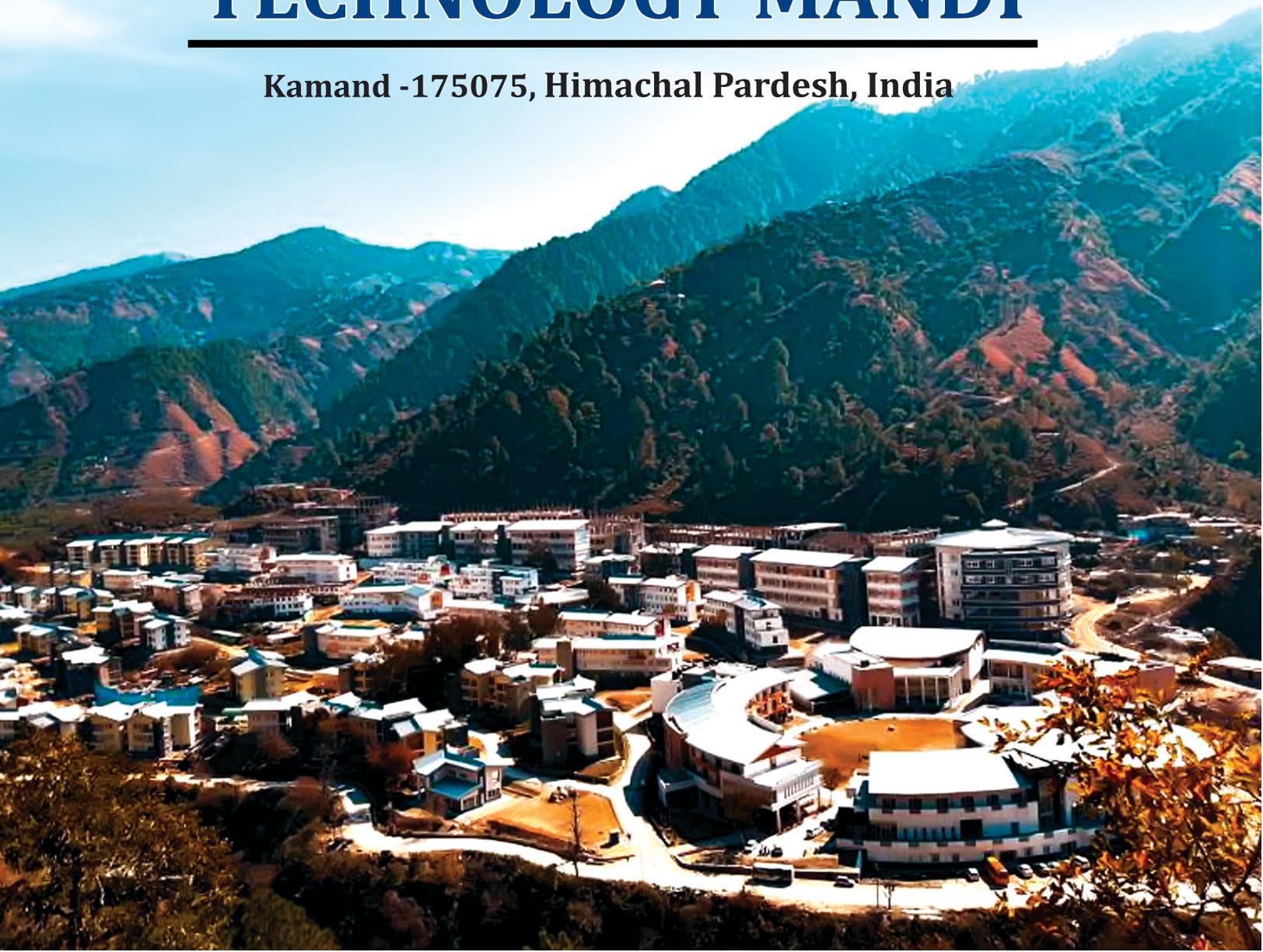




ANNUAL REPORT 2022-23

INDIAN INSTITUTE OF TECHNOLOGY MANDI

Kamand -175075, Himachal Pardesh, India



Annual Report 2022-2023



INDIAN INSTITUTE OF TECHNOLOGY MANDI
Kamand – 175075, Himachal Pradesh, India

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VISION

To be a leader in science and technology education, knowledge creation, and innovation, in an India marching towards a just, inclusive and sustainable society.

MISSION

- To create knowledge through team effort and individual for the benefit of society.
- To impart education to produce professionals capable of leading efforts towards innovative products and processes for the development of the Himalayan region in particular and our country and humanity in general.
- To inculcate a spirit of entrepreneurship and to impart the ability to devise globally recognized solutions for the problems of society and industry, particularly in the fragile ecosystem of the Himalayas.
- To train teachers capable of inspiring the next generation of engineers, scientists, and researchers.
- To work intensely with industry in pursuit of the above goals of education and research, leading to the development of cutting-edge and commercially-viable technologies.
- To operate in an ambiance marked by overriding respect for ability and merit.

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From the Director's Desk

It is with immense pride and joy that I present the comprehensive annual report for the academic year 2022-23, shedding light on the exceptional strides and accomplishments that have defined the trajectory of the Indian Institute of Technology Mandi. Since its inception in 2009, IIT Mandi has evolved into a focal point of academic brilliance, fostering innovation and research across a spectrum of disciplines.

The 10th Convocation, held on 5th December, 2022, marked a significant milestone for IIT Mandi, celebrating the graduation of 462 students. Among them were 188 B.Tech. students, 76 M.Tech. students, 95 M.Sc. students, 10 M.A. students, and 59 Ph.D. scholars. The event was graced by the esteemed presence of Prof. Stuart R. Hameroff from the University of Arizona, U.S.A., as the Chief Guest.

The 14th Foundation Day further exemplified the institute's commitment to excellence with the presence of Prof. T.G. Sitharam, Chairman of the All India Council for Technical Education (AICTE), as the Chief Guest, and Mr. Venkatadri K. R., Chief Commercial Officer at Tata Chemicals, as the Guest of Honor. Innovative interdisciplinary programs in areas such as the Indian knowledge system, Robotics, and Artificial Intelligence were initiated to propel the institute to new heights.

This year witnessed a significant increase in the student population, with total enrollment surpassing 2200. The South Campus, boasting a robust infrastructure spanning sixty-one thousand six hundred square meters, now accommodates 1100 students with dedicated hostel facilities and quarters for 54 faculty/staff members.

Noteworthy developments include a substantial expansion of the South Campus, featuring two new hostel blocks, a dining hall, ten 2-BHK apartments, and forty-five 3-BHK apartments, covering an extensive area of 22000 square meters. Simultaneously, the North Campus, sprawling over one lakh fifty-five thousand two hundred sixty square meters, provides hostel facilities for 1260 students and residences for 141 faculty/staff members. Ongoing developments aim to expand the campus's capacity to 5000 students and 350+ faculty members.

Dr. Garima Agrawal, a faculty member at IIT Mandi, was honored with the NASI-Platinum Jubilee Young Scientist Award 2022 by The National Academy of Sciences, India (NASI). Additionally, Dr. Mrityunjay Doddamani received the Prof. Satish Dhawan Young Engineers State Award at the J N Tata Auditorium, Indian Institute of Science (IISc), Bangalore. This prestigious award was presented by the Karnataka State Council of Science and Technology (KSCST), Department of Electronics, Information

Technology, Biotechnology, and Science & Technology, Government of Karnataka.

In the financial year 2022-2023, IIT Mandi saw a notable increase in Sponsored Projects, reaching a total of 55 compared to the previous year's 43. The funding for Sponsored Projects also witnessed a significant rise, reaching 20.31 crores INR, a commendable increase from the previous year's 17.48 crores INR.

IIT Mandi experienced a remarkable surge in Pre-Placement Offers (PPOs) for the academic year 2022-23, showcasing a notable uptick of over 23% compared to the preceding year. This increase reflects the growing recognition of the institution's academic excellence and the heightened desirability of its graduates in the professional landscape. The rise in PPOs attests to the continued success and upward trajectory of IIT Mandi's placement endeavors.

As we reflect on the achievements of the past year, heartfelt gratitude is extended to the entire IIT Mandi community – students, faculty, staff, and esteemed guests – for their unwavering contributions to our journey of excellence. Together, we remain committed to pushing the boundaries of knowledge and innovation, steadfastly shaping the future of IIT Mandi.

Prof. Laxmidhar Behera
Director

I. ACADEMICS at a Glance

Academic activities, including Teaching, Learning, and Research, are carried out in three orthogonal but complementary structures. These are Academic Schools, Student Degree Programmes and Research Groups. Each of these is designed to serve a distinct purpose. The three interact in flexible ways to best achieve the academic goals of the Institute. The structure encourages interdisciplinary learning and research that evolves in step with the march of technological innovation.

1.1 Schools

Faculty members belong to broadly and loosely defined Academic Schools. Each School provides a home base for faculty whose interests share some fundamental academic principles. Some faculty members also have joint appointments in other Schools. By broadly grouping faculty members into Schools, IIT Mandi has avoided traditional departments and divisions within the Institute. This has been done to foster an interdisciplinary culture and collaborative research and projects across disciplines within the Institute.

Currently, the Schools in the Institute are:

School of Computing and Electrical Engineering (SCEE)

Faculty members in the broad areas of Computer Science, Computer Engineering, Electrical Engineering including Electronics and Semiconductors, Signal Processing, Automation and Control and Electrical Energy Systems are part of this school.

School of Mechanical and Materials Engineering (SMME)

The faculty members of the school are involved in research and teaching in the areas of advanced materials, bio-mechanics, computational mechanics, composite design and manufacturing, energy engineering, smart structure & system, solid mechanics and thermo-fluidics.

School of Civil and Environmental Engineering (SCENE)

The faculty members of the school are involved in research and teaching in the areas of disaster management especially with an interdisciplinary approach involving Structural Engineering, Geotechnical Engineering, Water Resources Engineering, Environmental Engineering and GIS & Remote sensing.

School of Chemical Sciences (SCS)

The faculty members of the school are involved in research and teaching in the areas of subfields of organic, inorganic, physical, materials, polymer, and biological chemistry.

School of Physical Sciences (SPS)

The faculty members of the school are involved in research and teaching in the areas of cutting-edge themes of physics ranging from the physics of atoms, molecules, and quarks to the dynamics of black holes and the early universe, from exploring exotic states of matter to the physics of polymers and glasses.

School of Mathematical & Statistical Sciences (SMSS)

The faculty members of the school are involved in research and teaching in the areas of Differential Equations, Mathematical Control Problems, Nonlinear Dynamics and Chaos, Theoretical and Computational Partial Differential Equations, Optimization, Mathematical Biology, Computational Fluid Dynamics, Harmonic Analysis, Algebra, Topology, Combinatorics, Functional Analysis, Image processing, Machine learning, Statistics and Data Science.

School of Humanities and Social Sciences (SHSS)

Faculty members from English, German studies, Economics, Sociology, Psychology, Management, History and other areas of Humanities and Social Sciences are part of this school.

School of Management (SMSS)

The faculty members of the school are involved in research and teaching in the areas of data science tools and techniques like analytics, artificial intelligence machine learning, deep learning, natural language processing, and neural networks with a strong emphasis on problem solving approach.

School of Biosciences & Bio Engineering (SBB)

Faculty members are focused on teaching and cutting edge research in the broad areas of Biotechnology and Bioengineering and are part of this school.

1.2 Degree Programmes

1. Bachelor of Technology (B.Tech) in the following engineering disciplines
 - a) Civil Engineering (CE)
 - b) Computer Science & Engineering (CSE)
 - c) Data Science and Engineering (DSE)
 - d) Electrical Engineering (EE)
 - e) Engineering Physics (EP)
 - f) Mechanical Engineering (ME)
 - g) B.Tech.-M.Tech. Integrated Dual Degree in Bio-Engineering
2. Master of Science (M.Sc.) in the following disciplines
 - a) M.Sc. in Applied Mathematics
 - b) M.Sc. in Chemistry
 - c) M.Sc. in Physics
3. Master of Technology (M.Tech.) in the following disciplines
 - a) M.Tech in Mechanical Engineering with Specialization in Energy Systems
 - b) M.Tech in Materials and Energy Engineering
 - c) M.Tech. in Structural Engineering
 - d) M.Tech. in Fluid Thermal and Engineering
 - e) M.Tech in VLSI
 - f) M.Tech. in Power Electronics and Drives
 - g) M.Tech. in Communications and Signal Processing
 - h) M.Tech. in Computer Science and Engineering
 - i) M.Tech. in Electric Transportation
 - j) M.Tech in Biotechnology
4. Master of Arts (MA) in Development Studies
5. Master of Business Administration (MBA) in Data Science and Artificial Intelligence
6. I-Ph.D. (Physics)
7. M.Tech. (by Research) in the following schools and centres:
 - a) School of Computing and Electrical Engineering
 - b) School of Civil and Environmental Engineering
 - c) School of Mechanical and Materials Engineering
 - d) School of Management
 - e) Centre of Indian Knowledge System and Mental Health Application
 - f) Centre of Artificial Intelligence and Robotics
8. Ph.D. programme in the following schools and centres:
 - a) School of Computing and Electrical Engineering
 - b) School of Civil and Environmental Engineering

- c) School of Mechanical and Materials Engineering
- d) School of Mathematical and Statistical Sciences
- e) School of Biosciences and Bioengineering
- f) School of Chemical Sciences
- g) School of Physical Sciences
- h) School of Humanities and Social Sciences
- i) School of Management
- j) Centre of Indian Knowledge System and Mental Health Application
- k) Centre of Artificial Intelligence and Robotics

1.3 Statistics of the currently enrolled students based on the Year of Enrolment, Batch, and Category

| Year | B.Tech | | | | | | M.Sc.(Chemistry/Maths/Physics) | | | | | | M.Tech | | | | | | |
|-------|--------|-----|-----|----|-----|-------|--------------------------------|-----|----|----|-----|-------|-----------------------|-----|----|----|-----|-------|---|
| | Gen | OBC | SC | ST | EWS | Total | Gen | OBC | SC | ST | EWS | Total | Gen | OBC | SC | ST | EWS | Total | |
| 2017 | 0 | 1 | 0 | 1 | -- | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2018 | 0 | 2 | 0 | 0 | -- | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2019 | 126 | 72 | 41 | 17 | 6 | 262 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2020 | 120 | 86 | 45 | 22 | 32 | 305 | 2 | 0 | 1 | 2 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2021 | 114 | 87 | 45 | 21 | 32 | 299 | 52 | 37 | 18 | 10 | 14 | 131 | 38 | 27 | 9 | 3 | 3 | 80 | |
| 2022 | 128 | 90 | 49 | 28 | 28 | 323 | 43 | 36 | 20 | 11 | 18 | 128 | 62 | 30 | 15 | 2 | 15 | 124 | |
| Total | 488 | 338 | 180 | 89 | 98 | 1193 | 97 | 73 | 39 | 23 | 32 | 264 | 100 | 57 | 24 | 5 | 18 | 204 | |
| Year | M.A. | | | | | | I-Ph.D. | | | | | | M.Tech. (by Research) | | | | | | |
| | Gen | OBC | SC | ST | EWS | Total | Gen | OBC | SC | ST | EWS | Total | Gen | OBC | SC | ST | EWS | Total | |
| 2015 | -- | -- | -- | -- | -- | -- | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2016 | -- | -- | -- | -- | -- | -- | 2 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2017 | -- | -- | -- | -- | -- | -- | 4 | 2 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2018 | -- | -- | -- | -- | -- | -- | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 4 |
| 2019 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 3 | 8 | 1 | 0 | 0 | 0 | 9 | |
| 2020 | 1 | 0 | 0 | 1 | 0 | 2 | 2 | 1 | 0 | 0 | 1 | 4 | 4 | 2 | 0 | 0 | 2 | 8 | |
| 2021 | 8 | 5 | 3 | 1 | 2 | 19 | 1 | 0 | 0 | 0 | 1 | 17 | 4 | 0 | 0 | 4 | 25 | | |
| 2022 | 7 | 4 | 2 | 1 | 2 | 16 | 4 | 2 | 0 | 0 | 1 | 7 | 26 | 11 | 6 | 0 | 4 | 47 | |
| Total | 16 | 9 | 5 | 3 | 4 | 37 | 15 | 6 | 0 | 0 | 2 | 23 | 59 | 18 | 6 | 0 | 10 | 93 | |

| Year | Ph.D. | | | | | | MBA | | | | | |
|-------|-------|-----|----|----|-----|-------|-----|-----|----|----|-----|-------|
| | Gen | OBC | SC | ST | EWS | Total | Gen | OBC | SC | ST | EWS | Total |
| 2014 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2015 | 2 | 3 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2016 | 13 | 3 | 2 | 0 | 0 | 18 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2017 | 31 | 10 | 4 | 0 | 0 | 45 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2018 | 45 | 4 | 4 | 0 | 0 | 53 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2019 | 38 | 15 | 2 | 2 | 0 | 57 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2020 | 30 | 17 | 3 | 2 | 8 | 60 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2021 | 62 | 17 | 6 | 0 | 12 | 97 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2022 | 41 | 35 | 13 | 4 | 18 | 111 | 21 | 5 | 6 | 0 | 1 | 33 |
| Total | 263 | 104 | 34 | 8 | 38 | 447 | 21 | 5 | 6 | 0 | 1 | 33 |

2. Research Activities at a Glance

Office of Sponsored Research & Industrial Consultancy (SRIC) (the office) provides administrative support for the operation of sponsored research, industrial consultancy and other R&D related activities of the Institute. It facilitates interaction with external agencies, both national and international. It also promotes and manages Institute-Industry interaction and all externally funded research and development projects.

Last FY22-23, SRIC came up with a dedicated IPR (Intellectual Property Rights) and IEP (Innovation & Entrepreneurship Policy) policy for the institute. Related procedures for implementation of these policies were also formulated. These have helped in foresting the innovation spirit, while the count of patents filed & granted has been 30 & 16 respectively at the close of FY. Seed Grant amount was increased to Rs.15 Lacs for every newly joined faculty with a commitment to provide support to strengthen their initial research infrastructure. 20 MoUs were processed with various institutes, industry partners & universities, some of which are with NHIDCL, Tata Consultancy Services, Hitachi India Pvt Ltd etc. Another important milestone achieved in this FY was implementation of fund flow through PFMS for central sector schemes. The process involved identification of schemes, returning of unspent balance CNA wise, opening of more than 10 ZBS Accounts in various commercial banks, ensuring reassignment of unspent balance from each CNA through PFMS and receipt of fresh instalments through the same.

A total of 83 number of Sponsored and Consultancy projects were sanctioned in the FY22-23 with sanctioned value of Rs. 21.29 Crores; which translates to 13% increase in sanctioned value and 36% increase in project count as compared to FY21-22.

Table 1: Information on new projects sanctioned during the last three years

| Year | Sponsored Projects | | Consultancy Projects | |
|---------|--------------------|------------------------------------|----------------------|----------------------------------|
| | Number | Sanctioned Outlay (Rs. In crores)* | Number | Projects Outlay (Rs. In crores)* |
| 2022-23 | 55 | 20.31 | 28 | 0.98 |
| 2021-22 | 43 | 17.48 | 18 | 1.35 |
| 2020-21 | 35 | 11.17 | 9 | 0.44 |

*: includes GST for Indian parties/clients

Table 2: Funds received for R&D in 2022-23

| Project Type | Funds received (Rs. in crores) |
|----------------------|--------------------------------|
| Sponsored Projects | 16.54 |
| Consultancy Projects | 0.20 |
| Equipment Usage | 0.00 |
| Total | 16.74 |

Table 3 EXTERNALLY SPONSORED RESEARCH PROJECTS

| Sr. No. | Project No. | Project Title | Sponsoring Agency | Principal Investigator | Co- Principal Investigator | Department / School | Amount Sanctioned (In Rs.) | Duration of project |
|---------|------------------|---|-------------------|-------------------------|----------------------------|---------------------|----------------------------|---------------------|
| 1 | IITM/DST/SDG/367 | Climate change risk assessment and mapping at district and state level in India | DST | Dr. Shyamasree Dasgupta | | SHSS | 11201608 | 2 years |

| | | | | | | | | |
|---|-------------------------------|--|-------------------|---|---|-------|----------|---------|
| 2 | IITM/MeitY/ AD/369 | Speech technologies in Indian Languages | MeitY | Dr. Dileep AD Dr Padmanabhan Rajan | IIT Madras as Consortium Leader, IIIT- Hyderabad, IIT Kanpur, IIT Hyderabad, IISc Bangalore, NITK- Hyderabad, IISc Bangalore, NITK- Surathkal, CDAC Mumbai, IIT Dharwad, NIT Goa, IIT Guwahati, CDAC Kolkata, NIT Manipur, IIIT Sri City, SNU Chennai, IIT Kharagpur, IIT Mandi, DA-IICT Gandhinagar, SSNCE Chennai, KLEF Vaddeswaram | SCEE | 10905000 | 3 years |
| 3 | IITM/IHFC-IIT Delhi/LB/370 | Brain wave controlled robot in healthcare and tele- presence mobile manipulation in cognitive Imitation learning | IHFC-IIT Delhi | Prof. Laxmidhar Behera | | SCEE | 10000000 | 3 years |
| 4 | IITM/SERB/ TPS/371 | Sewage surveillance of SARS-CoV-2 genome: a useful technique for tracking the epidemiology of COVID-19 through wastewater system in Himachal Pradesh | SERB | Dr. Tulika P Srivastava | Dr. Ramesh Chander Guleria & Prof. Sunite A Ganju as Co- PI from Shri Lal Bahadur Shastri Govt. Medical College Ner Chowk Mandi | SBB | 4191000 | 1 year |
| 5 | IITM/IIRS- ISRO/MG/372 | Probabilistic Earthquake – Earthquake induced landslide multi – Hazard analysis: Application to Shimla, Mandi and Manali | IIRS-ISROC | Dr Maheshreddy Gade | Dr. Kala Venkata Uday | SCENE | 3997120 | 3 years |
| 6 | IITM/AICTE- MoE/LB/373 | IKS Research Projects Scheme | AICTE-MoE | Prof. Laxmidhar Behera | | SCEE | 1000000 | 3 years |
| 7 | IITM/DRDO/ HP/374 | Thermo – mechanical fatigue analyses of carbon fibre reinforced polymer composites for aerospace applications: Experimental and modelling approach | DRDO | Dr. Himanshu Pathak | Dr Sunny Zafar | SMME | 2542320 | 3 years |

| | | | | | | | | |
|----|--------------------------|--|---|-----------------------------|--|--------------|---------|---------|
| 8 | IITM/DRDO/ SUS/375 | Digital twin development employing Bayesian filters with sub structured predictor models for aerospace structures applications | DRDO | Dr. Subhamoy Sen | Dr. Himanshu Pathak | SCENE & SMME | 3408140 | 3 years |
| 9 | IITM/DRDO/ SZ/376 | A rapid method to manufacture carbon nanotubes on recycled carbon fibers to enhance mechanical performance composites thereof | DRDO | Dr. Sunny Zafar | Dr. Himanshu Pathak | SMME | 2064180 | 3 years |
| 10 | IITM/ICMR- RA/VKS/377 | Immunomodulatory potential of bioactive phytochemicals from <i>Tinospora cordifolia</i> | ICMR -RA | Dr. Vipendra Kumar Singh | Dr. Rajanish Giri (Mentor) | SBB | 1752000 | 3 years |
| 11 | IITM/MoES/ SYS/378 | Aerosol brown carbon, humic-like substances and nitroaromatics in the Himalayas: implications for regional climate | MoES | Dr. Sayantan Sarkar | | SCENE | 7800636 | 3 years |
| 12 | IITM/ICAR/ SKM/380 | Rice rhizosphere metabolome and microbiome functions for improved crop establishment, growth and yield | ICAR | Dr. Shyam Kumar Masakapalli | Dr. B Ramakrishnan (ICAR-IARI, New Delhi) Prof. Dwapendra Thakuria, CAU, Umiam Prof. Sanjeev Kumar, PRL, Ahmedabad | SBB | 2120900 | 3 years |
| 13 | IITM/SERB/ PAS/381 | 3D printing of continuous carbon fiber reinforced polymer composites using Fused Filament Fabrication | SERB | Dr. Prateek Saxena | | SMME | 3310000 | 2 years |
| 14 | IITM/SERB/ GJS/382 | Parametric study of deagglomeration process in dry powder inhalers (DPI) | SERB | Dr. Gajendra Singh | | SMME | 3309000 | 2 years |
| 15 | IITM/SERB/ HRS/383 | Dynamics of motile granular rods in a vibrated monolayer of nonmotile rods | SERB | Dr. Harsh Soni | | SPS | 1643400 | 2 years |
| 16 | IITM/VTPL/ AD/384 | Vehant Fellowship | Vehant Technologies Pvt Ltd | Dr. Dileep AD | | SCEE | 1000000 | 5 years |
| 17 | IITM/DFSS/ AB/385 | A deep learning and machine learning based package for detecting forgeries in images, video, and audio | Directorate of Forensic Science Services Ministry of Home Affairs | Dr. Arnav Bhavsar | Dr. Padmanabhan Rajan | SCEE | 3120000 | 2 years |

| | | | | | | | | |
|----|-----------------------------------|---|-------------------------|---|--|-------------|----------|----------|
| 18 | IITM/HIL/ AB/386 | AI based multimodal inspection for defect detection | Hitachi India Pvt. Ltd. | Dr. Arnav Bhavsar | Dr. Padmanabhan Rajan Dr. Dileep AD Dr. Aditya Nigam Dr. Dinesh Singh | SCEE | 3224000 | 7 month |
| 19 | IITM/SCL/ SG/387 | Processing & Delivery of recently developed i-line / MUV photoresist to SCL Mohali | SCL Mohali | Prof. Subrata Ghosh | | SCS | 579260 | 2 months |
| 20 | IITM/SERB- NPDF/ AKS/388 | Accurate monitoring of harmonics interharmonics in modern power system with low-cost hardware | SERB - NPDF | Dr. Ankit Kumar Srivastava | Prof. Bharat Singh Rajpurohit | SCEE | 2025600 | 2 years |
| 21 | IITM/SERB/ MUD/389 | Controlling the surroundings to optimize the efficiency of finite-time computation | SERB | Dr. Moupriya Das | | SCS | 1641200 | 2 years |
| 22 | IITM/SERB/ VKN/390 | Towards large scale photocatalytic hydrogen production using integrated catalytic panels | SERB | Dr. Venkata Krishnan | | SCS | 4781832 | 3 years |
| 23 | IITM/SERB/ AB/391 | EEG based visual brain decoding via machine learning and deep learning | SERB | Dr. Arnav Bhavsar | | SCEE | 5430991 | 3 years |
| 24 | IITM/SERB- TARE/ALS/392 | Development of in-situ leachate treatment system to prevent water contaminations | SCENE | Dr. Arun Lal Srivastav (Chtkara University) | Dr. Dericks P Shukla (Mentor) | SCENE | 1005000 | 3 years |
| 25 | IITM/SERB/ GB/393 | Fraction order modelling of the integro-differential population balance equation | SERB | Dr. Gaurav Bhutani | | SMME | 660000 | 3 years |
| 26 | IITM/SERB/ MM/394 | A unified mathematical framework for predicting viscoplastic constitutive response of sand | SERB | Dr. Mousumi Mukherjee | | SCENE | 660000 | 3 years |
| 27 | IITM/SERB/ NK/395 | Aspects of bulk reconstruction | SERB | Dr. Nirmalya Kajuri | | SPS | 1214400 | 2 years |
| 28 | IITM/MeitY- IIITDM/ ASh/396 | Capacity building for human resource development in unmanned aircraft system (Drone and related technology) | MeitY-IIITDM | Dr. Amit Shukla | Dr. Radhe Shyam Sharma | SMME & SCEE | 15091000 | 5 years |
| 29 | IITM/SERB/ SKSh/397 | A study unimodular rows | SERB | Dr. Sampat Kumar Sharma | | SMSS | 1172072 | 2 years |

| | | | | | | | | |
|----|---------------------------------------|---|---|--|-----------------------------|-------|----------|----------|
| 30 | IITM/SERB/ GSR/398 | Multi- mode resonator based electrically small antenna for integration with wireless devices | SERB | Dr. Gopi Shrikanth Reddy | Dr. Anirban Sarkar | SCEE | 2827000 | 3 years |
| 31 | IITM/ICMR/ AJ/399 | Photothermal therapy using ultrasmall gold nanoparticles and 2D MoS2 nanosheets composite | ICMR | Dr. Amit Jaiswal | | SBB | 963244 | 3 years |
| 32 | IITM/SERB/ GR/400 | Development of quantum dots and PB+2 free hybrid perovskite based flexible photovoltaic devices | SERB | Dr. Gopal Rawat | | SCEE | 3243900 | 6 months |
| 33 | IITM/IKS- MoE(AICTE)/ VD/401 | Indian Knowledge System and Mental Health Application centre | IKS- MoE- AICTE | Dr. Varun Dutt | Dr Arnav Bhavsar | SCEE | 3018000 | 2 years |
| 34 | IITM/CCRAS/ VD/402 | Efficacy of Ayurveda regimen (Mild Purgation and Internal oleation) along with yoga module in the management of unexplained and anovulatory female infertility; A randomized controlled trial | Central Council for Research Ayurvedic Sciences (CCRAS) | Dr. Varun Dutt as Principal Investigator from IIT Mandi, Dr. Anubha Chandla from Regional Ayurveda Research Institute (RARI) Mandi, Dr. Nalneesha Sharma from Shri Lal Bahadur Shastri Govt. Medical College, Nerchowk Mandi | Dr Arnav Bhavsar | SCEE | 2048250 | 3 years |
| 35 | IITM/DST- INSPIRE-1817/ AGi/403 | Biocatalytic reduction of CO2 to value added products via microbial electrosynthesis and enzyme immobilization | DST-INSPIRE | Dr. Anand Giri | Chairperson SCENE | SCENE | 11700000 | 5 years |
| 36 | IITM/SERB/ SKP/404 | Investigation of ultrafast carrier dynamics, transport and resistive switching behavior of two- dimensional perovskites | SERB | Prof. Suman Kalyan Pal | | SPS | 8906832 | 3 years |
| 37 | IITM/IITID- CPSF/AB/405 | Remote multimodal point-of care health diagnostic and consultancy system | IITI Drishti CPS Foundation | Dr. Arnav Bhavsar | Dr. Shubhajit Roy Chowdhury | SCEE | 990000 | 1 year |

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|----|------------------------------------|---|---|-------------------------|---|-------------|---------|-----------|
| 38 | IITM/ICMR/ PKS/406 | Implications for small heat shock proteins in formation of biological condensates | ICMR | Dr. Prasad Kasturi | | SBB | 1601160 | 3 years |
| 39 | IITM/SERB/ AR/407 | Theoretical investigation of coherently – coupled quantum mixtures of dilute atomic gases | SERB | Dr. Arko Roy | | SPS | 2984872 | 2 years |
| 40 | IITM/DST- INSPIRE/ SKSh/408 | On the Bass, Suslin Conjecture (IFA21-MA-164) | DST-INSPIRE | Dr. Sampat Kumar Sharma | | SMSS | 3500000 | 5 years |
| 41 | IITM/SERB/ HV/409 | Photoionization dynamics of atomic metal clusters and their endofullerenes | SERB | Dr Hari Varma | | SPS | 2063182 | 3 years |
| 42 | IITM/SERB/ RBS/410 | Development of bifacial indoor photovoltaics prototype for self powering smart internet of things (IoTs) | SERB | Dr Ranbir Singh | Prof. Satinder Kumar Sharma | SMME & SCEE | 5060132 | 3 years |
| 43 | IITM/NRIDA/ AKS/411 | Strategies and guidelines for slope cutting for village roads in hilly region | NRIDA | Dr. Ashutosh Kumar | Dr Maheshreddy Gade | SCENE | 1678600 | 18 months |
| 44 | IITM/iHub & HCIF-IIT Mandi/VD/412 | Digital nose for healthcare: Diagnosing diabetes and heart diseases via a low – cost digital nose | iHub & HCIF-IIT Mandi | Dr. Varun Dutt | Dr. Arnav Bhavsar Dr. Vikrant Kanwar, AIIMS Bilaspur Dr. Bhupinder Kumar, AIIMS Bilaspur Dr. Preyender Singh Thakur, AIIMS Bilaspur | SCEE& SCS | 6748500 | 2 years |
| 45 | IITM/iHub & HCIF-IIT Mandi/ABS/413 | Designing advanced, efficient, compact, highly reliable sensors and biomarkers-based systems to combat Alzheimer's disease, heart attacks and early stage cancers | iHub & HCIF-IIT Mandi | Dr. Anirban Sarkar | Dr Gopi Shrikanth Reddy | SCEE | 6204000 | 2 years |
| 46 | IITM/APN/ VG/414 | Regional cooperation for freshwater ecosystem services in the Himalayas (REFRESH): Understanding the influences of monsoon variability and compound extremes | ASIA- Pacific Networks for Global Change Research | Dr. Vivek Gupta | Dr. Ashutosh Sharma as PI from IIT Roorkee, Dr. Priyank Sharma from IIT Indore, Dr. Vishal Singh from National Institute of Hydrology Roorkee, | | | |

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|----|-------------------------------------|---|---|-----------------------------|---|------------------|----------|----------|
| | | | | | Dr. Pratik Singh Thakuri from Nepal Engineering College, Nepal, Dr. Kirtan Adhikari from College of Science & Technology, Royal University of Bhutan and Dr. Shivam Gupta from Mahamaya College of Agricultural Engineering and Technology, Uttar Pradesh | SCENE | 649800 | 3 years |
| 47 | IITM/SERB/GR/415 | Design and fabrication of low cost nanoelectronic devices for energy and environment applications | SERB | Dr. Gopal Rawat | | SCEE | 1080571 | 9 months |
| 48 | IITM/HIMCOSTE/VD/416 | Smart blood vaccine and medicine monitoring system | HIMCOSTE | Dr. Varun Dutt | Dr. Kala Venkata Uday Dr. Chander Singh | SCEE & SCENE | 630000 | 2 years |
| 49 | IITM/HIMCOSTE/GR/417 | Design and development of low cost flexible inorganic perovskite solar cell | HIMCOSTE | Dr. Gopal Rawat | | SCEE | 549000 | 2 years |
| 50 | IITM/iHub & HCIF- IIT Mandi/SRC/418 | Integration of digital olfaction with a mobile phone and television | iHub & HCIF- IIT Mandi | Dr. Shubhajit Roy Chowdhury | Dr. Amit Balkrishna Pawar as Lead Co-PI and Prof. Anirudha Chakraborty, Dr. Aditya Nigam, Dr. Trayambak Basak, Dr. Bhaskar Mondal, Dr. Moupriya Das, Dr. Venkata Ratnam Vakacharla, Dr. Dinesh Singh, Dr. Gopal Rawat and Dr. Priyatosh Mahish as Co-PI | SCEE & SCS & SBB | 10744800 | 2 years |
| 51 | IITM/CCRYAN-AYUSH/AP/419 | To evaluate the effects of common yoga protocol on perceived stress, mood states and innate immune cell functioning | Central Council for Research in Yoga & Naturopathy, Ministry of Ayush | Dr. Amit Prasad | Dr. Milan Behal (Medical Officer) | SBB | 4818840 | 1 year |

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|----|--------------------------|---|---|-----------------------------|---|-----|---------|---------|
| 52 | IITM/DST-RSF/SKM/420 | Enhancing the efficiency of clean energy production by intensifying anaerobic bioconversion of organic waste using solar energy | DST-RSF | Dr. Shyam Kumar Masakapalli | Dr. Vivekanand as PI, Dr. Kapil Pareek as Co-PI from MNIT Jaipur, Dr. Nidhi Prateek as Co-PI from CURAJ Ajmer | SBB | 2496361 | 3 years |
| 53 | IITM/EMBO-Germany/BB/422 | EMBO Global Investigator Network- 2022 | EMBO Young Investigator Network Germany | Dr. Baskar | | SBB | 2476336 | 4 years |
| 54 | IITM/MoT-NTTM/AJ/424 | Development of 2D nanomaterial based photo thermally active antimicrobial nanocoated fabrics and PPE | Ministry of Textiles (National Technical Textile Mission) | Dr. Amita Jaiswal | | SBB | 3200000 | 2 years |

