jodhpur

3.3 Third Advisory Committee meeting of Jodhpur City Knowledge and Innovation Cluster was held on January 30, 2023 under the Chairmanship of Dr. Ajit Seth, IAS, Former Cabinet Secretary, Govt of India.

Dr. Swati Basu, Scientific Consultant and Former Scientific Secretary, OPSA, Govt of India.

3.4 Project Review and Monitoring Committee meeting of OPSA was organized at IIT Jodhpur on February 14-15, 2023, under the Chairmanship of

3.5 JCKIF has conducted training programmes on "English for Office Work", "Government e-Marketplace (GeM)" and "General Financial Rules (GFRs)" were organized jointly by IIT Jodhpur and JCKIF.



Project Review and Monitoring Committee meeting of OPSA held at Boardroom, IIT Jodhpur on Feb 14-15, 2023 under the under the Chairmanship of Dr. Swati Basu, Scientific Consultant and Former Scientific Secretary, OPSA, Govt of India and the overall leadership of Prof. Santanu Chaudhury, Chairman BoDs, JCKIF and Director, IIT Jodhpur.

#### 4. Success Stories of Cluster

Since its inception, Jodhpur Cluster has been actively engaging with the stakeholders in Jodhpur and surrounding regions.

To engage with the artisans of the local handicrafts and handlooms industry, JCKIF and IIT Jodhpur organized several need assessment workshops, exhibitions and interaction sessions. JCKIF has also developed Augmented/Virtual Reality (AR/VR) technology for promoting the business of the artisans through E-commerce and reach the unreached globally.

JCKIF is actively collaborating with the Police authorities in developing smart traffic management solutions for the city of Jodhpur by using roadside cameras to detect Traffic violations such as wrong

Lane detection and Helmetless driving, and to perform traffic volume and speed variation analysis for the purposes of traffic planning on roads and at roundabouts.

G-filter and ultra-filtration membranes developed with the support of JCKIF are making impact at the grassroot level. The flow rate of G- filter lies is 2-2.5 L/hr with more than 99% microbial removal efficiency. The major advantages of G-filter is its low cost, capability of livelihood generation and zero operation energy requirement. A typical G-filter is economical and costs just Rs. 250-400 depending upon size variants. This technology has already been transferred to potters in around 200 villages of Rajasthan.

# TIH - iHub Drishti Foundation

The TIH (Technology Innovation Hub) at IIT Jodhpur, named iHub Drishti, focuses on building cyber-physical systems for Computer Vision (CV), Augmented Reality (AR) and Virtual Reality (VR). It is a Section-8, Not-for-profit organisation promoted by and at IIT Jodhpur under National Mission on Interdisciplinary Cyber physical System (NM-ICPS) of Government of India.

In FY 2021-22, iHub Drishti has developed 20 technologies as part of RAKSHAK (Remedial Action, Knowledge Skimming, and Holistic Analysis) initiative of DST. The hub has translated some of these technologies into products/ databanks:

1. **Campus Rakshak:** A product bouquet consisting of technically astute components to cater: (i) A badging system that enables the real-time implementation of interventions for COVID. (ii) The app that builds an anonymous contact graph, which can aid contact tracing. (iii) A novel smart pooling scheme to quantitatively screening resulting in considerable savings in screening cost. (iv) Simulator that tracks the spatial movement of agents which enables rich visualisation of activity on campuses. Pilot commercial run has been done at IIIT hyderabad and IIT jodhpur campuses.
2. **Smart Health Solution for Rapid Mass Screening using Integrated Telemedicine for Homecare:** Monitoring SpO<sub>2</sub>, heart rate, temperature of human body. Web and Android Application for video conference and chat support. The telemedicine solution is supported in Hindi, Bangla and English. The solution has been deployed at IIT Jodhpur PHC, and at a village in Sundarban area, West Bengal.
3. **Other prototypes/products are:** (i) AI-based platform to monitor and identify smell, taste and key COVID-19 therapeutic hotspots. (ii) Lakshman Rekha - A biometric smartphone App for strict post-COVID home quarantine management. (iii) Social distance alert - a wrist band for COVID based on RFID and bluetooth technology.
4. **Databanks:** 4 databanks have been created under RAKSHAK program: (i) Chest CT scans data of Indian COVID-19 patients, (ii) Radiology data for SARS nCov-2, (iii) Speech and Coughing breathing sound data, (iv) 5 lungs diseases chest X-Ray dataset.

iHub Drishti has cohosted IEEE International Conference on Automatic Face and Gesture Recognition 2021. It has co-organised SRS 2022 in collaboration with ACM student chapter IIT Jodhpur. It has also organised a hackathon in collaboration with Prithvi.AI (Industry Partner).

A MOU has been signed and five projects initiated in collaboration with DRDO CAIR: (i) Real-time 3D scene reconstruction and localization of autonomous ground vehicles in unknown environments, (ii) Seeing through occlusions, (iii) Visual intelligence generation from wide area sensing, (iv) TrustMe: Explainable adversarial attack detection and mitigation for object recognition algorithm, (v) Human-in-loop control for semi-autonomous system under presence of multimodal sensing and actuation delays.

Following projects initiated through Open Call: (i) Game development with ASI, (ii) India Anatomy Project Umbrella, (iii) Improving doctor-patient communication using VR, (iv) Haptics based medical simulators for palpation and tele-diagnosis, (v) Content creation solution for AR VR, (vi) Digital museum development with Rajasthan Government.

iHub Drishti has installed and commissioned an AI System built on NVIDIA A100, NVIDIA DGX A100 which is the universal system for all AI workloads and offers unprecedented compute density, performance and flexibility in the world's first 5 petaFLOPS AI system.

iHub Drishti, IIT Jodhpur is a Technology Innovation Hub focused around "Computer Vision, Augmented Reality and Virtual Reality". iHub Drishti Foundation has been at the forefront of fostering growth, innovation, and collaboration in Cyber-Physical Systems (CPS) technologies. With its cutting-edge research initiatives and state-of-the-art lab infrastructure, iHub Drishti has emerged as a beacon of technological advancements and interdisciplinary collaboration.



**TIH**  
iHub Drishti

**LAB INFRASTRUCTURE**

iHub Drishti supports its research with cutting-edge lab facilities. Office and laboratory areas with state-of-the-art infrastructure serve the participating institutions. The hub deployed and commissioned NVIDIA Omniverse, a real-time collaboration platform for 3D applications and assets. The NVIDIA DGX A100, the first AI system based on NVIDIA A100, is also at iHub Drishti. This groundbreaking AI infrastructure integrates training, inference, and analytics with unparalleled computational density, performance, and flexibility.



<p><b>AR-VR Applications:</b></p> <ul style="list-style-type: none"> <li>Digital Museum.</li> <li>Haptics-based Medical simulations for Palpation and Tele diagnosis.</li> </ul>	<p><b>Skill Development:</b></p> <ul style="list-style-type: none"> <li>MTech AR/VR for working professionals.</li> </ul>																				
<p><b>Computer Vision-Based Solutions for Industry 4.0:</b></p> <ul style="list-style-type: none"> <li>Vision System for Integrating mass manufacturing Line of Bearing Rollers.</li> </ul>	<p><b>Computer Vision-Based Solutions for Autonomous Systems:</b></p> <ul style="list-style-type: none"> <li>TrustMe: Explainable Adversarial Attack Detection and Mitigation for Object Recognition Algorithms.</li> <li>Real-Time 3D Scene reconstruction and localization of Autonomous ground vehicles in unknown environment.</li> <li>Human in loop Control for semi- Autonomous system under presence of sensing and actuation delay.</li> <li>Visual Intelligence Generation from Wide Area Sensing.</li> <li>Seeing through partial occlusion.</li> </ul>																				
<p><b>Computer Vision-Based Solutions for Biosphere:</b></p> <ul style="list-style-type: none"> <li>Computer Vision based monitoring of fishes in marine cage farming.</li> <li>Computer Vision for Plant Phenomics and Smart Agriculture.</li> </ul>	<p><b>Computer Vision-Based Solutions for Healthcare:</b></p> <ul style="list-style-type: none"> <li>Capturing Dynamics of Cellular Behavior using Biosphere tunable Soft Hydrogel: Development of a Bio-imaging based ML Model to Decipher Cell fate &amp; Morphology.</li> <li>Radio genomics Hub and Services.</li> <li>AI based risk stratification referral models, using eye images in a public health setting</li> <li>Study the miRNA profile of patients with coronary artery disease and to correlate this with atherosclerotic plaque burden by intra vascular ultrasound.</li> <li>Evaluation and development of Machine Learning (ML) models for the automated detection, localization and characterization of traumatic rib fractures on CT scans.</li> <li>AR VR Based Medical Simulators - Haptics-based Medical Simulators for Abdomen Palpation and Pulse Behavior.</li> <li>AR VR Based Medical Simulators - Haptics-Based Medical Simulators for Palpation and Tele Diagnosis.</li> </ul>																				
<table border="0"> <tr> <td>55+</td> <td>9+</td> <td>10+</td> <td>1500+</td> <td>4+</td> <td>17+</td> <td>22+</td> <td>2</td> <td>15+</td> <td>35+</td> </tr> <tr> <td>Projects</td> <td>Products</td> <td>Technology Developed</td> <td>HR Development</td> <td>Data Bank</td> <td>Industry Partners</td> <td>Academic Partners</td> <td>Computing Services</td> <td>Research Publications</td> <td>Honorary Members</td> </tr> </table>		55+	9+	10+	1500+	4+	17+	22+	2	15+	35+	Projects	Products	Technology Developed	HR Development	Data Bank	Industry Partners	Academic Partners	Computing Services	Research Publications	Honorary Members
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# IIT Jodhpur Technology Park

The Indian Institute of Technology Jodhpur promotes and supports the technology thoughts and actions towards the societal reach out / impact as important extension activities and the Scientific Social Responsibilities. In fulfilment of the above, IIT Jodhpur has been engaged in the (a) creation of a vibrant ecosystem that incubates and promotes learning, research, inventions and eventually innovations; and (b) providing technology innovations as a force to as many industries as possible for the economic value creation. The latter is planned through 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. We are working towards diffusion of the fruits of cutting-edge R&D from IITJ by setting up state-in-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 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. Presently the industries associated at IIT Jodhpur Technology Park are as follows.

- 1. Johari Digital Healthcare Limited (JDHL), Jodhpur**
2. Centre of Excellence for Renewable Energy at the Indian Institute of Technology, IIT Jodhpur Technology Park, was launched by Rajasthan Solar Association (RSA) The CSR stakeholders in this initiative are Elektrolites Power Ltd, Oil India Ltd., Udaipur Cement Works Ltd., Renew Power Pvt. Ltd., Brookfield Renewable, Greenko Group, etc.
3. WhizHack Technologies Private Limited also came in an agreement with IIT Jodhpur Tech Park and a Centre of Excellence (CoE) in Cyber-Physical-Systems Security has been started w.e.f. 1st June 2022 to encourage and promote cooperation for developing jointly branded Advocacy, Training programs and Product Development in the mentioned areas.

# IITJ Marudhara Foundation

IIT Jodhpur Marudhara Foundation is a company set up under Section 8 of the Companies Act 2013 to support IIT Jodhpur in bridging the funding gaps. In order to work smoothly and efficiently, IIT Jodhpur Marudhara Foundation can retain 2-5% of the donations, grants etc it receives to meet expenses and sustain itself, before remitting the balance funds to IIT Jodhpur. Marudhara Foundation is incorporated in 2019 with the following objectives:

- » To encourage, promote and facilitate education and research and other activities of the Indian Institute of Technology Jodhpur (Institute)
- » To 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.
- » To encourage dialogue with industries for research and consulting projects

Being a non-profit entity, Marudhara Foundation is eligible to avail Income Tax exemption under

Section 12A/12AA of the IT Act. IIT Jodhpur Marudhara Foundation has received the 80G and 12AA certificates thus donors will be benefited. Marudhara Foundation can seek donations from companies and donors, to obtain its initial Corpus or Seed funding required to setup office and begin operations. IITJ Marudhara Foundation has its registered office at IIT Jodhpur and it envisages to setup a liaison office in New Delhi managed by a two-member team, i.e., CFO (Chief Financial Officer) and Financial Analyst or Accountant after seeking prior regulatory approvals.

Recently, IIT Jodhpur Marudhara Foundation has also reconstituted its board and added five new Board of Directors. IIT Jodhpur Marudhara Foundation also initiated the crowd funding as a result of this, 34 students of IIT Jodhpur have agreed to donate their caution money to IIT Jodhpur Marudhara Foundation. The foundation has applied for a payment gateway; the payment gateway will enable to receive national as well as international funds, grants and donations.

# Staff Members

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

## Staff Members

S. No.	Name	Designation	Office / Departments
1	Hari Om Yadav	Registrar	Office of Registrar
2	Kshema Prakash	Deputy Librarian	Office of Library
3	Amardeep Sharma	Joint Registrar	Office of Academics
4	Ashok Kumar Khanduri	Joint Registrar	Office of Establishment (E-I & II)
5	Naresh Joshi	Deputy Registrar	Office of Research & Development
6	Shakti Ranjan Patra	Deputy Registrar	Office of Students
7	Vikas Kasnia	AM (ICT) Networking	Computer Center - Integrated Information System (IIS)
8	Ashish Kumar Rai	AM (ICT) System Administration	Computer Center
9	Anand Padegaonkar	Assistant Executive Engineer (Civil)	Office of Infrastructure Engineering
10	Ashish Kumar	Assistant Executive Engineer (Civil)	Office of Infrastructure Engineering
11	Gaurav Bhansali (on EOL)	Assistant Executive Engineer (Electrical)	Office of Infrastructure Engineering
12	Vinay Kumar	Assistant Executive Engineer (Electrical)	Office of Infrastructure Engineering
13	Arun Narayanan P J	Assistant Industry Liaison Officer	Office of Corporate Relations
14	Amit Kumar Soni	Assistant Library Information Officer	Office of Library
15	Kamleshkumar Patel	Assistant Library Information Officer	Office of Library
16	Chunni Chhatwani	Assistant Library Information Officer	Office of Library
17	Anup Vasantryo Tatewar	Assistant Manager (Horticulture)	Office of Infrastructure Engineering
18	Ashish Kachchawaha	Assistant Registrar	Office of Accounts
19	Himmat Singh	Assistant Registrar	Office of Students
20	Baikuntha Nath Sahu	Assistant Registrar	Office of IR, AR & CR

S. No.	Name	Designation	Office / Departments
21	Prashant Bhardwaj	Assistant Registrar	Recruitment (E-II)
22	T. Malati	Assistant Registrar	Office of Stores & Purchase
23	Laxman Singh	Assistant Registrar	Office of PRG & Recruitment
24	Sharabh Pradhan	Assistant Registrar	Office of Internal Audit
25	Sandeep Singh Chandel	Assistant Registrar	Office of Stores & Purchase
26	Renchu T	Assistant Sports Officer	Office of Students
27	Deboshree A. Ganguly	Continuing Education Programme Officer	International Relations & Outreach
28	Akash Vishwakarma	Counselor	Office of Students
29	Karunamoy Maji	ERP Manager	ERP Division
30	Shyam Sunder Singh	Junior Assistant	Office of Establishment-I
31	Ganesh Kumawat	Junior Assistant	Office of Students
32	Lalit Mohan	Junior Assistant	Office of Registrar
33	Arjun Singh	Junior Assistant	Office of Infrastructure Engineering
34	Robin Singh Kaintura	Junior Assistant	Recruitment (E-II)
35	Sunil Kumar	Junior Assistant	Office of Academics
36	Deepika Sharma	Junior Assistant	Office of Infrastructure Engg.
37	Mahendra Singh Meena	Junior Assistant	Office of Academics
38	Manisha Bhati	Junior Assistant	Office of Infrastructure Engg.
39	Gauri Mathur	Junior Assistant	Office of Academics
40	Krishan Lal Jangir	Junior Assistant	Office of Establishment-II
41	Abdul Khan	Junior Assistant	Guest House
42	Abhishek Yadav	Junior Assistant	Office of Research & Development
43	Kaushal Yadav	Junior Assistant	Office of Academics
44	Dheeraj Singh Khangarot	Junior Assistant	Deptt. of Chemical Engg.
45	Piyush Chandra Prakash	Junior Assistant	Deptt. of Electrical Engg.
46	Ajay	Junior Assistant	Office of IDRP
47	Rishabh Kumar Mangal	Junior Assistant	Office of Accounts
48	Kalpana Deep	Junior Assistant	Office of Stores & Purchase
49	Sambaji	Junior Assistant	Office of Establishment-I
50	Sohan Lal Suthar	Junior Engineer (Civil)	Office of Infrastructure Engg.
51	Amit Kumar	Junior Engineer (Electrical)	Office of Infrastructure Engg.
52	Deepak Suthar	Junior Engineer (Electrical)	Office of Infrastructure Engg.
53	Piyush Jaiswal	Junior Engineer (Electrical)	Office of Infrastructure Engg.
54	Darsh Kumar Khatwani	Junior Superintendent	Office of Director
55	Hanuman Singh	Junior Superintendent	Deptt. of Computer Science & Engg.
56	Ashok Gehlot	Junior Superintendent	Office of Stores & Purchase
57	T. Madhavi Lata	Junior Superintendent	Office of Deputy Director
58	Rakesh Kumar	Junior Superintendent	Office of Accounts
59	Trilotama Singh	Junior Superintendent	Office of Students
60	Neeraj Kumar	Junior Superintendent	Office of Advisor (Admin)

S. No.	Name	Designation	Office / Departments
61	Suresh Chandra Phulara	Junior Superintendent	Office of Stores & Purchase
62	Ramniwas Dhayal	Junior Superintendent	Office of Academics
63	Narayan Dadhich	Junior Superintendent	Office of Research & Development
64	Dhani Ram	Junior Superintendent	Deptt. of Electrical Engg. / Deptt. of Physics
65	Gurpreet KaurVirdi	Junior Superintendent	Office of Career Development Cell
66	Dheeraj Upadhyay	Junior Superintendent	Office of Academics
67	Sapna Sankhla	Junior Superintendent	Office of Accounts
68	Rishish Mishra	Junior Superintendent	Office of Academics
69	Naveen Kumar	Junior Technical Assistant	Deptt. of Electrical Engineering
70	Ravi Jangid	Junior Technical Assistant	Deptt. of Mechanical Engineering
71	Sampatlal N. Suthar	Junior Technical Assistant	Deptt. of Metallurgical & Materials Engg.
72	B. Umamaheswara Rao	Junior Technical Assistant	Deptt. of Metallurgical & Materials Engineering
73	Pawan Sharma	Junior Technical Assistant	CRDSI
74	Kamal Kishore	Junior Technical Assistant	Deptt. of Chemistry
75	Navdeep Singh Roheria	Junior Technical Assistant	Deptt. of Civil and Infr. Engg.
76	Kapil Kumar Sharma	Junior Technical Assistant	Deptt. of Civil and Infrastructure Engineering
77	Banoth sonyanaik	Junior Technical Assistant	Deptt. of Chemistry
78	Himanshu Sekhar	Junior Technical Assistant	Deptt. of Metallurgical & Materials Engineering
79	Abhinav Shukla	Junior Technical Assistant	Deptt. of Chemical Engg.
80	Vivek Bhati	Junior Technical Assistant	Computer Center
81	Alok Kumar Singh	Junior Technical Assistant	Computer Center
82	Balraj Singh	Junior Technical Assistant	Deptt.of Mechanical Engineering
83	Rahul Kumar	Junior Technical Assistant	Deptt.of Mechanical Engineering
84	Ravi Kumar Ravi	Junior Technical Assistant	Deptt.of Electrical Engineering
85	Vikram Singh Shekhawat	Junior Technical Assistant	Computer Centre
86	Habibullah Ghouri	Junior Technical Assistant	Computer Center
87	Asif Khan	Junior Technical Assistant	Computer Centre
88	Sunil Manana	Junior Technical Assistant	Computer Centre
89	Manish Singh	Junior Technical Assistant	Deptt.Computer Science & Engineering
90	Saroj Kumar Mahato	Junior Technical Assistant	Deptt. of Metallurgical & Materials Engineering
91	Vishal B	Junior Technical Assistant	Deptt.of Electrical Engineering
92	Devendra Kumar Meena	Junior Technical Assistant	Deptt. of Mechanical Engg.
93	Dhaval Bhai Rayani	Junior Technical Assistant	Deptt. of Mechanical Engg.
94	Praveen Suthar	Junior Technical Superintendent	Deptt. of Mechanical Engg.
95	Ganpat Choudhary	Junior Technical Superintendent	Deptt. of Chemistry

S. No.	Name	Designation	Office / Departments
96	Ram Singh Ratnu	Junior Technical Superintendent	Computer Center
97	Shubham Pandey	Junior Technical Superintendent	Deptt. of Chemistry
98	Gajraj Sharma	Junior Technical Superintendent	Deptt. of Electrical Engineering
99	Kailash Chander	Junior Technical Superintendent	Deptt. of Electrical Engineering
100	Poonam	Junior Technical Superintendent	Deptt. of Bioscience & Bioengineering
101	Jayanta Borthakur	Manager (ICT) – Networking	Computer Center - Integrated Information System (IIS)
102	Ashish Vyas	Manager (ICT) – System Administration	Computer Center
103	Simanta Das	Multimedia Content Developer	Computer Center - Integrated Information System (IIS)
104	Arjun Das	Physical Training Instructor	Office of Students
105	Jayita Sarkar	Scientific Officer	Office of CRDSI
106	Swati Kushwaha	Senior Assistant	Deptt. of Chemistry / Deptt. of Bioscience & Bio-engg
107	Sharad Srivastava	Senior Assistant	Office of Stores & Purchase
108	Rashmi Dhyani	Senior Assistant	Office of Academics
109	Shashank Choudhary	Senior Assistant	Deptt. of HSS / Deptt. of Mathematics
110	Ummed Singh Rathore	Senior Assistant	Office of Stores & Purchase
111	Pankaj Singh Sankhla	Senior Assistant	Office of Establishment-I
112	Manmohan Sewda	Senior Assistant	Recruitment (E-II)
113	Devender	Senior Assistant	Office of Stores & Purchase
114	Ishmeet Singh	Senior Assistant	Deptt. of Mech. Engg. / Deptt. of Met. & Mat. Engg.
115	Neha Dhariwal	Senior Assistant	Office of Accounts
116	Shankar Singh	Senior Assistant	Office of Estate, Security & Transport
117	Atul Kumar Pal	Senior Library Information Assistant	Office of Library
118	Prakash Mondal	Senior Software Engineer	ERP Division
119	Tarun Bhati	Senior Software Engineer	ERP Division
120	Mridul Bohra	Senior Software Engineer	ERP Division
121	Vivek Verma	Senior Technical Assistant	Deptt. of Computer Science & Engg.
122	Piyush Maru	Senior Technical Assistant	Deptt. of Mathematics
123	Avijit Sahoo	Software Engineer	ERP Division
124	I Vaisali	Software Engineer	ERP Division
125	Ankit Tomar	Software Engineer	ERP Division
126	Gaurav Nigam	Superintendent	Office of Students

S. No.	Name	Designation	Office / Departments
127	Naresh Chouhan	Superintendent	Office of Accounts
129	Raju Ram Parihar	Superintending Engineer	Office of Infrastructure Engineering
130	Vikash Pandey	System Administrator	ERP Division
131	Bharat Pareek	Technical Officer	Deptt. of Bioscience & Bioengineering
132	Narendra Kumar Singh	Technical Officer	Department of Physics
133	Poonam Chand Sankhla	Technical Officer	Computer Center - Integrated Information System (IIS)
134	Rinkesh Kumar Mangal	Technical Superintendent	Office of Library
135	Rimpesh Katiyar	Technical Superintendent	Deptt. of Computer Science & Engg.
136	Dheerendra Kumar Yadav	Technical Superintendent	Office of Academics
137	Puneet Garg	Training & Placement Officer	Office of Career Development Centre
138	Vikas Janu	Web Programmer	Computer Center

### Staff Members (Standing Committee)

S. No.	Name	Designation	Office / Departments
1	Pran Gobinda Basak	Advisor (Administration)	Office of Administration
2	Kirity Kumar Roy	Advisor (Industry-Academia Interface)	Office of INI
3	Dr. Subash Chandra Bose	Advisor (Academic)	Office of IDRP
4	Dr. G. Kiran Arya	Medical Officer	Health Center
5	Shiv Dayal Jatav	Audit Officer	Office of Internal Audit
6	Verander Singh	Security Officer	Transport and Security Unit
7	Kirti Vyas	English Language Instructor	School of Liberal Arts (SoLA)
8	Nivedita Verma	English Language Instructor	School of Liberal Arts (SoLA)

# New Initiatives towards Vision 2025

## New Centres

### Centre of Excellence on Art and Digital Immersion (ADI) @ IIT Jodhpur

The Centre of Excellence on Art and Digital Immersion (CoE on ADI), the School of Liberal Arts (SoLA) is the first Center of SoLA. It is envisioned as a futuristic research hub exploring the intersections between Arts and emerging Digital Technologies while enhancing their immersive experiences.