Table 4 INTERNAL PROJECTS

| S. No. | Project No. | Project Title | Sponsoring Agency | Principal Investigator | & Co-ordinator(s) | Department/School | Amount Sanctioned (In Rs.) | Duration of Project |
|--------|------------------|-------------------------------|-------------------|------------------------|-------------------|-------------------|----------------------------|---------------------|
| 1 | IITM/INT DORA/30 | Management of DORA activities | IIT Mandi | Dean DORA (PI) | AD (DORA) (Co-PI) | | 20,00,000 | 1 year |

Table 5 SPONSORED CONSULTANCY RESEARCH PROJECTS

| S.No. | Project No | Project Title | Principal Investigator & Co-Principal Investigator(s) | Agreement signed with | Amount Sanctioned (In Rs.) | Period |
|-------|--------------------------|---|--|--|----------------------------|-------------------|
| 1 | IITM/CONS/Xceltics/AP/66 | Isolation and supply of Taenia solium Cyst fluid antigens (6mg) | Dr. Amit Prasad | Xceltics GmbH, Pirnaer Strabe 24, D- 68309, Mannheim, Germany | 184750 | 30 days |
| 2 | IITM/CONS/ Ultra/KVU/67 | Restoration of Residential H-1 block at CCL civil plant | Dr. Kala Venkata Uday (PI) Dr. Ashutosh Kumar (Co-PI) | Ultra Tech Cement Limited, Distt.- Solan, Himachal Pradesh | 1105000 | 16 months |
| 3 | IITM/CONS/APMC/KVU/68 | Site geological report of Bhattakufar market yard at Shimla | Dr. Kala Venkata Uday (PI) Dr. Dericks P Shukla (Co-PI) | Agriculture Produce Marketing Committee, Shimla & Kinnaur | 33748 | 7 days |
| 4 | IITM/CONS/SJVN/RKR/69 | Consultancy services for computational fluid dynamics (CFD) analysis of intake structure of lower Arun HEP | Dr. Rajendra Kumar Ray | CGM/HoD Civil Design Arun- 3 & Lower Arun HEP, SJVN Tum;ingtar Nepal | 1500000 | 2 months 2 months |
| 5 | IITM/CONS/RSV/SKSH/70 | Professional advice and vetting of the civil drawings of the terminal buildings and intermediates tower of a proposed ropeway | Dr. Sandip Kumar Saha (PI) Dr. Kaustav Sarkar (Co-PI) | RSV Construction Pvt. Ltd. Hyderabad | 500556 | 60 days |
| 6 | IITM/CONS/NGSE/SP/71 | Design review of automated storage and retrieval system for storing two / four articles in eighteen storage cubicles | Dr. Satvasheel Powar | Nandan GSE Private Limited, Navi Mumbai | 129800 | 21 days |
| 7 | IITM/CONS/MIPL/HP/72 | Vetting of drawings and design calculation for tanks | Dr. Himanshu Pathak | Motiprabha Infratech Pvt Ltd Faridabad Haryana | 21240 | 1 month |

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| 8 | IITM/CONS/ FCI/RS/73 | Design of the toe wall skin reinforcement for FCI Mandi Godown | Dr. Rajneesh Sharma | AGM (CE), FCI, R.O Shimla, H.P. | 69030 | 1 month |
| 9 | IITM/CONS/ MLI-USA/RK/74 | Estimation of daily energy demand of air conditioning and heating load for e-bus | Prof. Rajeev Kumar (PI) Prof. Bharat Singh Rajpurohit (Co-PI) | Microgrid Labs Inc, USA | 1230535 | 4 months |
| 10 | IITM/CONS/ HPPWD/ KVU/75 | Consultancy services for the feasibility of double lane bypass at ReckongPeo | Dr. Kala Venkata Uday (PI) Dr. Dericks P Shukla (Co-PI) | NH division, HPPWD, Rampur Bushahr, H.P. | 314470 | 2 week |
| 11 | IITM/CONS/SK/ RS/76 | To find out the cement contents in mortar mix using image analysis | Dr. Rajneesh Sharma | Sh Suriender Kumar | 76700 | 1 month |
| 12 | IITM/CONS/ NHAI/RS/77 | Site visit and investigations for road failure of four lane Parwanoo- Solan section, H.P. | Dr. Rajneesh Sharma (PI) Dr. Kala Venkata Uday (Co-PI) | NHAI, Shimla, H.P. | 136526 | 10 days |
| 13 | IITM/CONS/ SJVNL/RS/78 | Vetting of field quality assurance (FQAP) plan of steel truss bridge for LHEP Stage-I (210MW) in Himachal Pradesh | Dr. Rajneesh Sharma | SJVNL, Shimla, H.P. | 153400 | 1 month |
| 14 | IITM/CONS/ Xceltis/AP/79 | Isolation and supply of Taenia solium Cyst fluid antigens (10mg) | Dr. Amit Prasad | Xceltis GmbH, Kamenzer Strasse -12, 68309 Mannheim, Germany | 339750 | 1 month |
| 15 | IITM/CONS/ HPPWD/RS/80 | Vetting of the structural design and drawings of the sub - structure of bridge over Binwa Khad at Khadial on Sagoor to Dhanag Via Nagan Road in HPPWD | Dr. Rajneesh Sharma | HPPWD Division Baijnath | 145730 | 1 month |
| 16 | IITM/CONS/ HPPLtd/MG/81 | Proff check the STP tanks and pump house | Dr. Maheshreddy Gade (PI) Dr. Shivang Shekhar (Co-PI) | Hydrotech Paryavarana (India) Pvt Ltd | 149949 | 45 days |
| 17 | IITM/CONS/ OPS&S/RS/82 | Vetting of the structural design and drawings of the bearing of construction of 40.00m span lane over Rana Khad on Jogindernagar Sarkaghat Ghumarwin road at km 7/225 under CRF | Dr. Rajneesh Sharma (PI) | O.P. Sharma & Sons | 69030 | 1 month |
| 18 | IITM/CONS/ SSIPNS-LLP/ SP/83 | Review of a patent application and submission of an affidavit with technical inputs | Dr Satvasheel Powar | SS Intellectual Property Neeti Consultancy LLP, 1124-1125, Tower 1, Assotech Business Cresterra, Sector- 135, U.P.- 201305 | 47224 | 7 days |
| 19 | IITM/CONS/ HPPWD/ KVU/84 | Remedial measures for landslides in Theog Shimla | Dr. Kala Venkata Uday (PI) Dr Derick P Shukla (Co-PI) | PWD, Theog Shimla | 237770 | 7 days |
| 20 | IITM/CONS/ HSL/KVU/85 | Soil testing for stratification | Dr. Kala Venkata Uday | Hindustan Salts Limited, Mandi | 53690 | 14 days |
| 21 | IITM/CONS/ AKG/RS/86 | Vetting of the structural design and drawings of the 35m span double lane PSC bridge over kurpan khad at RD 29/850 on Nore to Wazir Bowli road under CRF HPPWD Nirmand | Dr. Rajneesh Sharma | A K Gupta | 184080 | 2 months |

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|----|-----------------------|--|---|---|---------|----------|
| 22 | IITM/CONS/ARGT/SSH/87 | Vetting of structures for EMRS school for ministry of Tribal affairs | Dr. Sandip Kumar Saha | ARG Technocrates 3rd floor Plot no- 66, Pocket- II, Jasola Vihar, New Delhi | 728650 | 6 months |
| 23 | IITM/CONS/HPPL/MG/88 | Structural vetting of sewage treatment plants MS tank | Dr. Maheshreddy Gade (PI) Dr. Shivang Shekhar (Co-PI) | Hydrotech Paryavaran (India) Pvt Ltd 2nd floor, 7/18, 14 Cross 2nd Main Domlur Bengaluru, Karnataka- 560071 | 214998 | 15 days |
| 24 | IITM/CONS/MLSC/RS/89 | Third party site inspection of 'A' type Kendriya Vidyalaya at differenet place in north India under Jammu Zone NPCC Limited | Dr. Rajneesh Sharma | M/s Murari Lal Singhal Contractor, Lmli wali Gali Santar Road, Dholpur, Rajsthan-328001 | 69030 | 2 years |
| 25 | IITM/CONS/KNYP/SP/90 | The vetting of structural design for 333 Bed MES base hospital barrackpore (PH-I), Kolkata (W.B.)” | Dr. Shashank Pathak (PI) Dr. Sandip Kumar Saha (Co-PI) Dr. Kaustav Sarkar (Co-PI) | KNY Projects Pvt. Ltd. New Delhi | 400020 | 2 months |
| 26 | IITM/CONS/RPPL/SUS/91 | Vetting the dynamic / FEM analysis of concrete gravity main DAM & Power House structure of 2 x 33 MW Dhaulsidh Hydroelectric Project | Dr. Subhamoy Sen | Rithwik Projects Pvt. Ltd. Hamirpur (H.P.) | 1426620 | 1 year |
| 27 | IITM/CONS/SC/SHS/92 | Proof checking of the PEB shed structural drawings at Rajgir Railway Station | Dr. Shivang Shekhar (PI) Dr. Maheshreddy Gade (Co-PI) | Shree Construction, Aditya Smrithi, Radha Krishna Mandir road, Shivpuri, Shastri Nagar, Patna, Bihar-800023 | 180245 | 21 days |
| 28 | IITM/CONS/MA/VKG/93 | Proof checking of hydrological report for identification of HFL for gandak river at bridge location | Dr. Vivek Gupta | Manglesh Associate | 76700 | 3 months |

Table 6 SEED GRANT PROJECTS

| S.No. | Project No | Project Title | Principal Investigator & Co-Principal Investigator(s) | Department/ School | Amount Sanctioned (In Rs.) | Period |
|-------|----------------|--|---|--------------------|----------------------------|---------|
| 1 | IITM/SG/SBD/82 | Secure health monitoring system for internet of medical things (IoMT) devices | Dr. Srinivasu Bodapati | SCEE | 955000 | 3 years |
| 2 | IITM/SG/SPM/83 | Minimal input selection in large - scale network systems : applications in communication and transport networks | Dr. Sreelakshmi PM | SCEE | 700000 | 3 years |
| 3 | IITM/SG/SSU/84 | Development of low noise mode locked fiber lasers for characterization of high - speed electronic devices and other applications | Dr. Srikanth Sugavanam | SCEE | 1499996 | 3 years |
| 4 | IITM/SG/GJS/85 | Experimental investigation of dispersion mechanisms in dry powder inhalers: focusing on shear and impaction- based deagglomeration | Dr. Gajendra Singh | SMME | 1500000 | 3 years |

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|---|----------------|---|---------------------|-------|---------|---------|
| 5 | IITM/SG/NK/86 | AdS / CFT and black holes with inner horizons | Dr. Nirmalya Kajuri | SPS | 742000 | 3 years |
| 6 | IITM/SG/AR/87 | Study on collective excitations in the condensates of dilute atomic gases | Dr. Arko Roy | SPS | 605303 | 3 years |
| 7 | IITM/SG/SUM/88 | Mineralized injectable bioink for bone regeneration | Dr. Sumit Murab | SBB | 1500000 | 3 years |
| 8 | IITM/SG/SHP/89 | Risk assessment of Himalayan tunnels in multi- hazard scenario | Dr. Shashank Pathak | SCENE | 1500000 | 3 years |

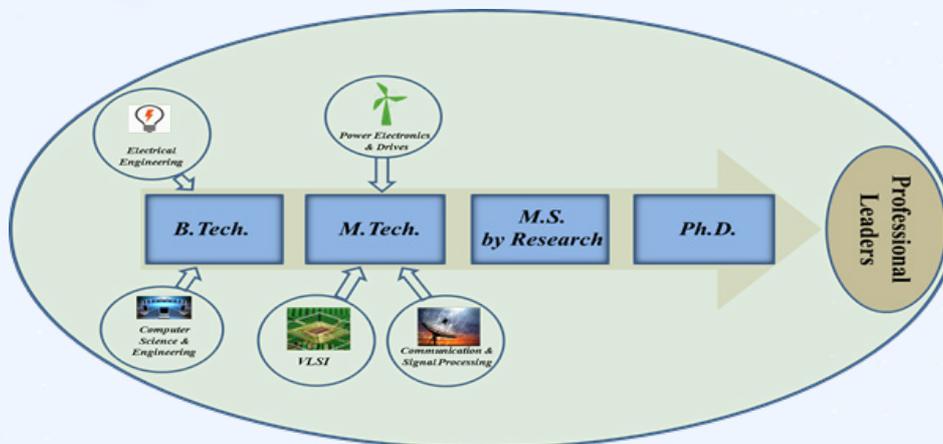
3. Academic Schools

3.1 School of Computing and Electrical Engineering (SCEE)

The School of Computing and Electrical Engineering (SCEE) of IIT Mandi aims to maintain excellence in teaching and research in technologies related to Computing, Communication, Electronics and Electrical Engineering.

The School of Computing & Electrical Engineering has 39 Regular Faculty members, 7 other Faculty members, 8 Staff Members and around 114 Ph.D. Students, 197 Masters Students, and 553 B.Tech. Students. It has five broad areas namely Power Electronics & Drives, Controls & Sensors, VLSI, Signal Processing and Communications, and Computer Science & Engineering.

The School offers two UG degrees namely B.Tech. in Computer Science & Engineering, and B.Tech. in Electrical Engineering. The School is also associated with two other UG degrees namely Data Science & Engineering and a Dual degree program in Bioengineering (offered jointly with the School of Basic Sciences.) The School has four M.Tech. program namely in Power Electronics and Drives, Signal Processing & Communications, VLSI and Computer Science & Engineering in addition to regular PhD and M.Tech. by Research programs.



Various programs in SCEE with their intake capacity and year of starting

| Program | Year | Intake |
|--|------|--------|
| B. Tech. (Computer Science & Engineering) | 2023 | 80 |
| B. Tech. (Electrical Engineering) | 2023 | 70 |
| B. Tech. Data Science and Engineering | 2023 | 50 |
| B. Tech. (Micro & VLSI) | 2023 | 30 |
| M. Tech. (VLSI) | 2023 | 20 |
| M. Tech. (Communication & Signal Processing) | 2023 | 05 |
| M. Tech. (Power Electronics & Drives) | 2023 | 12 |
| M. Tech. (Computer Science & Engineering) | 2023 | 17 |
| M. Tech. by Research | 2023 | 31 |
| Ph.D. | 2023 | 36 |

The areas of research cover a broad spectrum of theoretical and application-based topics such as: smart grid, renewable energy, materials for efficient semiconductor devices, next-generation communication and efficient human-computer interaction, artificial intelligence and applications like computer vision, speech and audio processing, medical image analysis etc.

At the undergraduate level, the School emphasize a hands-on learning approach by providing students with a firm foundation of both theory and practice of Computer Science and Electrical Engineering. The school also actively collaborates with other schools to expose students to the social, ethical, and inclusive dimensions of their chosen area of study, enabling them to make significant contributions to society.

The first batch of B.Tech. Students completed their graduation in 2013 and entered the world of innovation as capable engineers. At the post-graduate level, our faculty provides a deeper mastery of the basics and opportunities for research and professional capabilities for students in the field of Computer Science and Electrical Engineering.

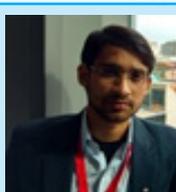
Our faculty members are engaged in both practical and theoretical research, often in partnership with government agencies, private industry and non-governmental organizations. National and international collaborations are a priority of the faculty. This aims towards the advancement of knowledge within our disciplines and also to contribute to society.

There were 30 Journal Papers, and 43 Peer Reviewed Conference Papers, 1 book/book chapters and 5 patents filed in 2022-23

For more information

Website: <https://scee.iitmandi.ac.in/faculty.php>

| Faculty Members | | | |
|-----------------|---|---|---|
| S. No. | Name | Specialization & Research Interest | Photograph |
| 1. | Dr. Aditya Nigam Chairperson, SCEE http://faculty.iitmandi.ac.in/~aditya/ | Deep Learning, Biometrics, Computer Vision, Image Processing, Computer Vision and Machine Learning |  |
| 2. | Dr. Adarsh Patel http://faculty.iitmandi.ac.in/~adarsh/ | Wireless Communications and Networks with the applications of signal processing, Game Theory, Machine Learning, Tensors, and Optimization based techniques. |  |
| 3. | Dr. Amit Kumar Singha http://faculty.iitmandi.ac.in/~amit/ | GaN-Based High-Frequency DC-DC Converters, DC-DC Converters for IoT Applications & Bifurcation Analysis of Digitally Controlled DC-DC Converter. |  |
| 4. | Dr. Anirban Sarkar https://sites.google.com/view/anirban-sarkar/homer | Developing IoT based smart reconfigurable, Advanced leaky-wave beam scanning antennas, On-body/off-body/invasive/non-invasive advanced, non-destructive, highly-sensitive and rapid-detecting electromagnetic intelligent Bio-sensors and Biomarkers. |  |
| 5. | Dr. Arnav Bhavsar Vinayak http://faculty.iitmandi.ac.in/~arnav/ | Computer Vision, Medical Image Analysis, Machine Learning, Deep Learning. |  |

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| 6. | Dr. Bharat Singh Rajpurohit http://faculty.iitmandi.ac.in/~bsr/ | Renewable Energies, Power Electronics and grid integration of Renewable Energies, Power System Harmonics, Power System (Operation, Control and Analysis), Parameter Estimation of electrical Machines® |  |
| 7. | Dr. Dileep A.D. http://faculty.iitmandi.ac.in/~addileep/ | Pattern Recognition, Kernel Methods for Pattern Analysis, Machine Learning, Speech Technology, Computer Vision. |  |
| 8. | Dr. Dinesh Singh https://faculty.iitmandi.ac.in/~dineshsingh/ | Computer Vision, Machine Learning and Big Data Analytics. |  |
| 9. | Dr. Gopal Rawat | Semiconductor Devices, Micro/Nano electronics, Sensors. |  |
| 10. | Dr. Gopi Shrikanth Reddy http://faculty.iitmandi.ac.in/~gopishrikanth/ | Antenna and Wave propagation, Microwave passive components, FSS and EBG structures, Electrically Small Antenna, MIMO/Diversity Antenna, Metamaterials. |  |
| 11. | Dr. Himanshu Misra http://faculty.iitmandi.ac.in/~himanshumisra/ | Electrical Drives, DFIG systems, Electric Vehicle, Renewable Energy, Power Converters. |  |
| 12. | Dr. Hitesh Shrimali http://faculty.iitmandi.ac.in/~hitesh/ | Analog and Mixed signal VLSI design, analog-to-digital converters and design of radiation hard circuits (space application). |  |
| 13. | Dr. Jinesh Machchhar http://faculty.iitmandi.ac.in/~jinesh/ | Geometric modeling, Simulation, Design. |  |

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| 14. | Dr. Kunal Ghosh http://faculty.iitmandi.ac.in/~kunal/ | Silicon solar cells, Performance and reliability analysis of photovoltaic modules. |  |
| 15. | Dr. Kaushik Halder https://sites.google.com/view/drkaushikhalder/home?authuser=0 | Control Systems, Intelligent Systems and Cyber-physical Systems. |  |
| 16. | Prof. Laxmidhar Behera https://faculty.iitmandi.ac.in/director/ | Robotics and Artificial Intelligence Intelligent Systems and Control, Cognitive Robotics, Nanorobotics, Vision based Control, Soft Computing, and Information Retrieval in music and language, Semantic Information Processing, Physics of Complex Systems, Cyber Physical Systems. Formation Control of UAVs, Brain-Computer Interface (BCI), Sanskrit Computational Linguistics. |  |
| 17. | Dr. Moumita Das http://faculty.iitmandi.ac.in/~moumita/ | Electric Vehicles: Power Converters and Control, Storage Aspect, Application of Wide Bandgap Devices (SiC, GaN) in Power Electronics & Use of Renewable Energy Sources for Charging of Electric Vehicles. |  |
| 18. | Dr. Narendra Kumar Dhar | Cyber-Physical System, Robotics and its Intelligent Control, Dynamical Systems. |  |
| 19. | Dr. Narsa Reddy Tummuru http://faculty.iitmandi.ac.in/~tummuru/ | Hybrid Energy Storage Applications in Future Microgrids, Efficient Power Electronic Interfaces in Renewable Energy Applications and Smartgrid Communication Networks. |  |
| 20. | Dr. Padmanabhan Rajan http://faculty.iitmandi.ac.in/~padman/ | Speech and audio processing , Analysis of music, Bioacoustics (analysis of natural sounds - bird calls, animal vocalisations) , Machine learning and pattern recognition, especially applied to audio signals. |  |
| 21. | Dr. Parimala Kancharla http://faculty.iitmandi.ac.in/~parimala/ | Generative Modeling, Deep Learning Based Video Compression, Multimedia Quality Assessment. |  |

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| 22. | Dr. Pratim Kundu http://faculty.iitmandi.ac.in/~pratim/ | Development of techniques for enhancing the reliability of power system operations using wide area measurements to avoid cascading failures. The research focuses on developing computational algorithms to improve smart grid operations. |  |
| 23. | Dr. Priyatosh Mahish https://scee.iitmandi.ac.in/faculty_personal.php?id=39 | Smart grid operation, Wide area power system monitoring and control, Grid-integration of renewable energy resources. |  |
| 24. | Dr. Radhe Shyam Sharma https://rsiitk.github.io/ | Robotics, Visual Servoing, Imitation Learning. |  |
| 25. | Dr. Rahul Shrestha http://faculty.iitmandi.ac.in/~rahul_shrestha/ | VLSI Design and Circuits & Systems for Signal Processing and Wireless Communication. |  |
| 26. | Dr. Rohit Saluja https://rohitsuja22.github.io/ | Optical Character Recognition, Road Safety, Computer Vision Applications related to Environment and Agriculture. |  |
| 27. | Dr. Samar Agnihotri http://faculty.iitmandi.ac.in/~samar/ | Information Theory, Wireless Communications and Networks, Computational and Communication Complexity. |  |
| 28. | Dr. Satinder Sharma http://faculty.iitmandi.ac.in/~satinder/ | VLSI Technology, CMOS Device Fabrication & Characterization, Advanced Lithography, Nanoelectronics. |  |
| 29. | Dr. Satyajit Thakor https://sites.google.com/site/satyajitthakor/ | Communication Theory, Information Theory, Network Coding. |  |

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| 30. | Dr. Shubhajit Roy Chowdhury http://faculty.iitmandi.ac.in/~src/ | Biomedical Embedded Systems, Non-invasive diagnostic systems, Near Infrared Spectroscopy, VLSI Architectures. |  |
| 31. | Dr. Siddharth Panwar https://scee.iitmandi.ac.in/faculty_personal.php?id=37 | Multivariate signal processing, Diagnostic predictive modeling, Data-centric machine learning. |  |
| 32. | Dr. Siddhartha Sarma http://faculty.iitmandi.ac.in/~siddhartha/index.html | Resource allocation in wireless networks, Wireless sensor network and IoT, Wireless energy harvesting. |  |
| 33. | Dr. Sreelakshmi Manjunath http://faculty.iitmandi.ac.in/~sreelakshmi/ | Communication Networks, Vehicular Networks, Control Theory, Non-linear Dynamics, Non-linear Controller Design & Time-delayed Systems. |  |
| 34. | Dr. Srinivasu Bodapati http://faculty.iitmandi.ac.in/~srinivasu | VLSI Design, Nanoelctronics, Hardware security, Cryptography and FPGA based system design. |  |
| 35. | Dr. Srikanth Sugavanam https://www.srikanthsugavanam.com/ | Fibre Lasers, Real-Time Laser Characterization Techniques. |  |
| 36. | Dr. Tushar Jain http://faculty.iitmandi.ac.in/~tushar/ | Control theory, fault tolerant control, industrial process control. |  |
| 37. | Dr. Varun Dutt http://faculty.iitmandi.ac.in/~varun/ | Artificial Intelligence, Human-Computer Interaction, Cognitive Science, Judgment and Decision Making. |  |

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| 38. | Dr. Varunkumar Jayapaul http://faculty.iitmandi.ac.in/~varunkumar/ | Algorithms and Data Structures. |  |
| 39. | Dr. Venkata Ratnam Vakacharla https://scee.iitmandi.ac.in/faculty_personal.php?id=40 | Power Electronics for Renewables, EV and WPT. |  |

List of Associated Faculty Members

| S. No. | Name | Specialization & Research Interest | Photograph |
|--------|---|--|---|
| 1. | Erwin Fuhrer, Visiting Faculty https://sites.google.com/iitmandi.ac.in/erwin-fuhrer/home | MRI, RF hardware, Biomedical Engineering. |  |
| 2. | Prof. Rajan Kapur, Adjunct Professor President, Larankelo Ventures LLC Boulder, Colorado, USA Adjunct Professor | Renewable Energy. Industrial Electronics. Head Mounted Displays. |  |
| 3. | Prof. Ramesh Oruganti, Adjunct Professor http://faculty.iitmandi.ac.in/~ramesho/ | Power Electronics, Solar photovoltaic energy systems. |  |
| 4. | Prof. Timothy A. Gonsalves Emeritus Professor (Honorary) http://faculty.iitmandi.ac.in/~tag/ | Computer networks and distributed software systems. |  |
| 5. | Prof. Yvonne Dittrich Adjunct Professor, IT University Copenhagen https://www.itu.dk/~ydi/ShortCV.htm | Software Engineering. |  |
| 6. | Prof. Kailash Srivastava Adjunct Professor | Power systems. |  |

| | | | |
|----|---|---|---|
| 7. | Dr. Astrid Kiehn Visiting Associate Professor http://faculty.iitmandi.ac.in/~astrid/ | Distributed Algorithms, Verification, Theoretical Computer Science. |  |
|----|---|---|---|

3.1.1. New Projects:

Names of PI, Co-PI, funding agencies and amount of grant received and amount spent etc.
Externally sponsored research projects

| S. No. | Name of the Faculty | Names of PI and Co-PI | Amount Sanctioned | Sponsoring Agency | Duration of Project |
|--------|---------------------|---|-------------------|---|---------------------------|
| 1. | Dr. Hitesh Shrimali | R. Shrestha, and G.S. Reddy | ₹95,00,000 | MeitY | 5 years |
| 2. | Dr. Kaushik Halder | Kaushik Halder | ₹1500000 | Seed grant | 2 years |
| 3. | Dr. Gopal Rawat | PI: Gopal Rawat, and Co-PI: Supriya Jaiswal | ₹549000 | HIMCOSTE | 2 Years |
| 4. | Dr. Gopal Rawat | PI: Gopal Rawat, and Co-PI: None | ₹1500000 | IIT Mandi | 2 Years |
| 5. | Dr. Gopal Rawat | PI: Shubhajit Roy Chowdhury, and Co-PIs: Gopal Rawat, Amit Balakrishna Pawar, Aniruddha Chakraborty, Aditya Nigam, Ashutosh Singh, Trayambak Basak, Bhaskar Mondal, Moupriya Das, Ratnam Venkata Vakacharla, Dinesh Singh, Priyatosh Mahish | ₹10744800 | iHub & HCL Foundation IIT Mandi | 2 Years |
| 6. | Dr. Anirban Sarkar | Dr. Anirban Sarkar, Asst. Prof. (SCEE) and Co-PI: Dr. Gopi Shrikanth Reddy, Asst. Prof. (SCEE) | ₹62,04,000 | iHub & HCI Foundation IIT Mandi | 2 Years |
| 7. | Dr. Anirban Sarkar | PI: Dr. Anirban Sarkar | ₹14,00,000 | IIT mandi Seed Grant | 2 Years |
| 8. | Dr. Rahul Shrestha | Dr. Rahul Shrestha, Dr. Hitesh Shrimali, and Dr. Gopi Shrikanth Reddy | ₹9600000 | MeitY- Microelectronics Development Division | 5 Years |
| 9. | Dr. B Srinivasu | B. Srinivasu | ₹18 Lacs | DST SERB | 2 years |
| 10. | Dr. B. Srinivasu | B. Srinivasu | ₹9 Lacs | IIT Mandi Seed grant | 3 years |
| 11. | Dr. Satyajit Thakor | PIs: Anuradha Sharma, IIIT Delhi, and Gleb Koshevoy, Russian Academy of Sciences, Co-PIs: India - Sudhir Ghorpade (IITB), Navin Kashyap (IISc), Satyajit Thakor (IIT Mandi), Lalitha Vadlamani (IIIT Hyderabad), | ₹1,04,35,281 | DST (India) and RSF (Russia) under Indo- Russian Joint Research | 06/01/2023- 05/01/2026 |

| | | | | | |
|-----|-----------------------------|--|--------------|---|----------|
| | | Mrinmoy Dutta (IIT Hyderabad), Naqueeb Ahmad Warsi (ISI Kolkata), Anoop Thomas (IIT Bhubaneswar), Samrith Ram (IIIT-Delhi), Shashank Vatedka (IIT Hyderabad). Russia - Grigory Kabatiansky (IST), Sergey Rebakov (IITP), Leonid Rybnikov (HSE), Evgeny Smirnov (HSE), Nikolay Bogachev (MIPT), Karine Kuyumzhiyan (HSE), Alexey Petukhov (IITP), Aleksei Ilin (HSE), Dmitri Gayfulin (IITP). | | | |
| 12. | Dr. Radhe Shyam Sharma | Dr. Amit Shukla, & Dr. Radhe Shyam Sharma | ₹1.5 Cr | MeitY | 5 Years |
| 13. | Dr. Shubhajit Roy Chowdhury | PI: Dr. Shubhajit Roy Chowdhury Co-PIs: Dr. Gopal Rawat, Dr. Priyatosh Mahish, Dr. Venkata Ratnam Vakacharla, Dr. Aditya Nigam, Dr. Dinesh Singh, Dr. Moupriya Das, Dr. Amit Balkrishna Pawar, Dr. Bhaskar Mondal, Dr. Trayambak Basak, Dr. Aniruddha Chakraborty | ₹1.07 Cr | DST-IIT Mandi iHub and HCI Foundation | 2 years |
| 14. | Dr. Shubhajit Roy Chowdhury | PI: Dr. Arnav Bhavsar Co-PI: Dr. Shubhajit Roy Chowdhury (IIT Mandi), Dr. Vikrant Kanwar (AIIMS Bilaspur) | ₹9.9 Lacs | DRISHTI, IIT Indore | 1 year |
| 15. | Dr. Shubhajit Roy Chowdhury | PI: Dr. Shubhajit Roy Chowdhury | kr60000 SEK | Swedish Research Council, Vattenspradet, Sweden | 2 years |
| 16. | Dr. Shubhajit Roy Chowdhury | PI: Dr. Varun Dutt, Co-PI: Dr. Shubhajit Roy Chowdhury, Dr. Arnav Bhavsar | ₹49.13 Lacs | INMAS, DRDO | 3 years |
| 17. | Dr. Shubhajit Roy Chowdhury | PI: Dr. Shubhajit Roy Chowdhury Co-PI: Dr. Shyam Kumar Masakapalli, Dr. Atul Dhar, Dr. Kaustav Sarkar, Dr. Mohammed Talha | ₹1.3 Cr | MoE | 10 years |
| 18. | Dr. Narendra Kumar Dhar | Dr. Narendra Kumar Dhar, Dr. Gopi Shrikanth Reddy, Dr. Nar Dr. Rohit Saluja | ₹2,24,29,000 | iHub and HCI Foundation, IIT Mandi | 2 years |
| 19. | Dr. Narendra Kumar Dhar | Dr. Narendra Kumar Dhar, Dr. Kaushik Halder | ₹99,84,000 | MHRD | 3 years |
| 20. | Dr. Narendra Kumar Dhar | Dr. Narendra Kumar Dhar | ₹15,00,000 | IIT Mandi | 2 years |

| | | | | | |
|-----|------------------|------------------|----------|-----------|---------|
| 21. | Dr. Adarsh Patel | Dr. Adarsh Patel | ©3198800 | SERB | 2 Years |
| 22. | Dr. Adarsh Patel | Dr. Adarsh Patel | ©1600000 | IIT Mandi | 3 Years |

3.1.2. Major Research Achievements including Products/Technologies developed/ISTP/DP/MTP

Outcome:

- Dr. Jinesh Machchhar proposed the problem of swept-volume computation has been open for more than 5 decades. No general computation framework existed, either open-source or proprietary. Such a framework has been proposed for the 2D case and is published in the top-tier CADG journal.
- Dr. Himanshu Misra developed the DP project (Silent Voices: Empowering Deaf and Blind Individuals through Communication Technology)
- Dr. Rahul Shrestha 1 DP project. 1 ASIC Chip Fabricated for Channel Decoder, compliant to 5G-NR standard.
- Dr. B Srinivasu Developed FPGA based mutual authentication for IoT devices., Developed FPGA based Encryption and Decryption for Image data using ASCON Cipher and Developed High Speed Adders for In Memory Computing using memristors.
- Dr. Satyajit Thakor A publication in IEEE Transactions on Information Theory, DOI: 10.1109/TIT.2022.3157623.
- Dr. Shubhajit Roy Chowdhury and Students in DP project received the second prize for building a Table Tennis ball dispenser system Nature India mentions our work on Device for early detection of Stroke in the year 2022. Link to the article. Selected as a Mentor by IEEE Instrumentation and Measurement Society mentoring programme for mentoring young scientists across the globe in the year 2022. Selected as Associate Editor of Frontiers in Medical Technology in the year 2022.

3.1.3. Publications:

Patents/Books/Book Chapters/ Papers National and International Journals/Conferences.

PATENTS

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2. A. K. Singha, "A Circuit for Determining Sampling Point of an Inductor Current and Method for Determining the Same," Indian Patent Application No.202211020702, 6 April, 2022.
3. A. K. Singha, "A System to Operate Boost Converter in a Discontinuous Conduction Mode and a Method Thereof," Indian Patent Application No. 202211020778, 6 April, 2022.
4. A. K. Singha, "A GaN-based Half Bridge Circuit and a Method Thereof," Indian Patent Application No.: 202211011441, Filing date: 3 March, 2022.
5. Dutt, V. Aggarwal, P., Katakwar, H., Utrani, S., and Sharma, M. Subnet Deception Tool – A testbed for understanding adversarial decision-making in the presence of subnetworks in realistic cyber deception scenarios (India Patent No. 202211005795). Indian Patent Office (2022).

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38. Bhargav, S., Choudhury, A., Kaushik, S., Shukla, R., Dutt, V. (2022). A Comparison Study of Abstractive and Extractive Methods for Text Summarization. In: Dua, M., Jain, A.K., Yadav, A., Kumar, N., Siarry, P. (eds) Proceedings of the International Conference on Paradigms of Communication, Computing and Data Sciences. Algorithms for Intelligent Systems. Springer, Singapore.
39. Akansha Tyagi, Padmanabhan Rajan, "Location-invariant representations for acoustic scene classification", Proc EUSIPCO 2022
40. Dr. Amit Kumar Singha attended IEEE PEDES conference.
41. Dr. G. Rawat attended IEEE International Conference on Computer, Electronics & Electrical Engineering and their applications (IC2E3), held on June 8th- 9th, 2023, at NIT Uttarakhand, India, 2023.
42. Dr. G. Rawat attended 6th IEEE International Conference on Emerging Electronics (ICEE), held at Bangalore, India, from 11th–14th Dec. 2022.
43. Dr. Satyajit Thakor attended IEEE Information Theory Workshop (ITW), Mumbai, India, November 2022 and a short Course on 5G and Beyond, IIT Kanpur, India, December 2022.

3.1.4. Outreach/Continuing Education Activities Organized:

1. Dr. Sreelakshmi PM participated in a workshop on the Effective Teaching of Computer Networks, Certification in Computer Science Education, Conducted in SSN College of Engineering, Chennai.
2. Dr. Himanshu Mishra Delivered an online talk on Operation and Control of wind-based Generation System at NITTR Chandigarh on 19th April 2022.
3. Dr. B Srinivasu was a part of HPKVN Embedded Systems course for HP Students. Also, he was

a speaker for Cryptography and Hardware Security workshop conducted by Rashtriya Raksha University (RRU), Gandhinagar.

4. Dr. Narendra Kumar Dhar conducted Hands-on Course on Embedded Systems and Model Predictive Control for Industrial Systems.
5. Dr. Satyajit Thakor successfully organized the 13th Joint Telematics Group/IEEE Information Theory Society Summer School on Signal Processing, Communications, and Networks, held virtually from June 20-23, 2022, at IIT Mandi. The event featured notable speakers like David Tse, Raymond W. Yeung, and Aylin Yener, who delivered insightful lectures on topics including blockchain protocols, information theory, and 6G wireless communications. The summer school, inaugurated by Prof. Laxmidhar Behera, Director, IIT Mandi, and Prof. Ajit Kumar Chaturvedi, Director, IIT Roorkee, attracted over 280 students and researchers worldwide. Distinguished academics like David Tse, Raymond W. Yeung, and Aylin Yener delivered insightful lectures on topics including blockchain protocols, information theory, and 6G wireless communications. The success of the event was made possible by the contributions of lecturers, participants, and sponsors, including IEEE Information Theory Society, Qualcomm, Saankhya Labs, COMSNETS Association, Google, IIT Mandi iHub & HCI Foundation, and Springer. For more information and recorded sessions, visit the summer school website <https://iitmandi.ac.in/jtg2022/> and https://drive.google.com/open?id=1ULTUYKPXQ5yB4wWVVUKDu7n_3qlhjwPi. Additionally, Dr. Thakor served as the publicity co-chair for the IEEE Information Theory Workshop (ITW) held in Mumbai, India, in November 2022.

3.1.5. Conf./Workshops/Other Inst./Industry Visited (India or Abroad) or Invited Lectures Delivered

Invited talks

1. Dr. Gopal Rawat delivered a talk on the "Nanoscale Devices and its Applications", Lovely Professional University, Punjab, India 2023, DST-SERB Sponsored Workshop on "Semiconductor Devices for IoT Applications"
2. Dr. Gopal Rawat delivered a talk on "Trends and Design of VLSI Considering the Technology Scaling" NIT Jalandhar, 2023, and on "Hands on Training for VLSI and Communication Modelling (HTVCM'23)"
3. Dr. Gopal Rawat delivered a talk on the "Nanoelectronic Devices and its Applications", VIT-AP University, 2023, and FDP on "Emerging Trends in Nano and Spin-based Electronics Devices and their Application"
4. Dr. Gopal Rawat delivered a talk on the "Semiconductor Electronics", IIT Mandi, 2023 during Teachers' Training Program at IIT Mandi, (SCERT-Delhi and IIT Mandi).
5. Dr. Gopal Rawat delivered a talk on the "Semiconductor Market Trends and Opportunities", K L University, Andhra Pradesh, India 2023, SERB Sponsored International Workshop on "Recent Trends Semiconductor Devices/ VLSI Chip Devices and its Sensor Applications".
6. Dr. Radhe Shyam Sharma delivered a talk on the "Smart Control Strategies for Autonomous Navigation of Mobile Robots" at TU Darmstadt, Germany, November 28, 2022.
7. Dr. Padmanabhan Rajan delivered an invited lecture on "AI for Bioacoustics" in Full-Stack Bioacoustics workshop, held at Leiden, the Netherlands in Aug 2022.

3.1.6. Professional Achievements, Honors, and Awards/Membership of Professional Societies

1. Dr. Hitesh Shrimali received the IIT Mandi Young Faculty Fellow Award.
2. Dr. Amit Kumar Singha is elevated to the grade of IEEE Senior member
3. Dr. Himanshu Misra became the senior member of IEEE.
4. Dr. Radhe Shyam Sharma received a travel grant from DAAD to visit several German Research Institutions
5. Dr. Narendra Kumar Dhar is an IEEE Member and actively participates in various committees at IIT Mandi, including the Senate, Health Services Management Committee, and Young Achiever Award committee under DORA. He received a Certificate of Appreciation for his significant contribution as the Faculty Advisor of the Robotronics Club under Students Gymkhana. Additionally, Dr. Dhar serves as an advisor for the Scholarship Committee, Robotronics Club, Student Gymkhana, and Technical Society.

6. Nature India mentioned the work of Dr Shubhajit Roy Chawdhury on Device for early detection of Stroke in the year 2022. He was selected as a Mentor by IEEE Instrumentation and Measurement Society mentoring programme for mentoring young scientists across the globe in the year 2022. Also, he was elected as Associate Editor of Frontiers in Medical Technology in the year 2022.
7. Dr. Adarsh Patel has demonstrated active involvement in the academic community by serving as a Technical Program Committee (TPC) member for conferences including IEEE International Conference on Signal Processing and Communications (SPCOM 2022), Conference on Computational Intelligence and Communication Networks (CICN 2022), International Conference on Intelligent Systems, Advanced Computing & Communication (ISACC 2023), National conference in Communications (NCC 2023), and International Conference on Communication Systems and Network Technologies (CSNT 2023). Additionally, he has contributed as a reviewer for respected journals such as IEEE Communication Letters, Signal Processing Letters, Transactions on Aerospace and Electronic Systems, and Transactions on Wireless Communications. Furthermore, Dr. Patel played a pivotal role as the Faculty Advisor of the MTech, CSP 2021-23 batch, drafting policies that facilitated internships for students, resulting in 90% placements for the cohort. He also served as the Faculty Advisor of the Mountain Biking (MTB) Club at IIT Mandi, overseeing the club's significant achievements and contributions from December 2019 to August 2023.

3.2 School of Mechanical and Materials Engineering (SMME)

School of Mechanical and Materials Engineering (SMME) is committed to serve society through innovation and excellence in engineering education and research focused on development of sustainable technologies.

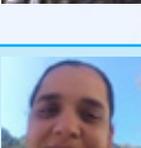
Our mission includes translation of research into the welfare of society, integration of research with engineering education; execution of external research projects towards engineering solutions via cross-disciplinary research approach etc. SMME is committed for high standard of engineering education through outstanding teaching, innovative curricula, and excellent research environment.

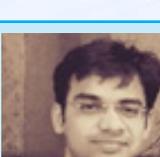
Currently, the school offers several diverse academic programs, such as Bachelor of Technology, Master of Technology, Master of Technology (by Research) as well as a doctoral program (PhD). The current streams of study are: Fluid and Thermal Engineering, Materials and Energy Engineering, Mechanical Design, Manufacturing, Computational Mechanics, Product Design, Electric Vehicles. Presently, School of Mechanical and Materials Engineering has 29 faculty members including 2 Professors, 12 Associate Professors, 15 Assistant Professor. There are currently 77 Ph.D. (including 2 ERPD & 2 Part time scholars), MS 22, M.Tech. 51 and B.Tech. 152 (Mechanical Engineering) students in the school.

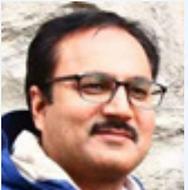
The main areas of research are Mechanical Design, Fluid and Thermal Engineering, Advanced Manufacturing, Materials Science and Engineering, Interdisciplinary areas like 3D Printing, Computational Mechanics, Product Design, and Electric Vehicles etc. In Materials and Design area, the focus is towards the development of materials for sensor, actuator & energy harvesting and energy storage applications and analysis of smart structures and systems.

In thermo-fluids engineering, faculty members are investigating Radiative heat transfer, Nano-scale heat transfer and Flow analysis & Heat transfer analysis of IC engines along with analysis of other engineering Systems. Energy efficient systems cover climate change studies, applications of phase change materials towards energy efficient buildings and the use of non-conventional energy sources to enhance energy efficiency. Sustainable Himalayan infrastructure encompasses the areas of slope stability, Geohazard zonation, waste management and performance based design. To this end a good number of sponsored research projects have been granted by agencies such as SERB, DRDO, ISRO, MoE, NRDMS, NMHS, MoES, DLR (German Aerospace Centre), BHEL etc. The school of Mechanical and Materials Engineering has several well equipped labs (Advanced Manufacturing lab, Composite Design and Manufacturing Research lab (CDML), Smart Material & Structure Research Laboratory (SMSL), Biomechanics Research Lab, Nano Fabrication for Energy Materials, Acoustics and Vibration lab, Nanoscale Materials & Devices Lab, Solar Thermal utilization and Thermal Energy storage lab.

| Faculty Members | | |
|-----------------|--|---|
| S. No. | Name and other details | Photographs |
| 1. | Dr. Atul Dhar, Chairperson & Associate Professor Specialization: IC Engines, Alternative Fuels, Emission Control PhD from IIT Kanpur (2013) Home Town: Sultanpur, Uttar Pradesh Phone: 01905-267143; Email: add@iitmandi.ac.in |  |
| 2. | Dr. Arpan Gupta, Associate Professor Specialization: Acoustics, Vibration, Bio-mechanics, Computational methods - FEM, CFD, Lattice Boltzmann Method Home Town: Indore, MP Phone: 01905-267922; Email: agupta@iitmandi.ac.in |  |

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| 3. | Dr. Amit Shukla, Assistant Professor Specialization: Control Systems, Robotics, Mechatronics, Machine Vision and Artificial Intelligence PhD from Imperial College, London in 2012. Home Town: Allahabad Phone: 01905-267222; Email: amitshukla@iitmandi.ac.in |  |
| 4. | Dr. Gaurav Bhutani, Assistant Professor Specialization: Fluid and Thermal sciences Ph.D. from Imperial College London (2016) Home Town: Delhi Phone: 01905-267108; Email: gaurav@iitmandi.ac.in |  |
| 5. | Dr. Gajendra Singh, Assistant Professor Specialization: Experimental Fluid Dynamics, Spray Atomization & Combustion, Advance Laser Diagnostics & Image Processing PhD from The University of Sydney, Australia Phone: 01905-267715; Email: gajendra@iitmandi.ac.in |  |
| 6. | Dr. Himanshu Pathak, Associate Professor Specialization: Computational Solid Mechanics, Fracture Mechanics, Functionally Graded Materials Ph.D. from Indian Institute of Technology, Patna (2015) Home Town: Muzaffarpur, Bihar Phone: 01905-267908; E-mail- himanshu@iitmandi.ac.in |  |
| 7. | Dr. Jaspreet Kaur Randhawa, Associate Professor Specialization: Nanomaterials. PhD from Gorakhpur University (2000) Home Town: Mohali, Chandigarh Phone: 01905-267056 Email: jaspreet@iitmandi.ac.in |  |
| 8. | Dr. Mohammad Talha, Associate Professor Specialization: Solid mechanics, Composite structures, Functionally graded materials, Structural mechanics, Uncertainty quantification and Imperfection sensitivity in composites PhD from IIT Kharagpur (2012) Home Town: Patna, Bihar Phone: 01905-267152; Email: talha@iitmandi.ac.in |  |
| 9. | Dr. Parmod Kumar, Assistant Professor Specialization: Thermal Engineering PhD from IIT Roorkee (2018) Home Town: Solan (Himachal Pradesh) Phone: 01905-267858; E-mail: parmody@iitmandi.ac.in |  |
| 10. | Dr. Pradeep Kumar, Associate Professor Specialization: Fluid and Thermal Science PhD from IIT Kanpur (2009) Home Town: Jaunpur, Uttar Pradesh Phone: 01905-267112; E-mail: pradeepkumar@iitmandi.ac.in |  |
| 11. | Dr. Prateek Saxena, Assistant Professor Specialization: Sustainable manufacturing, Tooling process chains, Paper-packaging, Additive Manufacturing and Tribology PhD from Technical University of Denmark Home Town: Jaipur Phone: 01905-267110; Email: prateek@iitmandi.ac.in |  |

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| 12. | Dr. Pydi Anil Kishan, Assistant Professor Specialization: Computational Fluid Dynamics PhD from IIT Kharagpur (2009) Home Town: Tirupati, Andhra Pradesh Phone: 01905-267141; E-mail: kishan@iitmandi.ac.in |  |
| 13. | Prof. Rajeev Kumar, Professor Specialization: Solid Mechanics, Vibration, FEM, Optimization PhD from IIT Roorkee in (2008) Home Town: Jaspur, Uttarakhand Phone: 01905-267148; E-mail: rajeev@iitmandi.ac.in |  |
| 14. | Prof. Rahul Vaish, Professor Specialization: Glasses & Glass-ceramics PhD (Engg.), Indian Institute of Science Bangalore (2010) Home Town: Badaun, Uttar Pradesh Phone: 01905-267139; E-mail-rahul@iitmandi.ac.in |  |
| 15. | Dr. Rajesh Ghosh, Associate Professor Specialization: Solid Mechanics, Biomechanics, Finite Element Analysis PhD from Indian Institute of Technology Kharagpur (2013) Home Town: West Bengal Phone: 01905-267903; E-Mail: rajesh@iitmandi.ac.in |  |
| 16. | Dr. Rik Rani Koner, Associate Professor Specialization: Hybrid Materials PhD from Indian Institute of Technology Guwahati (2009) Home Town: Ballour, West Bengal Phone: 01905-267220; Email: rik@iitmandi.ac.in |  |
| 17. | Dr. Satvasheel Ramesh Powar, Associate Professor Specialization: Dye-sensitized solar cells, Perovskite solar cells PhD from Monash University, Australia (2013) Home Town: Kolhapur, Maharashtra Phone: 01905-267136; Email: satvasheel@iitmandi.ac.in |  |
| 18. | Dr. Sudhir Kumar Pandey, Assistant Professor Specialization: Condensed Matter Physics and Material Sciences. Ph. D. from UGC-DAE Consortium for Scientific Research, Indore (2007) Home Town: Garhwa, Jharkhand Phone: 01905-267852; E-mail: sudhir@iitmandi.ac.in |  |
| 19. | Dr. Sunny Zafar, Assistant Professor Specialisation: Manufacturing Engineering Ph.D from Indian Institute of Technology, Roorkee (2016) Home Town: Chandigarh Phone: 01905-267268; E-mail- sunnyzafar@iitmandi.ac.in |  |
| 20. | Dr. Swati Sharma, Assistant Professor Specialisation: Materials and Manufacturing PhD from University of California, USA Hometown: Bhopal Phone: 01905-267830; E-mail: swati@iitmandi.ac.in |  |

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| 21. | <p>Dr. Vishal Singh Chauhan, Associate Professor Specialization: Design Engg. Electromagnetic Radiation during Deformation of metals and alloys, Solid Mechanics, FEM PhD from BIT Mesra, Ranchi (2009) Home Town: Sanawad, MP Phone: 01905-267044; E-mail: vsc@iitmandi.ac.in</p> |  |
| 22. | <p>Dr. Viswanath Balakrishnan, Associate Professor Specialization: Growth of functional materials/thin films, Electron microscopy & in situ exploration of structure-property relationships PhD (Materials Science) from IISc, Bangalore (2008) Home Town: Chidambaram, Tamil Nadu Phone: 01905-267142; E-Mail: chairse@iitmandi.ac.in, viswa@iitmandi.ac.in</p> |  |
| 23. | <p>Dr. Sarthak Nag, Assistant Professor Specialization: Thermal Engineering, Nanobubbles, and liquid phase electron microscopy PhD- Kyushu University Japan, 2022 Home Town: Palampur E-Mail: sarthak@iitmandi.ac.in</p> |  |
| 24. | <p>Dr. Mrityunjay Doddamani, Associate Professor Specialization: Manufacturing PhD: NIT Surathkal, 2012 Home Town: Dharwad, Karnataka Phone:1905-267264; E-Mail- mrityunjay@iitmandi.ac.in</p> |  |
| 25. | <p>Dr. Jagadeesh Kadiyam, Assistant Professor Specialization: Robotics PhD: IIT Indore, 2021 Home Town: Visakhapatnam Phone: 01905-267736; E-Mail: Jagadeesh@iitmandi.ac.in</p> |  |
| 26. | <p>Dr. Bukke Ravindra Naik, Assistant Professor Specialization: Electronic Materials- Semiconductors, and Display PhD: Kyung Hee University, 2022 Home Town: Y.S.R Kadapa, Andhra Pradesh Phone: 01905-267723; E-Mail: ravindra@iitmandi.ac.in</p> |  |
| 27. | <p>Dr. Deepak Sachan, Assistant Professor Specialization: Solid Mechanics and Design PhD: IIT Kanpur 2022 Home Town: Kanpur, Uttar Pradesh Phone: 01905-267737; E-Mail: dsachan@iitmandi.ac.in</p> |  |
| 28. | <p>Dr. Ranbir Singh, Assistant Professor Specialization: Energy Conversion Device Engineering (PVs, PENGs & TENGs) PhD: Politecnico di Milano, Italy 2014 Home Town: Hamirpur, Himachal Pradesh Phone: 8894639383; E-Mail: ranbir@iitmandi.ac.in</p> |  |

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| 29. | <p>Dr. Dube Dheeraj Prakashchand, Assistant Professor Specialization: Molecular Dynamics Simulations and Computation Molecules Biophysics PhD: Tata Institute of Fundamental Research 2021 Home Town: Mumbai E-Mail: dheeraj@iitmandi.ac.in</p> |  |
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| Adjunct Faculty Member | | |
|------------------------|--|---|
| S. No. | Name and other details | Photographs |
| 1. | Prof. Sandip Chaterjee Email: chatterjee.drsandip@gmail.com |  |

3.2.1 Research projects from IIT Mandi seed grants, sponsored projects, brief progress of the work done against each project, highlighting the major achievements during this period. Names of PI, Co-PI, funding agencies and amount of grant received and amount spent etc.

Seed grants projects:

| Sr. No. | Project No. | Project Title | Sponsoring Agency | Principal Investigator & Co-ordinator(s) | Dept./ School | Amount Sanctioned | Duration of Project | From | To |
|---------|-----------------|---|-------------------|--|---------------|-------------------|---------------------|-----------|-----------|
| 1 | IITM/SG/PAS/100 | Additive manufacturing of metal parts using fused filament fabrication technique | Seed Grant | Dr. Prateek Saxena | SMME | 15,00,000 | 2 years | 01.04.23 | 31.03.25 |
| 2 | IITM/SG/PKU/67 | Intelligent design of intakes for hydraulic machines to retard the vortex induced entrainment | Seed Grant | Dr. Parmod Kumar ⁹ | SMME | 8 Lakhs | 3 Years | July 2019 | July 2022 |

Externally Sponsored Research Projects

| S. No. | Project No. | Project Title | Sponsoring Agency | Investigators | Project Cost (in Rs.) | Duration of Project |
|--------|-----------------------|--|-------------------|---|-----------------------|---|
| 1. | IITM/DRDO/PK/355 | Development and Implementation of Non-Gray Radiation model for Combustion Applications | ARDB/DRDO | Pradeep Kumar and Gaurav Bhutani | Rs 32,91,807/- | 3 years, (11th Feb. 2022 to 10th Feb. 2025) |
| 2. | IITM/SERB-TARE/AM/354 | Phase selective CVD growth with controllable 1T-to-1H phase transition in WS ₂ monolayer for optoelectronic device applications | SERB | Dr. Viswanath (Coordinator-Mentor) Dr. Arul Prakash Jothi (PI) | Rs. 10,05,000/- | 3 years, (7-12-2021 to 7-12-2024) |
| 3. | IITM/IEEE/RK/339 | Design and development of an auto-tuned ventilator: A contactless treatment for COVID-19 patients | IEEE | Prof. Rajeev Kumar (PI) | Rs. 3,70,150/- | 1 year (1-09-2021 To 8-9-2022) |

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| 4. | IITM/SJVNL/ SUS/338 | Study for the optimum height of lift for mass concreting in concrete dam structures | SJVNL | Dr. Subhamoy Sen (PI) Dr. Himanshu Pathak (Co-PI) | Rs. 32,40,000/- | 2 years (21-09-2021 To 20-9-2023) |
| 5. | IITM/SERB/ SWS/361 | Development of oxidation-resistant glass - link carbon and carbon / carbon composites for high - temperature applications | SERB | Dr. Swati Sharma | Rs. 29,44,832 | 3 years (16-3-2022 To 15-03-2025) |
| 6. | IITM/MHRD- STARS/VB/295 | Phase selective CVD growth with controllable 1T-to-1H phase transition in WS ₂ monolayer for optoelectronic device applications | MHRD-STARS | Dr. Viswanath Balakrishnan (PI) | Rs. 49.95 lakhs | 2021-2024 |
| 7. | IITM/SERB- TARE/AM/354 | Fabrication of graphene coated heat sink for electrical vehicle battery thermal management. CNT coating has been carried out on Cu, SS in the form of sheet, foam and 3D printed structures to enhance the fast cooling of battery case. | TARE Grant, SERB | Dr.Arulprakasajothi M, Vel Tech, Chennai (PI) Dr. Viswanath Balakrishnan (Mentor) | Rs. 10.05 lakhs (IIT Mandi) | 2021-2024 |
| 8. | IITM/DRDO/ SZ/376 | A rapid method to manufacture carbon nanotubes on recycled carbon fibres to enhance mechanical performance composites thereof | AR&DB DRDO | Dr. Sunny Zafar & Dr. Himanshu Pathak | ₹ 20,64,180/- | August 2022 to August 2025 |
| 9. | IITM/DRDO/ HP/374 | Thermo-mechanical fatigue analyses of carbon fibre reinforced polymer composites for aerospace applications: experimental and modelling approach | AR&DB, DRDO | Dr. Himanshu Pathak & Dr. Sunny Zafar | ₹ 25,42,320/- | August 2022 to August 2025 |
| 10. | IITM/SERB/ GJS/382 | Parametric study of deagglomeration process in dry powder inhalers (DPI) | SERB | Dr.Gajendra Singh | 33,09,000 | 12.10.2022 to 11.10.2024 |
| 11. | IITM/SG/ GJS/85 | Experimental investigation of dispersion mechanisms in dry powder inhalers: focusing on shear and impaction- based deagglomeration | SERB | Dr.Gajendra Singh | 15,00,000 | 28.09.22 to 27.09.2025 |
| 12. | IITM/ HPSAMB/ HT/326 | Engineering design improvisation of packaging material leading to market friendly prototypes that retains Fruit quality | H.P. State Agriculture Marketing Board, H.P. Govt. Himachal Pradesh | Dr. Mohammad Talha | 17,88,000/- | 2021 to 2023 |
| 13. | IITM/SERB/ PAS/381 | 3D printing of continuous carbon fiber reinforced polymer composites using Fused Filament Fabrication | SERB | Dr. Prateek Saxena | 33,10,000 | 11.10.2022 to 10.10.2024 |
| 14. | IITM/SERB/ RBS/410 | Development of Bifacial Indoor Photovoltaics Prototype for Self-Powering Smart Internet of Things (IoTs) | DST | Dr.Ranbir Singh | 51 Lakhs | 07.03.2023 to 06.03.2026 |
| 15. | IITM/SERB/ PKU/428 | Development of an organic Rankine cycle-based system for recovery of waste heat from IC engines | SERB | Dr. Parmod Kumar | 39.09 Lakhs | 15.06.2023 to 15.06.2026 |

Brief progress details of selected projects:

PI- Dr. Parmod Kumar

Project Title: Intelligent design of intakes for hydraulic machines to retard the vortex induced entrainment

A new experimental facility studied pump intake vortex-induced air entrainment using cylindrical discharge tubes of varying diameters. Different vortex structures were observed based on pipe spacing. Results were published in *Physics of Fluids*, and further research is ongoing. Computational simulations are underway to understand interface evolution in detail.

PI- Dr. Pradeep Kumar & Dr. Gaurav Bhutani

Project Title: Development and Implementation of Non-Gray Radiation model for Combustion Applications Project No.

The HITEMP database has been utilized to calculate the radiative properties for different participating species like water vapor, carbon di-oxide etc. at different temperature, pressure and model fractions. Further, Full spectrum k- distribution method has been used to reorder random varying radiative properties into a monotonically increasing smooth function. The radiative transfer equation is solved using FSK for some small scale problem of Hydrogen combustion. We are in the process of developing a database of FSK distribution and an efficient algorithm to use this data for the solving of radiative transfer equations for more general and full scale problems.

PI- Dr. Viswanath Balakrishnan

Project Title: Phase selective CVD growth with controllable 1T-to-1H phase transition in WS₂ monolayer for optoelectronic device applications.

In the project related 2D materials, we are able to stabilize metastable phases in newer materials such as MoSe₂ and WSe₂. In addition, we also demonstrated the memristor devices utilizing the atomically thin 2D materials. For TARE project, we have developed a simple approach with the use of CNTs to address some issues related to battery thermal management.

3.2.2. Published Book

Mrityunjay Doddamani, H. S. Bharath, Pavana Prabhakar, SuhasiniGururaja, 3D Printing of Composites, Springer, 1st edition, <https://doi.org/10.1007/978-981-99-1730-3>.

P Kumar, A. Dhar, Basics of Thermodynamics, Published by AICTE

Recent Advances in Mechanical Engineering. FLAME 2022 (Lecture Notes in Mechanical Engineering)

3.2.3 Published Book chapters

1. S Sahu, P Kumar, A Dhar. Combustion, performance, and emissions characteristics of methanol-fueled engines. *Advancement in Oxygenated Fuels for Sustainable Development*, 263-283 2023.
2. A Srivastava, P Kumar, A Dhar. Methanol reformation-based strategies for using methanol as an internal combustion engine fuel: a brief overview. *Advancement in Oxygenated Fuels for Sustainable Development*, 61-79.
3. Automotive Exhaust Thermoelectric Generator Unit Integrated to Exhaust Noise Muffler: Heat Recovery and Noise Attenuation Simulations. Nag S.; Dhar A.; Gupta A., Year 2022, Pages 323-340.
4. Electrocaloric devices using cantilever structures. Novak N.; Patel S.; Vaish R. *The Electrocaloric Effect: Materials and Applications*, Year 2023, Pages 379-405
5. Ferroelectric ceramics and glass ceramics for photocatalysis Singh G.; Sharma M.; Bowen C.; Vaish R. *Ceramic Science and Engineering: Basics to Recent Advancements*, Year 2022, Pages 297-322
6. M. Jolly, K. Salonitis, E. Pagone, M. Papanikolaou, P. Saxena, *Energy Resilient Foundries: "The Small is Beautiful" projects*, Light Metals, Springer (Book chapter), 2022, Published.
7. A. R. Bhat, P. Saxena, Natural Fiber Reinforced Polymer nano-composites, *Nanomaterials for Sustainable Tribology 1*, Routledge, Taylor & Francis group (Book chapter), Published
8. A. Malik, N.S. Jammoria, A. Rafiq, P. Saxena, M.I.-Ul-Haq, A. Raina, *Nanocomposites and Tribology – Overview, Sustainability Aspects and Challenges*, *Nanomaterials for Sustainable Tribology 1*, Routledge, Taylor & Francis group (Book chapter), Published.
9. Strain Engineering of Metal Insulator Transition in VO₂, D Verma, V Balakrishnan, American

Institute of Physics, AIP, USA, 2023.

10. Kumar R., Rani M., Zafar S. (2022). Microwave-Based Manufacturing of Epoxy/Fiber Composites. In: Mavinkere Rangappa S., Parameswaranpillai J., Siengchin S., Thomas S. (eds) Handbook of Epoxy/Fiber Composites. Springer, Singapore.
11. Zafar S., Verma N., Singh M.K., Pathak H. (2021), Advances in the Processing of Composites Biomaterials for Bone Grafting and other Biomedical Applications. In Encyclopaedia of Materials: Plastics and Polymers, Elsevier doi:10.1016/B978-0-12-820352-1.00100-0
12. S. Pardhe, J. Ahamad, I. Singh, P. Kumar, A. Dhar, Strategies for Efficient Utilization of Methanol in Compression Ignition Engines, Renewable Fuels for Sustainable Mobility, 161- 182, 2023.
13. A. Srivastava, P. Kumar, A. Dhar, Methanol reformation-based strategies for using methanol as an internal combustion engine fuel: a brief overview, Advancement in Oxygenated Fuels for Sustainable Development, 61-79, 2023.
14. S. Sahu, P. Kumar, A. Dhar, Combustion, performance, and emissions characteristics of methanol-fueled engines, Advancement in Oxygenated Fuels for Sustainable Development, 263-283, 2023.
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- Chandel VS and Talha M. Nonlocal stochastic bending response of functionally graded porous nanobeams under thermal environment using FOPT. 8th Asian conference on mechanics of functional materials and structures, IIT Guwahati, 11-14 December 2022.
- Shakir M, and Talha M, Transient analysis of graphene reinforced FG-porous sandwich plates subjected to underwater blast. 67th Congress of the Indian Society of Theoretical and Applied Mechanics (ISTAM), IIT Mandi, 14-16 December 2022.
- Sharma P, Shakir M, and Talha M, on the natural frequency of shear deformable FGM plates with symmetric and asymmetric porosity distributions. 67th Congress of the Indian Society of Theoretical and Applied Mechanics (ISTAM), IIT Mandi, 14-16 December 2022.

3.2.10. International conferences papers/Conference attended and papers presented

Dr. Atul Dhar

- Organised a Track on "Environment and Sustainability" in Sustainable Energy and Environmental Challenges" (VII-SEEC) organized from December 16th – 18th, 2022, at the Indian Institute of Technology (BHU), Varanasi, India, under the auspices of the International Society for Energy, Environment and Sustainability (ISEES).

Dr. Mohammad Talha

- Amir M., Talha M., and Kim S W. "Uncertain Eigenvalue Analysis of Nonlinear Finite Element Modelled Sandwich Panel with the Graded Cellular Core." (2022): 94-95.
- Shakir M, Talha M., and Bassir D. Influence of structural damping on impulse response of sandwich plates with FG-porous graphene reinforced core. 20th International Conference of Numerical Analysis and Applied Mathematics, Crete, Greece, 19-25 September 2022.
- Fahed M., Talha M, and Bassir D. Stochastic Buckling Analysis of functionally graded porous beams reinforced with graphene platelets, 20th International Conference of Numerical Analysis and Applied Mathematics, Crete, Greece, 19-25 September 2022.
- Chandel VS, Talha M, and Bassir D. Thermo-elastic vibration analysis of gradient sandwich nanobeams and its possible application for biomass-sensor. 3rd International Conference on Biomaterials & Biodevices, 10-11 November 2022, Millennium Hotel Paris Charles De Gaulle, Paris, France.
- Shakir M, Talha M, and Dileep A. D. Artificial neural network based frequency predictions of FG-GPL reinforced porous plates. 8th International Conference on Computational Mechanics and Simulation, IIT Indore, 09-11 December 2022.

- Shakir M, Talha M and Dileep A. D. Machine learning aided stochastic vibration analysis of functionally graded graphene nanoplatelets reinforced porous plates. International Conference on Advanced Topics in Mechanics of Materials, Structures and Construction (AToMech2023), PMU, Al-Khobar, Saudi Arabia, 12-14 March 2023.

Dr. Arpan Gupta

- S. Yadav and A. Gupta, "A Mechanical Contrivance for Acoustic Levitation and Mixing of Particles," *Lect. Notes Mech. Eng.*, pp. 1–8, 2022.
- N. Chaudhary and A. Gupta, "Multi-body Analysis for a Four-Bar Mechanism Using RecurDyn and MATLAB," *Lect. Notes Mech. Eng.*, pp. 1813–1823, 2022.
- S. Nag, A. Dhar, and A. Gupta, "Automotive Exhaust Thermoelectric Generator Unit Integrated to Exhaust Noise Muffler: Heat Recovery and Noise Attenuation Simulations," *Energy, Environ. Sustain.*, pp. 32vb3–340, 2022.
- N. Rana, A. Varshan, and A. Gupta, "System Identification of Two Wheelers Using a Smartphone," in *Recent Advances in Computational and Experimental Mechanics, Vol II. Lecture Notes in Mechanical Engineering.*, D. K. Maiti, Ed. Springer, Singapore, 2022, pp. 557–566.
- S. Dogra, L. Singh, and A. Gupta, "Low-Cost Portable Smart Ventilator," *Lect. Notes Mech. Eng.*, pp. 599–606, 2022.
- A. Varshan, N. Rana, and A. Gupta, "Modeling and Analysis of Active Suspension System," in *Recent Advances in Computational and Experimental Mechanics, Vol II. Lecture Notes in Mechanical Engineering*, D. K. Maiti, Ed. Springer, Singapore, 2022, pp. 567–581.
- S. Dogra and A. Gupta, "Low-Frequency Noise Control in Ducts," *Lect. Notes Mech. Eng.*, pp. 527–535, 2022.

Dr. Anil Kishan

- Pushpendra Kumar Shukla and P. Anil Kishan, Solar Thermal Energy Storage with Phase Change Material for Domestic Active Space Heating Applications, Proceedings of CONV-22: Int. Symp. on Convective Heat and Mass Transfer, June 5 – 10, 2022, Turkey, , ISSN Online:2642-3499, ISBN Online:978-1-56700-523-3

Dr. Sunny Zafar

- Rampal* and Sunny Zafar, Characterization of microwave-drilled holes in kenaf-reinforced epoxy composites, International Conference on Precision, Micro, Meso and Nano Engineering (COPEN-2022), 2022, Indian Institute of Technology Kanpur, Kanpur, Uttar Pradesh, India.
- Nishant Verma, Rajeev Kumar*, Himanshu Pathak, Sunny Zafar, Influence of UV exposure on von-Mises stress and average strain of liner in total knee replacement, Proceedings of the 8th Asian Conference on Mechanics of Functional Materials and Structures, 2022, Indian Institute of Technology Guwahati, Guwahati, Assam, India.
- Rajeev Kumar*, Sunny Zafar, A novel technique for fabricating high-impact strength carbon fiber composite using vacuum-assisted resin infusion microwave curing process, Proceedings of 3rd International Conference on Advances in Materials & Processing: Challenges & Opportunities, 2022, Indian Institute of Technology Roorkee, Roorkee, India.
- Nishant Verma*, Himanshu Pathak, Sunny Zafar, Comparative study on the mechanical behavior of microwave-assisted compression molded and conventionally compression-molded nano-hydroxyapatite reinforced UHMWPE composite, Proceedings of 4th International Conference on Materials: Advanced and Emerging Materials, 2022, Barcelona, Spain.
- Nishant Verma*, Himanshu Pathak, Sunny Zafar, Applications of microwaves and the ultra-violet irradiations for the development of cross-linked UHMWPE plates for biomedical applications, Proceedings of 3rd International Conference on Advances in Materials & Processing: Challenges & Opportunities, 2022, Indian Institute of Technology Roorkee, Roorkee, India.
- Nishant Verma*, Himanshu Pathak, Sunny Zafar, Surface roughness and heat-affected zone in laser beam machining of UV exposed UHMWPE, Proceedings of 9th International Conference on Advancements and Futuristic Trends in Mechanical and Materials Engineering 2021, Indian Institute of Technology Ropar, Ropar, India.

Dr. Parmod Kumar

1. D. Debnath, S. Mishra, P. Kumar, S.K. Mitra, "Understanding the dynamics of underliquid drop spreading", Paper ID: 437, ICMF 2023, April 02-07, 2023, Kobe, Japan.
2. S. Patel, P. Kumar, "Frequency analysis of direct contact condensation using the wavelet transform during the vertical steam injection on the subcooled water pool", Paper ID: 4440, FMFP 2022, December 14-16, 2022, IIT Roorkee, India.
3. R. K. Mondal, P. Kumar, "Investigation of plug hole vortices during the drainage of water from a rectangular tank using two outlets" Paper ID: 766, ICMF 2023, April 02-07, 2023, Kobe, Japan.
4. R. K. Mondal, P. Kumar, "Influence of liquid discharge rate on the genesis of bathtub vortices with air-entrained structures during draining of a water pool through multiple outlets" Paper ID: 9079, FMFP2022, December 14-16, 2022, IIT Roorkee, India.

Dr. Pradeep Kumar

1. S. S. Rathore, B. Mehta, P. Kumar, and M. Asfer, "Parametric Study on the Primitive lattice using the Pore-scale Simulation to characterize the Flow and Heat Transfer Performance", 9th International and 49th National Conference on Fluid Mechanics and Fluid Power on December 2022 at IIT Roorkee, India.