On 19th September 2022, the centre of excellence was inaugurated by the Director, IIT Jodhpur, Prof Santanu Chaudhury; the legendary Hindustani classical singer Padmabhushan Pandit Ajoy Chakrabarty; and the eminent scientist and Bhatnagar awardee Professor Ashutosh Sharma (C. V. Sheshadri Chair Professor, IIT Kanpur; President, INSA; and former Secretary, DST). The School of Liberal Arts has entrusted Prof Chhanda Chakraborti

with the Co-ordinatorship of the CoE on ADI.

The centre has recently launched its flagship programme M S (By Research) with two specializations, namely AI and Creative Arts and Mixed-Media Arts. The flexible, interdisciplinary, futuristic, and collaborative programme is the first of its kind in India.

Inauguration of ADI by Director, IIT Jodhpur, Professor Santanu Chaudhury, Legendary Hindustani classical singer Padmabhushan Pandit Ajoy Chakrabarty, and Eminent scientist and Bhatnagar awardee Professor Ashutosh Sharma (C. V. Sheshadri Chair Professor, IIT Kanpur; President, INSA; and former Secretary, DST).



### DRDO-Industry- Academia Center of Excellence (DIA-CoE) IIT Jodhpur

IIT Jodhpur, a premier research and education institute of national importance has signed an MoU with Defence Research and Development Organisation (DRDO), a premier organisation under

the Ministry of Defence Govt. of India, which is a premier R&D organisation engaged in developing cutting-edge technologies and systems for defence application, on 6th October 2022. Under the MoU,



a DIA-CoE has been established at IIT Jodhpur, to pursue directed basic and applied research in identified following three verticals to develop futuristic technologies and products to meet defence requirements:

1. Desert Warfare Technologies
2. Futuristic Omni Mobile System
3. Artificial Intelligence in Information and War gaming

The Centre will collaborate with researchers/ faculty at IIT Jodhpur, and other academic Institutions, startups, Industries of the country in facilitating

and progressing advanced technology research. The Centre endeavours to become a world leader in identified areas by engaging talented young minds of faculty and students of IIT Jodhpur, and academic institutions, start ups and Industry with the support of DRDO's vast pool of scientists and R&D infrastructure available in a large number of laboratories across the country. DRDO will finance all research projects undertaken by the Centre. The Centre will facilitate interaction of IIT Jodhpur faculty with different DRDO laboratories to identify areas of research, guiding to prepare project proposals, oversee their sanctioning by DRDO HQ and coordinate its execution.



### Rishabh Centre for Research and Innovation in Clean Energy

Rishabh Centre for Research and Innovation in Clean Energy at Indian Institute of Technology Jodhpur is being set up by Rishabh Instruments Ltd. and Ivaan Foundation. The Centre will facilitate focused basic and applied research by utilizing the knowledge base of faculty and researchers at IIT Jodhpur and also engage with other academic institutions and technology Centers, startups and industries. The Centre will enable collaborative research through different academic programs and using other avenues to develop new technologies as per the research & technology roadmap of the Centre.

The Centre will have close linkage with respective industries and leverage the robust innovation ecosystem of IIT Jodhpur for the technology translation and product development. One of the objectives of the center is to conduct and promote basic and/or applied research and innovation, nurture entrepreneurship, support startups and MSME in identified areas of Clean /Green Energy Technologies.

To establish the necessary infrastructure and various research laboratories in the center, Rishabh Instruments Ltd and Ivaan foundation will provide

financial support around Rs. 70 crores in next 3-5 years. The center will admit M.S. (by Research) students in AY 2023-24. The main research verticals of the center are:

- a) Microgrid, Power Quality and future Grid research
- b) Electric Vehicles [including DC Solar Energy to directly charge modern age EVs (without going through AC mechanism)]
- c) Solar Thermal with Thermal storage
- d) Fuel Cells and Hydrogen as energy source

- e) Study the feasibility of carbon geo sequestration
- f) Storage of Solar Energy in cells / batteries
- g) improve efficiency of Solar cells and invertors

Several faculty members from various academic units will contribute will affiliate with the center. The center will also host many visiting faculty members and scholars to forward its agenda. The Centre will strive to become the global destination for research and product / process development in the different areas of Green and Clean Energy in close collaborations with industries, start-ups and other stakeholders.



### Centre of Excellence in AI and Data Science

IIT Jodhpur and University of Buffalo, has signed an MoU on 19th March 2023, for establishing a "Centre of Excellence in AI and Data Science".

The collaboration advanced by launching of the Joint Centre will be implemented by:

- » Exchange of students and researchers
- » Coordination of collaborative education, research and training programs
- » Mechanism of internal support for such exchange and coordination
- » Exchange of scholarly and pedagogical materials
- » Collaboration in applying for research funds from both national and international sources
- » Co-organization of International conference and thematic workshops Collaboration in seeking support from industry, Private foundation and alumni to ensure sustainable joint centre.

## New Units/ Cells

### Planning & Resource Generation

Office of Planning and Resource Generation (PRG) of the Institute works on generating resources from the various sources e.g., Industries, Foundations, Donors, Alumni etc. The institute is registered under CSR which allows it to seek Contributions from Corporates and Foundations for various projects. This office organises various activities and programs to provide the platform for Industries and Corporates to interact with faculty members, students, and staff of IIT Jodhpur. Various meetings are also arranged for Corporates all over India to explore the opportunities of possible Collaboration and support for the various activities.

This office also coordinates the Meetings for the New Financial Model Task Force which has been working on to develop new financial model and on effective management of the financial resources. Office of PRG also facilitates the scholarships

provided for the students of IIT Jodhpur by Corporates, philanthropists etc. The donations can also be provided for various avenues listed at our support IITJ page, i.e., [https://iitj.ac.in/support\\_iitj](https://iitj.ac.in/support_iitj)

#### Major Activities of Year 2022-23

Office of PRG recently organised the “Conclave for Friends of IIT Jodhpur 2023” on 11th and 12th February this year. The event was organised to explore opportunities and possibilities for impactful contributions at IIT Jodhpur.

The event included the Panel discussions to engage CSR representatives from Industry, Well-wishers of IITJ, Scientists, Industry experts, PAN IIT Alumni, and entrepreneurs in meaningful discussions on impactful contributions and exploration of various opportunities.

#### Details of CSR Contribution/ Donation received during the year 2022-23:

S.No.	Details	Amount (Rs.)
1.	CSR contribution from Ansys Software Private Limited for Scholarship to 04 PG Students of IIT Jodhpur	10,80,000/-
2.	Donation from Rishabh Instruments Ltd. & Ivaan Foundation for setting up of the “Centre for Clean Energy” at IIT Jodhpur	70,00,00,000/-
3.	Donation of Equipment as CSR contribution from Miles Education Private Limited for developing 02 Digital Class-rooms at IIT Jodhpur	15,00,000/-

### International Relations and Outreach

The Office of International Relations and Outreach looks after the international collaborations, alumni relations, and outreach activities in the Institute.

Details of National and International MoUs arranged through the Office of International Relations and Outreach are as below:

S.No.	Name of the University	Date of Signature
1.	Shraman Foundation	25-04-2022
2.	Dual Degree Agreement with The University at Albany, State University of New York, USA	19-05-2022
3.	Dual Degree Agreement with The University at Albany, State of New York, USA and IIT Jodhpur (Deptt. of CSE)	19-05-2022

S.No.	Name of the University	Date of Signature
4.	Dual Degree Agreement with The University at Albany, State of New York, USA and IIT Jodhpur (Deptt. of Electrical Engineering)	19-05-2022
5.	Dual Degree Agreement with The University at Albany, State of New York, USA and IIT Jodhpur (SME)	19-05-2022
6.	University at Buffalo (The State University of New York), IIT Delhi, IIT Kanpur, IIT Bombay, IIT(BHU) Varanasi and Ashoka University Sonipat Research, and Training	17-05-2022
7.	Joint PhD Degree Program with University at Buffalo (Computer Science & Engineering)	17-05-2022
8.	Capacity Building Commission Gol	08-07-2022
9.	Joint PhD Degree Program with University at Buffalo (Metallurgical and Materials Engineering)	02-12-2022
10.	Drexel University College of Engineering Philadelphia (USA)	05-12-2022
11.	Cooperation Agreement Establishing a Joint IIT Jodhpur - UB Center of Excellence in AI and Data Science	19-03-2023



Sharman Foundation Scholarship for B.Tech. The Institute has collaborated with Sharman Foundation, USA, a USA-based non-profit organization founded by Dr. Vinay Jain and his family for providing funding support for at-need students in India to pursue education in a technical field. The foundation has been providing funding support to many UG students at various IITs for the last few years and

IIT Jodhpur is included on the list this year. The Foundation is giving scholarships to an individual who is having an annual household income of less than 5 lac rupees. Last year, an amount of Rs. 5,60,000/- was disbursed to the selected students.

The office of IRO is also responsible for coordinating the Institute Lecture. The undermentioned are the list of the Lecture series conducted by Office of IRO:

Name of the Lecture Series	Name of the Speaker	Date of the Lecture Series
Institute Lecture on Convergence of Disciplines to Impact Energy and Health Care	Prof. Paras Prasad	December 02,2022
Invited Lecture on Design and biomedical applications of multifunctional carbon nanodots	Prof. Alberto Bianco	February 09, 2023

## Executive Education Program

The Office of Executive Education at IIT Jodhpur offers a range of executive programmes to cater to the professional development needs of working professionals. These programmes are designed to provide advanced knowledge and skills in various areas of technology. This report provides an overview of the executive programmes offered by the Office of Executive Education.

The Executive Programmes in M.Tech. in Data and Computational Sciences (DCS), M.Tech Executive in (RMS) and M.Tech Executive in (AR/VR) are specialized programs offered by the Indian Institute of Technology (IIT) Jodhpur through its Office of Executive Education. These programs conducted in collaboration with Cognizant, aims to provide working professionals with advanced knowledge and skills in the field of data science and computational sciences, Robotics and Mobility systems and Augmented Reality and Virtual Reality. This report highlights the significance of these Executive M.Tech programs and how the Office of Executive Education at IIT Jodhpur is making a difference by offering such programs.

The Executive M.Tech program spans the academic years 2021-22 and 2022-2023. These programs provide a comprehensive curriculum that covers both theoretical concepts and practical applications, enabling participants to gain a deeper understanding of cutting-edge technologies and techniques. These programs address the growing demand for skilled professionals and with the rapid expansion of big data, artificial intelligence, and machine learning, organizations require professionals who can effectively analyze, interpret, and apply data-driven insights. These programs equip participants with the necessary skills and knowledge to meet these industry demands, bridging the skills gap and fostering career growth.

These programs also foster networking and collaboration among participants, enabling them to learn from each other's experiences and build professional connections. The diverse backgrounds represented in the program create an environment that encourages interdisciplinary discussions and the exchange of ideas.

The Post Graduate Diploma in Data Engineering and Cloud Computing was conducted in the academic year 2022-23 at the Indian Institute of Technology Jodhpur through the Office of Executive Education. This program aimed to equip working professionals with advanced knowledge and skills in the areas of data engineering and cloud computing. The program was designed to address the growing demand for professionals who can effectively manage and analyze large volumes of data in cloud-based environments. The segment of Data Engineering provided participants with a comprehensive understanding of data engineering concepts, tools, and techniques. This knowledge empowered participants to design robust data architectures, implement data integration and processing workflows, and ensure data quality and security. This program also focused on cloud computing concepts, platforms, and services, enabling participants to leverage the full potential of cloud infrastructure for data engineering tasks. Participants gained expertise in cloud-based storage, computing, and data management technologies, allowing them to develop scalable and reliable solutions for handling large datasets.

The Data Analytics and Fundamentals of Machine Learning (ML) for Process Modelling course, was offered as a short-term program in the academic year 2022-2023 at the Indian Institute of Technology Jodhpur (IITJ), through the Office of Executive Education, aimed to provide participants with

comprehensive knowledge and practical skills in data analytics and machine learning techniques for process modelling. This program addressed this growing demand by equipping participants with essential skills in data analytics and machine learning specific to process modeling and developing the necessary expertise to perform data-driven process modeling and make informed decisions for process optimization. It also aimed to bridge this skill gap by providing participants with hands-on experience in applying analytical tools and machine learning algorithms to real-world process modeling problems.

The Executive M.Tech and Post Graduate diploma program, conducted through the Office of Executive Education at IIT Jodhpur, has emerged as a significant initiative in the field of Artificial Intelligence (AI). This program is a postgraduate program designed for working professionals seeking to enhance their knowledge and skills in the field of AI. The program has been running for three consecutive academic years: AY-2021-2022, AY-2022-2023, and AY-2023-2024. It combines theoretical knowledge with practical applications to equip participants with the necessary expertise to tackle real-world AI challenges. The courses are designed to provide participants with a comprehensive understanding of AI algorithms, tools, and techniques. The program also includes hands-on projects, case studies, and industry interactions to foster practical learning experiences and helps bridge the gap between academic knowledge and industry requirements. Participants gain practical experience through projects and industry interactions, enabling them to apply their skills directly to real-world scenarios.

The Office of Executive Education at IIT Jodhpur plays a crucial role in creating a difference through the Executive programs and similar initiatives. The office focuses on the following aspects:

1. The Office of Executive Education designs and delivers specialized programs tailored to the needs of working professionals. These programs take into account the participants' prior knowledge and experience, providing them with advanced knowledge and skills to enhance their professional growth and meet the industry's evolving requirements.
2. The office engages experienced faculty members who possess deep domain knowledge and research expertise. These faculty members bring a blend of academic excellence and practical experience to the classroom, enabling participants to receive high-quality education and mentoring.

In total, the executive programmes at IIT Jodhpur's Office of Executive Education had 1734 students across various programmes in the given time period. These programmes address the skills gap, enhances professional competence, fosters networking, and promotes industry-academia collaboration. The office's efforts in designing and delivering customized programs for working professionals, forging industry partnerships, engaging experienced faculty, and providing continuous support contribute to its success in creating a difference in executive education.

## Various Units/ Cells established by the Institute for Students and Employees under the SC, ST, OBC, PwD, and EWS Category

### 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.

The Cell has not received any grievances from either students or employees belonging to the SC/ST category during the Financial year 2022-23.

### OBC, PwD, EWS, Minority Cell

An OBC, PwD, EWS, and Minority Cell for ensuring the proper utilization and adoption 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, PwD, EWS, and Minority employees, and students, in the Institute. The Cell acts as a communicator between the Institute and the Ministry of Education in matters related to the OBC, PwD, EWS, Minority students and employees in the Institute. The Cell has not received any grievances from either students or employees belonging to OBC, PwD, EWS, or Minority categories during the Financial year 2022-23.

### Empowerment of Persons with Disabilities (PwD)

Initiatives taken by IIT Jodhpur towards empowerment of Persons with Disabilities (PwD) for facilitating their participation in all walks of life and enjoy their rights equally with dignity and respect:

1. IIT Jodhpur is following reservation guidelines for PwD candidates as per existing Government of India norms as applicable from time to time.
2. An infrastructure support ramp along with a railing is provided across the campus. The ramps are also in the Sports Complex.
3. Lifts have been provided for all Academic blocks, Hostel blocks and Campus quarters.
4. Medical clinic with well-equipped facilities 24\*7 and night duty doctors/attendants.
5. Ambulance service is also provided 24\*7 for all students.
6. IIT Jodhpur is encouraging the PwD students to actively participate in culture and sports activities and also initiated coaching camps in various sports and games for them.
7. The Institute provides hostel accommodations to students with disabilities on the ground floors for easy access to services and resources in different hostels located at the IIT campus.
8. Ramps, lifts and separate washrooms are available in all the buildings of the Institute for the convenience of students with disabilities.
9. The student Wellbeing Committee is especially sensitive to the needs of students with disability and provides the required psychological support.
10. Providing transport facilities for differently abled students.
11. Scholarship for Students with Disabilities as per GOI Guidelines.

- 12. The Institute is following the guidelines of 'The Rights of Persons with Disabilities (RPWD) Act, 2016 for the candidates belonging to PwD category, like providing Scribe /compensatory time for examination and easy access to classrooms through ramps/lifts etc.
- 13. The Institute has the facility of ramps and lifts for students and employees with disabilities in

all the academic buildings, residential buildings, and student hostels. Also, accessible toilets for disabled persons are present in all the hostels and Academic Buildings. In residential buildings these are constructed based on the requirement.

Some photos of the facilities that are provided by IIT Jodhpur to the PwD employees and Students:



Ramps



Lifts



Washroom



## Policy of the Institute on Reservation for Candidates under SC, ST, OBC, PwD, and EWS Category

IIT Jodhpur is following the reservation norms of Govt. of India for candidates under SC, ST, OBC, PwD, EWS category for admission in all UG and PG programmes. Institute provides the relaxation in eligibility criteria and application fee to SC, ST and PwD candidates at the time of admission. The PwD students are exempted from paying the Tuition Fee. IIT Jodhpur participates in conducting preparatory courses of one year duration for SC, ST and PwD candidates who applied for undergraduate courses in IITs through. On successful completion of the course, the students are offered direct admission in the next year to the already allocated undergraduate course.

Further to help students with the academic deficiencies, especially for SC, ST and PwD Students, the following support mechanisms are created:

- » There is a provision of Academic Probation for students with academic deficiency. A student placed on probation shall be monitored, including mandatory attendance in classes, special tutorials and mentoring. Mentoring would comprise structured guidance under a senior student.
- » These students can get B.Tech./B.Sc. in Engineering Science after completion of the credit requirements as an exit degree for those having academic deficiency.
- » Relaxation in minimum requirement on credits earned for continuation in a B.Tech. Programme.
- » Relaxation in CGPA for branch change
- » **Language support:** Language is an important axis for inclusion/exclusion. The Institute is committed to provide language training to students who need it. For non-Hindi speakers (Indian and foreign) on campus, providing Hindi language support.

Fee remission is applicable for UG students as per the Ministry of Education, Govt. of India guidelines as given below:

1. SC, ST & PwD are eligible to get a full Tuition fee waiver.
2. Economically Weaker Section (EWS) Students (whose family income is less than Rs. 1 lakh per annum) are eligible to get full remission of fees.
3. The other economically backward students (whose family income is between Rs. 1 lakh to Rs. 5 lakhs per annum) shall get remission of 2/3rd of the fee.
4. Various scholarship details are available on the institute website.

### Recruitment Initiatives

- » The Institute invites applications to meet the Reservation Policy as per the requirement through Special Recruitment Drives for Teaching and Non-Teaching positions.
- » The Institute seeks applications from foreign nationals for positions at different levels of Academic Grade as per the approved policy by the Board of Governors, IIT Jodhpur.

### International Community

IIT Jodhpur has a vibrant cohort of International Students. IIT Jodhpur warmly welcomes International Community from across the Globe. The existing Office of International Relations promotes and assists candidates to pursue their dreams through Education in various UG and PG Programs being offered by the Institute. The Institute provides opportunities for holistic growth of the International Community without any discrimination. Presently, the Institute is admitting foreign nationals through following schemes with opportunities of Scholarships:

- » Study in India (SII) Scheme
- » Indian Council for Cultural Relations Scholarships (ICCR)
- » The Association of South East Asian Nations (ASEAN)

# ACADEMICS

## 1. Introduction to the activities of Office of Academics

The Office of Academics manages academic programmes of the Institute which includes admissions to various programs such as B.Tech., B.S., M.Tech., M.Sc., M.Sc.-M.Tech., M.B.A., M.Tech.-Ph.D./Masters, M.Des., M.S. (by Research) Masters-Ph.D. and Ph.D. (which are based on JEE advanced, GATE, JAM, CAT, UGC NET, CEED and Institute Internal Examination), Academic Registration, Examinations (online/offline), Convocation etc. The Office of Academics successfully conducted the 8th Convocation held on 12 November 2022 in physical mode wherein a total of 516 degrees (212-B.Tech., 101-M.Sc., 123-M.Tech., 6-Masters, 27-M.B.A., 31-M.B.A.-Tech. and 16 -Ph.D.) and 66 different Industry-Ready specialization certificates were awarded.

## 2. New Initiatives taken by the Office during the period covered

The Institute has successfully completed Academic Session 2022-23 in fully physical mode after the COVID-19 pandemic. The Institute started new industry-ready PG Programmes as envisaged in the National Education Policy 2020. The institute further implemented new Academic Regulations for students enrolled from July 2022 onwards. The regular Ph.D. students will be further allowed a partial financial support up to Rs. 01.00 lakh for attending and presenting a research paper in an International conference of repute once during the program. The partial financial support can be further extended to Rs. 2.00 Lakh for presenting a

quality work in an esteemed conference with the justification of the supervisor and the Head of the department. Moreover, in addition to the regular assistantship through funding agencies, regular Ph.D. and M.S. students will also be eligible for a top-up amount of up to Rs. 40000 and Rs. 20000 per month, respectively depending on the availability of projects with Supervisors and the performance of students in course and research work.

### New Programmes Started

The Institute has introduced new PG Industry-Ready Programmes as envisaged in the National Education Policy 2020. A list of new programmes started at the Institute is placed as under:

1. M.Des.
2. M.S. (By Research)
3. M.Sc. in Chemistry and M.Tech. in Materials Engineering
4. M.B.A. in FinTech and Cybersecurity
5. Ph.D. in Center for Emerging Technologies for Sustainable Development

### Teaching Excellence award

The Institute awarded Dr. Vandana Sharma Memorial Award in Teaching Innovation for AY 2021-22 on the Institute foundation day held on 02 August 2022 to the following faculty members :

1. Dr. Manish Narwaria
2. Dr. Shankar Manoharan

Institute further awarded teaching excellence award for AY 2021-22 on Teacher's Day held on 5 September 2022 to the following faculty members:

1. Dr. Gaurav Harit
2. Dr. Amit Sharma
3. Dr. Rakesh Kumar Sharma

### 3. Programmes offered

The Institute offered the following Academic Programs in the A.Y. 2022-23.

#### 1) BS Programs

1. Chemistry with Specialization
2. Physics with Specialization

#### 2) Bachelor of Technology Programs

1. Bioengineering
2. Computer Science and Engineering
3. Electrical Engineering
4. Mechanical Engineering
5. Material Engineering
6. Chemical Engineering
7. Civil and Infrastructure Engineering
8. Artificial Intelligence and Data Science

#### 3) Master of Science Programs

1. Chemistry
2. Mathematics
3. Physics
4. Digital Humanities
5. Computational Social Science

#### 4) Master of Technology Programs

1. Bioscience & Bioengineering
2. Computer Science & Engineering
3. Artificial Intelligence
4. Cyber Physical Systems
5. Sensors and Internet of Things
6. Advanced Manufacturing and Design
7. Data and Computational Sciences
8. Thermofluids Engineering
9. Materials Engineering
10. Chemical Engineering
11. Civil and Infrastructure Engineering with specialization in Environmental Engineering
12. Civil and Infrastructure Engineering with specialization in Energy
13. Robotics and Mobility Systems
14. Intelligent Communication System
15. Intelligent VLSI Systems
16. Augmented Reality and Virtual Reality

#### 5) Doctor of Philosophy Programs

1. Biosciences and Bioengineering
2. Chemistry
3. Computer Science & Engineering
4. Electrical Engineering
5. School of Liberal Arts
6. Mathematics
7. Mechanical Engineering
8. Metallurgical & Materials Engineering
9. Physics
10. Chemical Engineering
11. Civil and Infrastructure Engineering
12. Management and Entrepreneurship
13. Artificial Intelligence and Data Science
14. Center for Emerging Technologies for Sustainable Development

#### 5. Master of Science - Master of Technology Programs

1. Data and Computational Science
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. Bioscience & Bioengineering
2. Computer Science & Engineering
3. Artificial Intelligence
4. Communication and Signal Processing
5. Cyber Physical Systems
6. Sensors and Internet of Things
7. Data and Computational Sciences
8. Materials Engineering
9. Mechanical Design
10. Advanced Manufacturing
11. Thermofluids Engineering
12. Civil and Infrastructure Engineering with specialization in Environmental Engineering
13. Civil and Infrastructure Engineering with specialization in Energy
14. Chemical Engineering
15. Intelligent Communication System

**7. Doctor of Philosophy Program in Interdisciplinary Areas**

1. Robotics and Mobility Systems
2. Digital Humanities
3. IoT & Applications
4. Quantum Information and Computation
5. Smart Healthcare

6. Space Science & Technology
7. Medical Technologies

**8. MBA**

**9. Masters - Ph.D. Dual Degree**

1. Medical Technologies

**10. Masters Programs**

1. Medical Technologies

**2. Ph.D. Thesis Defense**

The following Ph.D. Students defended their theses successfully during this 2022-23 year (01 April 2022 to 31 March 2023):

S. No.	Roll No.	Name	Department	Supervisor	Thesis Defense Date
1	P15EE202	Yogesh Kumar	Electrical Engineering	Dr. Sandeep Kumar Yadav	4-4- 2022
2	P16ME005	Waris Nawaz Khan	Mechanical Engineering	Dr. Rahul Chhibber	18-4-2022
3	P14PH002	Sanjoy Chatterjee	Physics	Dr. V. Narayanan	08-08-2022
4	P15CY003	Jyoti Faujdar	Chemistry	Dr. Atul Kumar	1-9-2022
5	P15MA001	Divya Gupta	Mathematics	Dr. V. V. Mohana Sarma Chandramouli	12-09-2022
6	P15VSS201	Aditya Raj	Electrical Engineering	Dr. Anil Kumar Tiwari	15-9-2022
7	P18PH007	Vivek Barua Thapa	Physics	Dr. Monika Sinha	12-10-2022
8	P17EE003	Idury Satya Krishna	Electrical Engineering	Dr. Soumava Mukherjee	16-10-2022
9	P15VSS006	Gajendra Singh Chawda	Electrical Engineering	Dr. Abdul Gafoor Shaik	29-10-2022
10	P17CY001	Abhishek Mishra	Chemistry	Dr. Ramesh K. Metre	01-11-2022
11	P17PH001	Jayanta Bera	Physics	Dr. Satyajit Sahu	20-12-22
12	P17CY002	Sheeba Malik	Chemistry	Dr. Ananya Debnath	4-1-2023
13	P17BS001	Madhumita	Bioscience and Bioengineering	Dr. Sushmita Paul	23-1-2023
14	P17EE001	Amit Kumar Shringi	Electrical Engineering	Dr. Mahesh Kumar	15-3-2023

## Collaborations - Memoranda of Understanding (MoU)

The following is a list of MoUs signed by IIT Jodhpur with various Institutions/ organizations/ companies during the FY 2022-23.