Dr. Prateek Saxena

1. P. Saxena, S. Gangwar, J. Luo, M. Lu, M. El. Mansori, T. Sivarupan; Sand selection for generic design of functional sand mould 3D printing; International conference on Design for 3D printing, NTU, Singapore, 2022
2. N. Kalita, P. Saxena, M. Talha; Numerical analysis and optimization of ventilated corrugated fiberboard packages for apple industry; 20th Indian Society of Mechanical engineers (ISME) conference, IIT Ropar, 2022
3. V. Gupta, P. Saxena; Investigations on the properties of the short carbon finer reinforced nylon 6 composite filaments for 3D printing of the functional parts using Fused Filament Fabrication; 3rd International workshop on Reliability and Design of Additively Manufactured Materials, Belgrade, Serbia 2022

Dr. Himanshu Pathak

1. Manish Kumar, Himanshu Pathak, Phase-field modeling of crack propagation merging and nucleation, Proceeding of 8th Asian Conference on Mechanics of Functional Materials and Structures (ACMFMS-2022), December 2022, IIT Guwahati.
2. Kishan Dwivedi, Himanshu Pathak, Fatigue crack growth in fiber-reinforced polymer composite laminate using higher-order XFEM, Proceeding of 8th Asian Conference on Mechanics of Functional Materials and Structures (ACMFMS-2022), December 2022, IIT Guwahati.
3. Kishan Dwivedi, Himanshu Pathak, Fatigue crack growth in fiber-reinforced polymer composite laminate using higher-order XFEM, Proceeding of 8th Asian Conference on Mechanics of Functional Materials and Structures (ACMFMS-2022), December 2022, IIT Guwahati.
4. Kishan Dwivedi, Himanshu Pathak, Crack modelling using higher-order eXtended finite element method, Proceeding of International Conference on Computational Modelling Simulation and Optimization, December 2022, Asian Institute of Technology Bangkok.
5. Nishant Verma, Himanshu Pathak, Sunny Zafar, Applications of microwaves and the ultra-violet irradiations for the development of cross-linked UHMWPE plates for biomedical applications, Proceedings of 3rd International Conference Advances in Materials and Processing: Challenges & Opportunities, October 2022, IIT Roorkee.
6. Nitin Pathak, Himanshu Pathak, Fatigue performance of recycled glass-epoxy composite for wind turbine blades: a multi-scale modeling approach, Proceeding of 20th Indian Society of Mechanical Engineers, May 2022, IIT Delhi.

3.2.11. Invited Lecturers/Talks/Continuing Education Programs**Dr. Atul Dhar**

1. Delivered lecture on "Value Analysis and Value Engineering" in HPKVN sponsored hands on course on Product Design and Manufacturing organised at IIT Mandi during 13 December 2022 to

03 January 2023

- Delivered lecture on “Fundamentals of Combustion and Demonstration of Engine Combustion Simulations.” in HPKVN sponsored Hands-on Training of Computation Fluid Dynamics organised at IIT Mandiduring November 01-19, 2022

Dr. Himanshu Pathak

- Invited lecture in ATAL FDP on Computational and Experimental Analysis of Advanced Materials and Structures, October 2022, IIT Ropar.
- Invited lecture in FDP on ICT in Teaching Learning Process, March 2023, Tezpur University and IIT Roorkee.
- Invited lectures in FDP for Government Engineering College Teachers of Himachal Pradesh, June 2022, IIT Mandi.
- Invited lectures in FDP for Government Polytechnic College Teachers of Himachal Pradesh, July 2022, IIT Mandi.
- Invited lectures in HP-KVN Course on Computational Fluid Dynamics, November 2022, IIT Mandi.
- Invited lectures in HP-KVN Course on Finite Element Modelling, November 2022, IIT Mandi.
- Invited lectures in HP-KVN Course on Product Design and Development, December 2022, IIT Mandi.

Dr. Prateek Saxena

- Invited Mr. Christian Lahoda, Research Engineer at TU Berlin (Germany) from 3rd April – 28th May.

Dr. Pradeep Kumar

- Global Center of Excellence in Affordable and Clean Energy at IIT Dharwad.
- Motilal Nehru National Institute of Technology, Allahabad, Prayagraj.
- Indian Institute of Technology Ropar, Rupnagar, Punjab.
- Aeronautical Development Agency (ADA), Bengaluru, India
- VSSC at ISRO, Thiruvananthapuram, Kerala.

Dr. Parmod Kumar

- Delivered an invited talk on “Performance enhancement of methanol reforming reactor utilizing engine exhaust heat for hydrogen generation” in VII International Conference on Sustainable Energy and Environmental Challenges (VII SEEC) organized by IIT (BHU) Varansi.
- Delivered an invited talk on “Advances in Waste Heat Recovery Technologies” at Bajaj Institute of Technology, Wardha, Maharashtra.
- Delivered an invited talk on “Understanding of boiling heat transfer over curved surfaces” at Mahatma Gandhi Govt. Engineering College Jeori, Rampur, H.P.

Dr. Anil Kishan

- Delivered lectures (for 5 sessions) on Computational Fluid Dynamics at IIT Mandi as part of HPKVN, during 1-19 Nov 2022
- Delivered lectures (for 2 sessions) on Calculus and Applications to Teachers of SCERT, New Delhi, during 26 Feb – 1 Mar 2023.

Dr. Rajesh Ghosh

- Invited Talk: “Impact of implant design, implant-bone interfacial conditions and bone quality on performance of tibial component for Total Ankle Replacement”: 13th August, 2022. 13th Lecture of ASTHI (Anabolic Skeletal Targets in Health and Illness) Webinar Series.CSIR-Central Drug Research Institute, Lucknow.

Dr. Sunny Zafar

- Studies on temperature profile and defects during microwave - assisted compression - molding

and conventionally compression-molding process, COPEN-12, 09th December 2022, IIT Kanpur [online]

2. Design for Manufacturing, Expert Invited Talk, 03rd November 2022, NIT Uttarakhand [online]
3. Non-Traditional Machining Processes, FDP, 23rd July 2022, IIT Mandi [online]
4. Manufacturing and characterizations of natural fiber-reinforced polymer composites through microwave-assisted compression molding, SERB Sponsored Online Karyashal under Accelerate Vigyan scheme on “Green Materials and Manufacturing: Concepts, Practices, and Needs, 23rd June 2022, NIT Meghalaya [online]
5. Manufacturing & Recycling of polymer composites using microwave energy, Online workshop “Novel Materials: Processing, Characterization, and Applications”, 25th May 2022, NIT Uttarakhand [online]
6. Expert Lecture on EDM & LBM, Expert Talk, 11th May 2022, RGEC Kangra [online]
7. Green Composite and its Processing, Expert talk, 10th February 2022, ABES Engineering College, Ghaziabad [online]

3.2.12. Short Term Course/Workshop organized during 1-4-2021 to 31-3-2022

1. Finite Element Modelling

Dr. Himanshu Pathak organised one month workshop on Finite Element Modelling under HP-KVN scheme, November 2022, IIT Mandi. The Centre for Continuing Education at the Indian Institute of Technology, Mandi, in collaboration with Himachal Pradesh KaushalVikas Nigam, Shimla, concluded a course on “Finite Element Modelling for Engineering”. The course was conducted in the North campus of IIT Mandi during 23rd November to 13th December 2022. The course was a fully residential program where students learn about the basics of finite element modelling and their applications to different industrial domains. This course consists of 62 sessions which had lectures and practice sessions of 90 hours. The course introduce basic equations of practical engineering problems, mathematical principles of FEM, implementation of FEM for variety of problems, formulation and implementation of non-linear FEM, case studies and limitations of FEM, motivation for eXtended finite element method (XFEM), formulation and implementation of XFEM. The participants were able to implement FEM/XFEM in various engineering applications with FEM software. Examples were demonstrated with MATLAB and ANSYS software packages. A total of 80 students were selected from over 144 students throughout Himachal Pradesh and were given an opportunity to be a part of this course.





2. **Dr. Prateek Saxena** Organised HPKVN sponsored hands on course on Product Design and Manufacturing with **Dr. Sunny Zafar** from 13th Dec 2022 to 3rd Jan 2023.



3. HPKVN sponsored course on “Hands-on Training of Computational Fluid Dynamics” was organized from November 01-19, 2022.



3.2.13. Professional Faculty/students Achievements/Honours/Awards

1. Dr. Atul Dhar: Young Faculty Fellow-2023 by IIT Mandi
2. Dr. Mrityunjaya Doddamani:
 - a) Prof. Satish Dhawan Young Engineer State Award, Govt. of Karnataka, 2023
 - b) Featured in Top 2% Scientists, 2022 Ranking List by Elsevier BV.
3. Dr. Prateek Saxena: Received Paired Early Career Fellowship in Applied Research from Indo-German Science and Technology centre.
4. Dr. Mohammad Talha:
 - a) The 2nd best paper award for paper entitled “Effect of graphene platelets reinforcement on vibration behavior of functionally graded porous arches under thermal environment” at the International conference on thermo-fluids and systems designs (ICTFSD-2022) held at BIT Mesra, Ranchi, India.
 - b) Guest Researcher, (24 Oct –23 Dec, 2022), Université de Technologie Belfort-Montbéliard, 90010 Belfort Cedex, France

3.2.14. Membership of Professional Societies

1. Dr. Mrityunjaya Doddamani: American Society of Metals
2. Dr. Mohammad Talha:
 - a) ASME: American Society of Mechanical Engineers
 - b) IEI: Member, The Institution of Engineers (INDIA)
3. Dr. Sunny Zafar: Life member of Tribological society of India

3.2.15. Outreach Activities

Dr. Prateek Saxena

1. Conducted four (theory + lab) sessions on Additive manufacturing in the FDP program for the

- faculties of government engineering institutions in HP (22 – 27 Aug 2022)
- Coordinated the FDP program (Mechanical engineering) and organized four (theory + lab) sessions on Additive manufacturing for the faculties of polytechnic institutions in HP (18 -24 July 2022)
 - An expert lecture on the “Recent trends in Additive Manufacturing” is scheduled on 18th November, 2022 at JNGEC Sundernagar (for 3rd and 4th year UG Mechanical students).
 - Mentoring the team “HPD Pumps” incubated at catalyst, IIT Mandi under Nidhi-Prayas Scheme
 - Mentoring the team “Mechanical chef” incubated at the catalyst, IIT Mandi.
 - Attended a 48 hours extensive online course on “Additive Manufacturing: Principle, Technologies & Applications” from 24th September 2022 to 21st January 2023 organized by IIT Indore and RRCAT (Raja Ramanna Center for Advanced Technology).
 - Visited IIT Ropar in October 2022 to discuss about the prospective collaborative opportunities
 - Attended the seminar “Indigenous Development of Futuristic Aerospace Technologies including Way Forward for Development of Indigenous Aero Engines” during the AERO INDIA – 2023, Bangalore.

Dr. Mohammad Talha

- Title: Graphene Reinforced Functionally Graded Porous Panels for Engineering Applications, Université de Technologie Belfort-Montbéliard, 90010 Belfort Cedex, France, December 14, 2022.
- Title: Mathematical Modelling and Analysis of Functionally Graded Porous Panels, Finite Element Modelling research Group, Laboratory Soete, Faculty of Engineering and Architecture, Ghent University, Belgium, December 19, 2022.
- Associate Editor, International Journal for Simulation and Multidisciplinary Design Optimization (IJSMDO): EDP Sciences

3.2.16. Vehicle Dynamics Laboratory

1. Hybrid Drivetrain Experimental Setup with Data logger

The Hybrid Drivetrain Experimental Setup with Data Logger is a laboratory apparatus designed to simulate and analyse the performance of a hybrid electric vehicle (HEV) drivetrain. The setup consists of various components such as an internal combustion engine, electric motor, battery pack, transmission, and other supporting equipment.

The purpose of this setup is to investigate the behaviour and efficiency of hybrid powertrains, specifically in the context of HEVs. By varying different parameters, such as motor speed, battery state of charge, and load, researchers can evaluate the impact on fuel economy and emissions. The setup is also equipped with a data logger, which enables the capture and analysis of critical data such as voltage, current, and power levels.

Overall, the Hybrid Drivetrain Experimental Setup with Data Logger is a valuable tool for researchers and engineers to investigate and optimize hybrid powertrains for improved efficiency and reduced environmental impact.



2. Two Wheeler Electric Vehicle Training Working Model for Training

The 2-Wheeler Electric Vehicle Training Working Model is a practical, hands-on training tool designed to teach individuals about electric vehicles (EVs) specifically focusing on 2-wheeler EVs. It is essentially a scaled-down version of a real 2-wheeler EV, complete with a motor, battery, charging system, and other components.

The working model allows individuals to get a comprehensive understanding of the various parts and systems that make up an EV. It can be used to demonstrate how the motor works, how the battery stores and delivers energy, and how the charging system operates. Additionally, it can be used to showcase the various safety features and systems that are integrated into EVs.



3. Three Wheeler Electric Vehicle Training Working Model for Training

The 3-Wheeler Electric Vehicle Training Working Model is a practical, hands-on training tool designed to teach individuals about electric vehicles (EVs) specifically focusing on 3-wheeler EVs. It is essentially a scaled-down version of a real 3-wheeler EV, complete with a motor, battery, charging system, and other components.

The working model allows individuals to get a comprehensive understanding of the various parts and systems that make up an EV. It can be used to demonstrate how the motor works, how the battery stores and delivers energy, and how the charging system operates. Additionally, it can be used to showcase the various safety features and systems that are integrated into EVs.



4. Four Wheeler Electric Vehicle Training Working Model for Training



The 4-Wheeler Electric Vehicle Training Working Model is a practical, hands-on training tool designed to teach individuals about electric vehicles (EVs) specifically focusing on 4-wheeler EVs. It is essentially a scaled-down version of a real 4-wheeler EV, complete with a motor, battery, charging system, and other components.

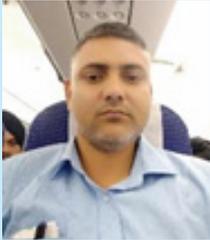
The working model allows individuals to get a comprehensive understanding of the various parts and systems that make up an EV. It can be used to demonstrate how the motor works, how the battery stores and delivers energy, and how the charging system operates. Additionally, it can be used to showcase the various safety features and systems that are integrated into EVs. And the students will collect data for analysis as well.

3.3 School of Civil & Environmental Engineering (SCENE)

School of Civil & Environmental Engineering (SCENE) is committed to serve the society through innovation and excellence in engineering, education and research with main focus on sustainable development and technological advancement. Our mission includes translation of research into the welfare of society, integration of research with engineering education; execution of external research projects towards engineering solutions via cross-disciplinary research approach etc. We are engaged in multidisciplinary and holistic teaching and learning to achieve global standards in skill and research development towards self-reliant nation. Developing innovative and sustainable solutions for resilient infrastructure with specific focus on mountain hazards. Developing socio-techno-economic-green solutions to alleviate climatic and anthropogenic catastrophes. Imbibing flexible, critical, creative and ethic centered principles in the education and research process. We are committed for high standard of engineering education through outstanding teaching, innovative curricula, and excellent research environment. SCENE offers B.Tech. in Civil Engineering; M.Tech. in Structural Engineering and M.Tech. (Research) in a number of different branches such as Structural Engineering, Geotechnical Engineering, Water Resource Engineering and Environmental Engineering. Presently, there are 22 faculty members including 06 Associate Professors, 13 Assistant Professor, 1 Adjunct Professor, 1 Distinguished Visiting Professor and 1 DST inspire fellow. There are currently 69 Ph.D. students, 13 M.Tech. (Research), 17 M.Tech. and 112 (48+36+25+03) B. Tech. students in the school.

The School has state-of-the-art laboratory and computational facilities to support cutting-edge research in the various disciplines of Civil and Environmental Engineering. We have several well equipped UG labs such as Structural Analysis Lab (SAL), Construction Material Lab (CML) Lab, Transportation Lab, Survey Lab, Geotechnical Lab, Environmental Engineering Lab, Rock Mechanics and Earth Science (RoMES) Lab, Water Resource Engineering (WRE) Lab. Along with these, we also have many advanced laboratories such as Advanced Structural Engineering lab (AdSEL), I4S Lab, Geohazard Lab, Advanced Hydrology Lab, Disaster Extremes and Environmental Remote Sensing (DExtER) Lab, Sigma HVR Lab, Atmospheric Chemistry and Climate Change Lab, Multi-Hazard Analysis and Infrastructure Design (MH-AID) laboratory etc. We have successfully secured research and consultancy projects from several renowned external funding agencies such as SERB, DRDO, ISRO, MoE, NRDMS, MoES, DLR (German Aerospace Centre), SDMA, NDMA etc. Currently, there are several ongoing research and consultancy projects with SCENE faculty. We are striving our best to bring excellence in all domains of Civil and Environmental Engineering.

| Faculty Members | | |
|-----------------|---|---|
| S. No. | Name and other details | Photographs |
| 1. | <p>Dr. Dericks Praise Shukla, Chairperson & Associate Professor Specialization: Remote Sensing & GIS Geinformatics; Natural Hazards; Landslides; Permafrost; Glacial Studies; Environmental Geology Ph.D. from University of Delhi (2012) Home Town: Allahabad, Uttar Pradesh Contact: 01905-267147 Email- dericks@iitmandi.ac.in, chair_scene@iitmand.ac.in</p> |  |
| 2. | <p>Dr. Deepak Swami, Associate Professor Specialization: Water Resources Engineering Groundwater flow and transport modelling, Water resources development and management, Disaster mitigation specially related to floods and flash flood. Ph.D. from IIT Roorkee (2014) Home Town: Kota, Rajasthan Phone: 01905-267265; Email- deepak@iitmandi.ac.in</p> |  |

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| 3. | <p>Dr. Venkata Uday Kala, Associate Professor Specialization: Geotechnical Engineering Landslide Monitoring, Landslide mitigation, Innovations in Disaster management, Environmental Geotech Ph.D. from Indian Institute of Technology, Bombay (2013) Home Town: Hyderabad Phone: 01905-267703; E-mail: uday@iitmandi.ac.in</p> |  |
| 4. | <p>Dr. Kaustav Sarkar, Associate Professor Specialization: Structural Engineering Durable Infrastructure; Climate-sensitive design; Construction Materials Ph.D. from Indian Institute of Technology, Delhi (2016) Hometown: Kolkata, West Bengal Phone: 01905-267901; Email-srkr@iitmandi.ac.in</p> |  |
| 5. | <p>Dr. Rajneesh Sharma, Associate Professor Specialization: Structural Engineering Mechanics of Composite materials, Design of nontraditional structures, Fracture and failure of mater Ph.D. from: Indian Institute of Technology, Delhi Hometown: Hamirpur, (H.P) E-mail-rsharma@iitmandi.ac.in</p> |  |
| 6. | <p>Dr. Subhamoy Sen, Associate Professor Specialization: Structural Engineering Bayesian filters, Stochastic estimation, Structural health monitoring, Mass concrete Ph.D. from: Indian Institute of Technology, Kharagpur (2016) Hometown: West Bengal Phone: 01905-267261; E-mail-subhamoy@iitmandi.ac.in</p> |  |
| 7. | <p>Dr. Ashutosh Kumar, Assistant Professor Specialization: Geotechnical Engineering Geotechnical Earthquake Engineering, Soil-structure interaction, pavement geotechnics Ph.D. from IIT Bombay (2018) Home Town: Bihar Phone: 01905-267825; E-Mail: ashutosh@iitmandi.ac.in</p> |  |
| 8. | <p>Dr. Dhanya J., Assistant Professor Specialization: Structural Engineering Random field modelling, Computational Earth Model, Earthquake data analysis, Seismic Hazard, Predict Ph.D. from Indian Institute of Technology, Madras Home Town: West Bengal Email- dhanya@iitmandi.ac.in</p> |  |
| 9. | <p>Dr. Harshad Vijay Kulkarni, Assistant Professor Specialization: Environmental Engineering Environmental engineering; Aqueous biogeochemistry; Advanced water purification and desalination; Ph.D. from Kansas State University, Manhattan, Kansas, USA (2016) Home Town :Maharashtra Email : harshad@iitmandi.ac.in</p> |  |

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| 10. | <p>Dr. Mousumi Mukherjee, Assistant Professor Specialization: Geotechnical Engineering Theoretical and Computational Geomechanics, Constitutive Modeling of Frictional Material Ph.D. from Indian Institute of Technology, Kanpur (2016) Home Town: West Bengal Phone: 01905-267997; E-mail-mousumi@iitmandi.ac.in</p> |  |
| 11. | <p>Dr. Maheshreddy Gade, Assistant Professor Specialization: Structural Engineering Wave propagation in elastic half-space, Rotational seismology, Earthquake source modelling Ph.D. from Indian Institute of Technology, Madras (2016) Home Town: West Bengal E-mail-maheshreddy@iitmandi.ac.in</p> |  |
| 12. | <p>Dr. Sandip Kumar Saha Assistant Professor Specialization: Structural Engineering Multi-hazard resilient infrastructure; Passive vibration control; Seismic Soil-Structure interaction Ph.D. from Indian Institute of Technology, Delhi (2014) Home Town: Binodia, Mursidabad, West Bengal Phone: 01905-267907; E-mail-sandip_saha@iitmandi.ac.in</p> |  |
| 13. | <p>Dr. Sayantan Sarkar, Assistant Professor Specialization: Environmental Engineering Atmospheric aerosols; Air quality; Climate forcing; Source apportionment; Population exposure. Ph.D. from Jawaharlal Nehru University (2012) Home Town: West Bengal Phone: 01905-267714; E-mail-sayantan@iitmandi.ac.in</p> |  |
| 14. | <p>Dr. Shashank Pathak, Assistant Professor Specialization: Structural Engineering Structural Dynamics; Uncertainty Analysis Ph.D. from Indian Institute of Technology, New Delhi Home Town: Kanpur (U.P) Phone: 01905-267716; Email: shashank@iitmandi.ac.in</p> |  |
| 15. | <p>Dr. Shivang Shekhar, Assistant Professor Specialization: Structural Engineering Bridge Engineering, Earthquake Engineering, Risk and Reliability of Infrastructure Systems Ph.D. from Indian Institute of Technology, Bombay (2020). Phone: 01905-267724; E-mail: shivang@iitmandi.ac.in</p> |  |
| 16. | <p>Dr. Prasanna Rousseau, Assistant Professor Specialization: Geotechnical Engineering Experimental Geotechnique, Geotechnical Earthquake Engineering, Critical State Soil Mechanics Ph.D. from Carleton University, Ottawa, Canada (2020) Phone:01905-267118; EMail: prasanna@iitmandi.ac.in</p> |  |

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| 17. | Dr. Tanushree Parsai, Assistant Professor Specialization: Environmental Engineering Emerging contaminants, nanoparticles, microplastic, human health, risk assessment, water pollution Ph.D. from Indian Institute of Technology, Delhi Phone:01905-267718, Email: tanushree@iitmandi.ac.in |  |
| 18. | Dr. Thainswemong Choudhury, Assistant Professor Specialization: Structural Engineering Masonry structures, Retrofitting, Heritage structure Ph.D. from Indian Institute of Technology, Guwahati (2020) Phone:01905-267725; Email: thainswe@iitmandi.ac.in |  |
| 19. | Dr. Vivek Gupta, Assistant Professor Specialization: Water Resource Engineering Hydroclimatic Extremes, Floods and Droughts, Forecasting, Stochastic modelling, AI & ML, DSS Ph.D. from Indian Institute of Technology, Roorkee (2020) Phone: 01905-267117, E-mail: vivek@iitmandi.ac.in |  |
| 20. | Dr. Anand Giri, Inspire Fellow Specialization: Environmental Engineering Carbon dioxide capture and utilisation, Microbial remediation, Enzyme Purification Ph.D. from Central University, Hamirpur Home Town: Uttrakhand E-mail: anand_giri@projects.iitmandi.ac.in |  |
| 21. | Prof. Ing. Balthasar Novák, Adjunct Professor Specialization: Structural Engineering Ph.D. from Technical University Darmstadt (1995) Email: balthasar.novak@iitmandi.ac.in |  |
| 22. | Prof. Sumant Nigam, Visiting Distinguished Professor Specialization: climate dynamics Ph.D. from Princeton University in 1984 Email: nigam@umd.edu, snigam@iitmandi.ac.in |  |

Research projects from IIT Mandi seed grants, sponsored projects, brief progress of the work done against each project, highlighting the major achievements during this period. Names of PI, Co-PI, funding agencies and amount of grant received and amount spent etc.

3.3.1 Externally Sponsored Research Projects

| S. No. | Project No. | Project Title | Sponsoring Agency | Investigators | Project Cost (in Rs.) | Duration of Project |
|--------|-------------------|---|---|----------------------------|-----------------------|------------------------------------|
| 1. | IITM/SERB/MM/394 | A Unified Mathematical Framework for Predicting Visco-plastic Constitutive Response of Sand | Mathematical Research Impact Centric Support Grant, SERB, India | Dr. Mousumi Mukherjee (PI) | Rs. 6,06,000/- Lakh | 3 years (07.01.2023-06.01.2026) |
| 2. | IITM/SERB/SHS/379 | Seismic Resilience Enhancement of Ageing Highway Bridges using Optimal Retrofit Measures | SERB | Dr. Shivang Shekhar(PI) | Rs. 14,78,400/- | 3 years (05.09.2022 to 28.01.2024) |

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|-----|------------------------|--|---|--|-----------------------------------|------------------------------------|
| 3. | IITM/SERB-TARE/ALS/392 | Development of in - situ leachate treatment system to prevent water contaminations | SERB | Dr. Arun Lal Srivastav (PI) (Chitkara University) Dr. Dericks P Shukla (Mentor) | Rs. 10,05,000/- (IIT Mandi share) | 3 years (01.11.2022 to 30.09.2025) |
| 4. | IITM/MoES/SYS/378 | Aerosol brown carbon, humic-like substances and nitroaromatics in the Himalayas: implications for regional climate | Ministry of Earth Sciences | Dr. Sayantan Sarkar (PI) | Rs. 78,00,636/- | 3 years (30.08.2022-29.08.2025) |
| 5. | IITM/DDMA-Kan/KVU/357 | Development and deployment of low cost landslide monitoring solutions in Kangra district, Himachal Pradesh | DDMA- Kangra | Dr. Kala VenkataUday (PI) Dr. Varun Dutt (Co-PI) | Rs. 50,00,600/- | 5 years (18.02.2022-17.02.8.2027) |
| 6. | IITM/DDMA-M/VD/358 | Development of a remote sensing data - enabled disaster (landslide) decision response system with local ground based monitoring | DDMA Mandi | Dr. Varun Dutt (PI)Dr. Kala VenkataUday (Co-PI) | Rs. 55,88,000/- | 3 years (03.03.2022-02.03.2025) |
| 7. | IITM/AICTE-MoE/LB/373 | Probabilistic Earthquake – Earthquake induced landslide multi – Hazard analysis: Application to Shimla, Mandi and Manali | ISRO | Dr. Maheshreddy Gade (PI) Dr. Kala VenkataUday (Co-PI) | Rs. 39,97,120/- | 3 years (27.05.2022-26.05.2025) |
| 8. | IITM/HIMCOSTE/VD/416 | Smart blood vaccine and medicine monitoring system | HIMCOSTE | Dr. Varun Dutt (PI), Co-PI's: Dr. Kala VenkataUday, Dr. Chander Singh | Rs. 6,30,000/- | 2 years (27.03.2023-26.03.2025) |
| 9. | IITM/NRIDA/AKS/411 | Strategies and guidelines for slope cutting for village roads in hilly region | NRIDA | Dr. Ashutosh Kumar (PI), Dr. Maheshreddy Gade (Co-PI) | Rs.16,78,600/- | 18 Months (02.03.2023-01.09.2024) |
| 10. | IITM/APN/VG/414 | Regional cooperation for freshwater ecosystem services in the Himalayas (REFRESH): Understanding the influences of monsoon variability and compound extremes | ASIA- Pacific Networks for Global Change Research | Dr. Vivek Gupta (PI), Dr. Ashutosh Sharma as PI from IIT Roorkee, Dr. Priyank Sharma from IIT Indore, Dr. Vishal Singh from National Institute of Hydrology Roorkee, Dr. Pratik Singh Thakuri from Nepal Engineering College, Nepal, Dr. Kirtan Adhikari from College of Science & Technology, Royal University of Bhutan and Dr. Shivam Gupta from Mahamaya College of Agricultural Engineering and Technology, Uttar Pradesh | Rs. 6,49,800/- | 3 years (16.03.2023-15.03.2026) |
| 11. | IITM/DRDO/SUS/375 | Digital twin development employing Bayesian filters with sub structured predictor models for aerospace structures applications | DRDO | Dr. Subhamoy Sen (PI) Dr. Himanshu Pathak (Co-PI) | Rs. 34,08,140/- | 3 years (30.08.2022-29.08.2025) |

| | | | | | | |
|-----|----------------------|--|---|--|-----------------|---------------------|
| 12. | CRRP2022-01MY-Sharma | Regional cooperation for Freshwater Ecosystem Services in Himalayas (REFRESH): Understanding the influences of monsoon variability and compound extremes | Asia Pacific Network for Global Change Research | Ashutosh Sharma (PI) & Dr. Vivek Gupta (Co-PI) | Rs. 74,52,000/- | 3 years (2022-2025) |
|-----|----------------------|--|---|--|-----------------|---------------------|

3.3.2. SEED Grant Project

| S. No. | Project No. | Project Title | Sponsoring Agency | Investigators | Project Cost (in Rs.) | Duration of Project |
|--------|----------------|--|-----------------------|---------------------|-----------------------|--|
| 1. | IITM/SG/SHP/89 | Risk Assessment of Himalayan tunnels under Multi-Hazard Scenario | IIT Mandi, Seed Grant | Dr. Shashank Pathak | INR 15,00,000/- | (3 Years) 26.10.2022 to 25.10.2025) |

3.3.3. Progress report of the Running Research Projects

1. PI- Dr. Mousumi Mukherjee

Project Title: Rate-dependent Behavior of Sand and Its Implications on Strength Prediction from Field Penetration Tests

Project No. IITM/SERB/MM/248

Duration of the Project: 3.5 years (24.06.2019-23.12.2022)

Project Cost: Rs.29.35 Lakhs

The proposal aims to study rapid penetration tests in sand for strength prediction, considering rate-effect phenomena. The material model proposed by Mukherjee (2016) has been generalized and validated under triaxial test conditions. A methodology for model parameter calibration was established, and the model predictions were validated against experimental data. Work is ongoing to integrate the material model into ABAQUS software using UMAT subroutine. The project also involves simulating pile penetration tests under large deformation, exploring updated Lagrangian and coupled Lagrangian Eulerian formulations. One international journal and conference paper have been published, and three manuscripts are under review, summarizing the research outcomes.

2. PI- Dr. Shivang Shekhar

Project Title: Seismic Resilience Enhancement of Ageing Highway Bridges using Optimal Retrofit Measures

Project No. IITM/SERB/SHS/379

Duration of the Project: 3 Years (05.09.2022 to 28.01.2024)

Project Cost: Rs. 14,78,400/- lakhs

In the first project phase (1st year), this study assesses aging bridges' vulnerability using analytical methods. It develops time-dependent seismic fragility curves considering advanced corrosion deterioration models integrating climate change effects. The research includes a critical review of local environmental factors' impact (temperature, humidity) and future climate change on corrosion. Improved models also account for concrete cracking and lifetime chloride ingress. Using OpenSees, finite element (FE) models incorporate corrosion effects. Site-specific ground motions are chosen for seismic fragility analysis, and curves are created based on dynamic damage thresholds and probabilistic demand models. These curves aid in precise vulnerability estimation for existing bridges in the study region.

3. PI- Dr. Shashank Pathak

Project Title: Risk Assessment of Himalayan tunnels under Multi-Hazard Scenario

Project No. IITM/SERB/SHS/379

Duration of the Project: 3 Years (26.10.2022 to 25.10.2025)

Project Cost: Rs. 15,00,000/-

- Comprehensive literature review was done on tunnel failure case studies under multi-hazards like (Blast explosions, Earthquake, Landslide, Avalanche, etc.).
- Based on the literature review, the parameters which cause the tunnel failure were identified.
- A comprehensive literature review is carried out to evaluate and identify the most suitable risk assessment approach.
- Currently, an algorithm is being developed to find the risk indices using a fuzzy-logic-based risk assessment method.

3.3.4. Published Book

1. Dubey, S. K., Jha, P., Gupta, P. K., Nanda, A., & Gupta, V. (2022). *Soil-Water, Agriculture, and Climate Change*. Springer.

3.3.5. Published Book chapters

1. Atharv A. Saurkar, Mousumi Mukherjee, Nishant Sharma and Arindam Dey (2023), Nonlinear analysis of coupled building-foundation system subjected to lateral loading condition, in Di Trapani, F., Demartino, C., Marano, G.C., Monti, G. (eds) *Proceedings of the 2022 Eurasian OpenSees Days. EOS 2022. Lecture Notes in Civil Engineering*, vol 326. Springer Cham, pp. 107-116, ISBN No. 978-3-031-30124-7.
2. Pathak, S. (02 February 2023). A Combination of Innovative Pedagogical Theories to Enhance the Learning Output – A Case Study with Engineering Students. In: Dixit, U.S., Echempati, R., Dey, S. (eds) *Engineering Pedagogy*. Springer, Singapore. https://doi.org/10.1007/978-981-19-8016-9_4.
3. Shukla, D. P. (2022). Arun Lal Srivastav, Sughosh Madhav, Abhishek Kumar Bhardwaj, Eugenia Valsami-Jones, *Current Directions in Water Scarcity Research* (299-317). <https://doi.org/10.1016/B978-0-323-91838-1.00013-0>
4. Ayush Kumar, Sonu Kumar and Ashutosh Kumar* (2022) "Behaviour of laterally loaded monopiled raft foundation in sloping ground." In: Reddy K.R., Pancharathi R.K., Reddy N.G., Arukala S.R. (eds) *Advances in Sustainable Materials and Resilient Infrastructure*. Springer Transactions in Civil and Environmental Engineering. Springer, Singapore. https://doi.org/10.1007/978-981-16-9744-9_24

3.3.6. Patents

Patent Title: Water and Energy Efficient Reliable Irrigation System (WatEr-ERIS), application No. 202211070518 filed in 7th Dec. 2022.

Authors: Dr. Kasiviswanathan K S, resident of IIT Roorkee, Uttarakhand, an Indian citizen, Dr. Tummuru Narsa Reddy, resident of IIT Mandi, Himachal Pradesh, an Indian Citizen, Dr. Subhamoy Sen, resident of IIT Mandi, Himachal Pradesh, an Indian Citizen, Dr. Soundharajan B, resident of Amrita Vishwa Vidyapeetham, Tamilnadu, an Indian Citizen

3.3.7. Papers accepted/published in reputed International journals

1. Gupta, S.K., Shukla, D.P. Handling data imbalance in machine learning based landslide susceptibility mapping: a case study of Mandakini River Basin, North-Western Himalayas. *Landslides* 20, 933–949 (2023). <https://doi.org/10.1007/s10346-022-01998-1>.
2. Guleria, A., Gupta, S.K. & Shukla, D.P. Scenario-Based Analysis of Contaminant Plume Evolution in the Groundwater Using GIS-Based Approach: A Regional Case Study of Panchkula, India. *Environ Model Assess* 28, 121–132 (2023). <https://doi.org/10.1007/s10666-022-09864-z>.
3. KC, N., Thapa, L. & Shukla, D.P. Processing CORONA image for generation of Digital Elevation Model (DEM) and orthophoto of Bilaspur district, Himachal Pradesh. *Appl Geomat* 15, 295–310 (2023). <https://doi.org/10.1007/s12518-022-00453-z>.
4. Sudan, M., & Mukherjee, M. (2023). Investigation on instability modes of sand under biaxial shearing accounting various specimen generation techniques in DEM. *Advanced Powder Technology*, 34(8), 104081. <https://doi.org/10.1016/j.apt.2023.104081>.
5. V Sharma, J Dhanya, M Gade, J Sivasubramonian, New generalized ANN-based hybrid broadband response spectra generator using physics-based simulations, *Natural Hazards* 116 (2), 1879-1901(2023).

6. Sharma, B., Sarkar, S., & Bau, S. (2023). Understanding population exposure to size-segregated aerosol and associated trace elements during residential cooking in northeastern India; Implications for disease burden and health risk. *Science of The Total Environment*, 875, 162539. <https://doi.org/10.1016/j.scitotenv.2023.162539>.
7. Kulariya, M., & Saha, S. K. (2023). Multi-Hazard Performance Evaluation of Hillside Buildings Under Earthquake and Landslide. *Structures and Buildings*, (ahead of print), 1-16. <https://doi.org/10.1680/jstbu.22.00132>.
8. Baddipalli, S., Kulariya, M., & Saha, S. K. (2023). Influence of Masonry Infills on Blast Response of Earthquake-Resistant Reinforced Concrete Buildings Structures. *Structures*, 50, 908-924. <https://doi.org/10.1016/j.istruc.2023.02.078>.
9. Kumar, H., & Saha, S. K. (2023). Effects of Uncertain Soil Parameters on Seismic Responses of Fixed Base and Base-Isolated Liquid Storage Tanks. *Journal of Earthquake Engineering*. <https://doi.org/10.1080/13632469.2023.2195017>.
10. Sonu Kumar and Ashutosh Kumar* (2023) "Effect of infiltration on single pile and mono pile-raft foundation embedded in unsaturated sand" *International Journal of Geomechanics, ASCE*, (ISSN: 1532-3641, Impact Factor: 3.819/2020), USA. Vol. 23, No. 2, pp. 04022288: 1-17. DOI: <https://doi.org/10.1061/IJGNAI.GMENG-7908>.
11. Madhusudan Negi and Mousumi Mukherjee (2022), Investigation on instability modes of sand under biaxial shearing accounting various specimen generation techniques in DEM, *Advanced Powder Technology*, Elsevier (accepted).
12. Mousumi Mukherjee and Siddharth Pathak (2023), Rate-dependent shearing response of Toyoura sand addressing influence of initial density and confinement: A visco-plastic constitutive approach, *Geomechanics and Engineering, An International Journal* (IF: 3.2), Techno Press, 34(2): 197-208, DOI: 10.12989/gae.2023.34.2.197.
13. Chhetri, N. K., Gupta, S. K., & Shukla, D. P. (2022). Kotrupi landslide deformation study in non-urban area using DInSAR and MTInSAR techniques on Sentinel-1 SAR data. *Advances in Space Research*, 70(12), 3878-3891. <https://doi.org/10.1016/j.asr.2021.11.042>.
14. Romana, H. ., & Shukla, D. P. (2022). Analysis of Air and Soil Quality around Thermal Power Plants and Coal Mines of Singrauli Region, India. *International Journal of Environmental Research and Public Health*, 19(18), 11560. <https://doi.org/10.3390/ijerph191811560>.
15. Baisantry, M., Sao, A. K., & Shukla, D. P. (2022). Selection of shape-preserving, discriminative bands using supervised functional principal component analysis. *International Journal of Remote Sensing*, 43(10), 3868-3889. <https://doi.org/10.1080/01431161.2022.2105174>.
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17. Mali, N., Shukla, D.P. & Kala, V.U. Identifying Geotechnical Characteristics for Landslide Hazard Indication: A Case Study in Mandi, Himachal Pradesh, India. *Arab J Geosci* 15, 144 (2022). <https://doi.org/10.1007/s12517-022-09475-8>.
18. Chhetri, N. K., Gupta, S. K., & Shukla, D. P. (2022). A Comparison of Image-Based and Physics-Based Atmospheric Correction Methods for Extracting Snow and Vegetation Cover in Nepal Himalayas Using Landsat 8 OLI Images. *Journal of the Indian Society of Remote Sensing*, 50(12), 2503-2521. <https://doi.org/10.1007/s12524-022-01616-6>.
19. Hanumanthu, K. and Sarkar, K. (2022). Improved sorptivity models for mortar and concrete based on significant process parameters. *Journal of Building Engineering* (Elsevier), 47(April), doi: <https://doi.org/10.1016/j.jobe.2021.103912>.
20. Mohammad, K. and Sarkar, K. (2022). Temperature and RH of normal concrete and mortar subjected to drying in an indoor residential environment. *Advances in Cement Research (ICE)*. 34(4), pp. 175-186, doi: <https://doi.org/10.1680/jadcr.21.00040>.
21. Mohammad, K. and Sarkar, K. (2022). Drying resistances of brick, mortar and concrete. *Journal of Architectural Engineering (ASCE)*, 28(1), doi: [https://doi.org/10.1061/\(ASCE\)AE.1943-5568.0000526](https://doi.org/10.1061/(ASCE)AE.1943-5568.0000526).
22. PS Nayek, M Gade, Artificial neural network-based fully data-driven models for prediction of newmark sliding displacement of slopes, *Neural Computing and Applications* 34 (11), 9191-9203. (2022).

23. Shukla, D. P., & Uday, K. V. (2022). Identifying geotechnical characteristics for landslide hazard indication: a case study in Mandi, Himachal Pradesh, India. *Arabian Journal of Geosciences*, 15(2), 144. <https://doi.org/10.1007/s12517-022-09475-8>.
24. T Semwal, KV Uday, Multi-dimensional Measurement-Based Approaches for Evaluating the Root Area Ratio of Plant Species, *International Journal of Geosynthetics and Ground Engineering* 8 (1), 15(2022).
25. Rawat, P., Sharma, B., Dey, S., Rana, A., Mukherjee, A., Polana, A. J., Mao, J., Jia, S., Yadav, A. K., Khillare, P., & Sarkar, S. (2022). Are fireworks a significant episodic source of brown carbon? *Environmental Science and Pollution Research*, 29, 40252-40261. <https://doi.org/10.1007/s11356-022-20183-4>.
26. Sharma, B., Jia, S., Polana, A. J., Ahmed, M. S., Haque, R. R., Singh, S., Mao, J., & Sarkar, S. (2022). Seasonal variations in aerosol acidity and its driving factors in the eastern Indo-Gangetic Plain: A quantitative analysis. *Chemosphere*, 305, 135490. <https://doi.org/10.1016/j.chemosphere.2022.135490>.
27. Ahmed, M. S., Bhuyan, P., Sarkar, S., & Haque, R. R. (2022). Seven-year study of monsoonal rainwater chemistry over the mid-Brahmaputra plain, India: assessment of trends and source regions of soluble ions. *Environmental Science and Pollution Research*, 29, 25276-25295. <https://doi.org/10.1007/s11356-021-17385-7>.
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29. Aggarwal, Y., & Saha, S. K. (2022). Component Repair Cost Functions in Indian Context for Seismic Loss Estimation of Reinforced Concrete Buildings. *Structures*, 44, 1974-1994. <https://doi.org/10.1016/j.istruc.2022.08.090>.
30. Sengar, K. K., Gade, M., & Saha, S. K. (2022). Vector-Valued Intensity Measures for Seismic Risk Assessment of Base-Isolated Liquid Storage Tanks. *ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering*, 9(1), 1-15. <https://doi.org/10.1061/AJRUA6.RUENG-967>.
31. Paknejad, A., Jamshidi, R., Pathak, S., and Collette, C. (November 28, 2022). "Active Vibration Mitigation of Bladed Structures with Piezoelectric Patches by Decentralized Positive Position Feedback Controller." *ASME. J. Eng. Gas Turbines Power*. 145(2): 021003.
32. Piron, D., Pathak, S., Deraemaeker, A., & Collette, C. (1 December 2022). "On the link between pole-zero distance and maximum reachable damping in MIMO systems." *Mechanical Systems and Signal Processing*, 181, 109519.
33. Arash Azizi, Ashutosh Kumar and David Toll (2022) "The bounding effect of the water retention curve on the cyclic response of an unsaturated soil" *ActaGeotechnica*, (ISSN: 1861-1133, Impact Factor:5.736/2021), Springer, The Netherlands. Doi: <https://doi.org/10.1007/s11440-022-01724-0>.
34. Ashutosh Kumar*, Arash Azizi and David Toll (2022) "The application of suction monitoring for cyclic triaxial testing of compacted soils" *ASCE Journal of Geotechnical and Geoenvironmental Engineering, USA* (ISSN: 10900241, Impact Factor: 4.236/2020) USA, Vol. 148, No. 4, pp. 04022009: 1-17. DOI: 10.1061/(ASCE)GT.1943-5606.0002766.
35. Kuncham, E., & Sen, S. (2022). An online model-based fatigue life prediction approach using extended Kalman filter. *Theoretical and Applied Fracture Mechanics*, 117, 103143. <https://doi.org/10.1016/j.tafmec.2021.103143>.
36. Tandon, K., & Sen, S. (2022). Integration of machine learning and particle filter approaches for forecasting soil moisture. *Stochastic Environmental Research and Risk Assessment*, 36(12), 4235-4253. <https://doi.org/10.1007/s00477-022-02258-3>.
37. Aswal, N., Sen, S., & Mevel, L. (2022). Switching Kalman filter for damage estimation in the presence of sensor faults. *Mechanical Systems and Signal Processing*, 175, 109116. <https://doi.org/10.1016/j.ymsp.2022.109116>.
38. Kuncham, E., & Sen, S. (2022). Response and input time history dataset and numerical models for a miniaturized 3D shear frame under damaged and undamaged conditions. *Data in Brief*, 45, 108692. <https://doi.org/10.1016/j.dib.2022.108692>.
39. Das, S., Jain, M. K., & Gupta, V. (2022). A step towards mapping rainfall erosivity for India using high-resolution GPM satellite rainfall products. *Catena*, 212, 106067. <https://doi.org/10.1016/j.catena.2022.106067>.

3.3.8. National conferences attended and papers presented

1. Gupta, P., & Shukla, D. P. (2023, January). Combined Optical and SAR remote sensing for LULC mapping of Imphal valley using Machine Learning Algorithm. 2023 International Conference on Machine Intelligence for GeoAnalytics and Remote Sensing (MIGARS), Hyderabad, India. <https://ieeexplore.ieee.org/abstract/document/10064582>.
2. Chhetri, N. K., Singh, A., & Shukla, D. P. (2023, January). Improved Landslide Susceptibility mapping using statistical MLR model. 2023 International Conference on Machine Intelligence for GeoAnalytics and Remote Sensing (MIGARS), Hyderabad, India. doi: 10.1109/MIGARS57353.2023.10064594
3. Pathania, A., & Gupta, V. (2023, January). Drought forecasting using Long short-term memory neural networks and Explainable AI. LAI 2023, NIT Rourkela. <https://lai2023.github.io/docs>.
4. Siddharth Pathak and Mousumi Mukherjee (2022), A Numerical Study on Rate-induced Strength Enhancement in Sand, Proceedings of the Indian Geotechnical Conference (IGC2022) GEOLEAP, Kochi, India.
5. Madhusudan Negi and Mousumi Mukherjee (2022), Effect of Sample Preparation Technique on Strain Localisation of Dense Sand under Biaxial Test Condition, Proceedings of the Indian Geotechnical Conference (IGC2022) GEOLEAP, Kochi, India.
6. Chirdeep NR, Saljas, S., Shekhar, S., Influence of Climate Change on Corrosion Deterioration and Flexural Capacity of RC Girders, National Conference on Resilient Infrastructure (NCRI 2022), Kerala, (Online).
7. Chirdeep NR, Shekhar, S., Bahurudeen, A., Seismic Fragility Assessment of Aging Highway Bridge Considering Climate Change Effects, 17th Symposium on Earthquake Engineering, (SEE 2022), IIT Roorkee, 2022.
8. Singh, V., Shekhar, S., Kotoky, N., Gaurav, G., Influence of Ground Motion Characteristics on the Seismic Vulnerability of Bridges, 17th Symposium on Earthquake Engineering, (SEE 2022), IIT Roorkee.
9. Nath, A., Kotoky, N., Shekhar, S., Probabilistic Seismic Vulnerability Assessment of RC Frame Building Considering Time-Dependent Deterioration, 17th Symposium on Earthquake Engineering, (SEE 2022), IIT Roorkee.
10. Chirdeep NR, Chowdary, M.B., Shekhar, S., Influence of Corrosion Deterioration on Lifetime Seismic Resilience of Highway Bridges, 12th Structural Engineering Convention-An International Event (SEC 2020+1), MNIT Jaipur, 2022.
11. Sengar, K. K., Gade, M., & Saha, S. K. (2022, November). Seismic Risk Assessment of Base-Isolated Liquid Storage Tanks with Friction-Pendulum System using Vector-Valued Intensity Measures. 17th Symposium on Earthquake Engineering, IIT Roorkee, India.
12. Y. Aggarwal & S. K. Saha (November 2022). Effects of Open Stories on Expected Seismic Losses in Hilly Buildings. 17th Symposium on Earthquake Engineering, Roorkee, India.
13. M. Kulariya & S. K. Saha (September 2022). Sacrificial Blast Wall for Blast Response Reduction in Hillside Buildings. National Conference on Resilient Infrastructure-2022 (NCRI 2022), Trivandrum, Kerala.
14. S Hoda, AK Goyal, M Gade, N Sharma, Effect of Soil Material Uncertainty on Seismic Response of Medium-Rise RC Frames Considering Soil-Structure Interaction, Eurasian Conference on OpenSees, 315-325.
15. Gupta, P., & Shukla, D. P. (2022, May). Time series Annual Land Use/ Land Cover mapping and change analysis of Mizoram using Machine Learning algorithm. North East Research Conclave 2022, IIT Guwahati, Assam. https://iitg.ac.in/rnd/nerc/assets/00_nerc-technical-sessions-minute-by-minute-final-schedule.pdf.
16. Raaj, S., Mohseni, U., & Gupta, V. (2022, November). Application of GIS and Fuzzy logic for Evaluating Groundwater Quality based on Water Quality Index – A Case Study of Ujjain City, Madhya Pradesh, India. IX International Groundwater Conference (IGWC-2022), IIT Roorkee. [.asf](#)
17. Raaj, S., Mohseni, U., & Gupta, V. (2022, November). Application of GIS and Fuzzy logic for Evaluating Groundwater Quality based on Water Quality Index – A Case Study of Ujjain City, Madhya Pradesh, India. IX International Groundwater Conference (IGWC-2022), IIT Roorkee.
18. Aggarwal, Y., Baddipalli, S., & Saha, S. K. (2022, June). Two-day Symposium on Socio-Technological Aspect of Seismic Disaster Management. Two-day Symposium on Socio-Technological Aspect of

Seismic Disaster Management, IIT Guwahati, India.

3.3.9. International conferences papers/ Conference attended and papers presented

1. Madhusudan Negi and Mousumi Mukherjee (2023), A DEM based micromechanical study on influence of lateral boundaries on instability response of sand under biaxial shearing, 10th European Conference on Numerical Methods in Geotechnical Engineering (NUMGE 2023), London, UK.
2. P. Verma, Y. Aggarwal & S. K. Saha (December 2022). Effect of Unequal Slab Levels in Adjacent Buildings on the Seismic Demand of Non-Structural Building Components. 5th International Workshop on the Seismic Performance of Non-Structural Elements (SPONSE), Stanford University, USA.
3. Aman Ujjwal, Sureka S., Mousumi Mukherjee and Arindam Dey (2023), Influence of aspect ratio and gully width on the run-out distance and velocity profile of dry granular debris flow, 17th Asian Regional Conference (17ARC 2023), Nur-Sultan, Kazakhstan.
4. AmanUjjwal, Sureka S., Govind Kant Mishra, Mousumi Mukherjee and ArindamDey (2023), Static and dynamic impact forces on a rigid barrier due to dry debris flow simulated by a DEM-based granular column collapse, Extended Abstract: 8th International Conference on Debris Flow Hazard Mitigation (DFHM8 2023), Torino, Italy.
5. Sonu Kumar and Ashutosh Kumar* (2023) "Load transfer mechanism of single pile and mono-pile raft foundation in unsaturated sand" Geo-Resilience 2023, Cardiff, United Kingdom, March 28-29, 2023.
6. Ashutosh Kumar*, Arash Azizi and David Toll (2023) "Insight into soil cyclic triaxial testing using a high capacity tensiometer" Geo-Resilience 2023, Cardiff, United Kingdom, March 28-29, 2023.
7. MadhusudanNegi and Mousumi Mukherjee (2022), Assessment of macro and micro level heterogeneities for characterizing mechanical behavior of sand in biaxial test employing DEM, Proceedings of the 15th World Congress on Computational Mechanics (WCCM-XV) and 8th Asian Pacific Congress on Computational Mechanics (APCOM-VIII), Yokohama, Japan.
8. Siddharth Pathak and Mousumi Mukherjee (2022), Prediction of Rate-dependent Mechanical Behaviour of Toyoura Sand Employing a Newly Proposed Visco-plastic Constitutive Model, Extended Abstract: Proceedings of the 15th World Congress on Computational Mechanics (WCCM-XV) and 8th Asian Pacific Congress on Computational Mechanics (APCOM-VIII), Yokohama, Japan.
9. Mousumi Mukherjee and Bhupendra Chand (2022), Simulation of pile penetration in sand employing updated lagrangian and CEL based FE approach: a comparative study, Proceedings of the 20th International Conference on Soil Mechanics and Geotechnical Engineering (ISSMGE) 2022, Sydney, Australia.
10. Pradhan, I. P., Shukla, D. P., Giri, A., &Knappett, P. S. (2022, July). Assessment of the Accuracy of Satellite-Derived Land Surface Temperature with IMD In-Situ Air Temperature: A Case Study for Kullu Region, Himachal Pradesh, India. The International Geoscience and Remote Sensing Symposium (IGARSS), 2022, Kuala Lumpur, Malaysia.
11. Pradhan, I. P., Shukla, D. P., & Giri, A. (2022, May). Mapping Permafrost distribution in the Parvati Valley, Kullu using LANDSAT 8 derived Land Surface Temperature. International Society for Photogrammetry and Remote Sensing 2022, Nice, France.
12. Gupta, P., & Shukla, D. P. (2022, May). Google earth engine based temporal analysis of indices used for forest fire study in Mizoram, India. The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Nice, France. <https://isprs-archives.copernicus.org/articles/XLIII-B3-2022/493/2022/isprs-archives-XLIII-B3-2022-493-2022.html>.
13. Singh , A., Gupta, S. K., , N., & Shukla, D. P. (2022, July). Estimating Suitable Categorization Method for Landslide Susceptibility Mapping of Mandi District. IGARSS 2022 - 2022 IEEE International Geoscience and Remote Sensing Symposium, Kuala Lumpur, Malaysia. 10.1109/IGARSS46834.2022.9884424.
14. Pradhan, I. P., & Shukla, D. P. (2022, July). Assessment of the Accuracy of Satellite-Derived Land Surface Temperature with IMD In-Situ Air Temperature: A Case Study for Kullu Region, Himachal Pradesh, India. The International Geoscience and Remote Sensing Symposium (IGARSS), 2022, Kuala Lumpur, Malaysia. 10.1109/IGARSS46834.2022.9884649.
15. Gupta, S. K., & Shukla, D. P. (2022, July). Variability of the Particulate Matter Concentration in the Northern Parts of India Using Low-Cost Sensors. IGARSS 2022-2022 IEEE International Geoscience

- and Remote Sensing Symposium, Kuala Lumpur, Malaysia. 10.1109/IGARSS46834.2022.9884246
16. Gupta, P., & Shukla, D. P. (2022, December). Rising Temperature of Ukraine due to Russia-Ukraine war 2022. In Fall Meeting 2022 AGU, Chicago, USA. <https://agu.confex.com/agu/fm22/meetingapp.cgi/Paper/1143474>.
 17. Rasa, J., Ahmad, P., Pathak, S., Dimitri, P., & Christophe, C. (September 2022). Active damping of high modal density of bladed structures with piezoelectric patches. In Proceedings of international conference on noise and vibration engineering and international conference on uncertainty in structural dynamics (12-14 September 2022), Leuven, Belgium. Sarkar, S., Dey, S., 2022. Linking chromophoric composition with optical characteristics of water-soluble brown carbon in the Indo-Gangetic Plains, India. 11th International Aerosol Conference, September 4th-9th 2022, Athens, Greece.
 18. Tarun Semwal, P Priyanka, Praveen Kumar, Varun Dutt, K.V Uday, Predictions of Root Tensile Strength for Different Vegetation Species Using Individual and Ensemble Machine Learning Models, International Conference on Trends on Construction in the Post-Digital Era, 87-100, Springer International Publishing (2022).
 19. Ashutosh Kumar* (2022) "An Investigation of the effect of 2015 Gorkha Earthquake within the World Heritage monument zones of Kathmandu Valley" Proc. of the 7th International Young Geotechnical Engineers Conference, Sydney, Australia. ISBN- 978-0-994-6261-5-8. pp. 149-154. Link to access (Click here).
 20. Pradhan, I. P., Mahanta, K. K., & Shukla, D. P. (2022, December). Evaluation of the probable permafrost distribution of Kinnaur district, Himachal Pradesh.. AGU Fall Meeting 2022, Chicago, IL
 21. Mahanta, K. K., Pradhan, I. P., & Shukla, D. P. (2022, December). Permafrost in Northern Hemisphere are shrinking at higher rate than in Southern Hemisphere. AGU Fall Meeting 2022, Chicago, IL.
 22. Shukla, D. P. (2022, December). Variation in Average Surface Velocity Estimation of Tidal and Mountain glacier using optical and SAR microwave Remote Sensing. AGU Fall Meeting Abstracts, Chicago.
 23. Shukla, D. P. (2022, December). Tectono-Geomorphologic assessment in the Barak River Basin of Western Hills of Manipur, using Remote Sensing and GIS techniques. AGU Fall Meeting Abstracts, Chicago.

3.3.10. Workshops/Other Institute/Industry Visited and Invited Lectures Delivered in India

Dr. Mousumi Mukherjee

1. Indian Geotechnical Conference (IGC2022), December 15-17, 2022, Kochi, India (Co-chaired a session on Computational, Analytical and Numerical Modelling).
2. Stability analysis of finite soil-slopes and Implications of soil shear strength parameters on slope stability analysis: Faculty Development Programme (FDP) organized for faculties of HP Govt. Engineering Colleges by IIT Mandi on 2nd September, 2022.
3. Stability analysis of finite slopes and overview on continuum modelling of debris flow: DST Summer School on Geospatial Technologies for Mountain Disaster Management-Landslide organised by Geo-informatics and Building Technology Research Centre, Department of Civil Engineering, Chitkara University, Solan, Himachal Pradesh on June 16th, 2022.
4. Investigation of Instabilities in Granular Materials Across the Length Scale: Webinar organised by Department of Civil Engineering, School of Engineering, Shiv Nadar University, Delhi-NCR on March 15th, 2022.
5. Resource person for the short course on Soil Constitutive models in the Center for Continuing Education in IISc, May 15-19, 2023.

Dr. Shivang Shekhar

1. Delivered guest lecture session titled "Lifetime Vulnerability Assessment of Deteriorating Infrastructure systems" on 26-07-2022 during the "09 Days Virtual Faculty Development Programme (FDP)' on "Advances in Sustainable Construction Materials and Technologies" held during 18th July to 27th July 2022.
2. Delivered guest lecture session titled "Computer Applications in Lifetime Seismic Vulnerability Assessment of Ageing Infrastructure Systems" during FDP on "Computer Diligence in Civil

Engineering and its Applications for Sustainable Development” held during 11th July, 2022- 15th July 2022 at Jaypee University of Information Technology, Wakhnaghat, Solan, Himachal Pradesh.

Dr. Shashank Pathak

1. Pathak, S. (2022). “The Science of Teaching” In Faculty Development Program for B.Tech. Faculty of HP Govt. Engg. Colleges, 29 August–3 September 2022. Indian Institute of Technology Mandi, Himachal Pradesh.
2. Pathak, S. (2022). “Blast Dynamics of Structures”. In Faculty Development Program for B.Tech. Faculty of HP Govt. Engg. Colleges, 29 August–3 September 2022. Indian Institute of Technology Mandi, Himachal Pradesh.
3. Pathak, S. (2022). “Fundamentals of Statistical Analysis for Civil Engineers”. In Faculty Development Program for Faculty, HP Government, Polytechnic Institutions, 18-24 July 2022. Indian Institute of Technology Mandi, Himachal Pradesh.
4. Pathak, S. (2022). “Teaching & Learning: Engineering Pedagogy”. In Faculty Development Program for Faculty, HP Government, Polytechnic Institutions, 18-24 July 2022. Indian Institute of Technology Mandi, Himachal Pradesh.
5. Pathak, S. (2022). “The Dynamics of Piezoelectric Structures: Why & How?” In Advanced Course on Smart Materials and Intelligent System Design, 5-6 May 2022. CSIR-Structural Engineering Research Centre, Chennai.

Dr. Sayantan Sarkar

1. Brown carbon aerosol: a significant climate forcing agent in the Indian context. Invited lecture at the Bihar State Pollution Control Board Online Training-cum-Exposure Series – 10th February 2023.
2. Sources and climate forcing of aerosol brown carbon in the eastern Indo-Gangetic Plain. Keynote Address at the VII International Conference on Sustainable Energy & Environmental Challenges at IIT BHU – 16th December 2022.

3.3.11. Workshops/Other Institute/Industry Visited and Invited Lectures Delivered in Abroad.

1. Pathak, S. (2023). “Differential Equations & Structural Dynamics” at Ghent Analysis & PDE Centre, Department of Mathematics: Analysis, Logic and Discrete Mathematics, 20 January 2023. Ghent University, Ghent, Belgium.
2. Pathak, S. Visiting Scientific Collaborator at Building, Architecture & Town Planning (BATir) Department of Universit’e Libre de Bruxelles (ULB), Brussels, Belgium, during 01.01.2023–31.01.2023.
3. Dr. Mousumi Mukherjee, Delivered an invited talk on "Modeling the constitutive response of geomaterials across the length scale", Universita degli Studi del Molise, Campobasso, Italy on July 3rd, 2023.

3.3.12. Short Term Course/Workshop organized during 1-4-2022to 31-3-2023

1. Dr. Mousumi Mukherjee organized a one-day International Workshop (online) on "Material and Geometric Nonlinearity Modeling for Geotechnical Applications" has been arranged by School of Civil and Environmental Engineering at IIT Mandi on 10th December, 2022. This workshop is a part of the Scientific Social Responsibility under Early Career Research Award Scheme, SERB, New Delhi.
2. Dr. Deepak Swami, has successfully organised a 3-day workshop from 24th to 26th February, 2023 on Groundwater Flow and Contaminant Transport Modeling using HYDRUS at School of Civil & Environmental Engineering at IIT Mandi. There were several scholars and working professionals from IIT Madras, IIT Kanpur, IIT Bhubaneswar, CSIR-NEERI Pune, and ICAR-IARI PUSA. The workshop is recognised and published by PC Progress on the global platform. HYDRUS is a very popular software package among the agriculture and groundwater researches globally to estimate the soil water balance, contaminant transport modeling in subsurface environment.



3.3.13. Professional Faculty Achievements/Honours/Awards

1. Dr. Mousumi Mukherjee, Awarded Mathematical Research Impact Centric Support (MATRICS) Grant in 2023 by SERB, India.
2. Dr. Mousumi Mukherjee, awarded with the IGS - Prof. C.S. Desai Biennial Award in 2022 for best paper on "Constitutive Modeling for Geologic Materials" by Indian Geotechnical Society.
3. Dr. Mousumi Mukherjee, Assistant Professor has been selected for the SERB International Research Experience (SIRE) for the year 2023-2024. This will enable her to work with A/Professor Ha H. Bui at the Monash Computational Geomechanics (MCG) Lab, Department of Civil Engineering, Monash University, Australia.
4. Dr. Shivang Shekhar, Selected as an Early Career Editorial Board Member (ECEB) for the prestigious ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems.
5. Dr. Sandip Kumar Saha, Awarded with "Dr Jai Krishna Prize" by "The Institution of Engineers (India) (2022).
6. Dr. Sandip Kumar Saha, Elected as an executive member of the Indian Society of Earthquake Technology (ISET).
7. Dr. Sandip Kumar Saha, Selected as a resource person for the Technical Appraisal Committee (TAC), HP-SDMA.
8. Dr. Ashutosh Kumar, Recipient of IACMAG John Carter Award – 2022 from International Association for Computer Methods and Advances in Geomechanics (IACMAG), AZ, USA.
9. Dr. Shashank Pathak, Visiting Scientific Collaborator at Building, Architecture & Town Planning (BATir) Department of Universit'eLibre de Bruxelles (ULB), Brussels, Belgium, during 01.01.2023 -- 31.01.2023.

3.3.14. Professional students Achievements/Honours/Awards

1. Ms. Aditi Rana, research scholar of Dr. Ashutosh Kumar visited Institute of Hazard, Risk and Resilience of Durham University, UK as a Visiting Student. (February 12- 28, 2023).
2. Dr. Neha Aswal, received the prestigious Marie Curie Bienavenue fellowship.
3. Mr. Madhu Sudan, PhD student awarded with SERB international travel grant for attending the NUMGE2023 conference in Imperial College London, U.K.

3.3.15. Membership of Professional Societies

1. **Dr. Mousumi Mukherjee**
 - a) Indian Geotechnical Society (Life Member)
 - b) International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE)
2. **Dr. Shivang Shekhar**
 - a) American Society of Civil Engineers (Membership No. – 000011062382)
 - b) Indian Society of Earthquake Technology (LM 1845)

- c) Indian Road Congress (102776)
3. **Dr. Sandip Kumar Saha**
- a) Indian Society of Earthquake Technology (Life Member).
- b) Indian Association for Computational Mechanics (IndACM), (Life Member)

3.3.16. New Initiatives / New Research Facilities Created / Laboratory Established

1. Dr. Mousumi Mukherejee- Procured Automatic Triaxial Testing Apparatus for Geotechnical Engineering Teaching Lab.
2. Dr. Dericks P. Shukla, established Rock Mechanics and Earth Science Lab.
3. Dr. Shashank Pathak: - established structural dynamics and uncertainties research group (www.studentrg.com)
4. Dr. Sandip Kumar Saha: - Commissioned a uni-axial shake table having 400kg capacity in our Advanced Structural Engineering Laboratory for supporting earthquake engineering education and research.

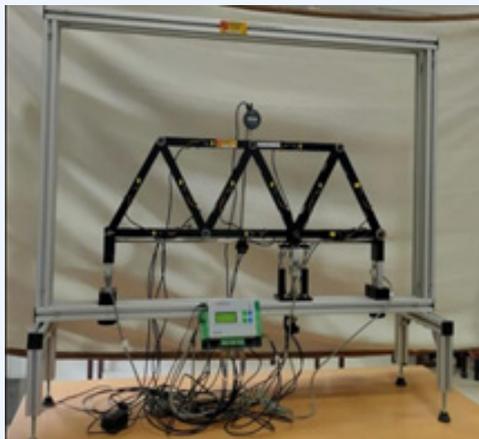
3.3.17. Faculty Development and Training Programmes attended/ organized

- Dr. Shivang Shekhar, School Co-coordinator of Faculty Development Program for HP Govt. Polytechnic Colleges & HP Govt. Engineering Colleges.
- Dr. Sandip Kumar Saha, delivered two lectures during the Faculty Development Program at IIT Mandi.

3.3.18. A Few Major Instruments Installed in Labs

1. Description of HST 19 Truss -01

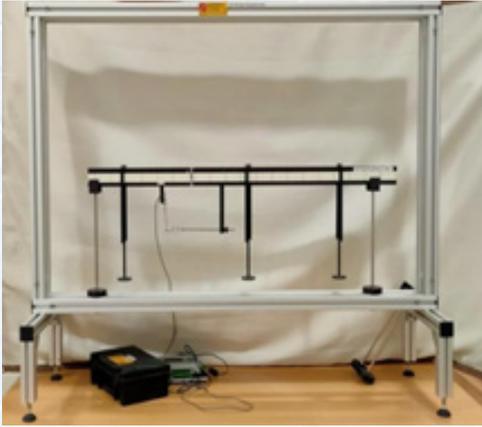
To determine the deflection in different members of truss. Two assembled pin-jointed frameworks (warren and basic roof truss) to measure the strains (hence stresses) and joint deflections. Each member, when assembled creates a truly pin joint. The frameworks mount onto two end supports. One support has a pivoting arrangement whilst the other has pivoting and rolling arrangement. The loads on the framework are applied at specific joints by using the screw-jack loading mechanism supplied. Each framework member has a strain gauge arrangement attached.



Name of the Equipment-01: HST 19 Truss
Specialization: Structure Analysis
Name of the lab: Structure Analysis Lab

2. Description of HST 10 Bending Moment -02

To determine the bending moment in beam. Each beam is simply supported on vertical supports which can be positioned in a variety of positions along the beam lengths. At the 'cut' section, a bearing in one beam rests inside a radiused pocket of the other beam. This restricts any vertical movement between the two beams (hence removes any visible shear force), but does not restrict rotation between the two beams and hence bending is not restricted.



Name of the Equipment-02: HST 10 Bending Moment

Specialization: Structure Analysis

Name of the lab: Structure Analysis Lab

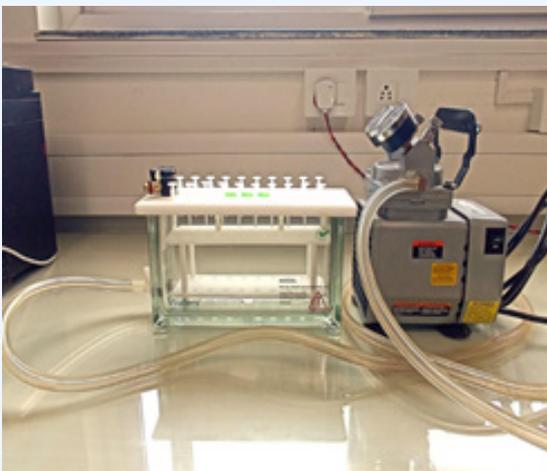
Name of the Equipment-01: HST 19 Truss

Specialization: Structure Analysis

Name of the lab: Structure Analysis Lab

3. Description of Solid phase extraction system-03

The solid phase extraction system is used for rapid separation of organic analyte of interest from a mixture. One or more analytes from a liquid sample mixture is isolated by extracting, partitioning, and/or adsorbing onto a solid stationary phase.



Name of the Equipment-03: Solid phase extraction system

Specialization: Environmental Engineering

Name of the lab: Atmospheric chemistry and climate change

4. Description of the Equipment-04

To verify Bernoulli's equation experimentally by plotting total energy line vs. distance. Bernoulli's theorem states that when there is a continuous

connection between particles of flowing mass of liquid, the total energy at any section of now will remain the same provided there is no reduction or addition of energy at any point.



Name of the Equipment-04: Bernoulli's Theorem

Specialization: Water Resource Engineering lab

Name of the lab: Hydraulics Lab

5. Description of the Equipment-05

To determine the Reynolds's Number and determine the type of flow: laminar or turbulent. In Reynolds experiments, the ratio of inertia to viscous forces was observed to be dimensionless and related to viscosity, average pipeline velocity, and geometrically similar boundary conditions.



Name of the Equipment-05: Reynold’s Apparatus
Specialization: Water Resource Engineering lab
Name of the lab: Hydraulics Lab

6. Description of the Equipment-06

To measure discharge through Venturimeter & Orificemeter.

VENTURIMETER: A Venturimeter consists of;

- a) An inlet section followed by a convergent cone.
- b) A cylindrical throat.
- c) A gradually divergent cone.

The inlet section of the Venturimeter is of the same diameter as that of the pipe, which is followed by a convergent cone. The convergent cone is a short pipe, which tapers from the original size of the pipe to that of the Throat of the Venturimeter. The Throat of the Venturimeter is a short parallel side tube having its cross-sectional area smaller than that of the pipe. The divergent cone of the Venturimeter is gradually diverging pipe with its cross-sectional area increasing from that of the Throat to the original size of the pipe. At inlet section & Throat of the Venturimeter, pressure taps are provided.

ORIFICEMETER: An Orifice meter consists of a flat circular plate with a circular hole called Orifice, which is concentric with the pipe axis.



Name of the Equipment-06: Venturimeter & Orificemeter
Specialization: Hydraulics Engineering
Name of the lab: Water Resources Engineering Lab

7. Description of the Equipment-07

To study the discharge over different types of notches. A notch is a device used for measuring the flow rate of a liquid through a small channel or tank. It may be defined as an opening in side of a tank or a small channel in such a way that the liquid surface in the tank or channel is below the top edge of the opening. The sheet of water flowing through the notch is called Nape or Vein. The bottom edge of a notch over which the water flows, is known as the sill or crest.



Name of the Equipment-07: Discharge Over Notches
Specialization: Hydraulics Engineering
Name of the lab: Water Resources Engineering Lab

8. Description of the Equipment-08

To determine the co-efficient of discharge. An orifice is an opening in the wall of a tank or in a plate which may be fitted in a pipe such that the plate is normal to the pipe axis. An orifice is used for the discharge measurement. A mouthpiece is a short pipe whose length does not exceed two to three times its diameter. It may be of uniform section or may have varying section.



Name of the Equipment-08: Orifice And Mouthpiece Apparatus
Specialization: Hydraulics Engineering
Name of the lab: Water Resources Engineering Lab

9. Description of the Equipment-09

To plot the surface profile of a free vortex by measurement of the surface profile coordinates and to show that total energy is constant throughout

vortex. Studying natural phenomena such as hurricanes, tornadoes, and whirlpools (free vortices) requires a full understanding of vortex behavior. It is also critical for engineers and designers to be able to characterize forced vortices generated in machinery, such as centrifugal pumps or turbines.