S. No.	MoU/ Agreement signed between	Date of signing	Objective	Duration
1.	Statement of Intent between Capacity Building Commission Government of India and IIT Jodhpur for Knowledge Partnership	08 July 2022	The Govt. of India has set a vision to enhance the execution capacity of the Indian state by radically improving the government's human resource management practices and augmenting the capacity of India's 25 million civil servants.	2 years
2.	Nirmata Technologies India Private Limited and IIT Jodhpur	22 June 2022	The purpose of this MoU is to enter into relationships between NIRMATA and IIT Jodhpur with regard to cooperation in different activities.	5 years
3.	Scottish Church College and IIT Jodhpur	07 July 2022	The collaboration concerns common fields of study, research, extension and scholarship of both institutes.	5
4.	Shivani Scientific Industries (P) Ltd. and IIT Jodhpur	16 June 2022	SSIPL is in the field of manufacturing, trading, marketing, and sales of film capacitors and resistors sector electronic equipment. IITJ leverages the academic and R&D resources in faculty/ laboratories to develop / deliver results mandated in project agreements executed with industry and other end-user	5 years
5.	EDCIL India Limited and IIT Jodhpur	13 January 2022	Background of study in India programme	3 years
6.	AIIMS Jodhpur and IIT Jodhpur	23 August 2022	This MoU contributes to the joint pursuit of education, advancement of Research and product development in the thrust area of Healthcare technologies of mutual interest, which may be identified over time. Its aim is to: 1. Promote relations that mutually benefit each Institute, this being the primary aim of a true academic collaboration; and 2. S&T cooperation towards developing devices for diagnostics and treatment towards providing improved quality of healthcare.	3 Years
7.	MoU Between Ved Vignan Maha Vidya Peeth and IIT Jodhpur	04 August 2022	The purpose of this MoU is to enter into relationships between VVMVP-SSIAR and IITJ with regard to cooperation in different activities.	5 years
8.	MoU between IIT Jodhpur and IIT Jodhpur Technology Park	03 June 2022	A future-driven institute for nurturing excellence of thought; creating, preserving and imparting knowledge; and using transformational/ interventions with a multidisciplinary approach to societal challenges and aspirations.	5 years

S. No.	MoU/ Agreement signed between	Date of signing	Objective	Duration
9.	Bundl Technologies and IITJ	09 August 2022	The Parties have collaborated to develop a face recognition and verification product("Work/ Work Product")	3 years
10.	Non Disclouser Agreement B/W QUNU LABS Pvt. Ltd. And IIT Jodhpur	07 September 2022	Collaboration with Qnu Labs for Quantum Secure Communication projects under Prof. Somitra Kumar Sanadhya, AIDE, IIT Jodhpur	
11.	Academic Partnership between 3.0 University and IITJ	10 October 2022	To cooperate and collaborate in the realm of Web 3.0, Metaverse, Blockchain and Digital Assests.	
12.	MoU between Sorting Hat Technologies Pvt. Ltd. And IITJ	19 October 2022	IITJ shall enrol approximately 1000 students with code chef	1 Year
13.	Exhibit A between Wiley India Private Limited & IITJ	01 June 2022	To both agree to develop and offer " PGD Course in DATA Engineering And Cloud Computing" ("Program")	8-24months depending on the couese selected
14.	MoU between IIT Jodhpur and DRDO	06 October 2022	The Department of Defence Research & Development of Defence, Govt. of India vide letter No. 1012(i) /D (R&D) dated 30.09.2022 conveyed its sanction for the establishment of DRDO-Industry-Academia-Centre of Excellence (DIA-COE), IIT Jodhpur. Accordingly, the IIT Jodhpur and the DRDO has signed an MOU for the establishment of DRDO Industry-Academia-Centre of Excellence (DIA-COE) at IIT Jodhpur to realize the objectives on 6 <sup>th</sup> October 2022.	25 Years
15.	MoU between Eeki Automation Private Limited and IIT Jodhpur	11 November 2022	The purpose of this MoU is to state the intentions of the parties in undertaking a collaboration in the research and development of Growing Chambers in Agritech. The parties have common scientific and research and will cooperate in performing the activities..	
16.	MoU for Mentorship by Confederation of Indian Industry and IIT Jodhpur	08 November 2022	This MoU constitutes the parties' mutual rights and obligations with respect to the subject matter hereof and supersedes any and all prior statements or agreements, both written and oral. This MoU may not be amended except by in writing signed by the parties.	12 Months
17.	MoU between IIT Jodhpur and Sahai Research Labs (OPC) Private Limited	18 November 2022	To promote industrial Innovation of a higher order that directly impacts the need of the Industries etc.	3 Years

S. No.	MoU/ Agreement signed between	Date of signing	Objective	Duration
18.	MoU between The University of Trans-disciplinary Health Sciences and Technology(TDU) & IIT Jodhpur	18 November 2022	The purpose of this MoU is to enter into the relationship between TDU and IITJ with regard to cooperation in different activities. The following are being considered for mutual collaboration at present. However, the scope can be revised/ reviewed with mutual consent to include any other challenges arising in future. 1. Research and Development of product PoCs, Pilots and Scale Ups. 2. Writing joint projects for third party funding. 3. Educational Activities including but not limited to teaching courses (theory and experimental). 4. Co-advising Students on thesis and projects, and other mutually agreeable educational activities.	5 Years
19.	MoU between Jodhpur city Knowledge and Innovation Foundation and IIT Jodhpur	09 September 2022	For Academic and Research collaboration. Develop Scientific Research Programs of relevance with IITJ and help in seeking funding from various funding agencies.	
20.	MoU between IIT Guwahati Technology Innovation and Development Foundation (IITG TI&DF)	12 September 2022	To develop a multi-arm long-reach manipulator mounted on a remotely operated vehicle for underwater inspections and detections.	3 Years
21.	MoU between IITJ and Jodhpur City Knowledge and Innovation Foundation (JCKIF)	15 December 2022	Contact Base is interested to be knowledge partner in research on culture and development and development of knowledge material.	5 Years
22.	MoU between Garrison Engineer no 2 Jodhpur under Commander Works Engineer (Army Jodhpur (CWE (A) Jodhpur and IIT Jodhpur and Dr. Vikky Anand, Deptt. of Chemical Engineering	22 December 2022	The PI is engaged by the First/Second Party in the capacity of an independent contractor to render the Services in accordance with the terms of this Agreement. Nothing in this Agreement shall be construed to mean that the PI is an employee, worker, agent or partner of First/ Second Party. Nothing in this Agreement shall be construed to have created a joint venture between the Parties.	2 Years
23.	MoU between Innovation Laboratory Energy Private Limited and IIT Jodhpur	14 December 2022	The purpose of this MoU is to enter a relationship between ILAB-E and IITJ with regard to cooperation in different activities. The following activities are being considered for mutual collaboration at present. However, the scope can be revised/reviewed with mutual consent to include any other challenges arising in future.	5 Years

S. No.	MoU/ Agreement signed between	Date of signing	Objective	Duration
24.	MoU between Neuros Intelligent Management System (NIMS) India Private Limited and IIT Jodhpur	22 December 2022	The purpose of this MoU is to enter into relationships between NIMS and IITJ with regard to cooperation in different activities. The following activities are being considered for mutual collaboration at present.	5 Years
25.	MoU between IIITB COMET Foundation and IIT Jodhpur	07 December 2022	The Parties shall cooperate in the Project titled "Smart Radio Environments: Implementation and deployment of targeted use-cases.	4 Years
26.	MoU between IIT Jodhpur INFLIBNET Centre	27 January 2023	This MOU defines responsibilities, liabilities and commitments of the institutions involved to ensure proper system implementation, to meet the objectives pertaining to submission and access to Electronic and Dissertations as envisaged by the UGC vide its Notification (Minimum Standards & Procedure for Award of M.Phil./ Ph.D. Degree), Regulation 2009 dated 1st June 2009.	
27.	Service Agreement between IIT Jodhpur and Healthcare NLP Softech LLP	21 February 2023	Consultant shall provide data annotation services to the Company on such terms as detailed in this Agreement.	01 Year
28.	MoU between Electronics Sector Skills Council of India (ESSCI) and IIT Jodhpur and Jodhpur City Knowledge and Innovation Foundation (JCKIF) on Collaborating for skills Development in ESDM Sector	04 February 2023	The Parties understand that this agreement shall be construed on best efforts basis and hence, this legally non-binding agreement that sets for the term and conditions (for the purpose") under which the ESSCI will engage in a mutually beneficial relationship for developing Skill Development Eco-system in Design & Manufacturing as well as Services domain and placement of Skilled Candidates.	03 Year
29.	MoU between Alliance Francaise De Jaipur and IIT Jodhpur	30 March 2023	The sole purpose of this agreement is the promotion and enhancement of the French language in partnership with IIT Jodhpur and its students and faculty. IIT Jodhpur will enjoy no financial gain out of it.	01 Year
30.	MoU between IIT Jodhpur and iHub Drishti Foundation	27 March 2023	To meet the fast-growing need for well trained and skilled professionals in various fields of merging technologies in India, Institute and TIH perceive the need for quality education and training in Computer Vision (CV), Augmented Reality (AR), and Virtual Reality (VR) etc.	03 Year



S. No.	MoU/ Agreement signed between	Date of signing	Objective	Duration
31.	MoU between Pifore Private Limited and IIT Jodhpur	22 December 2022	The purpose of this MoU is to enter into relationships between Pifore Pvt. Ltd. and IITJ with regard to cooperation in different activities. The following activities are being considered for mutual collaboration at present. However, the scope can be revised/reviewed with mutual consent to include any other challenges arising in future.	05 Year
32.	Co-operation Agreement Establishing a Joint IIT Jodhpur- UB Centre of Excellence in AI and Data Science	19 March 2023	The general objective of this agreement is to establish a multiparty collaborative framework by creating a Joint IIT Jodhpur-UB Centre of Excellence in AI and Data Science located at and administered by IIT Jodhpur. This centre will advance long-term multi-institutional and international collaboration in educational and research fields that are compatible with orientation and mission of each institution and that are relevant to the academic, scientific, industrial, social and cultural interests and needs of the countries in which the parties are respectively located.	05 Year
33.	MoU between Indian Farmers Fertilizer Cooperative Limited (IFFCO) and Jodhpur City Knowledge and Innovation Foundation JCKIF and Indian Institute of Technology Jodhpur IITJ	23 May 2023	This MOU is to set out the framework for a working relationship between IITJ, JCKIF and IFFCO for the collaboration for the Purpose as mentioned hereunder: 1. To carry out research / project work in the field related to crop science and technology. IFFCO proposed R&D / projects will be undertaken in IITJ /JCKIF institutions as appropriate with mutually agreed funding from IFFCO and mode of working. 2. Specific R&D / projects to be carried out under this MoU, will be annexed as part of MoU from time to time. Every such project proposal periodically annexed to this MOU shall include a budget, deliverables with set timelines, and mutually agreed terms and conditions that may be relevant to the said proposal.	03 Year
34.	MoU between Dystrophy Annihilation Research Trust, a research lab focusing on Duchenne Muscular Dystrophy (DART) and Indian Institute of Technology Jodhpur IITJ	11 May 2023	The Parties shall cooperate for the Project titled "Multimodal Approaches tom Develop Potential Therapeutic Leads Targeting Molecular Hot Spots of Duchenne Muscular Dystrophy for Clinical Trial" as further described in the Project proposal.	Not mentioned in the MoU

S. No.	MoU/ Agreement signed between	Date of signing	Objective	Duration
35.	Research Agreement between Quality Healthcare Access Private Limited and Dr. Alok Ranjan and Indian Institute of Technology Jodhpur	10 May 2023	The Researcher shall deliver to the Company all reports and other work product as required by this Agreement and shall perform, in a timely, professional and complete manner, all tasks required by this Agreement. In addition, if the Company so desires, the Researcher shall provide to the Company project plans, progress reports and a results report on a monthly basis. All reports shall be in such form and setting forth such information and data as requested by the Company.	02 Months
36.	MoU between HourOnEarth Creative Solutions Private Limited (AyuRythm) and IIT Jodhpur	08 May 2023	The purpose of this MoU is to enter into relationships between AyuRythm and IITJ with regard to cooperation in different activities. The following activities are being considered for mutual collaboration at present. However, the scope can be revised/reviewed with mutual consent to include any other challenges arising in future.	05 Year
37.	Non-Disclosure and Restricted Use Agreement Larsen & Toubro Limited and IIT Jodhpur	10 April 2023	Non-Disclosure and Restricted Use Agreement Larsen & Toubro Limited and IIT Jodhpur	Not mentioned
38.	Confidentiality Agreement between Tata Steel Limited and Indian Institute of Technology Jodhpur	06 April 2023	<p>The purpose of this Agreement is to define the confidentiality conditions under which Parties will exchange information for the Project i.e., to explore and engage in exchange of Confidential Information as defined hereunder:</p> <ul style="list-style-type: none"> <li>» TATA STEEL wants to upscale the Borophene production and wants to venture into attractive 2 D Materials.</li> <li>» IITJ has worked on Borophene at lab scale and they have</li> <li>» experienced in the development of the Borophene.</li> <li>» TATA STEEL wants to discuss with IIT-J regarding upscaling of the production of borophene at industrial scale.</li> <li>» Personnel from IITJ would like to visit R&amp;D and industrial set up of grapheme synthesis at TATA STEEL to see feasibility of the industrial production.</li> <li>» IITJ will share its knowledge base on synthesis of borophene.</li> <li>» TATA STEEL will share its knowledge base on synthesis of graphene.</li> </ul>	03 Year

S. No.	MoU/ Agreement signed between	Date of signing	Objective	Duration
39.	MoU between IIT Jodhpur and Department of Information Technology & Communication (DoIT&C), Govt. of Rajasthan	20 March 2023	Both the parties intend to enter a nonfinancial MoU as per the below scope: 1. DoIT&C to leverage knowledge management support and Capacity Building from Indian Institute of Technology in conceptualization, development & implementation of Geospatial Solutions/Application/Use-cases. 2. Indian Institute of Technology Jodhpur to leverage the availability of emerging technology, infrastructure support, state-owned sharable datasets and vast experience of implementation of GIS projects in Government domain.	02 Year
40.	Master Agreement for Blended Learning Programs between IIT Jodhpur and Miles Education Private Limited	06 April 2023	IITJ and Miles will offer Programs in new & merging areas (Blended Learning Programs) as set out in the Appendix to this Agreement and any further Appendices which may be mutually agreed ("Programs"). The Parties acknowledge that each student/candidate who enrolls in the Program will receive licensed access to Miles' Online Learning Platform/Learning Management System (LMS) and to IITJ Course Content (Literary/Educational Printed Content, if applicable, and Online /Digital Courseware) for the relevant Program.	05 Year
41.	Research Collaboration Agreement between George Institute for Global Health and IIT Jodhpur	01 April 2023		05 Year
42.	MoU between Libra Social Research Foundation and IIT Jodhpur	15 July 2023	To catalyze a 360 Degree Transformation of Healthcare that Pivots on Digital Technologies to ensure accessible, affordable, on-demand healthcare to the last person in the line while also remaining sustainable for stakeholders; enables data driven innovation and enables a wellness approach to care.	25 Years
43.	MoU between IIT Jodhpur and M/s Bharat Forge Limited	25 July 2023	This project encompasses collaboration between the IITJ and BFL for research projects mainly in areas of Metallurgical Engineering, Materials Science, Industrial Design, in Metallurgical & Materials Engineering Department of IITJ and other departments of IITJ as and when parties mutually decide ("Purpose"). This scheme is called the "BF Research Fellowship" and the student in this fellowship is called the "BF Research Fellow".	05 Year

S. No.	MoU/ Agreement signed between	Date of signing	Objective	Duration
44.	MoU between Gati Shakti Vishwavidyalaya, Vadodara and Indian Institute of Technology Jodhpur	02 August 2023	The purpose of the cooperation between the two mentioned institutions are as follows: 1. To promote interest in research, teaching, and training activities of the respective institutions, and 2. To deepen the understanding of the scientific, technological, and management issues relevant to the respective institutions.	05 Year
45.	MoU For Academic Collaboration Between Central University Rajasthan And Indian Institute of Technology Jodhpur	29 July 2023	A. The Parties wish to establish a cooperative relationship with the aim of developing and fostering links for knowledge sharing and collaborative research in different areas of mutual interest with a special focus on Education and Integrated Teachers Education Programme (ITEP). B. IITJ and the CURAJ have agreed to identify areas of shared research interests and expertise. C. The parties are interested in exploring the possibility of establishing a collaborative relationship, to conduct relevant activities aligned to their respective academic research interests and expertise. D. The parties anticipate that, while this Memorandum of Understanding (MOU) is not intended to establish a binding contractual relationship, it will facilitate the establishment of a working relationship between them, leading to the conduct of one or more collaborative activities. E. This Memorandum of Understanding (MOU) sets out the framework for the cooperative relationship between the Parties and will help in realisation and implementation of New Education Policy in the state of Rajasthan.	05 Year
46.	MoU Between Malaviya National Institute of Technology Jaipur And Indian Institute of Technology Jodhpur	29 July 2023	A. The Parties wish to establish a cooperative relationship with the aim of developing and fostering, primarily but not limited to, academic and scientific research linkages between the two institutions. B. This MoU sets out the framework for the cooperative relationship between the Parties.	03 Year

S. No.	MoU/ Agreement signed between	Date of signing	Objective	Duration
47.	Consultancy Project Agreement between Alluvium, Indian Institute of Technology Jodhpur, Dr. Angshuman Paul, Assistant Professor, CSE	01 September 2023	The Client wishes to engage the Consultant/ PI to provide consultancy services for the development of a process pipeline solution that enhances the accuracy of nested pipe calculations using image recognition techniques. The Client shall be responsible for the implementation of the algorithms.	01 year
48.	MoU Between Indian Institute of Technology (IIT) Delhi, Unnat Bharat Abhiyan and Regional Coordinating Institution	12 July 2023	To Develop the necessary mechanism and proper networking among Higher Educational Institutions (HEIs) and selected villages (Through community engagement, Panchayati Raj Institutions, and grass root voluntary organizations to enable effective intervention at the field level to enable the faculty and students in understanding rural realities.	Not mentioned

# Research

The Indian Institute of Technology Jodhpur places a strong emphasis on research projects, including Sponsored Research Projects, Consultancy, Fellowship, Award Money, Conference and Workshops, etc. The Office of Research & Development is specifically set up in the Institute to provide specialized administrative and managerial support for the operation of Sponsored Research Projects, Consultancy projects, and other related R&D activities. The institute is setting up many modern laboratories and continuously supporting infrastructure through these R&D projects.

The Office of R&D has taken various steps in order to facilitate PIs and inventors, which enable smooth execution of the projects. Key initiatives are as follows:

## Delegation of Powers and Smooth execution

- » Financial Powers upto Rs. 25 Lakhs delegated to PIs
- » Streamlined process of various functions which provide file movement procedures and time lines for completion of the work
- » Digitization of R&D Project Files

## R&D Project Hiring

- » Joining agreements through 'Signdesk' which results in cost reduction as well as time
- » Adhoc appointments for 06 Months

## R&D Projects MOUs / Agreements

- » MOUs and Agreement signing through 'Signdesk' which results cost reduction as well as time

## Implementation of eOffice

- » Revision of R&D Forms
- » Defining Internal and External processes
- » One Point Contact (HELPDESK) in the eOffice

## JIRA (Tracking System)

- » HELPDESK for all PIs
- » Online Tracking mechanism
- » Support extension mechanism
- » Grievance redressal mechanism
- » **IRMG:** International Research Mobility Grant, supported from R&D funds, for opportunities to young faculty members after following a rigorous two stage peer review process for selection of projects. This scheme is for young faculty members, to increase their collaborations with internationally reputed researchers. During the Financial year, IRMG has been awarded to following faculty members :

S.No.	Name of Faculty	Title of Project
1	Dr. Neha Jain, Assistant Professor, Department of Bioscience & Bioengineering	Role of fungal and bacterial amyloids in polymicrobial biofilm assembly
2	Dr. Dilpreet Kaur, Assistant Professor, Department of Mathematics	Essential dimension and the least degree of faithful representation of a finite group
3	Dr. Ruhi Sonal, Assistant Professor School of Liberal Arts	Choice environments and bounded rationality

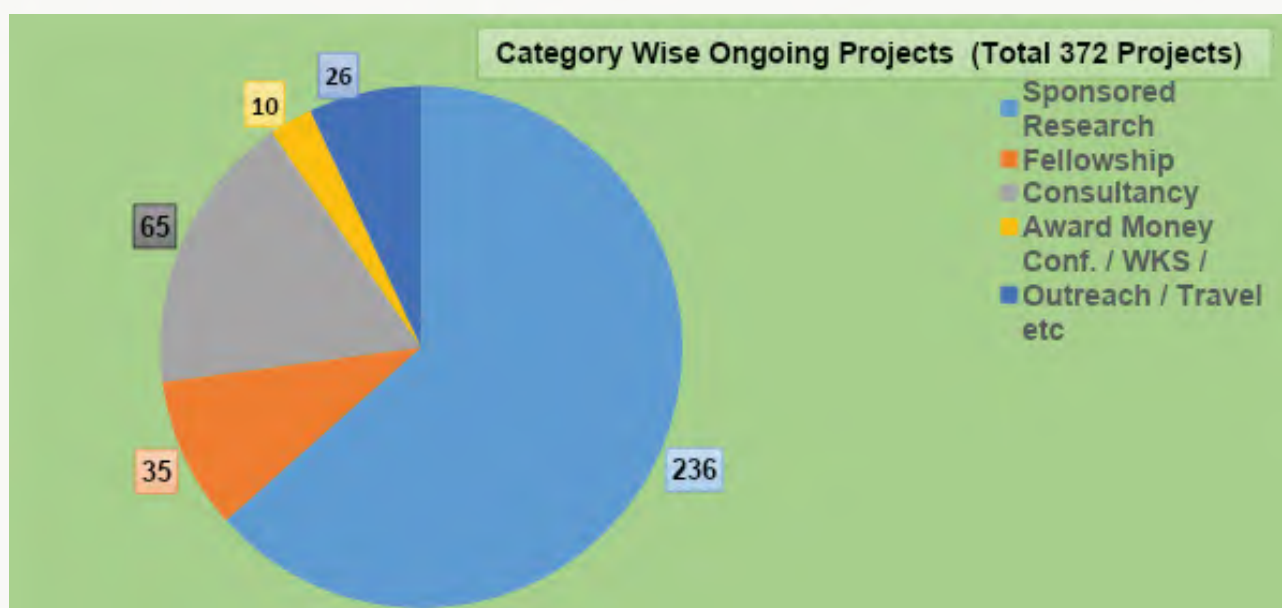
» **Research Excellence Award:** The Office of R&D supports the Institute Research Excellence Award. During the Financial Year 2022-23 the award has been given to following faculty members on the occasion of Institute Foundation Day:

S No.	Category of Award	Name of Faculty
1	Senior Researcher Award (Engineering)	Prof. Mayank Vatsa, Professor, Department of Computer Science & Engineering
2	Senior Researcher Award (Engineering)	Dr. Indranil Banerjee Associate Professor, Department of Bioscience & Bioengineering
3	Young Researcher Award (Engineering)	Dr. Harshit Agarwal Assistant Professor, Department of Electrical Engineering
4	Young Researcher Award (Science)	Dr. Gaurav Bhatnagar Associate Professor, Department of Mathematics
5	Young Researcher Award (Humanities & Management)	Dr. Alok Ranjan Assistant Professor, School of Liberal Arts

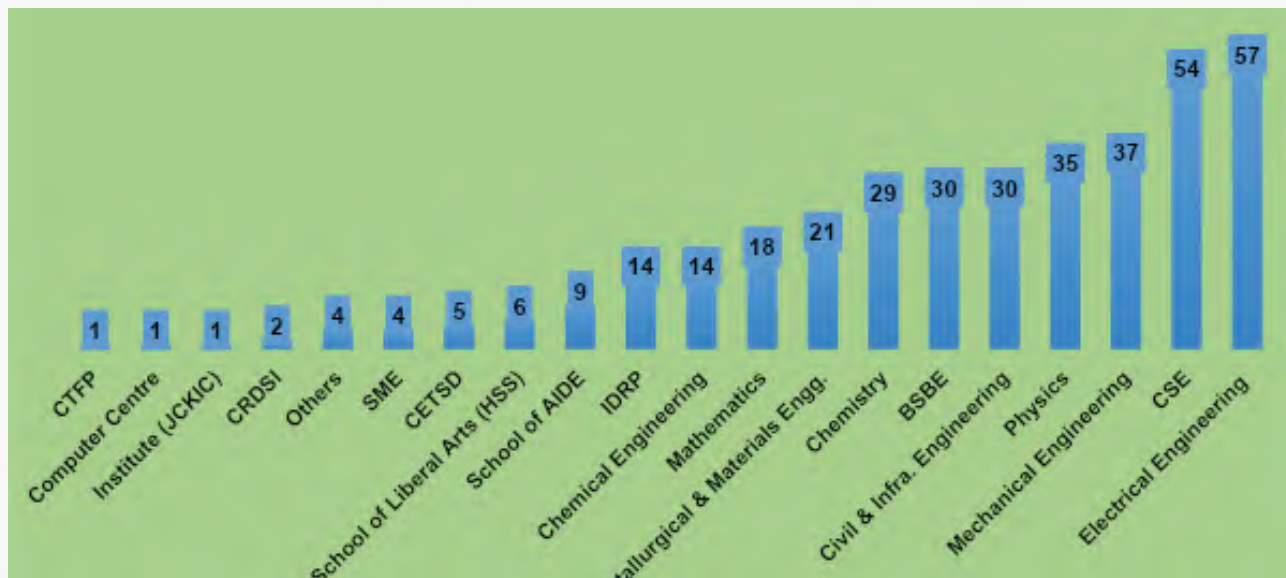
» **Seed Grant Projects:** The Institute has sanctioned 19 new seed grant projects worth Rs. 6.03 Crore as sanctioned grant during Financial Year 2022-23.