Name of the Equipment-09: Free Vortex Apparatus
Specialization: Hydraulics Engineering
Name of the lab: Water Resources Engineering Lab

10. Description of the Equipment-10

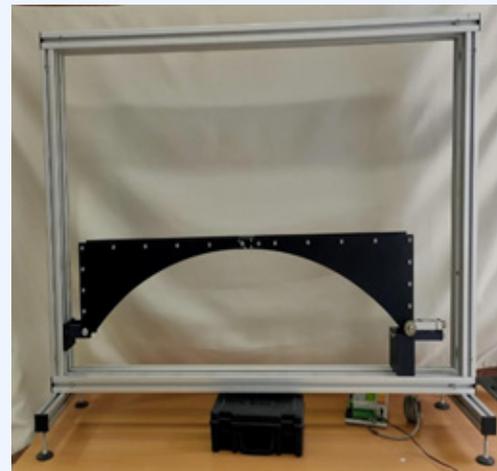
The apparatus has been designed to demonstrate the phenomenon of cavitation. Cavitation is demonstrated by forcing water through a contraction so that the static pressure of the water reduces. When the static pressure is reduced, any dissolved air in the water is released as bubbles. When the static pressure is reduced to the vapour pressure of the water, violent cavitation (vaporization of the water) occurs. By restricting the flow downstream of the test section, the static pressure in the test section is increased. When the static pressure is maintained above the vapour pressure, increased flow-rate is possible through the test section without cavitation occurring.



Name of the Equipment-10: Cavitation Apparatus
Specialization: Hydraulics Engineering
Name of the lab: Water Resources Engineering Lab

11. Description of the Equipment-11

The apparatus has been designed to demonstrate the phenomenon of cavitation. Cavitation is demonstrated by forcing water through a contraction so that the static pressure of the water reduces. When the static pressure is reduced, any dissolved air in the water is released as bubbles. When the static pressure is reduced to the vapour pressure of the water, violent cavitation (vaporization of the water) occurs. By restricting the flow downstream of the test section, the static pressure in the test section is increased. When the static pressure is maintained above the vapour pressure, increased flow-rate is possible through the test section without cavitation occurring.



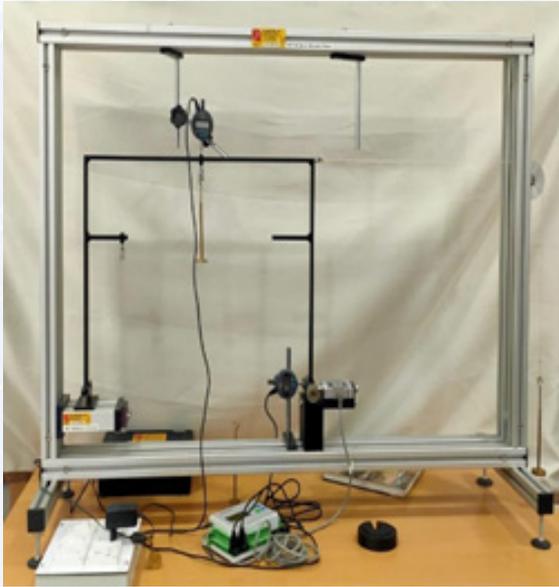
Name of the Equipment -11: HST 4 Three Hinge Arch

Specialization: Structure Analysis

Name of the lab: Structure Analysis Lab

12. Description of the Equipment-12

To determine the deflection in frames. A 'rectangular' Portal frame made from rectangular solid steel section are provided with either pinned ends or simple supports to enable each frame to be set up in the HST1 Universal Frame and Stand (sold separately) and loaded horizontally and vertically. One end of the portal frame pivots on a knife edge, while the other end is free to move horizontally on a track plate against a load cell.



Name of the Equipment-12: HST 7 Deflection In Frames
Specialization: Structure Analysis
Name of the lab: Structure Analysis Lab

13. Description of the Equipment-13

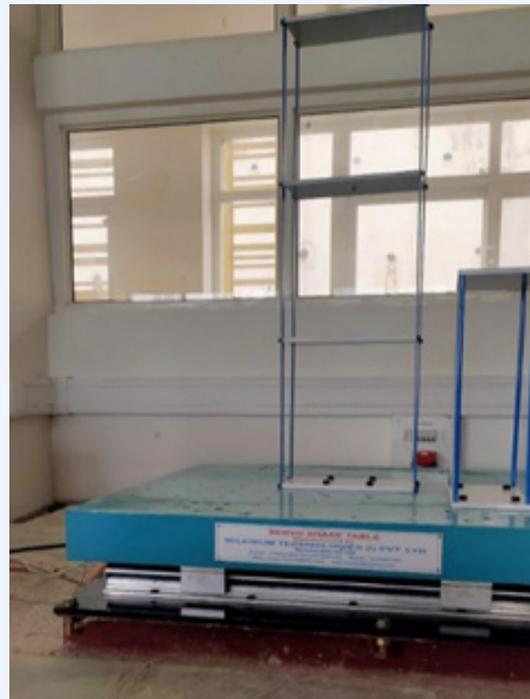
Three Channel Analog Input Sensor with 14 pin connectors WSDA-2000 wireless sensor analog The WSDA®-2000 is a network-ready gateway for reliable data acquisition from Parker wireless and inertial sensors. The WSDA-2000 features Ethernet, USB 2.0, and J1939 CAN interfaces, as well as 4GB of on-board memory for datalogging. Ethernet connectivity means access to your wireless sensor network from anywhere in the world. This gateway automatically pushes data to Sensor Cloud, where data is securely stored, viewed, and may have analytics operations or alerts set up. The WSDA-2000 also allows a remote connection so the owner can control their sensor network as if they are on-site.



Name of the Equipment -13: Three Channel Analog Input Sensor with 14 pin connectors
Specialization: Advanced Structural Engineering
Name of the lab: Advanced Structural Engineering Lab

14. Description of the Equipment-14

A shake table simulates the ground motions that take place during an earthquake. They're used to test structural models, scaled slopes, or building components, typically to the point of failure. Shake tables have a range of seismic waves and scenarios that test against the structure's integrity, which in turn helps structural engineers like the ones at HH Consulting build stronger, safer structures.



Name of the Equipment-14: Shake Table
Specialization: Advanced Structural Engineering
Name of the lab: Advanced Structural Engineering Lab

15. Description of the Equipment-15

KRYPTON data acquisition modules are designed to be small, rugged, and modular especially made perfect for field measurements in any environment. The small size of KRYPTON modules allows them to fit perfectly in tight places and can be placed very near the sensors. Traditional data acquisition systems are big boxes with many input channels, which means long and expensive sensor cabling is needed in order to perform data acquisition.



Name of the Equipment -15: Dewesoft KRYPTON
Specialization: Advanced Structural Engineering
Name of the lab: Advanced Structural Engineering Lab

16. Impact of Jet



Name of the Equipment-16: Impact of Jet
Specialization: WRE
Name of the lab: Hydraulics Lab

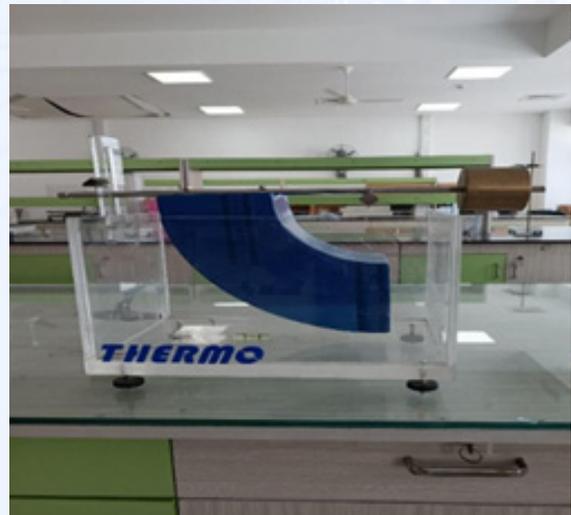
17. Losses due to friction in pipe



Name of the Equipment-17: Losses due to friction in pipe

Specialization: WRE
Name of the lab: Hydraulics Lab

18. Centre of Pressure



Name of the Equipment-18: Centre of Pressure
Specialization: WRE
Name of the lab: Hydraulics Lab

19. Digital pH meter



Name of the Equipment-19: Digital pH meter
Specialization: Environmental Engineering
Name of the lab: Atmospheric chemistry and climate change

3.4 School of Chemical Sciences

Chemistry discipline has remained one of the integral parts of the IIT Mandi academic community since its inception. Currently, the School of Chemical Sciences (SCS) is the home to a vibrant group of 12 faculty members, several research scholars, and Masters' students. SCS provides its faculty, students and scholars with a good academic ambiance and ecosystem. The faculty of SCS has established collaborations with scientists worldwide and thrives to excel in its teaching and research at national and international levels. SCS fosters a perfect harmony between fundamental and applied Chemistry through visionary research, innovation, and collaboration and is home to a diverse range of research areas involving synthetic organic chemistry, bioinorganic chemistry, spectroscopy and microscopy, organic and inorganic materials, functional nanomaterials, nano-electronics, drug delivery, polymer chemistry, organic electronics, theoretical and computational chemistry, homogeneous and heterogeneous catalysis, and photocatalysis. Interdisciplinary research lies in the heart of the SCS, which is constantly explored through fruitful research collaboration with biological and physical sciences and other branches of engineering sciences at IIT Mandi. Since its inception, SCS has successfully established many research collaborations with world-renowned institutions and attracted national and international research funding. Several of our alumni are well-placed in academic and industrial jobs in India and abroad. With its highly interdisciplinary and cutting-edge research activities, SCS constantly aims to push the frontiers of Chemistry and Material Science research and innovation.

SCS offers Ph.D. in different branches of Chemistry and M.Sc. in Chemistry. MSc Chemistry is a two-year (4-semester) postgraduate program, which was the first master-level program offered under the Basic Sciences discipline at IIT Mandi. MSc Chemistry is now the flagship program of the School of Chemical Sciences. This program aims to provide fundamental knowledge in the broad areas of Chemistry through core courses and simultaneously offers a knowledge base in the allied areas and beyond through elective courses. The MSc Chemistry program is highly research-oriented that enables students to avail a "learn-by-doing" approach through research projects.

School Chair

| | | |
|---|---|---|
| 1 | <p>Dr. Pradeep C. Parameswaran Professor and Chairperson SCS Specialisation: Inorganic/Materials/Nano-Chemistry PhD from University of Hyderabad (2006) Home Town: Thrissur, Kerala Phone: 01905-237931/267045 Email: Pradeep Chairperson Email: chairscs</p> |  |
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Faculty:

| | | |
|---|--|---|
| 1 | <p>Dr. Aniruddha Chakraborty Professor Specialisation: Theoretical Chemistry PhD from Indian Institute of Science (2005) Home Town: Kolkata, West Bengal Phone: 01905-267145 EMail: achakraborty</p> |  |
| 2 | <p>Dr. Prem Felix Siril Professor Specialisation: Chemistry of Nanomaterials PhD from DDU Gorakhpur University (2003) Home Town: Thiruvananthapuram, Kerala Phone: 01905-267040, Email: prem</p> |  |

| | | |
|---|---|---|
| 3 | <p>Dr. Chayan K. Nandi Professor Specialisation: Physical Chemistry PhD from Indian Institute of Technology Kanpur (2006) Home Town: Sarangapur, Bankura, West Bengal Phone: 01905-267047 EMail: Chayan</p> |  |
| 4 | <p>Dr. Subrata Ghosh Professor Specialisation: Organic Chemistry PhD from Indian Institute of Technology Guwahati (2006) Home Town: Bolpur-Santiniketan, West Bengal Phone: 01905-267065, EMail: Subrata</p> |  |
| 5 | <p>Dr. Venkata Krishnan Professor Specialisation: Materials Chemistry, X-ray Science PhD from University of Stuttgart, Germany (2006) Home Town: Coimbatore, Tamil Nadu Phone: 01905-267065 EMail: vkn</p> |  |
| 6 | <p>Dr. Aditi Halder Associate Professor Specialization: Design and development of new functional nanomaterials for the application of renewable energy, nano-electronics and sensor PhD from Indian Institute of Science (2009) Home Town: Kolkata, West Bengal Phone: 1905-267140 EMail: Aditi</p> |  |
| 7 | <p>Dr. Amit Balkrishna Pawar Assistant Professor Specialization: Organic Chemistry PhD from IISc Bangalore Home Town: Pune, Maharashtra Phone: 267116 EMail: amitpawar</p> |  |
| 8 | <p>Dr. Bhaskar Mondal Assistant Professor Specialization: Computational Chemistry and Catalysis PhD from Indian Association for the Cultivation of Science, Kolkata Home Town: Basirhat, West Bengal Phone: 267828 EMail: bhaskarmondal</p> |  |
| 9 | <p>Dr. Garima Agrawal Assistant Professor Specialization: Polymer Science and Technology, Materials Chemistry, Nanomaterials, Smart Materials, Biodegradable Polymers, Biomaterials PhD from RWTH Aachen University, Germany Home Town: Jaipur, Rajasthan Phone: 267827 EMail: Garima</p> |  |

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|----|--|---|
| 10 | <p>Dr. Moupriya Das Assistant Professor Specialization: Stochastic thermodynamics, Soft condensed matter, Transport phenomena, Climate science Ph. D from Indian Association for the Cultivation of Science, Kolkata, India (Advisor: Prof. Deb Shankar Ray), 2010 – 2015 Home Town: West Bengal Phone: 267723 Email: moupriya</p> |  |
| 11 | <p>Dr. Abhimanew Dhir Assistant Professor Specialization: Supramolecular Chemistry, Fluorescent Materials and Crystal Engineering Ph.D from Guru Nanak Dev University Amritsar, Punjab – 2011 Home Town: Phone: 267861 Email: abhimanew</p> |  |

Research projects from IIT Mandi seed grants, sponsored projects, brief progress of the work done against project, highlighting the major achievements during this period. Names of PI, Co-PI, funding agencies and amount of grant received etc.

| Sl. No. | IIT Mandi Reference/ Project No. | Project Title | Sponsoring Agency | Principal Investigator & Coordinator(s) | School | Amount Sanctioned | Duration | From | To |
|---------|----------------------------------|--|-------------------|--|--------|-------------------|----------|------------|------------|
| 1 | IITM/DST-FIST/AH/217 | FIST for improvement of S & T infrastructure- FIST project | DST | Dr. Aditi Halder | SCS | 1,12,00,000 | 5 years | 19.09.2018 | 18.09.2023 |
| 2 | IITM/DRDO/PFS/272 | Micronization and Encapsulation of explosive by expansion of CO ₂ - expanded liquid solutions | DRDO | "Dr. Prem Felix Siril (PI) (IIT Mandi) Dr. Sameer Dalvi, IIT Gandinagar" | SCS | 22,64,850 | 3 years | 21.12.19 | 20.12.22 |
| 3 | IITM/CSIR/ACY/277 | Electron solvation by a layer of polar adsorbates realistic model | CSIR | Dr. Aniruddha Chakraborty | SCS | 4,32,000 | 3 years | 01.05.19 | 30.04.22 |
| 4 | IITM/SERB/PM/281 | Function and mechanisms of sorcin in diet induced fatty liver diseases and lipid metabolism | SERB | Dr. Prosenjit Mondal, Dr. Subrata Ghosh (Co-PI), Dr. Mohan Kamthan (Co-PI) | SCS | 43,60,000 | 3 years | 25.02.20 | 24.02.23 |
| 5 | IITM/SERB/AH/286 | Low cost flexible and rechargeable Zn-air battery for portable device application | SERB | Dr. Aditi Halder | SCS | 42,17,400 | 3 years | 19.02.20 | 18.02.23 |

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|----|----------------------------------|--|-------------------------|---|------------|-------------|---------|----------|----------|
| 6 | IITM/DST/ VD/288 | National mission on interdisciplinary cyber physical system (NM-ICPS) implementation mechanisms- Technology innovation hubs (TIH s) | DST | Dr. Prem Felix Siril (PI), Dr. Varun Dutt, Dr. Arnav Bhavsar, Dr. Anil K Sao, Dr. Aditya Nigam, Dr. Gopi Srikanth Reddy, Dr. Srikant Srinivasan, Dr. Dileep AD and Dr. Satyajit Thakor are the (Co-PIs) | SCS & SCEE | 7,25,00,000 | 5 years | 30.03.20 | 29.03.25 |
| 7 | IITM/SERB/ BM/299 | Computation design of non-noble metal catalysts for photocatalytic N ₂ activation | SERB | Dr. Bhaskar Mondal S | SCS | 1991000 | 2 years | 04.12.20 | 03.12.22 |
| 8 | IITM/ DST(WOS-A)/ KGGH/302 | Design and synthesis of iminosugar-base seven membered fused deazapurine nucleosides and nucleotides | DST (WOS-A) | Dr. Ketaki Ghosh Dr. Subrata Ghosh (Mentor) | SCS | 3030480 | 3 years | 14.12.20 | 13.12.23 |
| 9 | IITM/SERB/ GA/303 | Designing functional microgels based agrochemical delivery systems with moisture preservation | SERB | Dr. Garima Agrawal | SCS | 2431000 | 2 years | 18.12.20 | 17.12.22 |
| 10 | IITM/SERB/ ABP/306 | Total synthesis of Indolizinone, Quinolizinone and Quinazolinone based natural products via cp*co(III)-Catalyzed cascada C-H functionalization | SERB | Dr. Amit Balkrishna Pawar | SCS | 3044254 | 2 years | 24.12.20 | 23.12.22 |
| 11 | IITM/SERB/ CKN/310 | Unique fluorescent nanodots as a marker to ease the method of correlative super resolution microscopy | SERB | Prof. Chayan Kanti Nandi | SCS | 6692400 | 3 years | 22.12.20 | 21.12.23 |
| 12 | IITM/DST/ GA/318 | Designing 3D printable smart composite hydrogel- inks for tissue engineering applications | DST | Dr. Garima Agrawal (PI), Dr. Rik Rani Koner (Co-PI) | SCS & SE | 3796642 | 3 years | 05.03.21 | 04.03.24 |
| 13 | IITM/SU-UK/ VKN/328 | Low-cost recycling of coronavirus contaminated medical waste (Re Cocir) | Swamsea University (UK) | Dr. Venkata Krishnan | SCS | 7,16,087 | 3 years | 12.04.21 | 11.04.24 |

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|----|--------------------------------|--|------------------------------------|---|-----------------|-------------|---------|------------|------------|
| 14 | IITM/SU-UK/ VKN/333 | Agreement between Swansea University, Marley Limited, Manonmaniam Sundaranar University and IIT Mandi | Swansea University (UK) | Dr. Venkata Krishnan | SCS | 1,81,440 | 3 Years | 19.03.21 | 18.03.24 |
| 15 | IITM/ SG/2023/04-1418 | Controlling driven transport through reshaping of potential barrier; theory and applications | IIT Mandi Seed Grant | Dr. Moupriya Das (PI) | SCS | 15,00,000 | 2 years | 01.04.2023 | 31.03.2025 |
| 16 | IITM/MHRD- SPARC/PFS/260 | Developing conducting polymer nanostructures and their nanocomposites as visible light photocatalysts for environmental remediation using flow chemistry | MHRD-SPARC | Prof. Prem Felix Siril (PI) | SCS | 60,83,710 | 4 years | 15.03.2019 | 31.03.2023 |
| 17 | IITM/DSRIC /03/2023/04-1416 | Integration of digital olfaction with a mobile phone and television | iHub and HCI Foundation, IIT Mandi | Dr. Shubhajit Roy Chowdhury (PI), Dr. Amit Balkrishna Pawar (Lead Co-PI) Prof. Aniruddha Chakraborty (Co-PI) Dr. Aditya Nigam (Co-PI) Dr. TrayambakBasak (Co-PI) Dr. Bhaskar Mondal (Co-PI) Dr. Moupriya Das (Co-PI) Dr. Ratnam Venkata Vakacharla (Co-PI) Dr. Dinesh Singh (Co-PI) Dr. Gopal Rawat (Co-PI) Dr. PriyatoshMahish (Co-PI) | SCEE, SCS & SBB | 1,07,44,800 | 2 years | 03.03.2023 | 02.03.2025 |
| 18 | IITM/SERB/ VKN/390 | Towards large scale photocatalytic hydrogen production using integrated catalytic panels | SERB | Dr. Venkata Krishnan (PI) | SCS | 47,81,832 | 3 years | 23.12.22 | 22.12.25 |
| 19 | IITM/SERB/ MUD/389 | Controlling the surroundings to optimize the efficiency of finite- time computation | SERB | Dr. Moupriya Das (PI) | SCS | 16,41,200 | 2 years | 05.12.22 | 04.12.24 |

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|----|-----------------------------|---|--------------------|---|-----|-----------|---------|------------|------------|
| 20 | IITM/SCL/ SG/387 | Processing & Delivery of recently developed i-line / MUV photoresist to SCL Mohali | SCL Mohali | Prof. Subrata Ghosh (PI) | SCS | 5,79,260 | 2 years | 28.11.22 | 27.01.23 |
| 21 | IITM/SG/ ABP/76 | Rational design and development of cyclopentadienyl based cobalt catalysts for selective C-H activation | Seed Grant | Dr. Amit B Pawar and Dr. Bhaskar Mondal | SCS | 16,00,000 | 3 years | 01.04.21 | 31.03.24 |
| 22 | IITM/DST- Inspire/GA/279 | Designing functional nanomaterials for drug delivery | DST | Dr. Garima Agrawal | SCS | 35,00,000 | 5 years | 25.05.2016 | 24.05.2022 |
| 23 | IITM/SG/GA/72 | Designing multifunctional smart nanogels based electrospun fibers for biomedical applications | Seed Grant Project | Dr. Garima Agrawal | SCS | 7,00,000 | 3 years | 01.04.21 | 31.03.24 |
| 24 | IITM/SCL/ SG/344 | Development of Bottom Anti- Reflective Coating (BARC) for Photo-Lithography Applications at SCL | SCL | Prof. Subrata Ghosh | SCS | 85,93,288 | 3 years | 01.12.21 | 30.11.24 |

Progress of projects

Prof. Aniruddha Chakraborty

Curve Crossing Problems with arbitrary coupling, Council of Scientific & Industrial Research, New Delhi, India, INR. 7,54,400 (completed in July, 2022).

Progress of Work: Nonadiabatic transition due to potential energy curve crossing is an interesting mechanism to induce electronic transitions in the collision process. There are examples where the transition is between two states and also there are cases of involvement of more than two states in the process. There are only a few cases where an exact analytical solution of two state problems is available but those involve specific shape of potentials and coupling terms. The aim of this project was to solve multi-state problems involving coupling terms as arbitrary functions of position. Here we have proposed an interesting method to deal with coupling functions of arbitrary shape.

Electron solvation by a layer of polar adsorbates - realistic model, Council of Scientific & Industrial Research, New Delhi, India, INR. 3,96,000 (completed in July, 2022).

Progress of Work: An electron near a metal surface feels the charge of its image in the metal and therefore it moves under the influence of this attractive potential. Harris et. al., reported an experimental study of the dynamics of electron in image states of a metal surface having polar adsorbates on it - they find two kinds of states, viz., one localized and the other delocalized. There have been attempts to model the process, but the problem is the nature of the image potential state is not known owing to the lack of detailed knowledge of the geometry of the metal surface. All the theoretical calculations done so far have used flat metal surfaces. In this project we have considered models in which we account for non-flatness of the surface and we show the correlation between non-flatness of the surface with the solvation process.

Dr. Garima Agrawal

- **Project title:** Designing 3D Printable Smart Composite Hydrogel-Inks for Tissue Engineering

Applications

Scheme: India - South Korea Joint Research project

Sponsoring Agency: DST

PI: Dr. Garima Agrawal

Co-PI: Dr. Rik Rani Koner

Amount sanctioned in Rs: 37,96,642/-

Duration of project: 3 years

Status: Ongoing

Progress of the work: Natural polymer-based hydrogels with self-healing and antimicrobial properties have been prepared. These systems have been optimized by tuning different synthetic parameters. Currently, in vitro biological performance of the developed systems is being investigated.

- **Project title:** Designing functional microgels based agrochemical delivery systems with moisture preservation
Sponsoring Agency: SERB
PI: Dr. Garima Agrawal
Co-PI: NA
Amount sanctioned in Rs: 24,31,000/-
Duration of project: 2 years
Status: Completed
Progress of the work: Multifunctional polymer-based microgels with enhanced foliar attachment properties have been prepared. These microgels can help in controlled delivery of both nutrients and insecticides for longer time thus avoiding their excessive use. The developed microgels have been investigated on pea plants for both seed germination and elongation.
 - **Project title:** Designing Functional Nanomaterials for Drug Delivery
Sponsoring Agency: DST
PI: Dr. Garima Agrawal
Co-PI: NA
Amount sanctioned in Rs: 35,00,000/-
Duration of project: 5 years
Status: Completed
Progress of the work: Herein, multifunctional polymer-based nanoparticles have been prepared For controlled drug delivery, radio sensitization, and imaging.
 - Seed Grant IIT Mandi
Project title: Designing Functional Nanomaterials for Drug Delivery
Sponsoring Agency: IIT Mandi
PI: Dr. Garima Agrawal
Co-PI: NA
Amount sanctioned in Rs: 7,00,000/-
Duration of project: 3 years
Status: Ongoing
Progress of the work:
 Biodegradable, redox responsive polymeric nano formulations have been developed with colon cancer targeting ability.
- Dr. Moupriya Das*
- **Funding Agency:** Department of Science and Technology, Start-up Research Grant
Start date: 05.12.2022
Amount of grant received (Total): 16,41,200/- INR
Amount of grant received (This year): 10,69,600/- INR

Amount spent: 4,84,169/- INR

- (a) **Aim of the project:** It is our general experience that standard computation in a computer releases heat. A part of this heat appears due to the erasure of memory which is an essential step for irreversible logic operations in regular computational processes. The laws of thermodynamics set a limit for the heat evolution associated with this erasure step and eventually for the computation. It is the general observation that higher is the speed of computation greater is the amount of heat evolved. For practical purposes, it is desirable to keep this heat as low as possible. However, to reach the lower limit of the evolved heat one needs to perform computation infinitely slowly and that would not be a useful function. Consequently, a very important field of research has emerged only recently which concentrates upon optimization of heat evolution for finite-time computation. This significant and practical problem has been attempted to solve with different approaches, however, no definite solution has been suggested yet. I am specifically interested in understanding how to control the relevant parameters in the environment to perform computation in the most efficient manner. This aspect has not been studied so far. I believe that this emerging field of research would achieve a very dynamic direction in future as it targets to address very important practical issues and it consists of an extensive amount of research questions that are yet to be answered. It can be anticipated that the success of the proposed study would satisfy the critical understanding about developing efficient and environment-friendly computational processes for the benefits of society.
- (b) **Brief progress of the work done:** The Landauer principle introduces a fundamental thermodynamic constraint on the minimum amount of dissipated heat to erase one logical bit of information through a quasi-statically slow protocol. For finite-time information erasure process, the thermodynamic costs depend on the specific type of physical realization of the logical memory and how the information is erased. We have treated the problem within the paradigm of a Brownian particle in a symmetric bistable potential. The two minima of the double-well potential represent the two values of a logical bit, 0 and 1, and the particle's position corresponds to the current state of the memory. The erasure protocol is understood by applying an external time-dependent tilting force. Combining probabilistic survival analysis with instanton calculus, we have derived analytical tools to calculate the work required to erase a classical bit of information in finite time via an arbitrary continuous erasure protocol, which is a very relevant set-up for practical applications. Importantly, our method is not limited to the average work, but instead gives access to the complete work distribution arising from many independent realizations of the erasure process. Using the common example of an erasure protocol that varies linearly with time, we have explicitly calculated all relevant quantities and verified them numerically.
- (a) Research results accepted as the regular article in the journal; Physical Review Research.

Dr. Bhaskar Mondal

- **Project Title:** Integration of digital olfaction with a mobile phone and television
Funding Agency: IIT Mandi iHub and HCI Foundation
PI: N/A
Co-PI: Dr. Bhaskar Mondal
Amount: 1,07,44,800/-
Duration: 2 Years (from 03.03.2023 to 02.03.2025)
Brief progress of the work done: N/A
- **Project Title:** Computational design of non-noble metal catalysts for photocatalytic N₂ activation
Funding Agency: SERB
PI: Dr. Bhaskar Mondal
Co-PI: N/A
Amount: 19,91,000/-
Duration: 2 Years 3 Months (from 04.12.2020 to 03.02.2023)
Brief progress of the work done: In this project, we have primarily uncovered the crucial role of electron density on the M–N–N–M core of bimetallic end-on μ_2 - η^1 : η^1 -N₂ complexes in N–N π -photoactivation. Our findings based on DFT and TDDFT calculations on prototypical complexes

provide fundamental insights into how the electronic nature of the M–N–N–M core determines the nature of the photoexcited charge-transfer states and their geometry. Most importantly, we were able to optimize the equilibrium geometry of the singlet and triplet charge-transfer states, which promisingly show an elongated N–N moiety. Four prototypical complexes based on Fe, Mo, and Ru bearing a ligand “trans” to their M–N–N–M core have been investigated so far. Overall, our work has established the crucial correlation between the geometry and electronic structure in “real” full-sized μ_2 - η^1 - η^1 - N_2 dinitrogen complexes for N–N π -photoactivation, which will encourage major experimental investigations leading to the development of novel molecular catalysts for N_2 photoactivation.

- **Project Title:** Rational Design and Development of Cyclopentadienyl-Based Cobalt Catalysts for Selective C–H Activation
Funding Agency: IIT Mandi
PI: Dr. Bhaskar Mondal
Co-PI: Dr. Amit B. Pawar
Amount: 16,00,000/-
Duration: 2 Years (from 01.04.2021 to 31.03.2023)

Brief progress of the work done: As the part of the computational objectives of this project, we have uncovered the origin of regioselectivity in transition metal catalyzed 1,3-diyne coupling reaction leading to the formation of heterocycles. Particularly, we computationally established the reaction mechanism of the catalytic cycle, identified the rate- and selectivity- determining steps. Such findings will guide us to rationally design and develop novel transition metal catalysts for robust C–H activation reactions.

Book Chapters published

- Cp*Co(III)-Catalysed C–H Functionalization Mediated by Oxidising Directing Groups Towards the Synthesis of Heterocycles (Wiley-VCH), Yogesh N. Aher, Dr. Bhaskar Mondal, Dr. Amit B. Pawar
- Y. N. Aher, Dr. Bhaskar Mondal, *and Dr. Amit B. Pawar*; “Cp*Co(III)-Catalyzed C–H Functionalization Mediated by Oxidizing Directing Groups Toward the Synthesis of Heterocycles” in Handbook of CH-Functionalization (CHF), 2022, Ed. Debabrata Maiti.
- H. Chand, P. Choudhary and Prof. Venkata Krishnan, Surface Modified Carbonaceous Nanomaterials for CO₂ Hydrogenation and Fixation (Chapter 9) in Surface Modified Nanomaterials for Applications in Catalysis: Fundamentals, Methods and Applications (Micro and Nano Technologies Series), M. B. Gawande, C. M. Hussain and Y. Yamauchi (Eds.), Elsevier Publishers, Netherlands, 2022, 1, 223-249. (<https://doi.org/10.1016/B978-0-12-822842-5.00014-5>)
- A. Kumar, A. Kumar, H. Chand and Prof. Venkata Krishnan, Upconversion Nanomaterials for Photocatalytic Applications (Chapter 15) in Upconversion Nanophosphors (Micro and Nano Technologies Series), S. Thomas, K. Upadhyay, R. K. Tamrakar and N. Kalarikkal (Eds.), Elsevier Publishers, Netherlands, 2022, 1, 391-406. (<https://doi.org/10.1016/B978-0-12-822842-5.00014-5>)
- A. Kumar and Prof. Venkata Krishnan, Near Infrared Light Active Lanthanide-doped Upconversion Nanoparticles: Recent Advances and Applications (Chapter 14) in Springer Handbook of Inorganic Photochemistry, D. Bahnemann and A. O. T. Patrocinio (Eds.), Springer Publishers, Switzerland, 2022, 1, 339–362. (https://doi.org/10.1007/978-3-030-63713-2_14)

Paper published in reputed International journals

- Reaction-diffusion dynamics in presence of two competing sink terms: Beyond Oster-Nishijima Model in barrierless reaction, C. Samanta* & Prof. Aniruddha Chakraborty, Physica A, 594, 127061 (2022).
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- A. Dhiman, A.K. Sharma, D. Bhardwaj, Dr. Garima Agrawal,* Biodegradable dual stimuli responsive alginate based microgels for controlled agrochemicals release and soil remediation, International Journal of Biological Macromolecules 2023, 228, 323.
- A. Dhiman, A. Gupta, S.K. Sethi, G. Manik, Dr. Garima Agrawal,* Encapsulation of Wax in

Complete Silica Microcapsules, *Journal of Materials Research* 2022, just accepted. DOI: <https://doi.org/10.1557/s43578-022-00865-y>

- A. Gupta, A. Sood, A. Dhiman, N. Shrimali, R. Singhmar, P. Guchhait, Dr. Garima Agrawal,* Redox responsive poly(allylamine)/eudragit S-100 nanoparticles for dual drug delivery in colorectal cancer, *Biomaterials Advances* 2022, 143, 213184.
- A.K. Sharma, A. Gupta, A. Dhiman, M. Garg, R. Mishra, Dr. Garima Agrawal,* Fe₃O₄ embedded κ-carrageenan/sodium alginate hydrogels for the removal of basic dyes, *Colloids and Surfaces A: Physicochemical and Engineering Aspects* 2022, 130155.
- A.K. Sharma, A. Dhiman, A.K. Nayak, R. Mishra, Dr. Garima Agrawal,* Environmentally benign approach for the efficient sequestration of methylene blue and coomassie brilliant blue using graphene oxide emended gelatin/κ-carrageenan hydrogels, *International Journal of Biological Macromolecules* 2022, 219, 353.
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- S. Kumari, S. Alagar, A.K. Sharma, D. Upreti, Aashi, Dr. Garima Agrawal, V. Bagchi,* In-situ Modulation of Al Traces and Interlayer Spacing in Ti₃C₂Tx -A₂ MXene: Supercapacitor with Ultrahigh Capacitance and Energy Density, *Advanced Materials Interfaces* 2022, 9, 2200919.
- A. Sood,† A. Gupta,† R. Bharadwaj, P. Ranganath, N. Silverman, Dr. Garima Agrawal,* Biodegradable Disulfide Crosslinked Chitosan/stearic Acid Nanoparticles for Dual Drug Delivery for Colorectal Cancer, *Carbohydrate Polymers* 2022, 294, 119833.
- 11. A. Gupta, A. Sood, E. Fuhrer, K. Djanashvili, Dr. Garima Agrawal,* Polysaccharide-Based Theranostic Systems for Combined Imaging and Cancer Therapy: Recent Advances and Challenges, *ACS Biomaterials Science & Engineering* 2022, 8, 2281
- Free Amine Directed Ru(II)-Catalyzed Redox-Neutral [4+2] C_oH Activation/Annulation of Benzylamines with Sulfoxonium Ylides. Yogesh N. Aher and Dr. Amit B. Pawar* *J. Org. Chem.*, 2022, 87, 12608.
- Ru(II)-Catalyzed Regioselective Redox-Neutral [4 + 2] Annulation of N-Chlorobenzamides with 1,3-Diynes at Room Temperature for the Synthesis of Isoquinolones. Arijit Ghosh, Goraksha T. Sapkal, and Dr. Amit B. Pawar* *J. Org. Chem.*, 2023, 88, 4704.
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National conferences attended and papers presented.

- Dr. Moupriya Das: Soft Matter Young Investigators' Meet (Organized by TIFR, NCBS, IIT Bombay), Mysore, 15th – 17th June, 2022.
Role: Invited Speaker
Talk title: Physical limits of information
(ii) Chemical Sciences Symposium, IIT Mandi, 23rd -24th May, 2022.
Role: Invited Speaker
Talk title: Representation and limits of information in physics, chemistry and biology
- Dr. Bhaskar Mondal: Invited talk at the "Theoretical Chemistry and Biology (TCB)" symposium at NIPER Mohali, Chandigarh, 15th October 2022.

International conferences attended and papers presented

- Prof. Pradeep. C. Parameswaran, Aryl Sulfonium Polyoxometalates for Materials and Catalytic Applications, International Conference on modern trends in Inorganic Chemistry XIX (MTIC-XIX), Dec 15-17 2022 held at BHU, Varanasi UP India. Invited Speaker.
- Dr. Garima Agrawal, Smart Nanomaterials: A Novel Platform for Cancer Therapy, International Conference on Emerging Trends in Science & Technology ICETST 2022, Chandigarh (June 2022) (Invited Speaker).
- Dr. Garima Agrawal, Smart Nanomaterials: A Novel Platform for Cancer Therapy, International conference on emerging Trends in Science & Technology – ICETST 2022, Department of Applied Sciences, Punjab Engineering College (Deemed to be University), Chandigarh, India (June 2022)

(Invited Speaker).