### Graphical presentation of R&D Projects

#### 1. Status of Ongoing R&D Projects



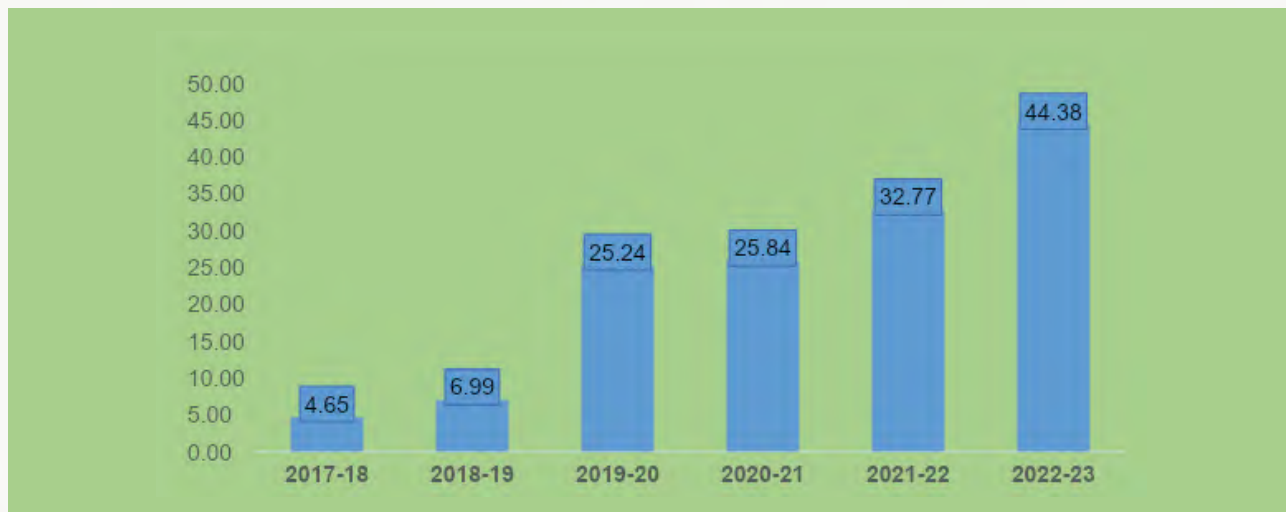
**Department /centre/school wise ongoing projects**



**2. Year wise new projects and sanctioned grants**



**3. Year wise grants received in Ongoing projects**





## IP activities during FY 2022-23

### A. IP Granted during F.Y. 2022-23

#### 1. Patent Title: Sub-Zero Temperature Process For Production Of High Surface Area, Phase, And Dimensionally Controlled Nanotitania For Solar Cell And Water Treatment Application Thereof

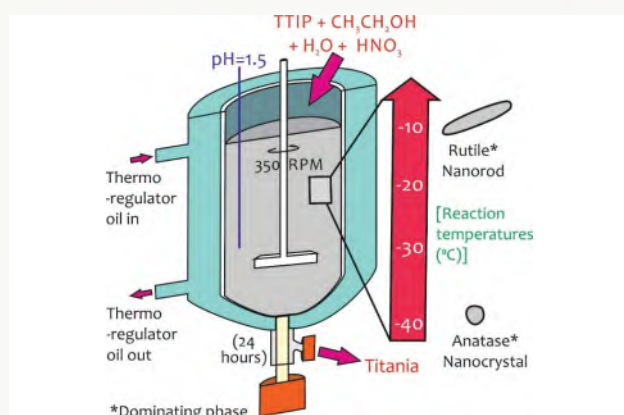
Indian Patent No.: 402926 Indian Patent Application No.: 201611022531

Date of Filing: 30-06-2016 Date of Published: 16-02-2018 Date of Granted: 03-08-2022

#### Inventors:

1. Dr. Rakesh K Sharma, Associate Professor, Department of Chemistry, IIT Jodhpur
2. Mr. Shejale Kiran Prakash (PhD Student), Department of Chemistry, IIT Jodhpur

**Brief Description:** This invention is about large-scale synthesis of high specific surface area titania (TiO<sub>2</sub>) nanostructures by a simple, one-step method involving titanium tetraalkoxide, chloride or amine in protic solvent for morphology and phase tuning at sub-zero temperature variation. In pursuance to the above-mentioned objects, the inventors have prepared titania nanoparticles at 0 °C to -196 °C. The oval shaped at low and nanorods at high temperatures are formed with the transformation between anatase and rutile phase. This titania as a photoanode materials, exhibit excellent photon scattering ability with enhanced photon harvesting and shows high photoconversion efficiency. In water treatment, titania membrane shows high efficiency in photo-assisted removal of organic impurities and toxic chromium metal from water



#### 2. Patent Title: Metal(S)/Clay Catalysts For Converting Biomass Into Diesel Grade Hydrocarbons

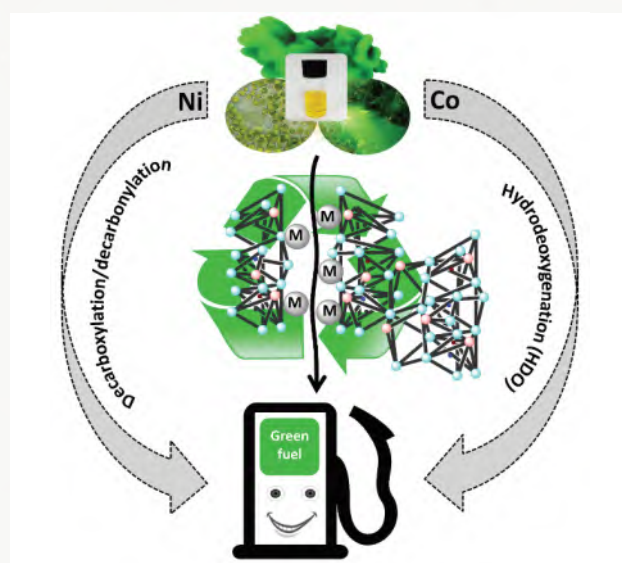
Indian Patent No.: 403795 Indian Patent Application No.: 201711025555

Date of Filing: 18-07-2017 Date of Published: 25-01-2019 Date of Granted: 18-08-2022

#### Inventors:

1. Dr. Rakesh K Sharma, Associate Professor, Department of Chemistry, IIT Jodhpur
2. Mr. Vineet Kumar Soni (PhD Student), Department of Chemistry, IIT Jodhpur

**Brief Description:** A green natural clay-based catalytic system has been developed for efficient and selective conversion of vegetable oil, algae oil and fatty acid/esters into diesel grade hydrocarbons. The complete hydrogenation and deoxygenation could be realized in the presence/absence of a solvent. Non-noble metals such as Ni and Co can be introduced to natural clay for the preparation of catalysts. These catalysts were characterized using several analytical techniques. The selectivity in deoxygenation could be altered with different metal loadings. The formation of straight chain hydrocarbons are useful in obtaining high cetane number for better performance. The catalysts are recyclable and low metal leaching was observed during hydroprocessing.



### 3. Patent Title: Facet Controlled Preparation of Metal Hexagonal Nano Crystal/Carbon Materials Catalyst And Application Thereof

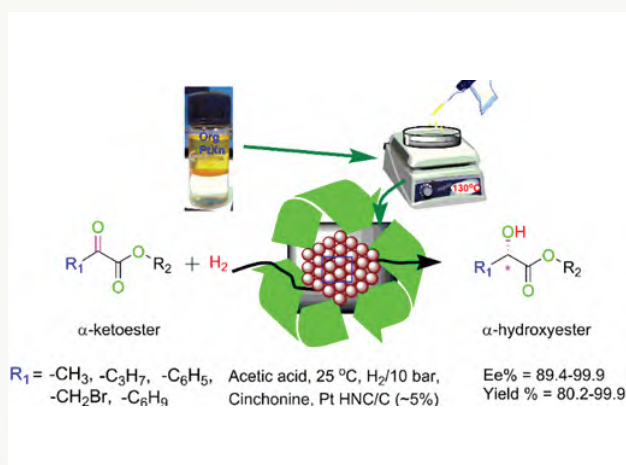
Indian Patent No.: 407169 Indian Patent Application No.: 201611022543

Date of Filing: 30-06-2016 Date of Published: 16-02-2018 Date of Granted: 20-09-2022

#### Inventors:

1. Dr. Rakesh K Sharma, Associate Professor, Department of Chemistry, IIT Jodhpur
2. Ms. Poonam Sharma (Ph.D Student), Department of Chemistry, IIT Jodhpur

**Brief Description:** This invention is about new process to prepare facet controlled Pt hexagonal on carbon and their application to form chiral compound by asymmetric heterogeneous hydrogenation. The catalyst is prepared by a facet controller reagents and nanocrystal motivating carbon support. Many steps are carried out for catalyst preparation: preparation of Pt-organic precursor; preparation of functionalised carbon solution in ethanol; mixing of Pt-organic precursor in functionalise carbon solution; drying of Pt-org-carbon solution on hot plate in air; washing of solid product with deionised water followed by ethanol and drying the product at 180°C. Various analyses confirmed the preparation of Pt/C catalyst. This invention further used for asymmetric hydrogenation reaction of  $\alpha$ -ketoester. The asymmetric product was analysed by NMR and HPLC. Among various carbon materials Pt/MWNT gave highest selectivity and enantioselectivity.



### 4. Title of Design: Jaw Rehabilitation Device based on a Planar Mechanism

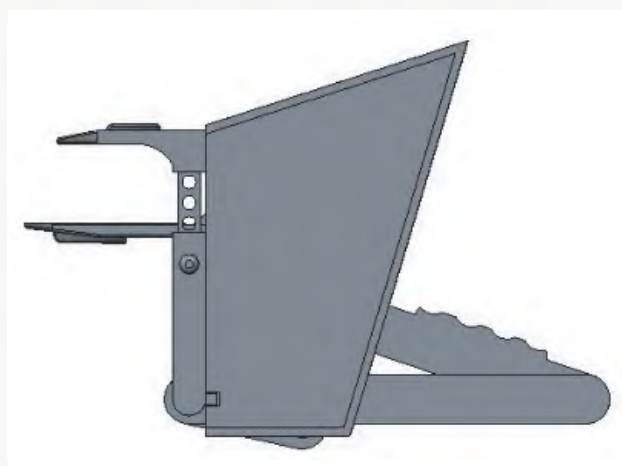
Design Number: 354559-001 Class: 24-01  
Date of Registration: 08-12-2021

Date of Issue of Certificate of Registration of Design: 29-12-2022

#### Inventors:

1. Dr. Kaushal A Desai, Associate Professor, Department of Mechanical Engineering, IIT Jodhpur
2. Mr. Priyanshu Raj Shrivastava Alumnus M Tech., Department of Mechanical Engineering, IIT Jodhpur

**Brief Description:** For patients suffering from Trismus or Lockjaw, a Jaw Rehabilitation Device is a means of exercising and rehabilitation of jaw muscles. It relieves the built-up stresses in jaw muscles and helps in regaining jaw's functionality. Moreover, this device is extensively used by dentists, orthodontists and other orally related medical fields which requires assistance in mouth opening of the patient. The design of such a device requires to have a mouth/teeth opening apparatus which should also be capable to keep the mouth in opened position and provision to apply pressure to open mouth. In addition to these, the calibration against extent to which mouth opening has been done is also required. The design patent is for the developed Jaw rehabilitation device which caters to above mentioned aspects.



**5. Title of Design: Portable Image Acquisition System**

Design Number: 354560-001 Class: 16-01

Date of Registration: 08-12-2021

Date of Issue of Certificate of Registration of Design: 16-01-2023

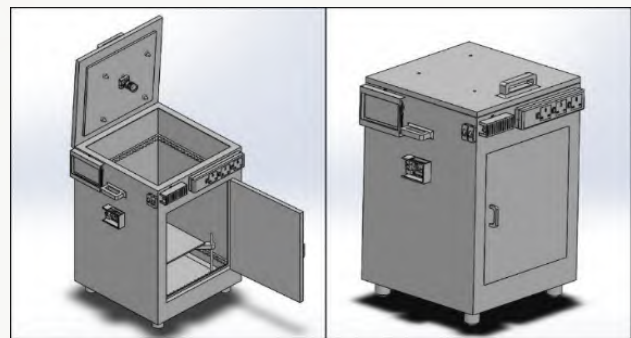
**Inventors:**

1. Dr. Kaushal A Desai, Associate Professor, Department of Mechanical Engineering, IIT Jodhpur
2. Mr. Swarit Anand Singh, Research Scholar, Department of Mechanical Engineering, IIT Jodhpur
3. Mr. Aitha Sudheer Kumar, Research Scholar, Department of Mechanical Engineering, IIT Jodhpur

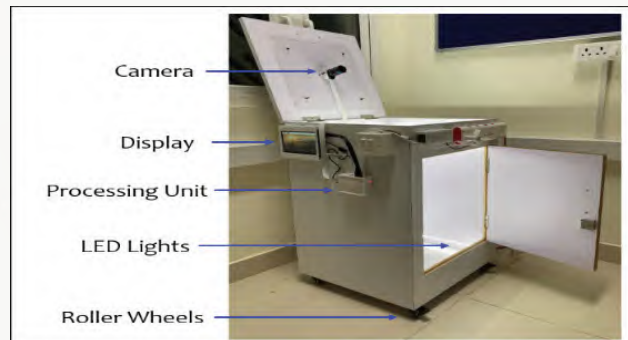
**Brief description:** Acquiring quality images is the fundamental step in setting up vision-based inspection systems. Therefore, developing a robust and reliable image-capturing system for the manufacturing shop floor is essential. While high-resolution industrial-grade cameras are available commercially, images taken in the shop floor environment often contain significant noise. The camera captures divergent images due to variable lighting conditions and surface reflections, necessitating enormous efforts and time in image pre-processing. The results are non-recurrent and inconsistent even after considerable pre-processing operations. Moreover, commercial vision systems are expensive and require a sophisticated environment for implementation. It becomes important to consider the development of a portable and versatile image-acquisition system.

The designed portable image acquisition system comprises a camera to capture the consistent component images, LED light strips to accomplish uniform and diffuse lighting conditions in the working ambiance, and a single board processing unit for image processing and storage. The developed system can accommodate a wide range of cameras with different lens systems and has provisions for front and backlighting conditions. The system is equipped with an LCD touch display

panel to illustrate acquired images. An adjustable work table is mounted to accommodate a variety of components within the system. The system components are arranged systematically within a closed cabinet with castor rollers. The closed cabinet ensures system robustness for direct application on the shop floor environment, ensuring the safe operation of the camera and lighting arrangements. The castor rollers attached to the cabinet provide ease of movement and transportation to the system. Furthermore, the system's overall development cost is considerably lower than the existing commercial systems. The system can capture images for a wide range of components and generate image data for subsequent analysis



Designed Portable Image Acquisition



Developed Portable Image Acquisition System

**6. Title of Copyright: Culb-Les: A Gpu Parallelized Lattice Boltzmann Solver for Turbulent Flow Simulation**

Copyright Application No. 4719/2022-CO/SW

Date of filing: 03.03.2022

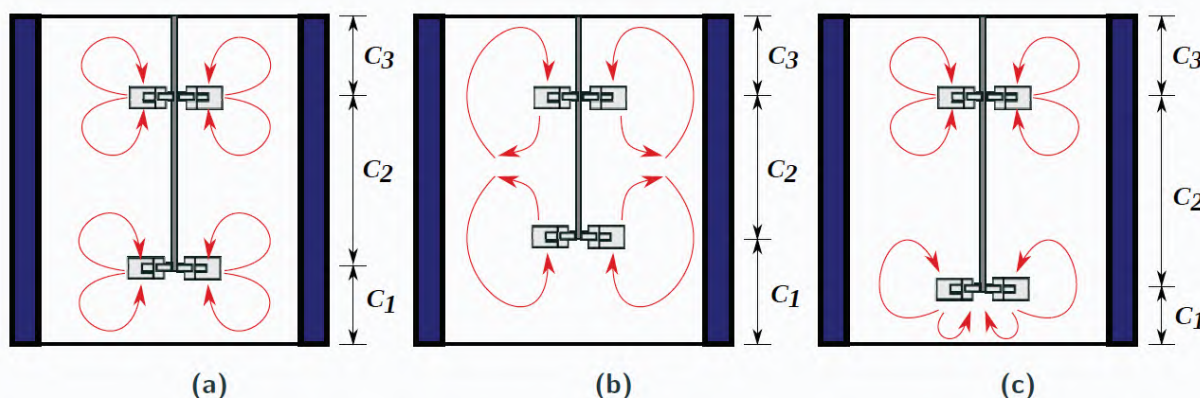
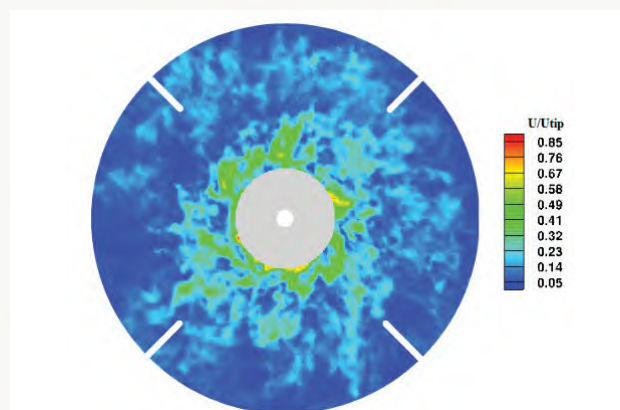
Date of Issuance of Certificate: 06.03.2023

Registration No.: SW-16080/2023.

**Brief description:** Is written in CUDA C. This software can be used to compute Flow Patterns in dual-Rushton turbine stirred tank reactor as shown in the Figures. The work can be extended for applications in other fields, where the turbulent flow plays an important role, such as aerospace engineering, chemical engineering, water resource engineering, ocean engineering, and others.

**Authors:**

1. Dr. B Ravindra, Associate Professor, Department of Mechanical Engineering, IIT Jodhpur
2. Mr. Alankar Agarwal(Ph.D Student), Department of Mechanical Engineering, IIT Jodhpur
3. Dr. Akshay Prakash, Assistant Professor, Department of Aerospace Engineering, IIT Kharagpur



**B. Patents Published during FY 2022-23**

**1. Patent Title: [(L2)VIVO](CLO4) For Catalytic Organic Transformations And Synthesis Thereof**

Indian Patent Application No.: 202211022551

Date of Filing: 16-04-2022      Date of Published: 29-04-2022

**Inventors:**

1. Dr. Rohan Diliprao Erande, Assistant Professor, Department of Chemistry, IIT Jodhpur
2. Dr. Akhilesh Kumar, Postdoctoral Associate, Department of Chemistry, IIT Jodhpur

3. Mr. Ghanshyam Mali, PhD Student, Department of Chemistry, IIT Jodhpur
4. Dr. Himanshu Arora, Assistant Professor, School of Engineering and Science, G. D. Goenka University, Gurugram
5. Dr. Amit Rajput, Assistant Professor, Chemistry, J. C. Bose University of Science & Technology, Faridabad

**2. Patent Title: System, Apparatus and Method To Detect Deepfakes**

Indian Patent Application No.: 202211049476

Date of Filing: 30-08-2022      Date of Published: 09-12-2022

## Inventors:

1. Prof. Richa Singh, Professor, Department of Computer Science & Engineering, IIT Jodhpur
2. Prof. Mayank Vatsa, Professor, Department of Computer Science & Engineering, IIT Jodhpur
3. Mr. Kartik Thakral, Ph.D Student, Department of Computer Science & Engineering, IIT Jodhpur
4. Ms. Surbhi Mittal, Ph.D Student, Department of Computer Science & Engineering, IIT Jodhpur
5. Mr. Saheb Chhabra, Visiting Ph.D Student, Department of Computer Science & Engineering, IIT Jodhpur

## C. Patent Filed in F.Y. 2022-23

S. No.	Title of Patent	Patent Application	Date of Filing
1	[(L2)VIVO](Clo4) For Catalytic Organic Transformations And Synthesis Thereof	202211022551	16-04-2022
2	An Integrated Process/System For Onsite CO2 Capture From Industrial Gaseous Emissions Favouring Carbon Capture And Waste Water Treatment.	202211028952	19-05-2022
3	Adaptive Frame Resolution Based Image System For Always-On Imaging Applications.	202211029231	20-05-2022
4	Antibacterial Hydrogel As Biocompatible Wound Healing Material And Its Process of Manufacture	202211032081	04-06-2022
5	A Cost Effective and User Friendly System to Irrigate Root Canal Under Apical Negative Pressure.	202211041593	20-07-2022
6	Indoor Air Purifying Device	202211042187	22-07-2022
7	Substrate Integrated Coaxial Line Six-Port Network Module For Wide-Bandwidth	202211044902	05-08-2022
8	System, Apparatus and Method To Detect Deepfakes	202211049476	30-08-2022
9	Automated Personalized Assistance and Monitoring System for People With Special Needs.	202211050413	03-09-2022
10	Oral Care Irrigation Device For Maintaining Oral Hygiene.	202211051961	12-09-2022
11	SPIV3_1: A Cationic Synthetic Peptide With Broad-Spectrum Antibacterial Activity	202211052566	14-09-2022
12	Pressure Ulcers Or Bed Sores Preventing Air Bubble Based Mattress	202211060577	22-10-2022
13	Automated Light Intensity Control System Using metal-semiconductor-Metal Photodetector	202211062382	01-11-2022
14	Camera System for Image Recognition Using Edge Information	202211077084	30-12-2022
15	System And Method For Robot Assisted Echocardiography	202211077085	30-12-2022
16	System And Method For Detecting Presentation Attacks	202211077564	31-12-2022
17	Designing And Development of Scaffold-Free 3d Multicellular Spheroids And Characterisation Of The Same	202311002108	10-01-2023
18	MMP-9 Responsive Growth Factor Releasing Neuroprotective Hydrogel	202311014414	03-03-2023
19	2,3-Dihydrofuro Dimedone (DHF_20) As Staphylococcal Thioredoxin Reductase Inhibitor	202311015493	08-03-2023
20	Electrochemical Potentiometric Device	202311016263	11-03-2023
21	Up Cities@2047: A Conceptual Framework.	Diary No. 7487/2023-CO/L	21-03-2023
22	Dynamic Powder Splitting System	202311023249	29-03-2023
23	Colorimetric Sensor For Detection Of Bacterial & Biofilm Contamination	202311023777	30-03-2023

# Events

## Republic Day

26th January 2023

IIT Jodhpur celebrated the 74th Republic Day of India on 26th January 2023. Various contests and performances were organised to strengthen India's republic and democratic values. The celebrations were widely attended.



The event started with the flag hoisting ceremony followed by the singing of the national anthem at the Chanakya Complex of IIT Jodhpur at 9.30 am. Afterwards, the students, IIT Jodhpur community assembled at the Lecture Hall Complex to attend the special address of the honorable Director of IIT Jodhpur, Prof. Santanu Chaudhury.



It was followed by a speech by Mr. Aman Prakash, the General Secretary of the Student Senate. India's vibrant colours, cultures and traditions were showcased through cultural performances— songs, dances, and poetry recitations. The cultural program began with a special segment of performances put together by the young participants of Kendriya Vidyalaya.



This was followed by musical, choreographed and oratorial presentations by members of the IIT Jodhpur family. Several children's contests were conducted by the Office of Students and student body as a prelude to the Republic Day celebrations. The results of these competitions were declared during the cultural program. The program was followed by a Nukkad Natak (street play) organised by the drama club of IIT Jodhpur (this play has also been performed in front of the iconic Clock Tower area of Jodhpur city to spread awareness about social evils). The entire program was well appreciated by the audience and it was concluded with a vote of thanks by the Chairman of the Institute's Committee for Celebration of Commemorative Days, Prof. Chhanda Chakraborti. All the events listed were widely attended.

## International Mother Language Day

**21st February 2023**

IIT Jodhpur's 2023 celebration of the International Mother Language Day was centred around the theme of multilingual education: it highlighted the necessity of transforming education to promote awareness of linguistic and cultural diversity, and to promote multilingualism at the IIT Jodhpur campus. The esteemed Director of IIT Jodhpur, Prof. Santanu Chaudhury addressed the audience on the occasion and emphasised on the importance of linguistic and cultural diversity in any IIT campus. Prof. Chaudhury also recited a poem in Bangla that poignantly evoked each individual's love for their Matribhasha (mother language) and the historical origins of the day. This was followed by a cultural program that included songs, a brief presentation on 'Living Language: How Creating Bhasha Creates Us', recitations, and a workshop on Urdu. The audience really enjoyed the event and actively participated in the Urdu workshop. The program concluded with a vote of thanks appreciating the audience and the participants.





## National Science Day at IIT Jodhpur

28th February 2023

28th February is celebrated as the National Science Day to commemorate the discovery of the Raman Effect by the Indian physicist, Sir C.V. Raman on this day in the year 1928. Sir C.V Raman was awarded the Nobel Prize in Physics in 1930 for this contribution.

IIT Jodhpur celebrated National Science day with an insightful and thought provoking talk by Prof. Surajit Sen, the eminent physicist. Prof. Surajit Sen, the speaker, works on theoretical and computational problems in non-equilibrium statistical physics and in nonlinear dynamics of many body systems. He is currently a Professor at the Department of Physics, College of Arts and Sciences at University of Buffalo, New York and a Distinguished Visiting Professor at IIT Jodhpur. The occasion was also graced by Dr. Kuldeep Singh, Dean, Academics of AIIMS Jodhpur.



The program started with a formal welcoming of the eminent guests by Prof. Neeraj Jain, Head, School of Artificial Intelligence & Data Science at IIT Jodhpur. The welcome was followed by a short talk by Prof. Kuldeep Singh, who spoke briefly about Science Day and introduced the speaker. Prof. Sen chose to deliver a talk on his continuing engagement with improving education of children and youth in rural West Bengal. The title of the talk was “Nurturing Curious Kids – Focus on India.” The talk focused on the unique issues that India faces with its nearly seventy crore youth and the steps

that we can take to empower them and help bring peace and prosperity to the country and the world. Prof. Sen spoke about the importance of nurturing curiosity in the minds of children during their school education. Curiosity, which is an inherent quality in most children, is an essential requirement for a comprehensive science education. However, most schools in India unfortunately suppress this quality for sake of more traditional, rote-based learning. The demographic Prof. Sen’s talk focused on include the underprivileged children in rural India, specifically in rural West Bengal. He described the

hardships that underprivileged children— orphans and those born in devastating poverty— face. He pointed to why it is important to focus on the education of these children because their socio-economic conditions stop them from accessing it. He spoke about individual case studies to illustrate the same, based on his continuing fieldwork in West Bengal. Prof. Sen emphasized that only if we pay attention to the educational needs of

underprivileged children, who form a formidable percentage of our young population, can we think about becoming a prosperous country in the future. He also stated that only providing money to NGOs is not the way out, we need to get involved in children’s education with a more hands-on approach and use our expertise and experience to enable them to build a better future for themselves through education.



The talk was followed by an intense discussion initiated with a question-answer session. The audience, mostly made up of faculty members and students of IIT Jodhpur was mesmerized by the talk and Prof. Sen was successful in provoking the

members to think deeply and act on the issue, as was evident by their questions. The evening ended with a vote of thanks by Prof. Gaurav Bhatnagar, Associate Dean, International Relations and Outreach, IIT Jodhpur.

## International Women's Day

8th March 2023

International Women's Day (IWD) is globally celebrated annually on March 8th to recognize the social, economic, cultural, and political achievements of women. This year, the theme of the International Women's Day was "DigitALL: Innovation and technology for gender equality." This highlights the importance of leveraging technology to achieve gender equality. This approach recognizes that technology and innovation can be powerful tools for overcoming the systemic barriers that prevent women and other marginalized groups from fully participating in the digital world. The term "DigitALL" emphasises the need for inclusive digital transformation that benefits everyone, regardless of gender, race, ethnicity, or socioeconomic status. It highlights the fact that digital inclusion and gender equality

are interconnected issues that must be addressed together. In practice, DigitALL involves a range of strategies and initiatives aimed at closing the digital gender gap and empowering women through technology. This can include efforts to increase access to digital tools and infrastructure, improve digital literacy and skills, promote women's leadership in the tech industry, and use technology to address gender-based violence and discrimination. Ultimately, the goal of DigitALL is to harness the power of technology and innovation to create a more equitable and inclusive world for all, regardless of gender or any other identity label. To celebrate this day, the Indian Institute of Technology Jodhpur organized a celebration aimed at promoting gender equality and empowering women.



### Events and Activities:

The celebration of International Women's Day at IIT Jodhpur began with a virtual inauguration ceremony, where Prof R. Chidambaram, Chairman,

Board of Governors, IIT Jodhpur, delivered the opening address. He emphasized the importance of gender equality and the role of technology in promoting it.



His address was followed by address by the distinguished speakers Ms. Sujata Biswas and Ms. Taniya Biswas, founders of the clothing brand 'SuTa', whose presentation was titled 'Digital Technology for Women's Empowerment: A Tale of Two Sisters'. 'SuTa' is an Indian women's clothing brand that celebrates women's achievements through its designs and messaging around women's achievements. It is centered on empowerment, inclusivity, and celebrating the unique strengths and accomplishments of women from all walks of life. The brand aims to empower women and promote gender equality through its products and marketing. The brand 'SuTa', talks about women's achievements by featuring real-life stories of women who have overcome obstacles and achieved success in their

fields. These stories are shared on the brand's website and social media channels, and they highlight the diverse accomplishments of women in various professions. 'SuTa', also uses its clothing designs to showcase women's achievements. They gave examples of the brand's "Her Story" collection which features sarees that are inspired by the stories of inspiring women, such as Kalpana Chawla (the first Indian woman to go to space) and Kiran Bedi (the first female police officer in India). In addition to highlighting women's achievements, 'SuTa' also focuses on promoting body positivity and self-love. The brand offers a wide range of sizes to cater to women of all shapes and sizes, and its marketing campaigns often feature models of different sizes and body types.



The next distinguished speaker was Dr. Lipika Dey, Chief Scientist, Research and Innovation Lab, Tata Consultancy Services, and she spoke on the theme "Are Women Visible in the Data Space?" where she explained that the visibility of women in the data space can vary depending on the context and the specific data being considered. In some cases, women may be highly visible and represented in the data, while in other cases, they may be underrepresented or invisible. She gave examples from fields such as healthcare and education, where data collection often includes

information about gender, making women visible in the data space. However, she also added that in other areas such as technology or finance, women may be underrepresented in the workforce or in leadership positions, which can lead to a lack of data about their experiences and perspectives. She emphasized on the fact that efforts are being made to improve the representation of women and other underrepresented groups in the data space, through more inclusive data collection methods and analysis techniques



Prof. Richa Singh, Professor and Head, Department of Computer Science at IIT Jodhpur was the second distinguished guest speaker of the day and spoke on “Security and Protection of Women in Cyberspace.” She explained that with advancements in cyberspace and its uses, we have witnessed an increase in cyber-crimes such as cyberstalking, harassment, and bullying, which have a devastating impact on the lives of women. Online platforms, social media, and messaging apps have become breeding grounds for cyber criminals who prey on women, exploiting their vulnerabilities and causing

significant emotional distress. Therefore, she added that to move forward, it’s essential that we acknowledge the severity of the problem and take immediate steps to protect women in cyberspace. She emphasized on the fact that governments, organizations, and individuals must work together to create a safe and secure online environment for women. She also shared the most crucial steps is to educate women about online safety and raise awareness about the risks associated with sharing personal information online.



The last speaker from the distinguished panel of speakers was Ms. Tamanna Desai, Head UX/Creative, UX/CX/Design Studio, Tata Consultancy Services, and she spoke on “Empowerment of Women: Digital Innovations and Designs.” She spoke about e-learning platforms for online education where women can now access high-quality learning resources from anywhere in the world. This has created an important opportunity for women who face cultural or economic barriers to traditional education. They can now make a difference by learning new skills and acquiring knowledge so they can improve their job prospects, start their own businesses, and participate more fully in society.

She gave a lot of emphasis on digital health services such as telemedicine and health apps that can help women access medical advice and treatment from anywhere in the world. This can be especially



beneficial for women in rural or remote areas, who may not have access to quality healthcare. Social media campaigns can be used by women to raise awareness about gender issues, mobilize support for women’s rights, and connect with other women who share their goals and aspirations. She also added that to truly achieve gender equality, we need to go beyond technology and address the underlying social, economic and political barriers that prevent women from reaching their full potential. We need to promote women’s education, provide equal opportunities in the workplace, and ensure that women have a voice in decision-making at all levels of society. Therefore, embracing digital innovations and designs as a means to empower women, create a more equal and just world and by working together, we can make sure that every woman has the tools and resources she needs to succeed and thrive in the digital age.



The talk from our guest panellist was followed by a panel discussion from the IIT Jodhpur students on the topic “Can the Digital Age Bring a Gender Equal Future?,” which explored the challenges faced by women in academia and ways to address them. The students who were invited to speak in the panel spoke about gender inequality which is still prevalent in many areas of life, including education, health, politics, and the workplace where women are often paid less than men for doing the same job and are underrepresented in leadership positions. They also face discrimination and harassment in

many areas of life, including online spaces. However, they agreed that the digital age has brought some positive changes by increasing the access to education and healthcare for women, and allowed them to connect with each other and with resources and information that can help them improve their lives. They also spoke about how the digital age has created new economic opportunities for women, such as working from home or starting their own online businesses. The closing remarks for the event were given by the Director of IIT Jodhpur.



The event organized by the Institute highlighted the importance of gender equality and the role of technology in achieving it. Overall, the celebration

of International Women's Day at IIT Jodhpur was a testament to the Institute's commitment to gender equality and women's empowerment.



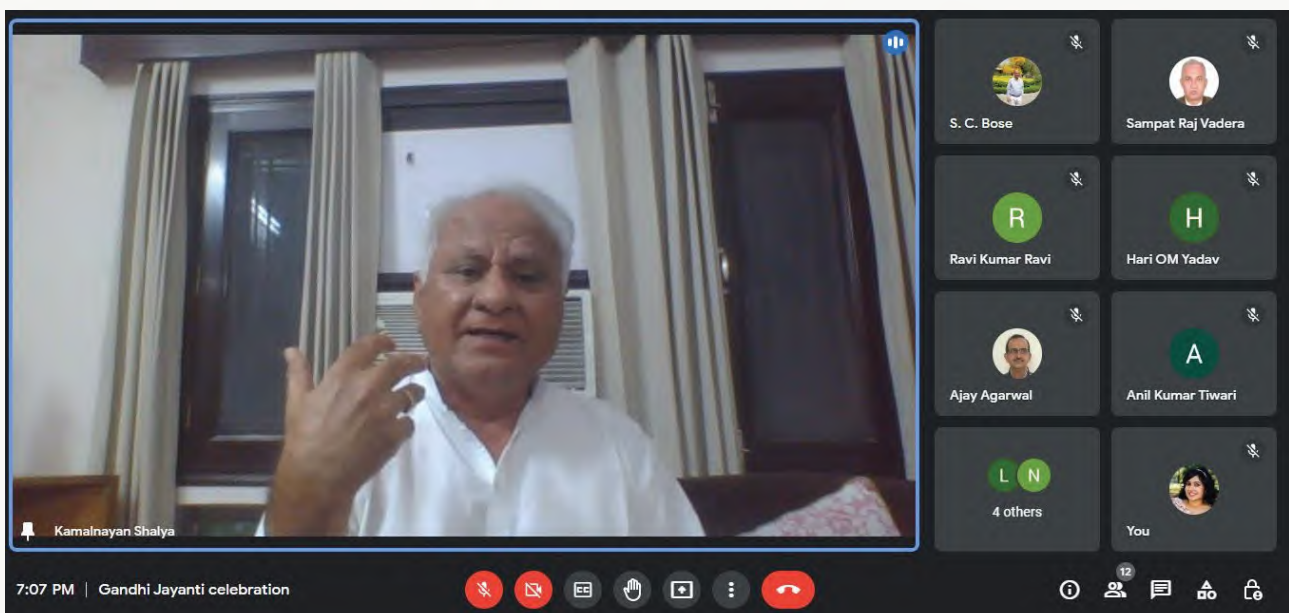
## Gandhi Jayanti

2nd October 2022

On Gandhi Jayanti, to celebrate the birthday of the Father of the Indian Nation, Shri Mohandas Karamchand Gandhi, Prof. Kamal Nayan was invited to the Institute for delivering a lecture. Prof. Kamal Nayan is the Senior Consultant of the Gandhian Institute and the retired Principal of Rajasthan's College of Education. He specializes in Indian Culture, Philosophy of History and Historiography. He has taught History for nearly four decades at various government colleges of Rajasthan.

Prof. Nayan spoke about the life of Mohandas Karamchand Gandhiji and how he impacted the world. He also spoke about various incidents from Gandhiji's life which taught the world about being righteous no matter what the circumstances are. Students, faculty and staff of IIT Jodhpur community actively participated and contributed to the discussion.

The session was concluded with thanking Prof. Kamal Nayan and the participants.



## Constitution Day Celebration

**26th November 2022**

IIT Jodhpur celebrated Constitution Day on 26th November 2022 to celebrate the adoption of the Constitution of India on 26th November 1949. The event was widely attended by the students, faculty members and staff of the Institute.



The event started with the reading of the Preamble of the Indian Constitution.

The Honorable Justice Vijay Bishnoi from Rajasthan High Court was invited to address the IIT Jodhpur fraternity. Justice Vijay Bishnoi is a presiding judge in Rajasthan High Court. His Lordship has specialization in Constitutional Law, Criminal Law and Election Law, and has served as Additional Central Government Standing Counsel, Counsel for Rural Development & Panchayat Raj Department, Stamps & Registration Department, Co-Operative Department, Labour Department, Transport Department & Excise Department, of the Government of Rajasthan.

Justice Bishnoi's speech emphasised on how the Constitution of India was developed after years of deliberation and looking at various constitutions of the world. He spoke about its uniqueness and discussed how India's Constitution is one of the lengthiest written constitutions, drawn from multiple sources, and is a perfect blend of rigidity and flexibility. The talk was followed by an interactive session with students, faculty and staff of IIT Jodhpur community.

The event ended with thanking the guest speaker and all present for the event.



## IIT Jodhpur Institute Lectures (Year 2022-23)

IIT Jodhpur invited some of the most renowned national and international personalities who have excelled in the domains of science, technology, humanities, industry, & governance to deliver the Institute Lectures on subjects of relevance to IIT Jodhpur community, especially for the benefit of the students of IIT Jodhpur. These lectures have been inspiring students and faculty of IIT Jodhpur and have a highly positive impact on the overall ecosystem of the Institute. These lectures, hosted at the Institute campus bring together a large and engaging audience with the best of innovative and creative minds of the country. The following Institute Lectures have been organized during 2022-23.

### 1. “AI for Social Good” by Prof. Venu Govindaraju on 29 April 2022

Prof. Venu Govindaraju is a State University of New York Distinguished Professor and a leading authority in the area of pattern recognition and machine learning (a sub-discipline of Artificial Intelligence). He founded and leads a successful multidisciplinary research center, the Center for Biometrics and Sensors. The Centre is internationally recognized as one of the best research labs in the field in terms of doctoral students graduated and accolades garnered for several path breaking innovations. Prof. Govindaraju is a fellow of the IEEE, ACM, IAPR, NAI and SPIE. He is the winner of the IEEE Technical Achievement Award from the Computer Society and the ICDAR Lifetime Outstanding Achievement Award from IAPR. The lecture covered his team’s achievements in several sustainable goals listed out by the

United Nations. He particularly described how the technique of Artificial Intelligence can be used to achieve sustainable development goals like poverty eradication, good health and well-being, quality education, and food security.

### 2. “Convergence of Discipline to Impact Energy and Health Care” by Prof. Paras N. Prasad on 02 December 2022.

Prof. Paras N. Prasad, holds the unique multidisciplinary position of State University of New York Distinguished Professor of Chemistry, Physics, Electrical Engineering, and Medicine (four departments spanning three schools). He is the Samuel P. Capen Chair of Chemistry and the Executive Director of the multidisciplinary Institute for Lasers, Photonics and Biophotonics, which he founded in 1999. His pioneering contributions in interdisciplinary research at the interface of photonics, nanotechnology, and biomedicine have broadly impacted healthcare, energy, and optical technologies. Scientific American named him among the world’s top 50 science and technology leaders.

In his Institute Lecture, he highlighted the importance of interdisciplinarity in the current global scenario and how the convergence of different domains of science and technology can propel the two very important sectors viz. energy and healthcare. Both these sectors are highly important for societies across different countries.

# Facilities

## Computer Centre

The Institute has a modern Computer Center (CC) to cater its all-round IT requirements starting from computing resources to last mile internet connectivity. Computer Center is the nucleus of major computing activities for students, staff members and faculty members. A modern data center equipped with High Performance Computing (2500 CPU Cores) and AI supercomputers (4 DGX A100) providing more than 20000 teraflops of computing power is the heart of this computing facility. Our HPC is listed in the CDAC Top 100 HPC in India list (July 2022 and January 2023). The Computer Center is powered by a 10G backbone. Presently the institute's internet requirements are met by 4 Gbps Internet lease line. The institute network consists of 2 Core switches, more than 500 access and distribution switches and 800 wireless access points with high availability. This network

covers the entire campus including service stations and gates. Further the network is protected by the latest UTM that provides seamless protection from any cyber threats. It also provides secure VPN connectivity to IIT Jodhpur fraternities while they are not inside the campus. CC also hosts several computing servers, application servers, mini HPCs and 0.5 Petabyte storage 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. The Institute's main website as well as all other necessary applications are hosted by the Computer Centre. CC hosts its own DNS in HA mode and directory services for catering user identity.



In the computer centre, the local instances e-file module of e-office is operational. IITJ successfully transitioned its file processing method from physical to digital in the previous one year by processing more than 5600 files and 5900 receipts over the course of a year till March 2023. This increases office procedures' accountability and transparency while also guaranteeing the integrity and security of data.

Through a service desk ticketing system, The Computer Centre offered assistance to IITJ end users. With a satisfaction rating of 4.7, Computer

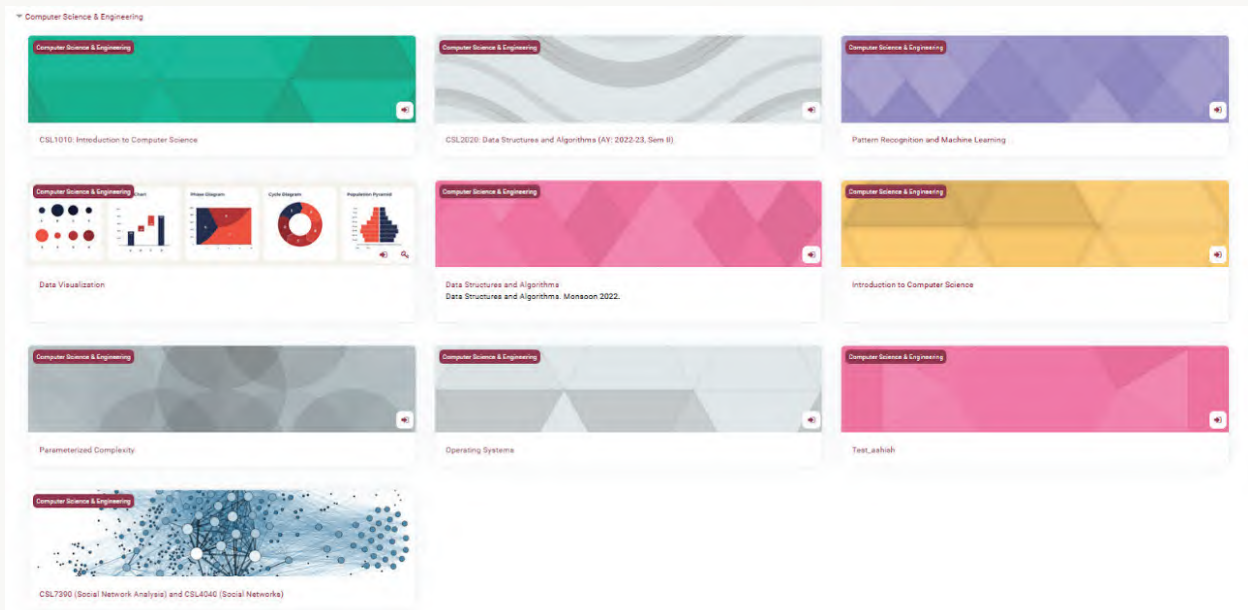
Centre successfully handled over 3500 service desk requests in a single year.

### Major Initiatives in FY 2022-23

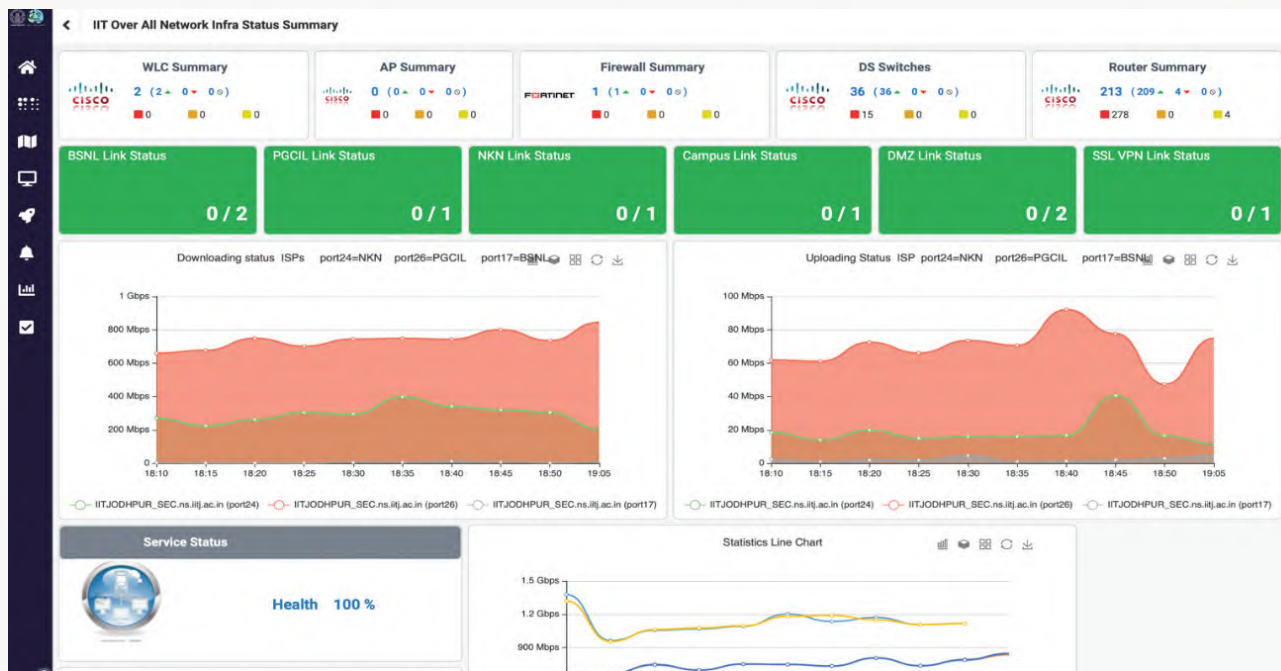
- » **Git (locally installed Github and Gitlab):** The computer center provides version control and project management facilities to its students and faculties with world's most popular git applications (i) Github Enterprise and (ii) Gitlab on-premise.