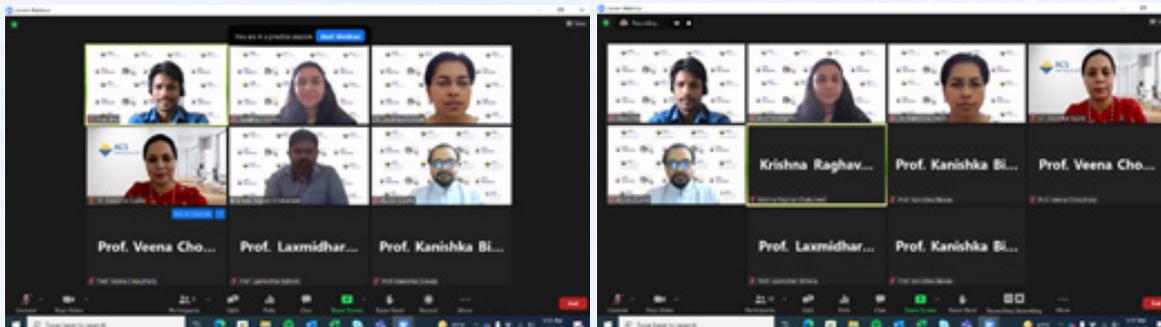
- Dr. Garima Agrawal, Stimuli Responsive Polymer based Materials for Controlled Drug Delivery, International Online Conference on Nanomaterials ICN 2022, Mahatma Gandhi University, Kottayam, Kerala (August 2022) (Invited Speaker).
- Dr. Garima Agrawal, Stimuli Responsive Polymer based Materials: A Novel Platform for Controlled Drug Delivery, International conference on “Current Trends in Drug Discovery Development & Delivery” – CTD4-2022, KL college of pharmacy, KL deemed to be University, India (October 2022) (Invited Speaker).
- Dr. Garima Agrawal, Biodegradable Disulfide Crosslinked Chitosan/Stearic Acid Nanoparticles for Dual Drug Delivery for Colorectal Cancer, 5th International Conference on Soft Materials (ICSM 2022), Department of Physics, MNIT, Jaipur, India (December 2022) (Invited Speaker).
- Dr. Garima Agrawal, Biodegradable Disulfide Crosslinked Chitosan/Stearic Acid Nanoparticles for Dual Drug Delivery for Colorectal Cancer, International Conference on Polymers for Advanced Technology, Goa, India (February 2023) (Invited Speaker).
- Dr. Bhaskar Mondal Invited talk at the “Designing Catalysts on Computers (DCC22)” international symposium at IACS Kolkata, Kolkata, 2-3 December 2022.

Invited Lecturers/Talks/Continuing education programs

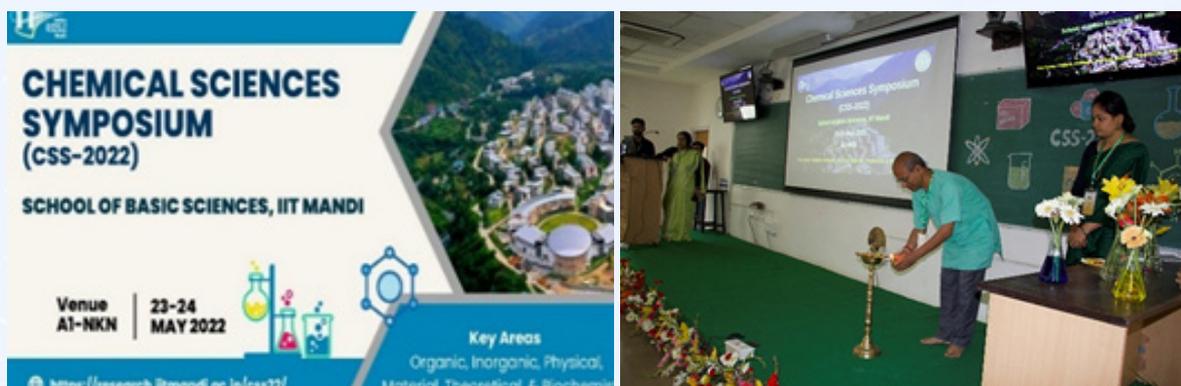
- Prof. Aniruddha Chakraborty: Delivered a talk to school teachers, in school teachers training camp at IIT Mandi, H.P 11/03/2023.
- Dr. Garima Agrawal, Chitosan based Redox Responsive Nanoparticles for Dual Drug Delivery, Webinar on Advances in Polysaccharide Materials, Molecules 2022 Webinars, MDPI (September 2022)
- Dr. Garima Agrawal, Recent Trends in Biomaterials, Faculty Development Program at National Institute of Technical Teachers Training and Research, Chandigarh (April 2022)
- Dr. Moupriya Das: Chemical Sciences Symposium, IIT Mandi, 23rd -24th May, 2022.
- Dr. Moupriya Das: Soft Matter Young Investigators’ Meet (Organized by TIFR, NCBS, IIT Bombay), Mysore, 15th – 17th June, 2022.
- Dr. Moupriya Das: Teachers’ Training Program 2023 (Organized by State Council of Educational Research and Training, Delhi & Indian Institute of Technology Mandi), IIT Mandi, 10th-15th March, 2023.
- Dr. Bhaskar Mondal Talk at the “Faculty Development Program in Science for Govt. School Teachers” in collaboration with SCERT, Govt. of NCR Delhi, at IIT Mandi, March 2023.
- Dr. Bhaskar Mondal Invited talk at the Faculty Development Program, Panjab University, Chandigarh, September 2022.
- Prof. Venkata Krishnan: Feb. 26, 2022 – Light - Saturday Seminar Series, U.S.A.
 - Feb. 27, 2022 - National Virtual Conference by Universal Intellectuals Trust, TN
 - Mar. 30, 2022 – Sardar Patel University, Mandi, HP (in-person)
 - May 23, 2022 – Chemical Sciences Symposium, IIT Mandi, HP (in-person)
 - May 27, 2022 – International Conference at Kumaraguru College of Tech., TN
 - Jun. 04, 2022 - Anusandhan Research Fair, IIT Mandi, HP
 - Jun. 18, 2022 – UGC-HRDC Refresher Course, University of Calicut, KL
 - Aug. 06, 2022 - International Conference Advanced Functional Materials, NIT Jldr., PB
 - Aug. 13, 2022 – Talk at Samskrita Bharati, HP
 - Aug. 22, 2022 – Orientation Program for Applied Science Students, PSG Tech., TN
 - Aug. 26, 2022 - National Symposium on Shaping the Energy Future, IIP Dehradun, UK
 - Sep. 15, 2022 – FDP Program at Saranathan College of Engineering, Trichy, TN
 - Oct. 12, 2022 - UGC-HRDC Refresher Course, Bharathiar University, Coimbatore, TN
 - Nov. 03, 2022 – Catalysis for Energy and Environment (CACEE 2022), TIFR, MH
 - Nov. 07, 2022 – ACS Environment and Sustainability Event, INSA, DL (in-person)
 - Nov. 12, 2022 – Sustainable Development (ICRANS22), Maharaja Agrasen Univ., HP
 - Dec. 09, 2022 - UGC-HRDC Refresher Course, University of Burdwan, WB
 - Dec. 20, 2022 – HPKVN Workshop on Product Design and Manufacturing, IIT Mandi

Workshop/ Conference organized with high resolution soft copies of photographs

- Prof. Aniruddha Chakraborty, as faculty Adviser of SCRI, organized research fair on 4th November, 2022.
- Dr. Garima Agrawal Hosted online ACS Seminars at IIT Mandi during 05th to 06th May 2022. A total of 976 registrants [500+ institutes, 43 countries] participated in the seminar.



- **Chemical Sciences Symposium, IIT Mandi, 23rd -24th May, 2022.**
Chemical Sciences at IIT Mandi organised a two-day national-level Chemical Sciences Symposium (CSS-2022) on 23rd-24th May 2022 at IIT Mandi. The focus of the symposium was on the current developments in fundamental and applied chemistry in different areas of chemical sciences, material sciences, spectroscopy, microscopy, and imaging. This meeting was intended to provide a vibrant platform for interaction between distinguished chemists from different parts of the country. The symposium was inaugurated by the Hon'ble Director, IIT Mandi, Prof. Laxmidhar Behera. In his inauguration speech, Prof. Behera hoped that the symposium will help significantly in expanding professional networks of the chemistry students and faculty members beyond their immediate academic circles. The symposium was conducted in in-person mode with about 15 eminent speakers from highly reputed academic institutes, like IACS Kolkata, IIT Kanpur, IIT Delhi, IIT Ropar, IISER Mohali, CSIR-IHBT Palampur, etc. Along with the invited speakers from national-level institutes, faculties from the chemistry discipline of IIT Mandi also delivered lectures. The symposium witnessed a vibrant presence of about 150 participants including MSc chemistry students and PhD scholars from IIT Mandi, which included active participation through oral and poster presentations. Through the oral and poster presentations, young researchers got the opportunity to showcase their research accomplishments as well as individual professional traits to other scientists. Two best oral and poster presentations were awarded to encourage the young researchers.



Lighting the lamp by the Director, IIT Mandi



Chemistry Faculties with the Invited Speakers Inauguration remarks by Prof. C K Nandi



CSS-2022 Poster Session



CSS-2022 Group Photo



Cultural Program

- Teachers' Training Program 2023 (Organized by State Council of Educational Research and Training, Delhi & Indian Institute of Technology Mandi), IIT Mandi, 10th-15th March, 2023.

The School of Chemical Sciences, participated in organizing a six-day Teachers' Training Program for a group of 52 teachers from different government schools located in Delhi. The objective of the Teachers' Training Program was to provide the targeted teachers pedagogic and advanced knowledge about the basic topics of Biology, Physics and Chemistry. The topics related to the chemical sciences were discussed by the expert faculty members of School of Chemical Sciences. Some training on hands-on experiments were also provided at the chemistry lab. Another important goal of this program was to make the teachers aware of the scope of study in Basic Sciences at IITs so that they can convey the gained view to the students with science background. The program offered the trainee teachers a bigger exposure to science and teaching, in general.



Group Photo



Coordinators

Prof. Prem Felix Siril (Chair)
 Dr. Garima Agrawal (Co-coordinator)
 Dr. Moupriya Das (Co-coordinator)

Patents filed/ awarded in 2022-23

| Sl. No. | Patent Application no. | Patent titled | Inventor | Co-Inventor(s) | Satus |
|---------|------------------------|--|--|--|---------|
| 1 | 202141007495 | A process for I-line resist dissolution modulation using Hydroxy styrene based ter-poylmer | Santu Nandi, Lalit Khillare, M.Yogesh, Suman Dolai, Chullikatil.P.Pradeep, Satinder K Sharma, Anvesh Bogavelly, Deep Naryan Tiwari, Paritosh Jain, Subrata Gosh, Kennerth E Gonsalves, Surinder Singh. | Santu Nandi, Lalit Khillare, M.Yogesh, Suman Dolai, Chullikatil.P.Pradeep, Satinder K Sharma, Anvesh Bogavelly, Deep Naryan Tiwari, Paritosh Jain, Subrata Gosh, Kennerth E Gonsalves, Surinder Singh. | Granted |

Professional achievements, honours and awards

Dr. Garima Agrawal

- Young Achiever Award 2023 IIT Mandi 2023
- Emerging Young Investigator in Nanoscience 2023 Nanoscale, Royal Society of Chemistry 2023
- NASI Young Scientist Platinum Jubilee Award National Academy of Sciences India 2022

Membership of Professional Societies

Dr. Garima Agrawal:

- Executive board member of Asian Polymer Association (India)
- Life member of Asian Polymer Association APA (India)
- Life member of Him Science Congress Association HSCA (India)
- Life member of The Society for Polymer Science (India)
- Life member of Soft Materials Research Society (India)

Dr. Moupriya Das: Member of American Physical Society

Visit to Academic Institutes and lectures delivered

- **Dr. Moupriya Das:** Research Visit to Max Planck Institute for the Physics of Complex Systems, Dresden, Germany
 Program: MPIPKS Visitors Program

Role: Guest Scientist

Project Title: The linkage between climate change and economy

Duration: 26th Jul 2022 - 17th Aug 2022 (3 weeks)

- **Dr. Bhaskar Mondal:** Guest Scientist visit at the Institute of Organic Chemistry (IOC), RWTH Aachen University, Germany, December 2022.

Outreach Activities

- **Prof. Aniruddha Chakraborty:** Given a talk to school kids at the Jawahar Navodaya Vidyalaya, Pandoh, H.P., under DST-INSPIRE prog.15/03/2023
- **Dr. Garima Agrawal:** Member - National advisory Board, Asian Polymer Association 2022.

Any Other Information

Dr. Moupriya Das: Composed an authored article for India's most widely circulated magazine India Today's Education Today section on 'Stochastic Resonance in Climate'. The purpose of the article was to explain intricate scientific matters in climate science and complex systems to a general readership. The article was written in a manner so as to serve as a pedagogical document for interested students.

Link:<https://www.indiatoday.in/education-today/gk-current-affairs/story/stochastic-resonance-in-climate-iit-prof-explains-earth-switches-between-ice-age-and-greenhouse-periods-1984179-2022-08-06>

3.5 School Of Physical Sciences (SPS)

Welcome to the School of Physical Sciences (SPS), IIT Mandi. Formed in 2022 after the dissolution of the School of Basic Sciences (SBS), the mission of SPS is to establish itself as an internationally recognised fraternity of academics contributing to knowledge creation in cutting-edge themes of the physical sciences; training future scientists and engineers via rigorous academic programs.

Currently, eighteen bright faculty along with over fifty research scholars, conduct research in cutting-edge themes of physics ranging from the physics of atoms, molecules, and quarks to the dynamics of black holes and the early universe, from exploring exotic states of matter to the physics of polymers and glasses. We offer a vibrant research ambience with state-of-the-art experimental and high-performance computing facilities.

We also conduct teaching programs at the undergraduate, postgraduate, and research levels. Students engage in research at both undergraduate and postgraduate levels, often serving as authors in research publications and frequently presenting their research at national and international conferences. Many of our alums have made us proud with their outstanding academic and research achievements. We aim to foster a friendly and diverse environment in our school, striving for excellence, equity, and inclusiveness.

| Faculty Members | | |
|-----------------|--|---|
| S. No. | Name and other details | Photographs |
| 1. | Prof. Suman Kalyan Pal, Professor and Chairperson SPS Specialisation: Fast and Ultrafast Laser Spectroscopy PhD from Indian Association for the Cultivation of Science, Jadavpur (2006) Home Town: Katwa, West Bengal Phone: 01905-267040; Email: suman@iitmandi.ac.in; chairsp@iitmandi.ac.in |  |
| 2. | Prof. Arti Kashyap, Professor (Joint Appointment) Specialisation: Magnetism and magnetic materials PhD from Indian Institute of Technology Roorkee Home Town: Mandi, Himachal Pradesh Phone: 01905-267042; Email: arti@iitmandi.ac.in |  |
| 3. | Dr. Prasanth P. Jose, Associate Professor Specialization: Soft condensed matter physics PhD from Indian Institute of Science (2005) Home Town: Palakkad, Kerala Phone:01905-267064; Email:prasanth@iitmandi.ac.in |  |
| 4. | Dr. Ajay Soni, Associate Professor Specialisation: Nanomaterials and Experimental Condense Matter Physics PhD from UGC-DAE Consortium for Scientific Research, Indore (2009) Phone: 01905- 267135; Email: ajay@iitmandi.ac.in |  |
| 5. | Dr. Bindu Radhamany, Associate Professor Specialization: X-ray spectroscopy PhD from UGC-DAE, consortium for scientific research, Indore (2005) Home Town: Kollam, Kerala Phone: 01905-267060; Email: bindu@iitmandi.ac.in |  |
| 6. | Dr. Pradyumna Kumar Pathak, Associate Professor Specialisation: Quantum Optics, Quantum Information and Nano photonics PhD from Physical Research Laboratory, Ahmedabad Home Town: Mathura, Uttar-Pradesh Phone: 01905- 267046; Email: ppathak@iitmandi.ac.in |  |

| | | |
|-----|--|---|
| 7. | Dr. Hari Varma, Associate Professor Specialisation: Atomic and Molecular physics PhD from Indian Institute of Technology Madras (2008) Home Town: Kochi, Kerala Phone: 01905-267064; Email: hari@iitmandi.ac.in |  |
| 8. | Dr. Kaustav Mukherjee, Associate Professor Specialisation: Experimental Condensed Matter Physics PhD from UGC-DAE Consortium for Scientific Research (2008) Home Town: Kolkata, West Bengal Phone: 01905-267043; Email: kaustav@iitmandi.ac.in |  |
| 9. | Dr. C. S. Yadav, Associate Professor Specialisation: Low Temperature Physics PhD from Jawaharlal Nehru University (2008) Phone: 01905-267135; Email: shekhar@iitmandi.ac.in |  |
| 10. | Dr. Pradeep Kumar, Associate Professor Specialisation: Raman and Infrared Spectroscopy PhD from Indian Institute of Science (2014) Home Town: Rohtak, HR Phone: 01905-267152; Email: pkumar@iitmandi.ac.in |  |
| 11. | Dr. Girish Sharma, Assistant Professor Specialization: Theoretical condensed matter physics PhD from Clemson University (USA) Home Town: Shimla, HP Email: girish@iitmandi.ac.in |  |
| 12. | Arko Roy, Assistant Professor Specialization: Ultracold quantum gases PhD from Physical Research Laboratory, Ahmedabad Home Town: Kolkata, West Bengal Email: arko@iitmandi.ac.in |  |
| 13. | Harsh Soni, Assistant Professor Specialization: Soft Condensed Matter Physics PhD from IISc Home Town: Baran, Rajasthan Email: harsh@iitmandi.ac.in |  |
| 14. | Nirmalya Kajuri, Assistant Professor Specialization: Theoretical High Energy Physics PhD from Institute of Mathematical Science Home Town: Kolkata Email: nirmalya@iitmandi.ac.in |  |
| 15. | Dr. Amal Sarkar, Assistant Professor Ph.D: IIT Bombay, Mumbai Email: amal@iitmandi.ac.in Address : G1 - 102, South Campus |  |
| 16. | Dr. Prabhakar Palni, Assistant Professor Ph.D: University of New Mexico, USA Email: prabhakar@iitmandi.ac.in Address : G1 - 101, South Campus |  |

| | | |
|-----|--|---|
| 17. | Dr. Krishna Mohan Parattu, Assistant Professor Address – G1-104, South Campus Email: krishna@iitmandi.ac.in |  |
| 18. | Dr. Rahul Kothari Assistant Professor Ph.D: IIT Kanpur Address: G1-103, South Campus Contact No.: +91 9936760102; Email: rkothari@iitmandi.ac.in |  |

3.5.1. Research projects from IIT Mandi seed grants, sponsored projects, brief progress of the work done against project, highlighting the major achievements during this period. Names of PI, Co-PI, funding agencies and amount of grant received etc.

| S. No. | Project No. | Project Title | Sponsoring Agency | Principal Investigator & Co-ordinator(s) | Dept./ School | Amount Sanctioned | Duration | From | To |
|--------|-------------------|--|-------------------|--|---------------|-------------------|----------|----------|----------|
| 1. | IITM/DST/SKP/320 | Optical control of valleytronics materials | DST | Prof. Suman Kalyan Pal (PI) Prof. Tonu Pullerits from Sweden | SPS | 54,25,000 | 3 years | 05.03.21 | 04.03.24 |
| 2. | IITM/DST/AKP/312 | Livelihood generation and improvement for women entrepreneurs in small scale fruits and vegetable farming and post-harvesting management | DST | Dr. Arti Kashyap (PI) Dr. Surya Prakash Upadhyay (Co-PI) | SPS and SHSS | 35,65,540 | 3 years | 24.12.20 | 23.12.23 |
| 3. | IITM/DST/AS/308 | Design of novel layered materials in bulk and 2D form for thermal energy harvesting | DST | Dr. Ajay Soni | SPS | 38,36,880 | 3 years | 11.11.20 | 10.11.23 |
| 4. | IITM/SERB/KM/307 | Exploration of physical properties of heusler alloys a prospective class of multi-functional material | SERB | Dr. Kaustav Mukherjee | SPS | 49,87,400 | 3 years | 28.12.20 | 27.12.23 |
| 5. | IITM/SERB/CSY/359 | Exploration of emerging phenomena in topological quantum materials using magneto-transport and thermoelectricity studies | SERB | Dr. C S Yadav | SPS | 47,67,400 | 3 years | 04.03.22 | 03.03.25 |
| 6. | IITM/SERB/GS/305 | Disorder, topology and correlations in dirac matter | SERB | Dr. Girish Sharma | SPS | 13,62,372 | 2 years | 21.12.20 | 20.12.22 |

| | | | | | | | | | |
|-----|---------------------------|---|-----------|----------------------|-----|---------------------|---------|----------|----------|
| 7. | IITM/SERB/SKP/404 | Investigation of ultrafast carrier dynamics, transport and resistivity switching behaviour of two-dimensional perovskites | SERB | Dr. Suman Kalyan Pal | SPS | 89,06,000 (approx.) | 3 years | 25.01.23 | 24.01.26 |
| 8. | SERB-CRG, CRG/2022/002309 | Photoionization dynamics of atomic metal clusters and their endofullerenes | SERB-CRG | Dr. Hari Verma | SPS | 20,63,182 | 2 years | 01.04.23 | 31.03.25 |
| 9. | IITM/SG/2023/04-1419 | The Dynamics of active chiral rings in two dimensions. | IIT Mandi | Dr. Harsh Soni | SPS | 1500,000 | 2 years | 06.10.22 | 05.10.24 |
| 10. | SERB-SRG/2022/000061-G, | The dynamics of motile granular rods in a vibrated monolayer of nonmotile rods | SERB | Dr. Harsh Soni | SPS | 16,43,400 | 2 years | 13.02.23 | 12.02.25 |
| 11. | IITM/SERB/AR/407 | Theoretical investigation of coherently coupled quantum mixtures of dilute atomic gases. | SERB | Dr. Arko Roy | SPS | 29,84,872 | 3 years | 28.09.22 | 27.09.25 |
| 12. | IITM/SG/AR/87 | Study on collective excitations in the condensates of dilute atomic gases. | IIT Mandi | Dr. Arko Roy | SPS | 605,303 | 2 years | 07.01.23 | 07.01.25 |
| 13. | IITM/SERB/NK/395 | Aspects Of Bulk Reconstructions | SERB | Dr. Nirmalya Kajuri | SPS | 12,14,400 | 3 years | 28.09.22 | 28.09.25 |
| 14. | IITM/SG/NK/86 | Ads/CFT and black holes with inner horizons. | IIT Mandi | Dr. Nirmalya Kajuri | SPS | 754000 | 3 years | 05.03.21 | 04.03.24 |

Brief progress of the work done against project

- Title:** Optical Control of Valleytronics Materials
PI: Suman Kalyan Pal
Funding Agency: DST
Amount: 50.25 lacs (approx.)

Progress: The objectives of this project are to prepare bulk as well as 2D group-IV metal monochalcogenides (MMs) and investigate their optical properties including valley properties by laser spectroscopy. Among many MMs, tin(II) monosulfide (SnS) could find applications in emerging photonics and optoelectronics because of high carrier mobility, long-time stability and linear and nonlinear optical properties. We investigated nonlinear optical properties of SnS QDs using femtosecond Z-scan technique. Our study demonstrated that SnS QDs possesses high nonlinear absorption coefficient, low saturation intensity, and low non-saturable losses. The closed aperture z-scan measurements exhibited positive refractive nonlinearity leading to self-focussing effect in SnS QDs.

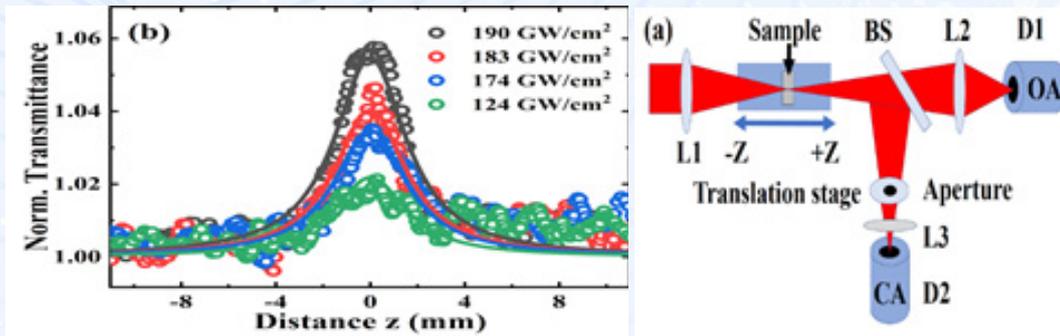


Figure (a)

Z-scan setup. BS - beam splitter, L - lens, D1 and D2 - detectors to collect respective data.

Figure (b)

Results of open aperture (OA) z-scan measurements at four different laser intensities.

- Title:** Investigation of ultrafast carrier dynamics, transport and resistive switching behavior of two-dimensional perovskites
PI: Suman Kalyan Pal
Funding Agency: SERB
Amount: 89.06 lacs (approx.)

Progress: The major hindrance for the commercialization of metal halide perovskite (MHP) devices is poor long-term stability. The stability can be increased by incorporating larger organic cations into the three-dimensional (3D) structure which forms a two-dimensional (2D) structure. In recent time, 2D MHPs have emerged as promising materials for optoelectronic devices, though the device performance is not impressive. In this proposal, the dynamics of excited carriers in 2D halide perovskites will be thoroughly investigated by exploiting ultrafast time-resolved terahertz and transient absorption spectroscopy to find the way of improving device performance. The resistive random-access memory (ReRAM) devices of 2D halide perovskites are expected to provide high ON/OFF ratio as higher Schottky barrier is formed at the interface. Hence, we will also investigate resistive switching behaviour of 2D halide perovskites by fabricating ReRAM devices. We have just started this project by synthesizing various 2D perovskites.



Figure (a)

Structures of (a) 3D

Figure (b)

2D perovskites

- Title:** "Livelihood generation and improvement for women entrepreneurs in small scale fruits and vegetable farming and post-harvesting management"
Name of PI: Dr. Arti Kashyap
Name of Co-PI: Dr. Surya Prakash Upadhyay
Funding Agency: DST
Amount of grant received: 35,65,540

Progress: The project aim to enhance the livelihoods of women, farmers in the region by providing them with the necessary training and resources to improve their farming practices, post-harvesting

management, and market linkages. During the first phase of the project, which started from August 2021, a baseline survey was conducted to identify the key challenges and opportunities for women and local farmer entrepreneurs in the targeted area. We installed the pulp extraction machine at Village Khnahal near Sojha, Tehsil Aut, District Mandi Himachal Pradesh on 7th of Sep, 2021 in a rented space. To start the project our team visited the nearby locations and collected the B & C grade apple from local market and local farmers. The first batch of apple pulp was produced at the location by following a proper SOP provided by our collaboration partner Innofarms who provided us with pulp extracting machine. With the help of Innofarms Pvt. Ltd. we trained local people to operate the pulp extractor machine. Additionally, our team established local market linkage system to help the women to sell their other niche produce at fair prices. Also, four Self Help Groups has been made each including 15-18 women. As a result of these interventions, the women are able to increase their production, improve the quality of their produce, and sell their products at higher prices, thereby enhancing their incomes and livelihoods.

- **Title: Exploration of Quantum Magnetism in Rare Earth Orthovanadates.**

In the past decade, researchers have focused on exploring quantum magnetism in 3D rare-earth based systems, particularly in rare-earth orthovanadates (RVO₄). These compounds, with a tetragonal crystal structure, have drawn attention due to their unique magnetic ground states, such as spin ice, quantum spin liquid (QSL), and low-dimensional magnetism. Members like TmVO₄ and TbVO₄ have recently exhibited intriguing properties like ferro quadrupole quantum phase transition and rotating magnetocaloric effect.

Other members (R = Ho, Ce, Pr, Eu, Tb, and Er) are under investigation for novel phases using experimental probes and theoretical methods. HoVO₄, for instance, shows signatures of a 3D QSL state with short-range correlations below 10 K. CeVO₄ displays a magnetic ground state with effective spin – ½ moments, while PrVO₄ indicates low-dimensional magnetism with a spin gap in the excitation spectra. EuVO₄ exhibits an enhanced effective moment at low temperatures under a magnetic field.

TbVO₄ undergoes a structural transition around 31 K, forming a pseudo spin – ½ doublet with a magnetic field-induced splitting. Above 10 kOe, a phase with 5th order susceptibility is observed. ErVO₄ presents a magnetic anomaly below 10 kOe, attributed to magnetoelastic coupling along the easy c-axis, and above 10 kOe, the out-of-plane component of magnetic anisotropy stabilizes a higher order magnetic phase. Overall, these investigations shed light on the diverse and fascinating magnetic behaviors within this family of rare-earth orthovanadates.

- **Title: Title: Emergence of low-temperature glassy dynamics in Ru substituted non-magnetic insulator CaHfO₃**

Non-magnetic insulators/semiconductors with induced magnetism introduced via transition metal substitution are one of the promising materials in the field of spintronics, magneto electronics and magneto-optical devices. In this context, we have focussed on magnetism induced in a non-magnetic insulator CaHfO₃, by the substitution of 4d element Ru, at Hf-site. Structural investigations indicate that substitution of Ru⁴⁺ (up to 50%) does not affect the original crystal structure of the parent compound. Magnetic studies divulge a crossover from a diamagnetic to paramagnetic state with 20% Ru substitution. Further replacement of Hf results in a glassy magnetic state in CaHf_{1-x}Ru_xO₃ (0.3 ≤ x ≤ 0.5). The nature of the low temperature glassiness (below 20 K) in these compositions is confirmed through Vogel–Fulcher and Power law, along with, magnetic memory effect and relaxation dynamics. The observed glassiness is explained through the phenomenological ‘hierarchical model’. Our studies indicate that the presence of competing short range interactions among randomly arranged Ru cations in non-magnetic insulator CaHfO₃ are responsible for the observed low temperature magnetic state in this series with compositions >0.25.

- **Title: Melting of spin ice state and development of fifth order susceptibility with magnetic field in pyrochlore Tb₂Sn₂O₇**

Pyrochlores offer an ideal playground to investigate the magnetic ground state of frustrated magnetic systems. In this class of materials, competition between various magnetic interactions remains frustrated and prevents an ordered magnetic state at low temperatures. Tb₂Sn₂O₇

has recently attracted significant attention due to its ordered spin-ice state. Additionally, in such systems, application of external magnetic field might result in exotic magnetic states. Our current investigation on $Tb_2Sn_2O_7$ reveal the presence of a new phase associated with fifth order susceptibility at low temperatures and high magnetic fields. In this compound, at zero fields, for a stabilized spin-ice state, the singlet-singlet state separated by δ play an imperative role. Under magnetic fields, δ increases and the Zeeman energy associated with the magnetic anisotropy is believed to get enhanced; which can be the key ingredient for evolution of higher-order moments, above 10 kOe, in this compound.

- **Title: Evidence of multi-band superconductivity in non-centrosymmetric full Heusler alloy LuPd₂Sn**

Evidence of multi-band superconductivity and presence of mixed parity states in full Heusler alloy LuPd₂Sn is investigated using the x-ray diffraction, temperature and field dependent resistivity, temperature dependent magnetization, and heat capacity measurements. Our studies reveal that LuPd₂Sn is a type II superconductor and undergoes superconducting transition below 2.5 K. Above 2.5 K, the temperature and field dependence of resistivity indicate to the presence of multiple bands and inter-band phonon assisted scattering. The upper critical field, H_{C2} (T) exhibits linear behaviour and deviates from Werthimer, Helfand and Hohenberg model over the measured temperature range. Additionally, the Kadowaki-Woods ratio plot supports the unconventional superconductivity in this alloy. Moreover, a significant deviation from the s-wave behaviour is noted, which is studied using phases fluctuation analysis. It indicates the presence of spin triplet along with spin singlet component arising due to antisymmetric spin orbit coupling.

- **Title: Dynamics of active chiral rings in two dimensions.**

PI: Dr. Harsh Soni

Funding Agency- IIT Mandi

Amount: 15,00,000 INR

Progress: We have written the numerical code to perform the numerical studies of the proposed problem. Our code is working perfectly fine.

- **Title: Dynamics of motile granular rods in a vibrated monolayer of nonmotile rods.**

PI: Dr. Harsh Soni

Funding Agency: SERB

Amount: 16,43,400 INR

Progress: We have completed numerical studies of the dynamics of active granular rods for different values of the rod size and the area fraction of the rod, confined between vibrating plates.

- **Title: Aspects of bulk reconstructions**

PI: Dr. Nirmalya Kajuri

Funding Agency: SERB

Amount: 12,14,400

Progress: The Ads/CFT correspondence is the central idea in theoretical physics that postulates a duality between quantum gravity in a d-dimensional Anti-de-Sitter(Ads) spacetime and a conformal field theory (CFT) in a d-1 dimensional flat spacetime. The correspondence is still incomplete, and the bulk reconstruction program aims to bridge the gap by constructing boundary representations of the bulk fields. Our project focuses on understanding the boundary representations obtained from data specified on a limited portion of the boundary, such as the AdS-Rindler patch. In this progress report, we summarize the progress made in our project and outline our plans for the future.

Progress made: Our work has focused on two key areas: the equivalence of different boundary representations and the non-standard Cauchy problem for obtaining boundary representations. In two dimensions, we have established the equivalence of different boundary representations, but the extension to higher dimensions remains the open question. We plan to use Bogoliubov transforms to identify and eliminate redundant modes and understand the evanescent modes that are connected to the divergence of the smearing function. We have also made progress in resolving the non-

standard Cauchy problem for asymptotically AdS boundaries. We have developed a framework for establishing necessary and sufficient conditions for obtaining boundary representations from boundary data, and we plan to extend this framework to more general situations.

Future Plans: In the coming year, we plan to focus on several open questions that remain in our project. Firstly, we will generalize our work on the equivalence of different boundary representations from two to higher dimensions. Secondly, we will continue to explore the non-standard Cauchy problem for asymptotically AdS boundaries, with the goal of establishing necessary and sufficient conditions for obtaining boundary representations. We will also investigate the analog of the domain of dependence for the non-standard Cauchy problem. Thirdly, we seek to understand why the smearing function diverges when evanescent modes appear in the bulk spacetime. We believe that this understanding will shed light on the connection between quantum error correction and holography.

- **Title: AdS/CFT and black holes with inner horizons.**

PI: Dr. Nirmalya Khajuri

Funding Agency: IIT Mandi

Amount: 7,54,000

Progress: Our project is focused on understanding the phenomenon of bulk reconstruction in the black holes. We aim to construct boundary representations of bulk fields and understand the dictionary between two theories, in the previous year, we had worked on 3d rotating BTZ black holes and Achucarro-Ortiz black holes in 2d. We had raised several questions regarding the CFT representations of the fields beyond the inner horizon, which we intend to address in the upcoming year.

Progress made: Bulk Reconstruction in 2d Achucarro Ortiz Black Holes: We have carried our bulk reconstruction in 2d Achucarro Ortiz black holes by using the standard HKLL procedure. We have successfully constructed boundary representation of the bulk scalar both outside and inside the inner horizon. This has helped us address the questions raised in our previous work. We have also attempted to answer mirror operators for fields beyond the inner horizon by demanding right entanglement structure. We aim to use this to settle the question of CFT representations of fields beyond the inner horizons. Extension of work in 3d Rotating BTZ Black Holes: We are attempting to extend our previous work on 3d rotating BTZ Black Holes by constructing operators beyond the inner horizon via the mirror operator construction. This will help us to understand the CFT representations of fields beyond the inner horizons in this black hole.

Plan of Action:

- Complete the analysis of mirror operator construction in 2d Achucarro-Ortiz black holes investigate its implications for CFT representations of fields beyond the inner horizon.
- Extend our work on 3d rotating BTZ Black Holes by constructing operators beyond the inner horizons and analyze their CFT representations.
- Further investigate the island region of the Achucarro-Ortiz black hole and explore noble features in the presence of inner horizons.