- » **Open Source Learning Management System (Moodle):** IIT Jodhpur has implemented Moodle, an open source LMS to facilitate the management of learning to its students. It provides tools to address both asynchronous and take home activities.



- » **LaTeX:** IIT Jodhpur computer centre provides an online LaTeX writing tool that allows you to easily create and collaborate on perfectly formatted scientific and technical documents.
- » **Network Management System (NMS) implementation:** The IITJ campus network consists of more than 1000 network devices. An enterprise class NMS has been deployed in the computer centre to automatically manage these devices.



## 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/TLS certificates for all the iitj.ac.in domains and subdomains.

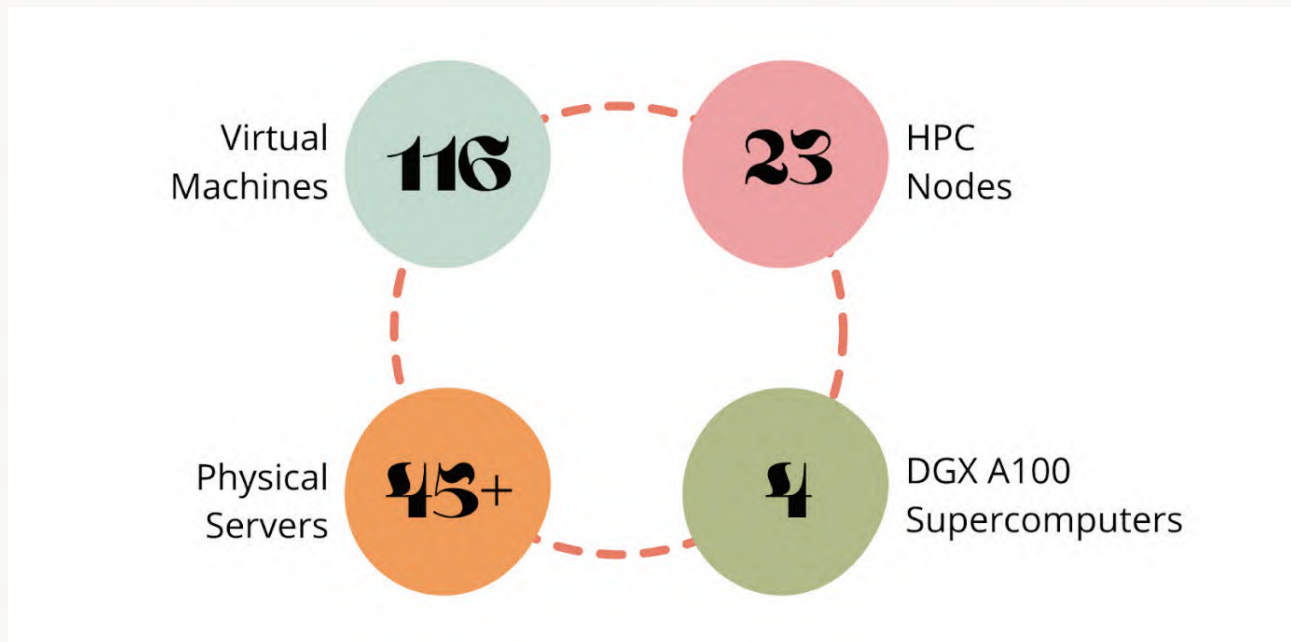
## Resources

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 45 terminals and another with 40 terminals are operated by the Computer Center. These laboratories have seating capacity of 110 and 120 respectively. Computer Center has licenses of Microsoft Windows Operating Systems, Microsoft Office 365, RHEL, RHVM and Matlab to name a few. Details of the resources are provided below.

## Hardware Infrastructure

- » 4 NVIDIA DGX A100 AI Supercomputer
- » NAS storage with 200 TB space
- » PFS storage with 200 TB space
- » SAN storage with 30 TB space
- » Unified storage with 50 TB 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 14 Servers consisting of 3 Cisco, 4 Dell and 7 Lenovo server
- » Fortinet UTM and FortiAnalyzer
- » Cisco Communication System: CUCM, Voice Gateway and CMS in HA for IP Phones
- » IP Phone (490 phone installed till date)
- » Network equipments 1000+

## Hosted VM's & Physical Server



### Software Licenses

#### » Red Hat Enterprise Linux

- o Standard License: 26 License
- o HPC: 56 License
- o RHVM: 40 License

#### » Oracle Licenses

- o Virtualisation solution for Physical Server (Each server with 2 CPU Sockets) : 16 licenses
- o Enterprise Grade Oracle Operating System for Virtual machines: Unlimited
- o Patch Management Software for Physical Server (Each server with 2 CPU Sockets) : 16 license

#### » Microsoft campus wide license with Office 365

- o Microsoft 365 A3 for students use benefit : 4000
- o Microsoft 365 A3 for faculty : 200
- o O365 A3 EDU Open Faculty Enterprise : 5
- o Win Server Standard Core : 32
- o SQL Svr Ent Core : 2

#### » Google

- o Google Workspace for Education: Unlimited
- o Google Workspace Education Plus: 250 Faculty License and 2500 Student License

#### » MATLAB License: Unlimited Institute Wide Access

#### » WebEx

- o Advanced Space Meetings: 2520 Licenses
- o Meeting Suite: 2520 Licenses
- o Device: 120 Licenses

#### » Jira License: 15 Agent License

### Training Organized by Computer Center

- » e-Office user training (online)
- » Parallel Computing workshop for users of MATLAB software

### Design Credit Project with Student

Computer centre is in charge of helping the institute's young students to create projects that require managing/working with the production environment. This serves to achieve student's learning needs as well as benefit the institute.

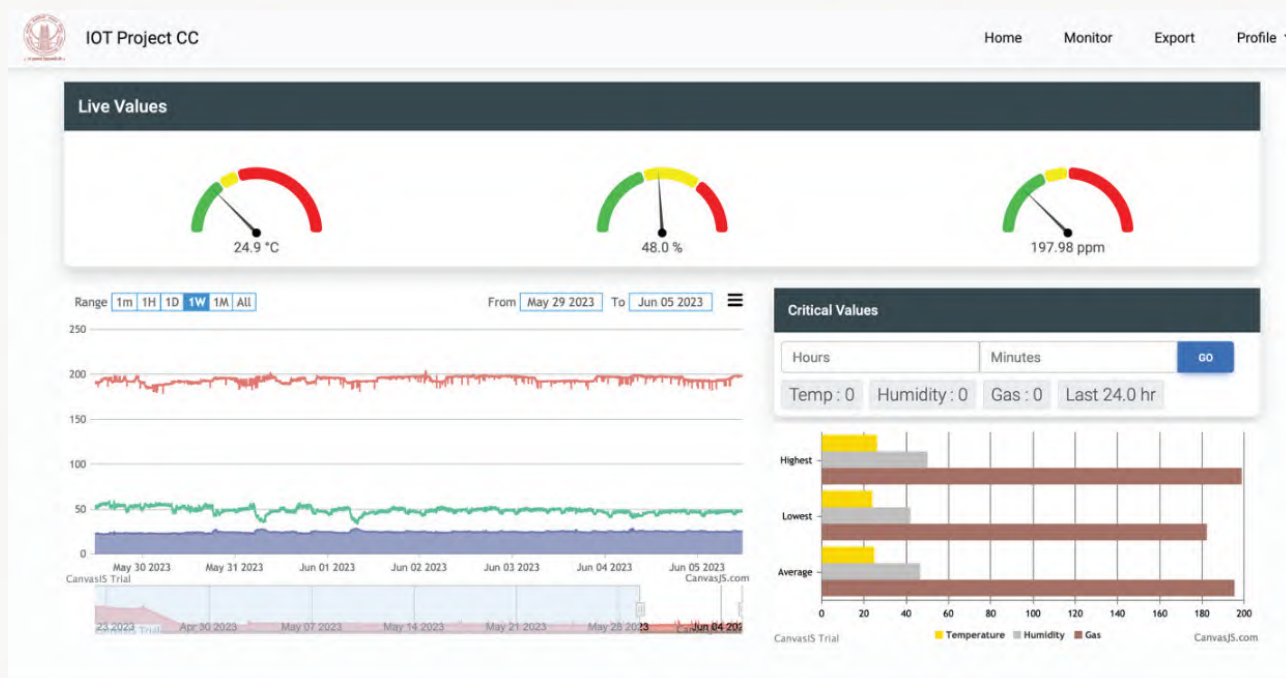
Major outcomes of these collective efforts in this academic year are listed below:

#### » IoT based Data Centre Monitoring System:

Two B.Tech final year students, Mr. Anuman from CSE Dept. and Mr. Deepanshu Agrawal from EE Dept., along with Mr. Jayanta Borthakur, Manager(ICT) Networking,

developed an IoT based data centre monitoring solution. This internal system is made up of a number of sensors, including ones that measure temperature, humidity, motion, and smoke. A system was designed to collect data from the sensors. The system analyses the sensor data to produce a dashboard for real-time

monitoring of these data files and to send notifications or alerts through WiFi when the sensor values exceed the specified threshold. This system is currently operational at Computer Centre, assisting Computer Centre in taking the necessary or proactive actions to reduce downtime at the data centre.



» **Development of Private cloud using OpenStack:** A team of 5 B.Tech third and fourth-year students namely Mr.Manav Kapoor, Mr.Gopathi Rahul Pramodh, Mr.Ravi Pratap Singh Rajawat, Miss. Divyanshi Singh Bora and Miss Harshita Kalani developed an open source private cloud infrastructure using OpenStack along with Mr. Ashish Vyas, Manager (ICT) System Administration. This cloud infrastructure is made to host the implementation of virtual machines based on templates. With load balancing and other high availability features, this design made it possible to distribute services across numerous nodes. Old End of Life (EOL) servers and equipment were used in the setup.

13th International Conference on Computing Communication and Networking Technologies (ICCCNT), Kharagpur, India, 2022, pp. 1-6, doi: 10.1109/ICCCNT54827.2022.9984627.

## Publications

J. Borthakur, "A comparison study of single area OSPF Network to multiple area OSPF Network implementation in a Campus area Network," 2022

## The Team:



From Left to Right: Ram Singh Ratnu, Sunil Manana, Vivek Bhati, Habib Ghouri, Suman Kundu (Head), Poonam Chand Shankla, Jayanta Borthakur, Ashish Kumar Rai, Vikas Kasnia, Alok Kumar Singh, Vikram Singh Shekhawat and Asif Khan (not present in the photograph)

# S. R. Ranganathan Learning Hub

The S. R. Ranganathan Learning Hub, i.e., the library supports teaching and research activities of the Institute by facilitating acquisition, organization and dissemination of knowledge resources, and by providing library & information services to IIT Jodhpur community. It 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 the Library Committee, which has representatives from all Departments, and Student Representatives.

**Collection:** The Library has a rich and growing collection of approximately 18,000 volumes of books in print and electronic format, which include textbooks, and books of general and reference nature. A wide range of scholarly journals, databases and research support tools are subscribed from various sources for the academic and research purposes of the institute community.

**Services & Facilities:** The following services and facilities are provided by the library:

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

**Biometrics enabled RFID technology:** The library services are automated through biometrics 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:** Library subscribes to a wide range of scholarly resources, like, journals, citation, indexing and scientometric databases, in all the thrust areas of academics and research of the Institute. In addition, the library subscribes and provides access to tools for academic and writing support, plagiarism detection, current and leisure reading, and off-campus resource access for the users. These resources are accessible through the user-friendly, responsive Library website, which is a comprehensive site maintained by Library. The website also provides online catalogue, lists of useful resources accessible in the open domain like the open access journals, books, repositories, video lectures, open courseware, and these are continuously updated.

Besides the major journal resources like, American Chemical Society (ACS), American Institute of Physics (AIP), American Physical Society (APS), American Society for Civil Engineers (ASCE), American Society for Mechanical Engineers (ASME), Association for Computing Machinery (ACM), Elsevier Science Direct, Emerald Management Journals, IEEE Xplore Digital Library, Institute of Physics (IoP), Journal of Visualised Experiments (JoVE), JStor, MathSciNet, Optical Society of America (OSA), Oxford University Press (OUP), Project MUSE, Royal Society of Chemistry (RSC), Institute for Mechanical Engineers (IMEchE), SciFinder Scholar-n, Scopus, Society for Industrial & Applied Mathematics (SIAM), Springer Nature, Taylor & Francis, and Web of Science, the new resources added during FY 2022-23 are:



1. ICE Thomas Telford Current Engineering Journals
2. NCTM Complete Journals
3. Wiley Journals
4. Bulletin of the Seismological Society of America
5. Canadian Geotechnical Journal
6. Feminist Studies
7. Geotechnical Engineering Journal of SEAGS-AGSSEA
8. Human Affairs
9. Indian Journal of Gerontology
10. International Journal of Geosynthesis and Ground Engineering
11. Journal of Fandom Studies
12. Journal of Fluid Mechanics
13. Journal of Geology
14. MIS Quarterly
15. Nature Nanotechnology
16. Nature Physics
17. Nature Reviews Neuroscience
18. Nature Sustainability
19. Perspectives of Politics
20. Studies of South Asian Film and Media
21. The Economic Journal

**Library Instruction Programs:** Regular user orientation and library instruction sessions are organized for students by the Library Staff Members. Besides these, the library also organizes workshops and training sessions on using various resources, author workshops with experts and library expert talks on trending topics in scholarly communication.

### The vital statistics of Library for FY 2022-23, are as below:

S. No.	Description	Statistics
<b>1.</b>	<b>Print Books added</b>	<b>Total 621</b>
	a. Number of titles added	367
	b. Number of volumes added	621
<b>2.</b>	<b>eBooks added</b>	
	a. Number of titles & volumes added	2181
<b>3.</b>	<b>Number of Scholarly Resources subscribed (For CY 2023)</b>	<b>Total 71</b>
	a. Fulltext resources	56
	b. Archive of fulltext journals	2
	c. Research databases	7
	d. Research support tools	5
	e. Digital Newspaper & Magazines	1
<b>4.</b>	<b>Document Supply &amp; Inter Library Loan service requested fulfilled</b>	<b>Total 61</b>
	a. Document supply of articles & research papers	60
	b. Books arranged on Inter Library Loans	1
<b>5.</b>	<b>Circulation Transactions</b>	<b>Total 31,191</b>
	a. Number of book check-outs	15,181
	b. Number of book check-ins	14,710
	c. Number of book renewals	1,300

For complete list of subscribed resources, please scan the code:



**Institutional Memberships:** 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.

**Workshops & Trainings Conducted:** “*The Learning Hub Workshop Series*”, is a popular and well-received workshop series organized by the S. R. Ranganathan Learning Hub its library users that makes them aware of various resources provided by the library and helps them to gain advantage of their access. During the FY 2022-23, workshops were conducted on accessing eBooks through EBSCO and ProQuest eBooks platform, to name a few.

## Glimpses of the S. R. Ranganathan Learning Hub at IIT Jodhpur



RFID Gate & Drop-Box



Stacks & General Section



Circulation Counter



Hindi Anubhag



24x7 Reading Spaces @ SRRLH, IITJ



24x7 Reading Spaces @ SRRLH, IITJ



24x7 Reading Spaces @ SRRLH, IITJ



Unique Rajsthani style antique baithak for leisure reading

## Scholarly Activities of Library Staff Members

### 1. Amit Kumar Soni, Assistant Library Information Officer attended:

- Workshop on **“Research Information Management System (RIMS)”** during 11th – 13th April 2022 at the INFLIBNET Centre, Gandhinagar, Gujarat
- 25<sup>th</sup> Online National Convention on Knowledge, Library & Information Networking (NACLIN 2022) on **“Redefining & Repositioning Libraries - Exploring, Engaging & Expanding for Next Gen Library Users”** organized by Developing Library Network (DELNET), New Delhi during 14-16 December 2022.
- Hindi workshop for filing of quarterly Hindi Progress Report on 27.03.2023

### 2. Kamlesh J. Patel, Assistant Library Information Officer attended:

- Three Days Workshop on **“Research Information Management System (RIMS)”** organised by Information and Library Network (INFLIBNET) Centre, Gandhinagar, Gujarat, from 11 to 13 April 2022.
- National Conference on **“Re-Envisioning Library and Information Services in the Agile Era”**, jointly organized by Department of Library & Information Science, Gujarat University, Ahmedabad & Raja Ram Mohun Roy Library Foundation, Kolkata, at Gujarat University, Ahmedabad during 9-10 January 2023.

- c. Hindi workshop for filing of **quarterly Hindi Progress Report**, organised by Hindi Office, IIT Jodhpur **on 27 March 2023**.
- d. DELNET-BIPL on **“Drillbit: Plagiarism Detection Software for Academic Integrity”** organised by Developing Library Network (DELNET), New Delhi on 18 June 2022. (Online)
- e. DELNET-CEMCA Webinar on **“Leveraging OER to Enhance Higher Learning”** organised by Developing Library Network (DELNET), New Delhi on 30 September 2022. (Online)
- f. DELNET Webinar on **“Research & Publications Ethics: Role of Librarians”** by Dr. Shubhada Nagarkar, SPPU Pune, organised by Developing Library Network (DELNET), New Delhi on 30 November 2022. (Online)
- g. DELNET NACLIN 2022 - 25<sup>th</sup> National Convention on Knowledge, Library & Information Networking, organised by Developing Library Network (DELNET), New Delhi, during 14-16 December 2022. (Online)
- h. The National Conference on Re-Envisioning Library and Information Services in the Agile Era, at Department of Library & Information Science, Gujarat University, Ahmedabad in January 2023 and presented paper on **“Open Educational Resources: A study of awareness among the undergraduate students at IIT Jodhpur”**, jointly authored with Kshema Prakash, Mukesh Khatik and Yogesh Parekh.
- i. DELNET Webinar on **“Fostering Research & Innovation in Institutions for Strengthening Tomorrow”** by Dr. Krishna Venkatesh, organised by Developing Library Network (DELNET), New Delhi on 25 February 2022. (Online)

**3. Chundi Chhatwani, Assistant Library Information Officer** attended:

- a. Training program on **“Research Information Management System (RIMS)”** organized by INFLIBNET Gandhinagar (Gujrat) during 11-13 April 2022.

- b. Webinar on **“Research and Publication Ethics: Role of Librarian”** organized by DELNET on 30<sup>th</sup> Nov 2022.
- c. Webinar on **“Tools and Strategies for Countering Information Overload”** organized by DELNET on 30<sup>th</sup> April 2022.
- d. Webinar **“NACLIN 2022 - 25th National Convention on Knowledge, Library & Information Networking”** organized by DELNET during 14-16 December 2022.

**4. Atul Kumar Pal, Senior Library Information Assistant** attended:

- a. **“National Seminar on Information Systems & Services for Research and Innovation”** at IIT Roorkee on 22<sup>nd</sup> September 2022

**5. Dr. Kshema Prakash, Deputy Librarian**

- a. Authored a paper jointly with Patel, K.J., Khatik, M. and Parekh, Y., **“Open Educational Resources: A study of awareness among the undergraduate students at IIT Jodhpur”** for National Conference on Re-inventing Library and Information Services in Agile Era, jointly organized by the Department of Library & Information Science, Gujarat University, Ahmedabad, and Raja Ram Mohun Roy Library Foundation, Kolkata during 9-10 January 2023.
- b. Delivered Expert Lecture on **“Librarian’s role in Institutional Rankings and Institutional Publications”** on 16<sup>th</sup> September 2022, Short Term Training Programme for LIS professionals on Recent Advances in Library Management and Information Technology organized by Indira Gandhi National Open University (IGNOU), New Delhi, during 12-17 September 2022.

**Attended the following professional development programs:**

- a. Webinar on Developing a “Be of Service Attitude for Serving the Library Users” organized by Developing Libraries Network (DELNET), New Delhi on September 24, 2022.

- b. IP Awareness Program/ Training Program under National Intellectual Property Awareness Mission (NIPAM) organized by Intellectual Property Office, India, on 24 May 2022.
- c. Dr. H. K. Kaul Memorial Lecture 2022 organized by Developing Libraries Network (DELNET), New Delhi on 1 July 2022.
- d. One Day Specialized Online Awareness Program on Shodhganga for University Coordinators/Library Professionals from CFTIs/ INIs organized by INFLIBNET Centre, Gandhinagar on 13 May 2022.

## Our Team



# Our Campus

IIT Jodhpur Campus is located at Karwar, NH-62, Jodhpur-Nagaur Highway in a total land of 852 acres. 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.

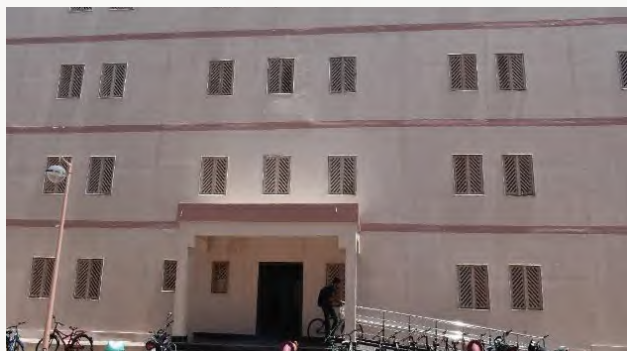
IIT Jodhpur campus has three different land pockets i.e. Pocket A, Pocket B and Pocket C. In the month of October 2022, the Institute has taken up all the repair, maintenance and operations of building from CPWD. The construction milestones achieved by the Institute from the year 2022-23 are as follows:

## 1. New Hostels and Transit Accommodation (Pre-Cast Technology):

IIT Jodhpur along with CPWD has moved forward with a new Precast technology for the development of hostel buildings. Precast is a modern construction method using prefabricated reinforced concrete elements. It is a method of industrialized design, production and construction, using precast concrete products. Precast technology has many advantages such as durable, structurally sound and has fast paced construction. The total area of Y-4 hostel is ~86865 Sq. Ft. and Transit accommodation is ~38751 Sq. Ft. The project of construction of Y4 hostel (327 rooms) and transit accommodation (3 blocks of 16 apartments) are completed and under utilization in IIT Jodhpur.



Y-4 Hostel



Transit Accommodation



## 2. Artwork on the Berms:

To enhance the beauty of the IIT Jodhpur campus, berms had been painted thematically with 5 different elements i.e. Earth, Air, Water, Fire, and Sky/Space. The name IIT Jodhpur has also been written with the background of nature.

Wherein, Berms E9 & E13 have been painted with

Earth artwork, E14 & E18 with Air artwork, W10 & W14 with Water artwork, W15 & W20 with Fire artwork and berms W3 to W5 have been painted with IIT Jodhpur Name Tag. The berms between these artworks have been painted with the theme space which incapsulates all the other elements.



Berms Artwork

## 3. Semi Permanent Structure :

IIT Jodhpur campus has developed two semi-permanent structures at Irawati Karve Complex, which are being utilized by the Department of Mathematics and School of Liberal Arts. Total area

of each porta cabin is ~12000 Sq. Ft. including faculty rooms, meeting room, labs, office space and other common facilities.



Semi Permanent Structure

## Academic & Research Facilities

Moreover, nomenclature has been done for the buildings that are being used for its academic, research and administrative activities. The building names are as follows:

1. Chanakya Complex housing the administrative offices of the Institute;
2. S. R. Ranganathan Learning Hub housing the Library of the Institute.
3. Jnan Chandra Ghosh Lecture Hall Complex 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. Rangaswamy Narasimhan Bhawan houses the Departments of CSE, Mathematics, and Humanities & Social Sciences. Also, the laboratories of Computer Science & Engineering are established in this building;
5. Acharya P. C. Ray Bhawan housing the Department of Chemistry;
6. J. C. Bose Bhawan housing the Department of Electrical Engineering;
7. G. Doraiswamy Naidu Bhawan housing the Department of Mechanical Engineering;
8. Bibha Chowdhuri Bhawan housing the Department of Physics.
9. T. R. Anantharaman Bhawan housing the Department of Metallurgical & Materials Engineering and Department of Chemical Engineering.
10. Asima Chatterjee Bhawan housing the Department of Bioscience & Bioengineering;
11. Irawati Karve Complex housing Department of Mathematics & SoLA (Humanities and Social Sciences).
12. A Ramakrishna Bhawan housing Workshop Building which also house Civil and Infrastructure Engineering Department
13. S. S. Bhatnagar Basic Laboratory Complex, The Basic Laboratories are established in one building;
14. APJ Abdul Kalam Innovation Complex housing the Technology Innovation and Startup Centre for nurturing innovation and entrepreneurship in various domains;
15. Aruna Asaf Ali Complex for School of Management & Entrepreneurship;
16. PC Mahalanobis Bhawan housing School of Artificial Intelligence and Data Science;
17. Srinivasa Ramanujan Centre housing Computer Centre.
18. G. N. Ramachandran Centre housing Instrumentation building for Advanced Scientific Equipment.
19. Jivaka Primary Health Centre;
20. Shalihotra Animal House;
21. Milkha Singh Sports Complex;
22. Moriya Community Centre; and
23. Jodhpur Club.

### OBC, PwD, Minority Cell:

An OBC, PwD, and Minority Cell for ensuring the proper utilization and adoption of reservation policies and guidelines issued by the Government of India is functional at IIT Jodhpur. The Cell deals with grievances from OBC, PwD, and Minority employees and students in the Institute. The Cell communicates between the Institute and the Ministry of Education in matters related to the OBC, PwD, Minority students, and employees in the Institute. The Cell has not received any grievances from students or employees belonging to OBC, PwD, or Minority categories during the Financial year 2022-23. The cell has received one request from a PwD student to provide additional academic support. The same request has been discussed with the Office of Academics, which provided the necessary support.

### 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 and an inclusivity cell has been created in the IIT Jodhpur for ensuring the proper utilization and adoption of reservation policies and guidelines



issued by the Government of India. 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 grievances from SC & 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.

The Cell has not received any grievances from either students or employees belonging to the SC/ST category during the Financial year 2022-23.

## Office of Hindi

वित्त वर्ष 2022-23 के अंतर्गत हिन्दी प्रकोष्ठ द्वारा निम्नलिखित मुख्य गतिविधियों को सफलतापूर्वक संपन्न किया गया -

1. संस्थान में 30 जून 2022 को कंप्यूटर केंद्र के सहयोग से कंप्यूटरों को हिंदी यूनिकोड समर्थित करने हेतु ऑनलाइन कार्यशाला का आयोजन किया गया।
2. **प्रथम हिंदी पत्रिका की शुरुआत** - निदेशक महोदय द्वारा 14 सितंबर 2022 को हिंदी पखवाड़ा के उद्घाटन समारोह में संस्थान की विभिन्न गतिविधियों के मासिक संक्षिप्त समाचारों को प्रकाशित करने हेतु "खम्मा घणी" हिंदी समाचार पत्रिका की शुरुआत पुस्तकालय के सहयोग से की गई।
3. **हिंदी पखवाड़ा 2022-23 का आयोजन** - सरकारी कामकाज में राजभाषा हिंदी के प्रगामी प्रयोग को प्रोत्साहित करने के उद्देश्य से केंद्र सरकार के कार्यालयों में प्रति वर्ष हिंदी पखवाड़ा अथवा हिंदी माह का आयोजन किया जाता है। पिछले वर्ष की तरह इस वर्ष भी संस्थान के संकाय सदस्यों, अधिकारियों एवं कर्मचारियों को हिंदी में कार्य करने के लिए प्रेरित एवं प्रोत्साहन करने हेतु हिंदी पखवाड़ा - 2022 का 14 सितंबर 2022 से 30 सितंबर 2022 के दौरान आयोजित किया गया। हिंदी पखवाड़ा - 2022 के अंतर्गत विभिन्न प्रतियोगिताओं (आशु भाषण, निबंध लेखन, चित्र देखो कहानी लिखो, हिन्दी शब्द ज्ञान (केवल ख एवं ग क्षेत्र कर्मिकों के लिए), हास्य/व्यंग्य/कविता) का आयोजन किया

## Internal Complaints Committee

The Internal Complaints Committee has been constituted as per the requirement of the act. The committee decided to place posters pertaining to awareness on the Sexual Harassment of Women at Work Place (Prevention, Prohibition and Redressal) Act, 2013 (POSH Act). The posters were put up at Hostels, Students Mess, departments and other buildings of the institute. The committee also organized a workshop on the POSH Act by an advocate of the Supreme Court for sensitizing the students/faculty and staff members.

गया जिसमें कर्मिकों ने अत्यंत उत्साह के साथ भाग लिया। प्रतियोगिता के विजेताओं को नगद पुरस्कार एवं प्रमाण-पत्र दिया गया।

4. **हिंदी टंकण कार्यशाला** - संस्थान के विभिन्न प्रशासनिक कार्यालयों और विभागों में कार्यरत स्टाफ सदस्यों को हिंदी टंकण, अनुवाद एवं राजभाषा हिंदी के प्रभावी प्रयोग का प्रशिक्षण देने हेतु हिंदी कार्यशाला का आयोजन 22 दिसंबर 2022 को किया गया, जिसमें समूह बी और सी स्टाफ सदस्यों (अधीक्षक, कनिष्ठ अधीक्षक, वरिष्ठ सहायक, कनिष्ठ सहायक) ने भाग लिया, जो प्रशासन से संबंधित मामलों को देख रहे हैं।
5. **संसदीय राजभाषा समिति की पहली उप-समिति द्वारा राजभाषा संबंधित विभिन्न कार्यों का निरीक्षण**

संसदीय राजभाषा समिति की पहली उप-समिति का जोधपुर स्थित केन्द्रीय सरकार के कार्यालयों का 13 एवं 14 जनवरी 2023 को निरीक्षण/दौरा किया गया। इस निरीक्षण कार्यक्रम एवं माननीय सदस्यों के जोधपुर प्रवास हेतु ऑयल इंडिया लिमिटेड, राजस्थान क्षेत्र, जोधपुर को समन्वयक की जिम्मेदारी प्रदान की गई थी। भारतीय प्रौद्योगिकी संस्थान जोधपुर का भी राजभाषा संबंधित विभिन्न कार्यों का निरीक्षण 14 जनवरी 2023 को किया गया।



उप-समिति के उपाध्यक्ष श्री भर्तृहरि महताब, संयोजक श्री रामचंद्र जांगड़ा, श्री धर्मेन्द्र कश्यप, श्री श्याम सिंह यादव, श्री अरण्य कड़ाड़ी इत्यादि माननीय संसद सदस्यों के साथ-साथ मंत्रालय के विभिन्न अधिकारी उपस्थित रहे। उप-समिति के निरीक्षण की उक्त बैठक में संस्थान के निदेशक, उपनिदेशक, कुलसचिव, राजभाषा अधिकारी

एवं सहायक राजभाषा अधिकारी ने भाग लेते हुए संस्थान में राजभाषा संबंधित विभिन्न गतिविधियों का प्रस्तुतिकरण दिया जिसमें शिक्षा मंत्रालय से संयुक्त निदेशक (राजभाषा) एवं कनिष्ठ अनुवादक ने भी उपस्थित होकर अपना सक्रिय सहयोग प्रदान किया।



उप-समिति के निरीक्षण के दौरान संबंधित कार्यालयों ने राजभाषा के क्षेत्र में किए जा रहे विभिन्न कार्यों को प्रदर्शित करने हेतु प्रदर्शनी लगाई गई जिसमें भारतीय प्रौद्योगिकी संस्थान जोधपुर ने भी अपनी प्रदर्शनी लगाई। माननीय उप-समिति सदस्यों एवं अन्य अधिकारियों द्वारा प्रदर्शनी का भ्रमण किया गया तथा संस्थान द्वारा किए जा रहे राजभाषा

संबंधित विभिन्न कार्यों की सराहना की गई। उप-समिति के संयोजक माननीय रामचंद्र जांगड़ा जी द्वारा संस्थान की मासिक पत्रिका खम्मा घणी की पहल की सराहना की गई तथा इसे संस्थान की राजभाषा के क्षेत्र में एक उपलब्धि बताया।

संस्थान के निदेशक द्वारा राजभाषा संबंधित विभिन्न गतिविधियों के प्रस्तुतिकरण के पश्चात उप-समिति के उपाध्यक्ष श्री भर्तृहरि महताब ने संस्थान द्वारा हिंदी कार्यशालाओं, अभियांत्रिकी विषयों के हिंदी में शिक्षण-प्रशिक्षण, सह-शैक्षणिक गतिविधियों जैसे नुक्कड़ नाटक, कविता पाठ, सम्मेलनों इत्यादि में हिंदी के प्रयोग की सराहना की तथा दैनिक पत्राचार में संस्थान के अधिक से अधिक हिंदी के प्रयोग हेतु किए जा रहे विभिन्न प्रयासों के लिए निदेशक महोदय को बधाई दी।

**हिंदी कार्यशाला** - भारतीय प्रौद्योगिकी संस्थान जोधपुर के कार्मिकों को कार्यालय की तिमाही प्रगति रिपोर्ट भरने हेतु कार्यशाला का आयोजन दिनांक 28/03/2023 को किया गया। जिससे विभिन्न प्रशासनिक कार्यालयों और विभागों में तैनात स्टाफ सदस्यों को हिंदी के प्रभावी प्रयोग का प्रशिक्षण दिया गया।

## Office of Publications

The Office of Publications oversees the publication of various publications of the Institute, such as, TechScope: The Science, Technology and Education Journal of IIT Jodhpur, Annual Report of IIT Jodhpur, Institute Brochure - IIT Jodhpur: At a glance, and Convocation Brochures. During the Financial Year 2022-23, three issues of TechScope were published. The Annual Report for FY 2021-22 was published.

The Institute Brochure "IIT Jodhpur: At a glance" was published and released on the Institute's Foundation Day on 2nd August 2022. Also, the Convocation Brochure containing the Director's Report, Chief Guest's Convocation Address, Address of the Chairman, BoG, and the list of graduating students was published on the occasion of the 8th Convocation of the Institute.

## Primary Health Center

IIT Jodhpur provides round-the-clock health care facilities to Students, Faculty and Staff Members and their dependents of the Institute. This fully equipped and self-sufficient facility is run by M/s. Goyal Hospital & Research Center Private Limited, Jodhpur, on contract under the supervision of Institute's medical officers, Medical Service User's Committee and Prof-in-Charge PHC. Presently, the following facilities are available at the Primary Health Center (PHC).

1. Doctors (24 x 7)
2. Regular visits of specialist doctors,
3. Paramedical staff, (24 x7)
4. Diagnostic laboratory,
5. Physiotherapy unit,
6. 24 x 7 in-house Pharmacy,
7. 24 x7 Emergency Room
8. Separate male and female wards and cabins
9. One BLS (Basic life Support) Ambulance & one ACLS (Advanced Cardiac Life Support) Ambulance

Besides this, IIT Jodhpur has facilities available at the All-India Institute of Medical Sciences (AIIMS Jodhpur), S. N. Medical College and some

other specialized hospitals. The Institute has agreements with a few prominent hospitals for priority treatment to its students, faculty and staff members and their dependents of the Institute. These include (1) Goyal Hospital and Research Center, (2) MediPulse Hospital, (3) ASG Eye Hospital, and (4) Vasundhara 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. Arrangement was also made for specialist doctor visits on the campus (Psychiatrist, gynaecologist, paediatrician) on a weekly basis. PHC also organizes Covid-19 vaccination and blood donation camps in coordination with the State Government of Rajasthan.

During the FY 2022-2023, the Medical Service User's

Committee(MSUC) and Primary Health Centre (PHC) have served the institute with dedication and commitment. OPD services were provided in the Institute PHC to all the residents of the campus by the medical officer of the Institute and doctors and support medical staff from Goyal Hospital (the medical service provider at PHC). There is also the joining of a new medical officer on campus. Arrangements were made to provide medical services (both OPD & IPD) to its residents in four different empaneled hospitals in Jodhpur.

The PHC and MSUC both played crucial roles in management of COVID inside the campus including management of COVID patients in super isolation. During that time, efforts were made to keep the campus safe from the COVID-Pandemic.

- » 02 vaccination camps were organized for both Covishield and covaxin (including precautionary doses) inside the campus for its residents

(faculty, staff, their family members, and students) and altogether 522 numbers of vaccinations were done with the help of the state government of Rajasthan.

- » RT-PCR Camps are being organized on a weekly basis in the PHC.
- » One new BLS (Basic life Support) ambulance was introduced to manage the medical emergency more effectively.
- » During this period, in association with Dr. Sarvepalli Radhakrishnan Rajasthan Ayurved University, an AYUSH OPD was introduced in the PHC where Ayurvedic, Homeopathy, Naturopathy & Yogic science doctors visit our PHC twice a week to render their services to the IITJ Community.





Inauguration of AYUSH OPD at the PHC of IIT Jodhpur by Prof. Santanu Chaudhury, honorable director of IIT Jodhpur and Prof. Vd. Pradeep. K. Prajapati, honorable Vice Chancellor of Dr. Sarvepalli Radhakrishnan Rajasthan Ayurved University on 2nd February, 2023.

# Students

As per the provisions laid out in the Constitution of the Student Activity Council (SAC) and the Academic and Co-Curricular Activity Council (ACAC), the responsibility of organizing student activities both in offline and online platforms has been assigned to the President of the respective Boards under SAC and ACAC.

The Student Activity Council (SAC) comprises the following Boards:

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

The Academic and Co-Curricular Activity Council (ACAC) consists of the following Boards:

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 Society for Alumni Affairs

These Boards, headed by their respective Presidents, are responsible for coordinating and facilitating various student activities within their designated domains. This allocation of responsibilities aims to ensure the smooth execution of student activities across both offline and online platforms, in accordance with the principles outlined in the Constitution of SAC and ACAC.

## Key Student Festivities and Events

SNo.	Fest/Event Name	Type	Date
1	Azadi ka Amrit Mahotsav	Mini-Marathon, Yoga Competition Of all 23 IITs , Birth anniversary of Bhagawan Birsa Munda as 'Janajatiya Gourav Diwas' ,Vivekananda Sandesh Yatra' organized, World Cycle Day and Digital painting, Article Writing Competition as a part of the Azadi Ka Amrit Mahotsav events respectively.	15th August 2021 and 16 July 2022, 21 June 2022. 15th November 2022 5th January 2023 3rd June 2023
2	Aaftaab	Literature Fest	October 2022
3	Varchas	Sports Fest	November 2022
4	Ignus	Socio-Cultural Fest	February 2023
5	Spandan	Intra college Cultural Fest	March 2023
6	Kridansh	Intra College General Championship	27 March- 01 April 2023
7.	Farewell	Outgoing batch UG & PG	01 May 2023
8.	Inter IIT Sport Meet 2022	Inter IIT Sport Meet 2022 of students, staff and faculty members	14th December to 22nd December 2022.
9.	Freshanza 2023	FRESHANZA 2023, UG freshers	March 2023

### 1. Azadi ka Amrit Mahotsav:

Various activities have been organized under Azadi Ka Amrit Mahotsav. The Board of Student Welfare organized the Institute Webinar: DRDO's Journey towards Self-reliance in Critical Defence Technologies as part of the Azadi ka Amrit Mahotsava. The mini-marathon has been organized on 15th August 2021 and 16 July 2022, Birth anniversary of Bhagawan Birsa Munda as 'Janajatiya Gourav Diwas' on 15th November 2022, Yoga Competition Of all 23 IITs on 21 June 2022, Vivekananda Sandesh Yatra' organized on 5th January 2023, World Cycle Day on 3rd June 2023

and Digital painting, Article Writing Competition as a part of the Azadi Ka Amrit Mahotsav events respectively.

### 2. Aaftaab (28-30 October 2022)

Aaftaab is the annual literary festival conducted by IIT Jodhpur. Aaftaab, the literature fest is a celebration of the splendor, diversity, and inclusiveness of literature. The Aaftaab' 22 took place from the 28th of October to the 30th of October, and it aims to promote the beauty of literature through a myriad of events organized in English, Hindi as well as Regional Languages.c



### 3. Varchas (04-06 November, 2022)

Varchas is the annual sports festival conducted by IIT Jodhpur. In its eighth edition, the event had a variety of informal and pronites during the festival which included an EDM night starring Aztec, a sunburn campus artist which took place on 5th November 2022, a pronite which started with an EDM followed by a music concert by Shirley Setia on 6th November 2022.



### 4. Ignus(16 -19 February, 2023)

IGNUS 2023 returned with a bang, providing a platform for creative and intellectual minds to showcase their talent and creativity. This year, the theme of IGNUS was “Bohemian Convoy” as it celebrated socially unconventional journeys. It was bejeweled by stars like Salim-Suleiman, Kashish Methwani, Sargam Koushal, Varun Singla from Gatesmashers and Anoosha and Saurabh from Jodi-Anurabh. Overall, IGNUS has been a fantastic platform for students to showcase their talents and learn from field experts.





## 5. Spandan

The event served as a platform for students to showcase their skills and prepare for the prestigious Inter-IIT Cultural meet. This year's edition of Spandan surpassed all expectations, witnessing an unprecedented level of student participation and organizational excellence.



## 6. Kridansh

Kridaansh is an annual sports fest organized by our institution to encourage sportsmanship and a healthy competitive spirit among students. This year, we aim to make it bigger and better than ever. A notable sports personality like Pooja Bishnoi at our event would significantly boost the fest.



## 7. Farewell

The Institute farewell to the outgoing batch of UG and PG students on 30th April, 2022.



## 8. Inter IIT Sport Meet 2022

Inter IIT Sport Meet 2022 of students from 14th December to 22nd December 2022 was held in two locations. 74 Students visited IIT Delhi and 69 Students visited IIT Roorkee respectively to showcase their sportsmanship.



## FRESHANZA 2023

FRESHANZA 2023, the annual event organised to welcome the UG freshers and have an evening filled with lots of joy, laughter, and cheer.

## BOARD OF ART & CULTURE (BAC)

### Students Accolades

Place	Event	Society Name	Board Name	Position
Inter IIT Cultural Meet 2023	Group Dance	The Groove Theory	Board of Art and Culture	8th Position
NIFT Jodhpur Spectrum 2023	Group Dance	The Groove Theory	Board of Art and Culture	1st Position
AIIMS Jodhpur AURA 2023	Group Dance	The Groove Theory	Board of Art and Culture	2nd Position
IGNUS 2023	Duet Dance	The Groove Theory	Board of Art and Culture	3rd Position
IGNUS 2023	Group Dance	The Groove Theory	Board of Art and Culture	HHI Regionals Qualified
Inter IIT Cult Meet 23	Online Short Film	Frame-x	Board of Art and Culture	7th Position
Inter IIT Cult Meet 23	51 hrs Short Film	Frame-x	Board of Art and Culture	7th Position

Place	Event	Society Name	Board Name	Position
Inter IIT Cultural Meet '23	Theatre	Dramebazz	Board of Art and Culture	9th Position
Inter IIT Cultural Meet '23	StreetPlay (Nukkad)	Dramebazz	Board of Art and Culture	9th Position
Inter IIT Cultural Meet '23	Online Photography	Shutterbugs	Board of Art and Culture	4th Position
Inter IIT Cultural Meet '23	Street Photography	Shutterbugs	Board of Art and Culture	5th Position
Inter IIT Cultural Meet'23	Design Marathon	Designerds	Board of Art and Culture	5th Position
IGNUS'23	Photoshop Battle	Designerds	Board of Art and Culture	3rd Position
Inter IIT Cultural Meet'23	Charcoal Art	Attliers	Board of Art and Culture	4th Position
Inter IIT Cultural Meet'23	Fine Arts	Attliers	Board of Art and Culture	8th Position
Inter IIT Cultural Meet'23	Solo Singing	Sangam	Board of Art and Culture	9th Position
Ignus 2023	Solo Singing	Sangam	Board of Art and Culture	2nd Position
Ignus 2023	Pair on Stage	Sangam	Board of Art and Culture	1st and 3rd Position
Inter IIT Sports 2022	Men's Badminton	Badminton Society	Board of Student Sports	4th Position
Inter IIT Sports 2022	Chess	Chess Society	Board of Student Sports	7th Position

## Events

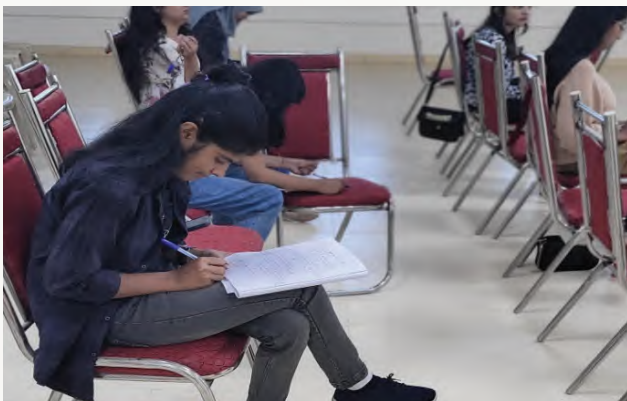
Name of Society	Event
<b>The Groove Theory (Dance Society)</b>	'Open for all' Jam session
	Garba Workshop
	Workshop for 2022 Fresher's Batch
	4 day workshop by Jodhpur's local choreographer Tarun Rana, Tarun Dance Studio
	10- day workshop by choreographer Vinay Kumawat, Triangle of Dance Studio, Jaipur
	Teacher's Day
	<b>Inter IIT Cultural meet 2023</b>
	» One group dance
	» 2 duets
	<b>IGNUS'23</b>
	» A Group Dance
	» 2 Duets
	» Street Battle
	NIFT Spectrum'23
	AURA'23
Freshanza 2023	
<b>Spandan 2023 Extravaganza</b>	
» 2 Group Dances	
» A Duet	
Alumni Day/Dashak 2023	
<b>Frame-X (Film Making Society)</b>	Introduction to Adobe Premiere Pro
	Camera Session
	Freshers Intro Video 2022
	Freshers Competition
	Varchas After Movie
	Republic Day(Reel Competition)
	Inter IIT Online Film making Competition, Inter IIT Cult Meet at Madras.
	Inter IIT 51 hrs Film making Competition, Inter IIT Cult Meet at Madras.
	Documentary on Community in Jodhpur to spread awareness about the traditional Rajasthani Culture.
	Class Song 2K23
	TedX
<b>Shutterbugs (Photography Club)</b>	Introduction to Rules in Photography
	Basics of DSLR
	Wow Effect and Aesthetics in Photographs
	Basic Editing with Lightroom (Mobile)
	Basics of Street Photography
	Photowalk 1 (Kaali Pahadi excursion)
	Photowalk 2 (In campus wildlife walk)
	Event Photography and Night Photography
	Reviewing Photographs
	Aaftaab 2022
	Prometeo 2023
	Ignus 2023
	Spandan 2023
	Sandstone 3.0
Kridansh 2023	

Name of Society	Event
	Intellia 2023
	Chem-E-Sorption 2023
	EXL 2022
	IITJ Padharo 2023
	Introduction to Photography
	Republic Day
	Ignus
	Spandan
<b>Dramebaaz (The Dramatics Club)</b>	Inter IIT Theatre
	Inter IIT Nukkad
	Inter IIT Monologue
	Spandan Chachi 420
	Spandan Tamasha
	Spandan Monologue
	Spandan Dumb Charades
<b>Designers (Design Society)</b>	Workshop on Designing tools, elements, opportunities, motivation.
	Workshop on Basic Principles, about , , Colour psychology, fonts, resources
	Workshop on Set of basic tools, effects, layers, properties, clipping mask, etc.
	Different activities have been done on Scribble story, Kridansh'23, National Technology Day, Ambedkar Jayanti, Virasat.
<b>Ateliers (Fine Arts Society)</b>	Informal
	Charcoal
	Art Session
	Origami
	Soft Pastel
	Art Connect
	Comi-Con
	MotherLanguage Day Event
	Events during Spandan:
	» Costume Design
	» T-Shirt Painting
	» Charcoal Art
	» Acrylic Art
	» Live Sketching
<b>Sangam (Music Society)</b>	Anand Mela
	Jamming
	Learning Sessions
	Unplugged Concert
	Inter-IIT Cult Meet 5
	Frame-X & Sangam collaboratory music video
	Ignus music events
	Extravaganza (Spandan '23)
	Spandan musical competitions
	Dashak
<b>IITJ RAW (Campus life recording &amp; web streaming society)</b>	Prometeo 23
	Society of Alumni Aff airs Introduction '22
	Brief Introduction to streaming

### BOARD OF LITERARY AFFAIRS (BLA)

**The activities of the board are as under:** Word Games, Exordium-Introductory Session for the Freshers, Inter-IIT Cult Meet 5.0, Valentine’s Day Event-The Proposal Booth, Model United Nations

(MUN), Practice Debate sessions, Republic Day Debate,, IGNUS, AAFTAAB, SPANDAN, Regional Language Poetry Competition etc.

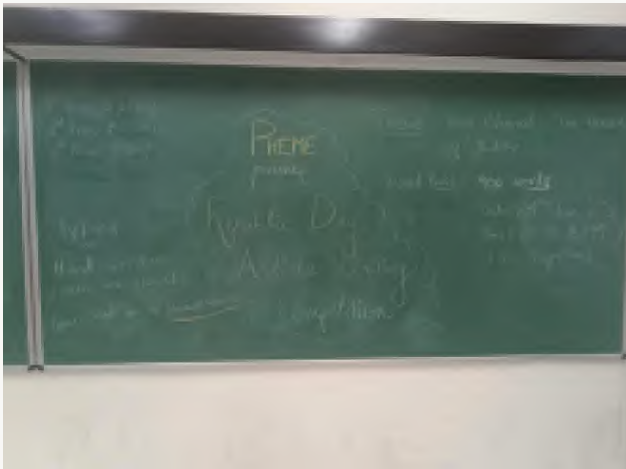


### Quiz Society

**Quiz Society conducted following Quizzes:** Otaku Quiz, Spandan Quizzes, Prometeo Quiz, Bootup Quiz, Valentine’s Day Quiz, Trivia Tuesday, Sci Tech Biz Quiz, Ignus quiz, General Quiz, Aaftab Quizzes, Noob Quiz, MELA Quiz, Mythology Quiz.



Engineers Day Essay Writing Competition (open to all), Club Introductory Session, Aarambh Event, Intra-Club Poster and caption writing competitions, Republic Day Article Writing Competition.



## BOARD OF STUDENT WELFARE (BSW)

### Student Wellbeing Committee (SWC)

The Student Wellbeing Committee (SWC) at IIT Jodhpur has been a key component of the institute since 2008. Its purpose is to ensure the mental and emotional wellbeing of students by promoting their personal and academic development. The committee operates along three primary aspects: Academic, Extra-Curricular, and Personal. In addition to the above, the committee maintains a ragging-free campus and helps organize orientation programs for new students. The committee also organizes lectures and workshops on:

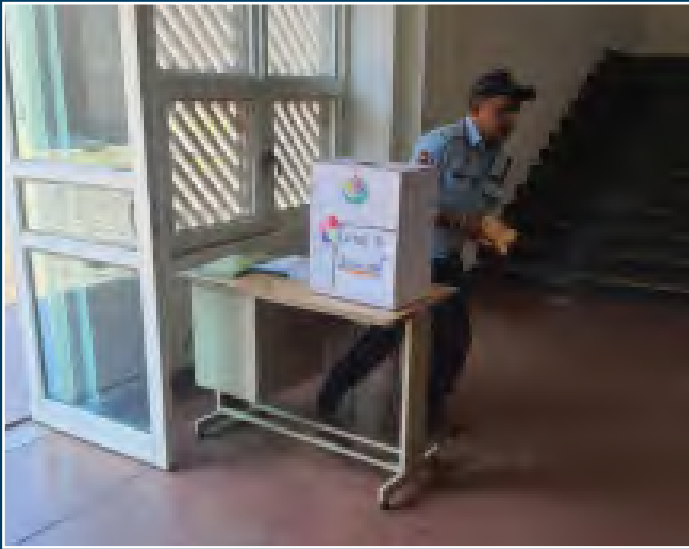
- (a) Stress management,
- (b) Time management,
- (c) Health care and hygiene,
- (d) Substance Abuse,

- (e) Relationships,
- (f) Cope with homesickness,
- (g) Addiction and others, and
- (h) motivational lectures by eminent speakers;

The list of Activities Accomplished by the SEC committee in 2022-23:

PG Orientation 2023 (4th January 2023), Letter to Your Future Self (17th - 20th November 2022), Meditation with Music (18th October 2022, World Mental Health Day (10th October 2022), Burn your own Ravana (5th October 2022), Samvit Yoga and Meditation Session (From 7th September 2022), Farewell of UG team also (Nov 2022), Gratitude day, 5th March, 2023, Freshanza, 9th March, 2023, Open-Air Theatre, 8th March, 23,.









### Festivals and Events Committee:

This committee plays a vital role in organizing various events and festivals that foster a sense of community, cultural diversity, and engagement among the student body. The committee successfully organized a range of events including Ganesh Chaturthi, Navratri, Diwali, Lohri and Makar Sankranti, Saraswati Puja, Holika Dahan, and Holi.





### Aapno Campus Committee

The Aapno Campus Committee plays a significant role in ensuring the smooth functioning of various operations on campus and addressing the needs of the student community.

**The committee has 3 sub cells:** Scholarships Awareness Cell, Vernacular Languages Cell & Student Thrift Cell

### Board of Hostel Affairs (BHA)

The Board has 2 different societies (I) Hostel Coordination Committee (II) Dining Services Committee. The board organized different events i.e. Janmashtami Celebrations, Diwali, Kridansh .



## Social Excursion under Non-Graded Course (Social Connect)

Social Excursion, coordinated by the Office of Students, involved B.Tech 1st year students visiting historical places in Jodhpur. Its aim was to promote social interaction and broaden students' perspectives. The excursion encouraged students to express themselves openly and build connections

with others, nature, and society. The Office collaborated with faculty advisors and students to address local community issues, fostering a comprehensive understanding of the Institute's social structure and objectives.



Mandore Garden



Arna Jharna (The Desert Museum of Rajasthan)



Rao Jodha Park

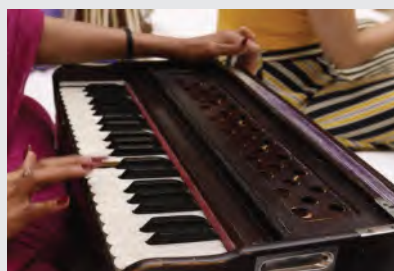


Toor Ji ka Jhalra

### Non-Graded Course(Performing Arts)

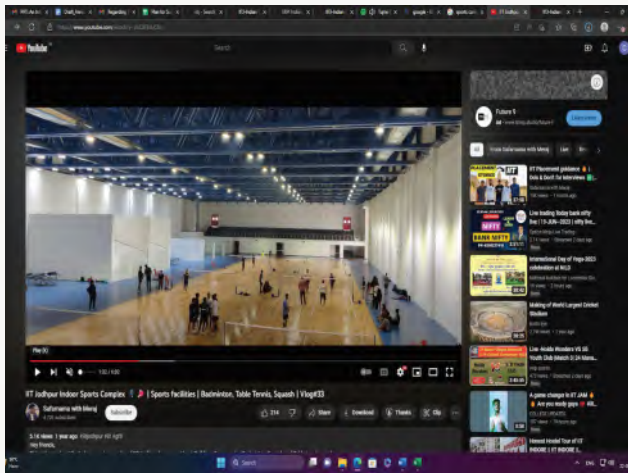
Performing arts is one of the non-graded courses of B.Tech 1st year students that is being coordinated by the Office of Students. In this course, the students are exposed to a wide range of activities like: dance, theater, music, painting, Guitar, Keyboard, Tabla, Rawanhatha etc., thereby enabling the students to hone their skills while being guided by experts from their respective fields. Performing arts helps the youth to grow their understanding and include numerous

cultural expressions that reflect human creativity. These activities provide the space for students to sharpen their aesthetic skills and explore the possibilities in the art form that they like. This course will also look at the theoretical part to explore further possibilities. Most universities follow a three-dimensional approach with music, theater and dance, and other art forms as subsidiaries. Many prestigious Artists/Instructors are invited from all over India.



Sports is another non-graded course of B.Tech 1st year students that is being coordinated by the Office of Students. In this course, the students are exposed to a wide range of sports activities like: athletics, badminton, football, table tennis, volleyball, basketball, zumba and yoga. The Government of India, through its National Sports Organization, provides a scheme in all IITs, where all

incoming, i.e. first year students, must sign up for a particular sport, and undergo training. This scheme, popularly called NSO, is available to IIT students for training in various sports, such as Athletics, Basketball, Badminton, Cricket, Football, Hockey, Lawn tennis, Squash, Swimming, Table tennis, etc. The sports classes function two evenings a week, and each session stretches to a couple of hours.



Volleyball



Yoga



Basket Ball

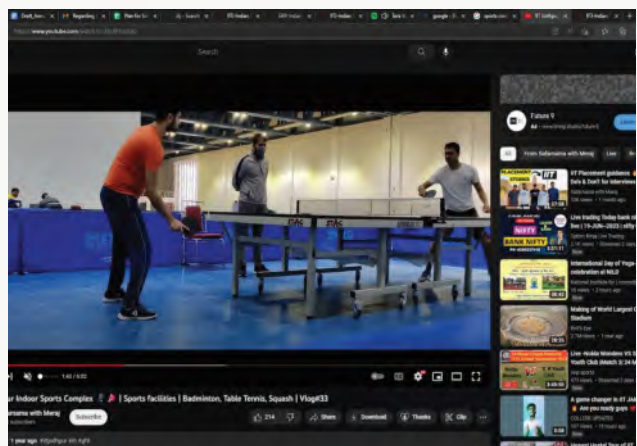


Table Tennis

## VIRASAT 2023

IIT Jodhpur organized VIRASAT 2023 on March 29, 2023: a SPIC MACAY Festival, a cultural extravaganza to celebrate the variety and richness of Indian Cultural Heritage, in association with SPIC MACAY.

### Key Performer (Artist)

Sr. No.	Name of Artist	Area in the specialised
1.	Pt. Viswamohan Bhatt	Mohan Veena - Satvik Veena
2.	Ritesh Mishra & Rajneesh Mishra	Hindustani Vocal
3.	Sujata Mohapatra	Odissi Dance
4.	Sudha Raghuraman	Carnatic Vocal
5.	Debopriya & Suchismita (Flute Sisters)	Flute

Virasat, literally meaning heritage in Hindi, is an Indian Cultural Festival that showcases an eclectic mixture of all aspects of Indian Cultural Heritage. It was launched for the first time in Dehradun in 1995 and is held annually during the first half of the Academic Year in educational institutions across the nation and abroad..





### 1. Narcotics Control Bureau, Ministry of Home Affairs (NCB):

The Narcotics Control Bureau, Ministry of Home Affairs organized various events on the 38th Raising Day of NCB. In this regard, a Seminar/Awareness Programme is scheduled on 16.03.2023 from 06.00 PM-7.00 PM in Room No. 204, 1st Floor, Jnan Chandra Ghosh Lecture Hall Complex.

### EBSB activities

The EBSB club at IIT Jodhpur, India, organized diverse activities to celebrate unity and showcase the rich heritage and culture of our nation. Regular webinars and awareness talks were held to promote the EBSB program's theme. Students

were encouraged to participate in activities such as dancing, drama skits, presentations, poetry, and anchoring based on their interests and skills.

### Janajatiya Gaurav Diwas 15 November 2022:

The government of India has declared 15th November (Birth Anniversary of Bhagawan Birsa Munda) as 'Janajatiya Gaurav Diwas.' The EBSB club organized the symposium to celebrate the Janajatiya Gaurav Diwas on 15th November. The theme of the symposium was enlightening on the legacy of tribal leaders like Birsa Munda and unsung heroes of the Janajati communities of our country. So, everyone was invited to participate in this symposium.



### Vijay Diwas Samaroh 16 December 2022:

EBSB club participated in the 51st Vijay Diwas Samaroh at the Konark War Memorial, Jodhpur Military Station, Jodhpur Rajasthan, on the 16th of December and paid tribute to the heroes of war.



### Veer Baal Diwas 26 December 2022:



The government of India has declared 26th December as "Veer Baal Diwas." The EBSB club organized the symposium celebrating the "Veer Baal Diwas" on 26th December. Veer Baal Diwas is celebrated to pay tribute to the bravery and martyrdom of Sri Guru Gobind Singh Ji sahibzadas.

The symposium's theme was enlightening on the legacy of Sri Guru Gobind Singh Ji, the 10th Guru of the Sikh community. So, everyone is invited to participate in this symposium. The glimpse of the Veer Baal Diwas are:



### Gujarat & Diu Visit by EBSB club:

The EBSB Club of IIT Jodhpur visited the Somnath temple Gujarat, and world heritage sites in Gujarat and Diu. In order to explore the cultural and traditional practices of the destination approved by MoE, the Government of India (F. No. 1108/02/2019/EBSB) regarding visit by students to 100 identified tourist destinations under EBSB related to the implementation of NEP-2020. Also,

there are various cultural events in which the EBSB club is actively involved. Such as the club organizing the invited talks, cultural activities, dance, skits, poetry, and literature. The visited places are as under: Somnath Temple, Ahmedabad, Diu Fort identified for Wi-Fi based on footfalls & Gir National Park.



### Visits of Institutes/Schools

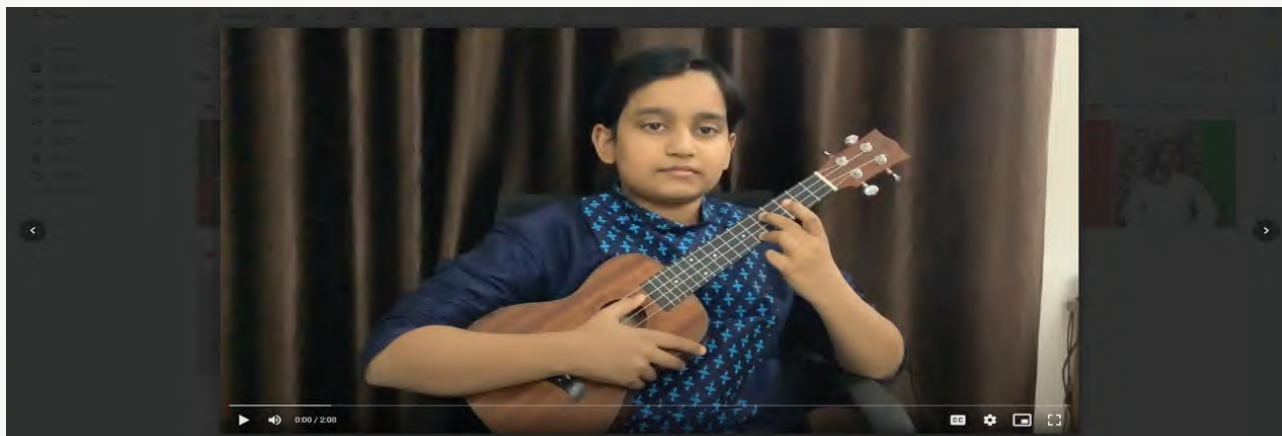
The Office of Students arranged visits of Institutes/Schools to the departments and other facilities, likewise AIDE department, Knowledge tree, Chanakya admin building, Library Building, Computer center, Lecture Hall building, Departments, Service Tunnel, and Akash Building (Sports complex):

S. No	Name of the Institutes/Schools	Number of Students	Date of Visit
1.	Bal Niketan School	120	27 August 2022
2.	SVGMS, Luni, Jodhpur Swami Vivekananda Govt. Model School Luni (Jodhpur)	95	21 September 2022
3.	VIVA Institute of Management (Mumbai)	49	5 April 2023
4.	Alma Mater School Jodhpur	12	21 April 2023
5.	Central Academy, Jodhpur Cantt. Branch	364	28 April 2023



### Republic day & Independence Day:

On the occasion of Republic day and Independence day, the Office of Students organized competitions for the Children of IITJ Fraternity. Five competitions for children were organized through online mode. The competitors were divided into three age groups, i.e, from 3-5, 6-9 and 10-14. The competitions included: Drawing, Singing, Poetry, Dance and Music.



### Yoga at Jodhpur Club:

The Office of Students conducted the Fitness Workshop of Yoga on 23 February

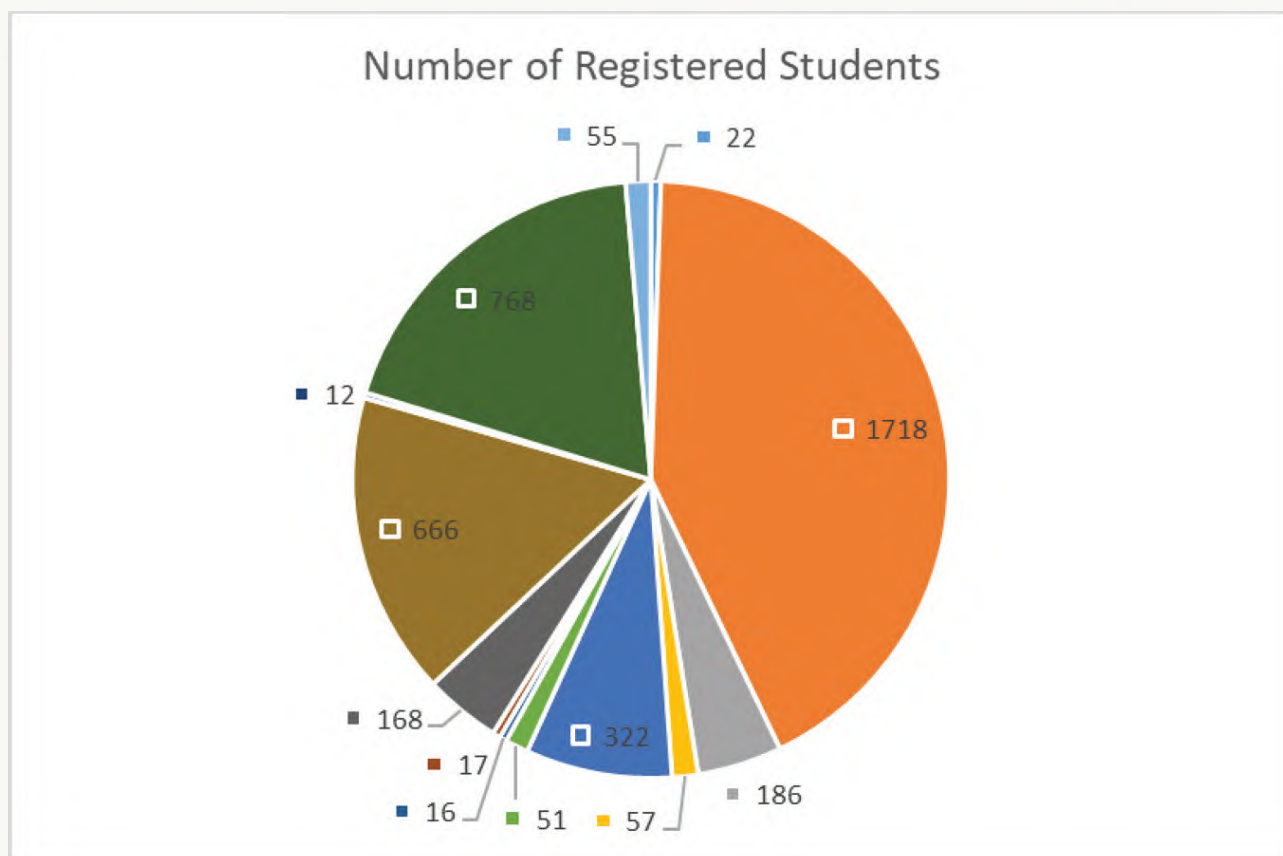
2023 at Jodhpur club IIT Jodhpur. The workshop was inaugurated by Dr Hari Om Yadav, Registrar IIT Jodhpur and facilitated by Dr. Subir Debnath from MNIT Jaipur. The aim of event was to develop fitness, immunity, and healthy culture. Almost 40 numbers of participants joined the workshop including Students, Faculty and Staff members.



### Registered Students in IIT Jodhpur:

IIT Jodhpur has, as on 31 March 2023, a total of 4058 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.S.	22
B. Tech.	1718
M.Sc.	186
M.Sc.-M.Tech.	57
M.Tech.	322
M.Tech.-Ph.D.	51
Masters	16
Masters-Ph.D.	17
MBA	168
Ph.D.	666
Preparatory	12
M. Tech. (Executive)	768
PG-Diploma	55



### UG Orientation (29 October - 03 December 2022)

The orientation was planned for the whole month of November. The program started on 29 October with a formal orientation session. Orientation attempts to help students with the transition to this new chapter in their lives by welcoming them as a part of the IITJ community and making them feel at home.



### PG (22 July 2022 - 25 July 2022)

The PG Orientation program 2022 was organized from 22.7.2022 till 25.7.22 for the newly joined PG students. As part of PG orientation program 2022 the institute has hosted Dr. Aloknath De, Executive Consulting Director, Samsung Open Innovation and Adjunct Prof. IISc Bangalore and IIT Jodhpur as our orientation guest speaker. A mini marathon was organised by the Office of Students.

**Indian Institute of Technology Jodhpur**

**SPEAKERS**

**Prof. Santanu Chaudhury**  
Director  
Indian Institute of Technology Jodhpur  
22 nd July

**Dr. Aloknath De**  
Exec Consulting Director & ex-CTO, Samsung  
Adjunct Prof. IISc & IIT-J  
25 th July

**INDIAN INSTITUTE OF TECHNOLOGY JODHPUR, INVITES YOU TO**

**PG ORIENTATION 2022**

**Venue LHB 110**

22-25 th July  
9 AM onwards

For more information, visit: <https://iitj.ac.in/>

## Career Development Cell

The Career Development Cell (CDC) aspires to provide comprehensive career counseling to IIT Jodhpur students' during their academic involvement and even after graduation. CDC performs various individual and collective activities relating to training and placement process planning, career development, counseling, competence/skill assessment, decision making. CDC fosters students' abilities, competencies, interests and assists them in developing professional skills, knowledge, and positive attitude to manage their career path.

This year, the placement season was conducted in hybrid mode with more than 230+ companies participating in the Placement Season 2022-2023. CDC continuously builds symbiotic relationships with a broad spectrum of reputed MNCs, Core companies, Governmental organizations including PSUs, IIT alumni through social networking, workshops, invited talks, industrial visits, etc. Several renowned industries like American Express, Paytm, Warner Brothers, VE Commercial Vehicles, BEL, Maruti Suzuki, Mercedes Benz, Royal Enfield, Tata Technologies, HCL, Infosys, TCS, L&T, EXL, Kotak, Deloitte, Cognizant and many more visited IIT Jodhpur for both internship and placement opportunities.

### Key statistics from the season 2022-2023

- 230+ companies participated in Internship and Placement
- Total Number of offers – 400 offers
- Total no. of students placed- 405 (B.Tech. – 240, Students, M.Tech.- 77 Students, M.Sc.- 27 student, MBA- 61)
- B.Tech. Placement percentage – 89%, M.Tech. –70%, M.Sc. -53%, MBA- 90%
- Average salary offered to the B.Tech. Students – 21 Lakhs, MTech. – 14 Lakhs, MBA-Rs.13 Lakhs

CDC designs and develops the “Career Development Activity Calendar” to conduct a multitude of activities for students focusing on Career Planning, Counseling, Research and Innovation, Industrial Relations, Entrepreneurship, Training and Placements. In association with experienced professionals and experts, CDC makes efforts to inculcate skills that are essential for graduating students to strategize their career paths and enter the outside world. CDC aids students in refining facets of their personality, verbal and written communication, learning corporate etiquettes, learning interview skills, handling group discussions, writing customized resumes, leadership and teamwork skills.

During 2022-23 CDC organized sessions on resume writing, career growth, expert talks and industrial visit for the students.

IIT Jodhpur continues its endeavor to develop programs and course pedagogy, providing both academic rigor and industry relevance. It has over a period, become one of the preferred choices for recruiters owing to interdisciplinary and industry aligned courses. Career Development Cell (CDC) partners with students and industry to succeed in finding life-long career fulfillment. The roles and profiles offered to students during this placement season is a testament of the diversified and relevant courses offered at IIT Jodhpur. In addition, we have successfully built coherent relationships with our campus partners and strive to improve the students' as well as the recruiters' experience year after year. The Institute has designed a curated capability program to prepare students for the campus placement process. Throughout the year, the CDC at IIT Jodhpur organizes career development workshops, mock interviews, leadership talks, soft skill training and personality development activities



# Final Position

## BALANCE SHEET AS ON 31 MARCH, 2023

Amount in ₹

SOURCES OF FUNDS	Current Year	Previous Year
<b>CORPUS/CAPITAL FUND</b>	11,90,94,11,938	10,38,76,60,344
<b>DESIGNATED/EARMARKED/ENDOWMENT FUNDS</b>	27,14,75,259	73,43,55,374
<b>CURRENT LIABILITIES &amp; PROVISIONS</b>	3,52,81,96,730	2,86,27,58,979
<b>TOTAL</b>	<b>15,70,90,83,927</b>	<b>13,98,47,74,697</b>
<b>APPLICATION OF FUNDS</b>		
<b>FIXED ASSETS</b>	13,04,65,95,892	11,80,26,08,734
Tangible Assets	12,22,34,20,526	11,52,53,20,568
Intangible Assets	8,40,21,325	4,24,35,128
Capital Works-in-Progress	73,91,54,041	23,48,53,038
<b>INVESTMENTS FROM EARMARKED/ENDOWMENT FUNDS</b>		
Long Term		
Short Term		
<b>INVESTMENTS - OTHERS</b>	16,66,78,628	-
<b>CURRENT ASSETS</b>	2,06,83,56,446	2,07,59,59,358
<b>LOANS, ADVANCES &amp; DEPOSITS</b>	42,74,52,962	10,62,06,605
<b>MISCELLANEOUS EXPENDITURE NOT WRITTEN OFF</b>	-	-
<b>TOTAL</b>	<b>15,70,90,83,927</b>	<b>13,98,47,74,697</b>

S. No.	Particulars	Recurring (OH-31)	Salary (OH-36)	Non-Recurring (OH-35)	Total (Other than HEFA Grant)	Hefa Loan Principal Repayment	Hefa Loan Interest Repayment	Total (Including HEFA Grant)
A	Total Grant Received in FY 2022-23	69,85,00,000	68,95,00,000	78,33,00,000	2,17,13,00,000	32,04,26,250	12,66,00,098	2,61,83,26,348
	<b>Total Fund Received</b>	<b>69,85,00,000</b>	<b>68,95,00,000</b>	<b>78,33,00,000</b>	<b>2,17,13,00,000</b>	<b>32,04,26,250</b>	<b>12,66,00,098</b>	<b>2,61,83,26,348</b>





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