- **Title: Theoretical investigation of coherently-coupled quantum mixtures of dilute atomic gases.**

PI: Dr. Arko Roy

Funding Agency: SERB

Amount Sanctioned: 29,84,872 INR

Progress: The main objective of this project is to characterize the ferromagnetic transition in Bose-Bose mixtures with coherent coupling. In particular, to demonstrate the analogy with the solid-state magnetic systems. To meet the objective, we have developed the analytical and numerical schemes to study the effects of thermal fluctuations in coherently coupled condensates using the HFB-Popov and Stochastic Gross-Pitaevskii equations. We plan to study the collective modes of the multicomponent condensates with coherent coupling at zero and finite temperatures. This would enable us to relate the frequency and the momentum of the excitation through the dispersion relation. Furthermore, we intend to study the interplay between quantum and thermodynamic phase transitions and characterize the quantum critical region, a topic of intrigue in condensed matter physics community.

3.5.3. Papers published in reputed National journals

1. Probing Cosmology beyond Λ CDM using SKA. Shamik Ghosh, Pankaj Jain, Rahul Kothari, Mohit Panwar, Gurmeet Singh, Prabhakar Tiwari. Published on Mar 28, 2023.

3.5.4. Papers accepted in reputed National journals

1. A study of dipolar signal in distant quasars with various observables. Shamik Ghosh, Pankaj Jain, Rahul Kothari, Mohit Panwar, Gurmeet Singh, Prabhakar Tiwari. This paper is under review.

3.5.5. Paper published in reputed international journals

1. Kundar, M.; Bhandari, S.; Chung, S.; Cho, K.; Sharma, S. K.; Singh, R.; Pal, S. K. Surface Passivation by Sulfur-Based 2D (TEA)₂PbI₄ for Stable and Efficient Perovskite Solar Cells ACS Omega 2023, 8, 12842–12852.
2. Soni, A; Kushavah, D; Lu, L; Chang, W. H.; Pal, S. K. Efficient Multiple Exciton Generation in Monolayer MoS₂. Phys. Chem. Lett. 2023, 14, 2965–2972.
3. Nakka, N; Kushavah, D.; Ghosh, S.; Pal, S. K. Photophysical, electrochemical and electron donating properties of rhodanine-3-acetic acid-linked structural isomers Chem. Phys. 2023, 566, 111793.
4. Mushtaq, A.; Pradhan, B; Kushavah, D.; Zhang, Y; Naumenko, D.; Amenitsch, H.; Hofkens, J.; Pal, S. K. Femtosecond Induced Third-Order Optical Nonlinearity in Quasi 2D Ruddlesden-Popper Perovskite Film Deciphered Using Z-Scan Mater. Adv. 2022, 3, 8211-8219.
5. Soni, A; Pal, S. K. Valley degree of freedom in two-dimensional van der Waals materials J. Phys. D: Appl. Phys. 2022, 55, 303003.
6. Evidence of multi-band superconductivity in non-centrosymmetric Full Heusler alloy LuPd₂Sn Kavita Yadav and K. Mukherjee J. Phys. Condens. Matter 35, 275601 (2023)
7. Origin of the long-range ferrimagnetic ordering in cubic Mn(Co)Cr₂O₄ spinels A. Das, P. Pal, Dheeraj Ranaut, K. P. Islam, G. Bhattacharya, S. Mehta, A. Mondal, V. Adyam, K. Mukherjee, A. Das, and D. Choudhury Phys. Rev. B 107, L100414 (2023)
8. Van Vleck paramagnetism and enhancement of effective moment with magnetic field in rare earth orthovanadate EuVO₄ Dheeraj Ranaut and K. Mukherjee Phys. Letts. A 465, 128710 (2023)
9. A plausible investigation of low dimensional magnetism in a 3D spin system PrVO₄ Dheeraj Ranaut and K. Mukherjee Phys. Chem. Chem. Phys. 25, 4305 (2023)
10. Evolution of field induced magnetic phase attributed to higher order magnetic moments in TbVO₄ Dheeraj Ranaut and K. Mukherjee Sci Rep 13, 487 (2023)
11. Possible realization of three-dimensional quantum spin liquid behavior in HoVO₄ Dheeraj Ranaut, S. S. Shastri, S. K. Pandey and K. Mukherjee J. Phys. Condens. Matter 34, 485803 (2022)
12. Emergence of low-temperature glassy dynamics in Ru substituted non-magnetic insulator CaHfO₃ Gurpreet Kaur and K. Mukherjee J. Phys. Condens. Matter 34, 415802 (2022)
13. Melting of spin ice state and development of fifth-order susceptibility with magnetic field in pyrochlore Tb₂Sn₂O₇ Karan Singh, Dheeraj Ranaut and K. Mukherjee New J. Phys. 24, 073037 (2022)
14. Unravelling the signatures of effective spin $\frac{1}{2}$ moments in CeVO₄: Magnetization and Heat Capacity study Dheeraj Ranaut and K. Mukherjee J. Phys. Condens. Matter 34, 315802 (2022)
15. S. Nehra, S. Kumar, S. Srivastava, S. Chillar, C.S. Yadav and A. Dogra; Suppression of conductivity by 1 uc buffer layer at LAO/STO interface Physica B (2023)
16. Shailja Sharma, Shiv Kumar, Amit Kumar, Kenya Shimada, C.S. Yadav; Electronic transport studies of Ag doped Bi₂Se₃ topological insulator Journal of Applied Physics 132, 105108 (2022)
17. T. S. Dash, Sheetal Devi, K. D. Tulsian, D. Samal, C. S. Yadav, and Saroj L. Samal; Mn_{2-x}HoxSnS₄: A mixed quaternary metal chalcogenide system with an antiferromagnetic ordering; J. Solid State Chemistry 314, 123350 (2022)
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19. Shailja Sharma, C.S. Yadav Angular dependence of magnetoresistance and anisotropic upper critical field in Nb doped Bi₂Se₃ Superconducting Science & Technology 35, 075015 (2022)
20. Sheetal, A. Elghandour, R. Klingeler, and C.S. Yadav Field induced spin freezing and low temperature heat capacity of disordered pyrochlore oxide Ho₂Zr₂O₇ Journal of Physics: Condensed Matter, 34, 245801 (2022)

21. Decoupling intranode and internode scattering in Weyl fermions G. Sharma, Snehasish Nandy, Karthik V. Raman, and Sumanta Tewari *Phys. Rev. B* 107, 115161 – Published 28 March 2023.
22. Longitudinal magnetoconductance and the planar Hall conductance in inhomogeneous Weyl semimetals Azaz Ahmad, Karthik V. Raman, Sumanta Tewari, and G.Sharma *Phys. Rev. B* 107, 144206 – Published 27 April 2023
23. Vivek Kumar, D. Kumar, B. Singh, Y. Shemerliuk, M. Behnami, B. Buchner, S. Aswartham, Pradeep Kumar " *Phys. Rev. B* 107, 094417 (2023).
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25. S. Saxena, H. N. Vasavan, M. Badole, A. K. Das, S. Deswal, Pradeep Kumar and Sunil Kumar "Tailored P2/O3 phase-dependent electrochemical behavior of Mn-based cathode for sodium-ion batteries" *Journal of Energy Storage* 64, 107242 (2023).
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41. Strain induced phase transition in La_{0.2}Sr_{0.8}MnO₃; Priyamedha Sharma, Swati Pathak, Himanshu Pant, and R. Bindu; *Applied Physics A* 128, 271 (2022).
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43. Title: Properties of the dissipation functions for passive and active systems, Author: Harsh Soni. Phys. Rev. E 107, 014111 – Published 11 January 2023
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 46. Paramjeet Banger, R. Kishor Kumar, Arko Roy, S. Gautam, Effective potentials in a rotating spin-orbit-coupled spin-1 spinor condensate, Journal of Physics: Condensed Matter 35, 045401 (2023).
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 48. Pivotal Role of Intersite Hubbard Interactions in Fe-Doped α -MnO₂ Ruchika Mahajan, Arti Kashyap, Iurii Timrov The Journal of Physical Chemistry C 126 (33), 2022.
 49. Magnetization in iron-based compounds: A machine learning model analysis Yogesh Khatri, Rajesh Sharma, Ashutosh Shah, Arti Kashyap AIP Advances 13, 025318 (2023).

3.5.6. Paper accepted in reputed International journals

1. Thermoelectricity in Ag/Cu Based Complex Crystal Structure Minerals with Inherent Low Thermal Conductivity, Kewal Singh Rana and Ajay Soni, Invited Review Article accepted in Oxford Open Materials Science (2023).
2. Dramatic modifications in the angular photoemission time delay in Ar@C₆₀q=1: Coulomb Confinement Resonance as an amplifier to Spin-Orbit-Interaction Activated Interchannel Coupling effect Afsal Thuppilakkadan, Sourav Banerjee and Hari R. Varma (Accepted in Physical Review A)

3.5.7. National conferences attended and papers presented

1. Mr. Kewal Singh Rana presented poster on “Large unit cell colusites mineral for thermoelectric application” in the international conference on emerging technology and functional materials (ICETFM)-2022, held at Medi-Caps University Indore, during 12-14 July 2022
2. Ms. Divya Rawat gave oral presentation on “High degree of crystalline anharmonicity in α -In₂Se₃ crystal” in the international conference on emerging technology and functional materials (ICETFM)-2022, held at Medi-Caps University Indore, during 12-14 July 2022
3. Mr. Aditya Singh presented poster on “Phonon modes in single crystals of Bi₂Se₃ and Bi₂Te₃” in the international conference on emerging technology and functional materials (ICETFM)-2022, held at Medi-Caps University Indore, during 12-14 July 2022
4. Mr. Ankit Kashyap gave oral presentation on “Chemically transformed nanowires for thermoelectric energy conversion applications” in the International Conference on Smart Materials for Sustainable Technologies (SMST-2022), held at IIT Bombay, during October 13-16, 2022. Ankit won best technical presentation award.
5. Ms. Aksa Thomas presented poster on “Growth and characterization of tungsten nitride thin-film on silicon substrates” in 66th DAE Solid State Physics Symposium in BIT Mesra, Jharkhand from December 18 to December 23, 2022.
6. Ms. Divya Rawat gave oral presentation on “Many body phenomena in bismuth chalcogenides using light-matter interaction” in National Science Day 2023 held at IIT Mandi on 28th February 2023. Divya won best technical presentation award.
7. Mr. Ankit Kashyap presented a poster on “Chemically transformed Ag₂Te nanowires for thermoelectric energy conversion applications” in National Science Day 2023 held at IIT Mandi on 28th February 2023. Ankit won best Poster award.
8. Mr. Kewal Singh Rana presented a poster on “Thermoelectricity in Cu₂₆Nb₂Sn₆Se₃₂ with complex unit cell” in National Science Day 2023 held at IIT Mandi on 28th February 2023.
9. Mr. Aditya Singh presented a poster on “Transport and optical properties of single crystals of Bi₂Se₃ and Bi₂Te₃” in National Science Day 2023 held at IIT Mandi on 28th February 2023.
10. Ms. Aksa Thomas presented a poster on “Fabrication of MoS₂/WS₂ heterostructure as vertical p-n junction diode for optoelectronics application” in National Science Day 2023 held at IIT Mandi on

28th February 2023.

11. "Local structure study around Mn atom of Co₂MnAl compound" at CMDAYS NIT Nagaland conference Dec (2022): Poster presented by Ms. Swati Pathak.
12. "Effects of impurity on properties of CaCu₃Ru₄O₁₂" presented at International Conference on emerging materials for sustainable development (EMSD) organized by CSIR-CSIO, Chandigarh -Oct 2022: Poster presented by Ms. Swati Pathak.
13. Attended the XIX school on "Neutrons as probes of Condensed matter" Organised by UGC DAE BARC (Nov 2022): Attended by Mr. Himanshu Pant C60 AS A MOLECULAR DIFFRACTOR IN ELASTIC SCATTERING J. Jose¹, Aiswarya R. R. Shaik, H. R. Varma and H. Chakraborty² 3rd National conference on Atomic, molecular and optical physics (NCAMP) 2023, Feb 20-23, 2023, IIST Trivandrum, India.
14. PHOTOIONIZATION DYNAMICS OF Na₂₀@C₂₄₀: FIRST EVIDENCE OF RESONANT INTERCLUSTER COULOMBIC DECAY Hari R. Varma¹, Rasheed Shaik, Himadri S. Chakraborty² 3rd National conference on Atomic, molecular and optical physics (NCAMP) 2023, Feb 20-23, 2023, IIST Trivandrum, India.
15. Electronic transport and Hall effects in quantum materials' at the Workshop on Quantum materials held on 6-8th April at IISER Trivandrum (Kerala) presented by Dr. C. S. Yadav.
16. Review on Charge Density Wave compounds: VSe₂ and ZrTe₃' at the Workshop on Quantum materials held on 6-8th April at IISER Trivandrum (Kerala) presented by Dr. C. S. Yadav.
17. Electronic Transport and Planar Hall effect in Dirac semimetal PdTe₂' at Conference on Condensed Matter Physics held on Feb 6-8, 2023 at Physical Research Laboratory, Ahmedabad (Gujrat) presented by Dr. C. S. Yadav.
18. Shubnikov de-Haas oscillations and ARPES study in transition metal doped topological insulators at the conference Emergent phenomena in Quantum Materials (E-QMAT) on Oct 13, 2022, held at Indian Institute of Technology Roorkee (Uttarakhand) presented by Dr. C.S. Yadav.
19. Exotic quantum Phenomena in condensed matter, and Quantum materials of contemporary interests at UGC Refresher course on Oct 08, 2022 organized by Bharathiar University Coimbatore (Tamilnadu) presented by Dr. C. S. Yadav.
20. Spin Ice and Spin Freezing in Disordered Pyrochlore Zirconate: Dy₂Zr₂O₇ at the National conference on Quantum Condensed Matter on Sept 22, 2022 held at Indian Institute of Technology Kanpur presented by Dr. C. S. Yadav.
21. (IUMRS-ICA 2022 held at IIT Jodhpur, during 19-23 Dec. 2022) attended by Dr. Pradeep Kumar.
22. Shivalik Hepcats meeting, CUHP, Dharamsala, Sep 2022 Observables in Quantum Gravity, IISER Mohali, Mar 2023 attended by Dr. Nirmalaya Kajuri.
23. Presented paper at the DAE-BRNS High Energy Physics (HEP) Symposium held in November 2022 at IISER Mohali presented by Dr. Prabhakar Palni.
24. "Thermoelectric studies near metal to insulator transition in NdBaCo₂O_{5.6}" at CMDAYS conference held at NIT Nagaland (Dec 2022): Oral presentation by Mr. Himanshu Pant & Dr. Bindu Radhamany.
25. SERB school on "Single crystals of functional materials and their applications" held at Shiv Nadar University, Chennai (Jan-Feb 2023): Attended by Mr. Himanshu Pant & Dr. Bindu Radhamany.
26. Invited talk at QMat 2022 at IIT Kanpur on September 19, 2022 on "Fluctuations in quantum gases" delivered by Dr. Arko Roy.
27. Invited talk at Young Investigators' meet Condensed Matter Theory at NISER Bhubaneswar on October 31, 2022 on "Fluctuations in Bose-Bose atomic mixtures" delivered by Dr. Arko Roy.
28. Meeting on Statistical Physics and Complex Systems, IIT Kharagpur, 2022 attended by Dr. Harsh Soni.

3.5.8. International conferences attended and papers presented

1. Ms. Divya Rawat gave oral presentation on "Phonon-Plasmon coupling in thermoelectric Cu_{2-x}Te using Raman spectroscopy" in European Materials Research Society (E-MRS)-2022 Fall Meeting held at Warsaw University, Poland from 19th September to 22nd September 2022.
2. "Structural studies of NdBaCo₂O_{5.75}" at CONMAT 2022, Dubai (Oct 2022): Poster presented by Mr. Himanshu Pant. Confinement induced enhancement of photoionization cross-section of an alkali-metal cluster inside a giant fullerene R Shaik, HV Ravi, H Chakraborty.

3. Comparative study of plasmon-resonance properties as a function of fullerene size using density functional theory R Shaik, HV Ravi, H Chakraborty.
4. Photoionization dynamics of Na 3s in the Cooper minimum region N Hosea, J Jose, H Varma, P Deshmukh, S Manson.
5. Shubnikov de-Haas oscillations and ARPES study in transition metal doped topological insulators at the International Forum on Applied Superconductivity and Magnetism (IFSAM 2022) held on Dec 06-08, 2022 in hybrid mode at Gold Coast, Australia presented by Dr. C. S. Yadav.
6. Presented poster (Co-author) at the 8th International Conference on Physics and Astrophysics of Quark Gluon Plasma (ICPAQGP-2023) held during 7-10 February 2023 in Puri, Odisha by Dr. Prabhakar Palni.
7. Contributed Oral presentation at American Physical Society: Division of Atomic, Molecular and Optical Physics (APS DAMOP) Meeting in Orlando, USA on June 2, 2022 on "Spin dynamics in low dimensional quantum gases" by Dr. Arko Roy.
8. Attended 67th Annual conference on magnetism and magnetic materials and presented paper on "Magnetization in iron-based compounds: A machine learning model analysis" by Prof. Arti Kashyap.

3.5.9. Invited Lecturers/Continuing education programs

1. Visualizing the journey of photogenerated carriers in semiconductor nanomaterials through ultrafast spectroscopy, Refresher Course, BU, 8th December, 2022
2. Femtosecond transient absorption spectroscopy: a technique to visualize the dynamics of photogenerated charge carriers in semiconductor nanostructures, Short-term course on Photonic Devices and Spectroscopic Techniques, NIT Kurukshetra, 21th February, 2023.
3. Light Matter Interactions and Many Body Phenomena in Chalcogenide Materials,
4. Ajay Soni, Invited talk in conference on "Frontiers of Materials", organized by Oxford Instruments and JNCASR, Bangalore on March 14th, 2023
5. Dr. Soni gave an invited talk on "Thermoelectricity and Materials ", in the 5th faculty development program organized by UGC-HRDC and University of Calicut, Kerala, on June 30th, 2022.
6. Dr. Soni gave an invited talk on "Light Matter Interactions in Chalcogenides and Technological Applications", in international conference on Emerging Trends in Science and Technology, organized by Punjab Engineering College, Chandigarh, on June 5th, 2022.
7. Talk delivered in Teacher Training Program in Physics at Indian Institute of Technology Mandi, Himachal Pradesh organised by SCERT and IIT Mandi, 13th March'23 by Dr. Bindu Radhamany.
8. Invited Key note speaker in National Seminar cum Workshop on Content Development of Physics Curriculum in Indian Perspectives - 29-30 June, 2022 by Dr. Bindu Radhamany.
9. Invited talk at Meeting on Statistical Physics and Complex Systems, IIT Kharagpur, 2022 by Dr. Harsh Soni.
10. Invited in Soft and Active Matter Seminar at IIT Hyderabad, 2022 attended by Dr. Harsh Soni.
11. Dr. Arti Kashyap was invited to give a talk on "DFT and DFT based Material Databases in the Era of Machine Learning" at NNEBRASKA CENTER FOR MATERIALS & NANOSCIENCE, 2022.
12. Integrated Community Resilience" in "TECH-@75" organized by the Department of Bio-Technology (DBT) and Council of Scientific and Industrial Research (CSIR)] in collaboration with the Ministry of Earth Sciences (MoES) on 8.7.2022 where Dr. Arti Kashyap was invited to share her views and experience.
13. Invited as the keynote speaker at the conference for 22nd International Postgraduate Research Conference (IPRC) 2022 organized by University of Kelaniya, Sri Lanka on 28th of December 2022.
14. "Status of Bioenergy Development and Role" in International Conference on Bioenergy organized by World Bioenergy Association and CII (20.9.2022).
15. Dr. Suman Kalyan Pal has Visited Indian Association for the Cultivation of Sciences (IACS), Jadavpur, Kolkata on 26th September, 2022 and delivered a lecture having Title: Probing the dynamics of quasiparticles in 2D materials using ultrafast pump-probe spectroscopy.

3.5.10. Workshop/ Conference organized with high resolution soft copies of photographs

1. One-day workshop in Physics on the occasion of National Science Day 2023.



Inauguration ceremony of Science Day 2023 at IIT Mandi

2. Deliberations in Atomic, Molecular, Cluster, and Optical Sciences – 2 (DAMCOS-2) IIT Mandi, 20th and 21st June, 2022



Science Day 2023 with all students and faculties Faculty talks on Science Day celebration

3. Out of Equilibrium (July 22)



4. Shivalik Hephcats (Jan 23)



- Hot QCD Matter Conference 2022 organized from 12-14 May 2022



3.5.11 Patents filed/ awarded

- Arti Kashyap, Mr. Pawan Tiwari
Title: Biomass compact briquette fuel and its preparation method.
Patent number: 415795
Indian patent Application number: 201811000279
Date: 28/12/2022

3.5.12 Professional achievements, honors and awards

- Dr. Soni elected to Senior Member of IEEE (SM-IEEE) in June 2022.
- Dr. Niraj Singh, PhD Scholar won best thesis award in SODH-2023
- Selected as one of the 75 Women in STEAM to be featured in the second edition of She Is. The announcement was made in Delhi by the Principal Scientific Adviser Prof K Vijay Raghavan and His Excellency, The British High Commissioner Mr. Alex Ellis

3.5.13 Membership of Professional Societies.

- Life member of the Optical Society of India (Prof Suman Kalyan Pal)
- Dr. Soni is a Member of Royal Society of Chemistry of UK, (2023).
- Dr. Hari Verma is a Life member Indian Society of Atomic and Molecular Physics
- Dr. Arko Roy is a member of American Physical Society.
- Dr. Krishna Mohan Parattu is a member of IAGRG (Indian Association for General Relativity and Gravitation).

3.5.14. Outreach Activities

- Dr. Soni gave an interactive session on "Importance of science and Scientific Methodology, for the DST Vigan Jyoti Program for Girls, held at JNV Pandoh, Mandi, on March 28th, 2023.
- Dr. Soni gave an interactive session on "Career in Science after School", at Mind Tree IIT Mandi Campus School, Mandi, on April 3rd, 2023.
- Dr. Hari Verma has delivered a talk titled "Physics of Atoms and Molecules" was delivered on the occasion of Teachers training program at IIT Mandi, organized by IIT Mandi and SCERT Delhi, March 13, 2023
- Dr. Harsh Soni has participated in SCERT Delhi PGT/TGT Physics Training Program in March 2023.
- Dr. Nirmalya Kajuri has published popular science article on the topic "Black Hole in the Wire Science" Dec 2023.
- Popular lecture on black holes in IMA, Chennai, Jan 2023.
- Dr. Krishna M Parattu is a member of the core committee of Kerala Theoretical Physics Initiative, an organization arranging projects in theoretical physics for MSc students in Kerala and outreach lectures by eminent scientists.

3.6 School Of Management (SOM)

Tremendous growth in ICT and web enabled platforms has revolutionized how organizations function. Rapid technological advancements have not only driven the technology landscape but are seen to be the drivers of momentum in managerial domains. Technology and data are widely used by organizations to assist in managerial decision making. With these advancements, the boundaries between technology and management roles are continuously diminishing. Business decisions are heavily dependent on technology and data. Although the business arena is seeing rapid changes, there is a dearth of trained professionals who can not only have good working knowledge of management principles but are also proficient in providing technology based solutions and deriving insights from data. Since its inception in 2010, IIT Mandi has consistently worked to nurture professionals with industry ready skills. Thus, in order to cater to fast paced changing industry requirements, School of Management (SOM) was established at IIT Mandi in 2022. The school aims to create leaders who can not only adeptly provide solutions to organizational problems using their managerial expertise but can also use technology and data proficiently.

The school offers MBA in Data Science & Artificial Intelligence and Ph.D. program.

3.6.1 MBA DS&AI program

MBA in Data Science and Artificial Intelligence was launched by SOM, IIT Mandi in 2022. This program has been uniquely crafted by leaders from industry and academia with a strong emphasis on managerial fundamentals and decision making in congruence with the technology based solutions such as Data Science, Artificial Intelligence and Machine Learning to keep it relevant to the fast-changing global human resource need. The program is a blend of management of contemporary concepts, softer skills towards developing individuals, and relevant applications of data science tools.

The program objectives are:

- To provide an exposure to fundamentals of business management with special emphasis on contemporary and emerging topics.
- To help the individuals to develop their personality by adequate exposure to soft skills like communication, creativity, and emotional intelligence etc.
- To provide an in-depth exposure to tools and techniques of data science, artificial intelligence, and machine learning etc. with a strong emphasis on problem solving approach.
- Prepare the graduate of the course to evolve as leaders of an organization who can combine rational and subjective skills in the context of an organization to make appropriate decisions.

The MBA (DS & AI) program is a blend of management of contemporary concepts, softer skills towards developing individuals, and relevant applications of data science tools. MBA (DS & AI) is a 2-year long full-time Masters programme, distributed in 4 semesters. The credit requirement is 70. The program aims to provide an in-depth exposure on data science tools and techniques like analytics, artificial intelligence, machine learning, deep learning, natural language processing, and neural networks with a strong emphasis on problem solving approach.

Number of seats: 80

For more information, please visit our website: <https://iitmandi.ac.in/SOM/>

| Faculty Members | | | |
|-----------------|--|---|---|
| S. No. | Name | Specialization & Research Interest | Photograph |
| 1. | Prof. Manoj Thakur, Chairperson Aditya PhD from IIT Roorkee Hometown: Roorkee, Uttarakhand Phone: 01905-267750; Email: chairsom@iitmandi.ac.in | Specialization: Optimization, Machine Learning Research Interests: Optimization, Soft Computing, Machine Learning & Computational Finance. |  |

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| 2. | Dr. Puran Singh, Associate Professor Ph.D. from Punjab University, Chandigarh Home Town: Mandi, Himachal Pradesh Email: puran@iitmandi.ac.in | Specialization: Finance, Entrepreneurship Research Interests: New Venture Creation Dynamics, Regional Entrepreneurship Ecosystems, Entrepreneurship Policy Research. |  |
| 3. | Dr. Saumya Dixit, Assistant Professor Ph.D. from IIIT Allahabad Home Town: Allahabad, Uttar Pradesh Email: saumya@iitmandi.ac.in | Specialization: Marketing Management Research Interests: Consumer Behavior; Technology Adoption; Consumer well being. |  |
| 4. | Dr. Ashish Bollimbala, Assistant Professor Ph.D. from TAPMI, research center of Manipal Academy of Higher Education, Manipla, Karnataka Home Town: Manipal, Karnataka Email: ashish@iitmandi.ac.in | Specialization: Marketing Management Research Interests: Consumer Behavior; Creativity Management; Advertising; Neuralmarketing. |  |
| 5. | Prof. N Ravichandran Visiting Distinguished Professor | Specialization: Operations Management |  |
| 6. | Mr. Arun Malhotra Adjunct Professor of Practice | Specialization: Sales and Marketing |  |

3.6.2. Publications

- **Book chapters published**

1. Gupta, S., & Singh, P. (2022). Technology and financial inclusion: A study of technology's role in continuity of banking agents. In *Technology and Policy: An intersection of ideas for public Policy*. Routledge (Accepted).

- **Paper published in international journals**

1. Pathania, A. & Dixit, S. & Rasool, G. (2022). 'Are online reviews the new shepherd?'—examining herd behaviour in wearable technology adoption for personal healthcare. *Journal of Marketing Communications*.
2. Jain, M., Dixit, S. & Shukla, A. (2023). Role of e-service quality, brand commitment and e-WOM trust on e-WOM intentions of millennials. *The International review of Retail, Distribution and Consumer Research*.
3. Jain, M., Dixit, S., Sindhu, S. & Shukla, A. (2023). Examining the moderating role of gender and point of purchase platforms on eWOM intentions. *International Journal of Internet Marketing and Advertising* (accepted)
4. Bollimbala, A., James, P. S., & Ganguli, S. (2022). Grooving, moving, and stretching out of the box! The role of recovery experiences in the relation between physical activity and creativity. *Personality and Individual Differences*, 196, 111757.

● National Conference

1. Sirohi, A., & Singh, P. (2022). Homestay Business Model Analysis: A Case Study of Himachal Pradesh. International Conference on People, Ecosystem & Emerging Trend in Entrepreneurship, FIED, IIM Kashipur & HCE, Strathclyde Business School, United Kingdom.
2. Kaur, N., & Singh, P. (2022). Role of financial literacy in the adoption of banking methods among the rural population: An empirical study of Himachal Pradesh, India. India Public Policy Network (IPPN) Annual Conference, IIM Ahmedabad.

3.6.3 Invited lecturers/talks/continuing education programs

- Dr. Puran Singh offered a course on 'Financial Accounting' on NPTEL portal in January 2023 that was taken by 5757 students.
- Dr. Puran Singh was invited to speak on the panel discussion titled 'Strengthening the Ecosystem: Incubators as Enablers' at 'Startup Kumbh: G20-DIA National Roadshow' organized by AIC-BIMTECH, March 28, 2023, Noida
- Dr. Puran Singh was invited to speak on panel discussed titled 'Panel on Strengthening Startup Ecosystem and Promoting Partnership' during 'ICON 2022: A startup-corporate connect initiative' organized by CII-HP in Nov 2022
- Dr. Ashish Bollimbala conducted a session on 'Creative Thinking' for more than 60 Polytechnique faculty members of Himachal Pradesh in July 2022 at IIT Mandi.
- Dr. Ashish Bollimbala conducted a session on 'Creative Thinking' for more than 30 Polytechnique faculty members of Himachal Pradesh in Jan 2023 at IIT Mandi.

3.6.4. Eminent guest/scholars/students/interns hosted

- Britu Raj Deka, founder of Dulic, March 18, 2023, Decoding B2B E-commerce Marketplace
- Anupam Dutta, Ex PwC, IBM, and Wipro, March 15, 2023, Fit for the Future with Data & Analytics
- Prof. Arvind Mahajan, Texas A&M University - Mays Business School, February 07, 2023, The Effects of ESG Violations on Firm Value
- Vinay Kumar, Managing Director, DATAWISE, January 20, 2023, Supply Chain Management, Online Streaming Platform, and Fire Safety Solutions domain
- Gagan Pal Singh Nagi, Founder and CEO, Metalty Ventures Private Limited, December 09, 2022, Metaverse is the Present!
- Saurabh Mittal, Wipro, Fractal Analytics, Arnetta Technologies India and QYON, December 02, 2022, Leadership in the VUCA Business World

3.6.5. Professional achievements, honors and awards

- Dr. Puran Singh became Co-convener of CII-HP Panel on Startups & Education for the year 2023–24
- Dr. Puran Singh became a member of the Governing Body of Indian STEPS and Business Incubators' Association (ISBA) in Dec 2022
- Dr. Puran Singh became a member of CII Northern Region Committee on Startup & Entrepreneurship for the year 2022–23
- Dr. Puran Singh became member of CII-HP Startup Panel, Himachal Pradesh, 2022-2023

3.6.6. Membership of professional societies

- Dr. Puran Singh became Founding Member of Global Association of Financial and Entrepreneurial Research (GAFER) in 2022

3.6.7. Student activities/achievements

- The student contingent comprised of PARNIKA KAPOOR, Shreya Agarwal, Rahul panda, Harshit Kalra, Harsha Harod, Vikram singh and Tejas Bhimate won First and Third Positions respectively in Consularium, the Consulting Event of Samanvay - IIT Madras, organized by the DoMS, IIT Madras in 2022.
- Student contingent of Harshit Kalra, Surinderpal Singh, and GYANJYOTI KALITA represented IIT Mandi at the Inter IIT Tech Meet 11.0, hosted by IIT, Kanpur this year in February and won Bronze medal in paradime.io's Product Challenge.



Pioneering batch of MBA DS&AI Students with Faculty Members

3.7 School Of Humanities And Social Sciences (SHSS)

Welcome to the School of Humanities and Social Sciences (SHSS) at the Indian Institute of Technology Mandi (IIT Mandi). SHSS has carved a niche through its academic and research activities in disciplines ranging from Economics to English and World Literature, German Studies, Sociology, History, Himalayan Studies, Development Studies and allied areas. Our academic endeavour focuses on critical thinking and rational enquiry into complex disciplinary and interdisciplinary problems. We have a thriving academic atmosphere, with fourteen faculty members, over forty PhD scholars, and two ongoing batches of postgraduate students in MA Development Studies at SHSS.

We offer a wide range of courses at postgraduate and undergraduate levels. The unique location of our institute has also inspired several courses and research activities at the School that are particularly focused on the Himalayan region with significant components of fieldwork and community interaction. We also spearhead the Interactive Socio-Technical Practicum (ISTP) for undergraduate students that aims to explore the various issues and challenges faced by society, propose technology-based solutions for these, and evaluate the proposed solutions from social, technical, economic, environmental and other aspects.

We have various research and academic collaborations within and outside India that led to studies of the highest quality both nationally and globally. Our faculty members have successfully drawn significant research grants from several national and international agencies, such as the Indian Council of Social Science Research; Department of Science and Technology; Social Science Research Council, USA; Swedish Research Council, Sweden; Swiss Agency for Development and Cooperations, Embassy of Switzerland amongst others. In addition, we regularly publish research articles, monographs, reports and outreach materials with highly reputed international peer-reviewed journals and leading publishers.

| Faculty Members | | |
|-----------------|---|---|
| S. No. | Name and other details | Photographs |
| 1. | Dr. Shyamasree Dasgupta, Associate Professor and Chairperson Specialization: Energy and Environmental Economics, Economics of Climate Change, Applied Econometrics Ph.D. from Jadavpur University, Kolkata Home Town: Kolkata, West Bengal Phone: 01905-267122; Email: shyamasree |  |
| 2. | Dr. Aruna Bommareddi, Assistant Professor Specialization: Comparative Literature, Indian Literatures in English Ph.D. from University of Hyderabad Home Town: Hyderabad, Andhra Pradesh Phone: 01905-267121; Email: aruna |  |
| 3. | Dr. Devika Sethi, Assistant Professor Specialization: Modern Indian History, Colonialism and Decolonization, Free Speech and Censorship Ph.D. from Jawaharlal Nehru University, New Delhi Home Town: Allahabad, Uttar Pradesh Phone: 01905-267244; Email: devika |  |
| 4. | Dr. Manu V. Devadevan, Associate Professor Specialization: Literary practices in South Asia, Political and Economic Processes in premodern South Asia & South Asian Epigraphy PhD from: Mangalore University, Mangalagangothri, Mangalore. Phone: 01905-267147; Email: manu |  |

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| 5. | Dr. Neha Kaushik, Assistant Professor Specialization: Translation Studies, Women's Writing, Comparative Linguistics, German Studies Ph.D. from Jawaharlal Nehru University, New Delhi Home Town: New Delhi Phone: 01905-267267, Email: nehakaushik |  |
| 6. | Dr. Nilamber Chhetri, Assistant Professor Specialization: Sociology Ph.D. from Jawaharlal Nehru University, New Delhi Home Town: Kalimpong, West Bengal Phone: 01905-267269; Email: nilamber |  |
| 7. | Dr. Puran Singh, Associate Professor Specialization: Corporate Finance, Microfinance Ph.D. from Punjab University, Chandigarh Home Town: Mandi, Himachal Pradesh Phone: 01905-267916; Email: puran |  |
| 8. | Dr. Rajeshwari Dutt, Associate Professor Specialization: Latin America, Social and Cultural History Ph.D. From Carnegie Mellon University, USA Home Town: Kolkata, West Bengal Phone: 01905-267043; Email: rdutt |  |
| 9. | Dr. Ramna Thakur, Associate Professor Specialization: Development Economics Ph.D. from Himachal Pradesh University, Shimla Home Town: Mandi Phone: 01905-267044, Email: ramna |  |
| 10. | Dr. Saumya Dixit, Assistant Professor Specialization: Post Consumption Consumer Behaviour, E-waste Management, E-wom Management Ph.D. from IIT Allahabad Home Town: Allahabad, Uttar Pradesh Email: saumya |  |
| 11. | Dr. Suman, Assistant Professor Specialization: Colonialism, Post colonialism, Imperialism and Romance Literature Ph.D. from Indian Institute of Technology Delhi. Home Town: Faridabad Phone: 01905-267919; Email: suman.sigroha |  |
| 12. | Dr. Surya Prakash Upadhyay, Assistant Professor Specialization: Sociology of Religion, Urban Sociology, Post-Reform India Ph.D. from Indian Institute of Technology Bombay Home Town: Lucknow, Uttar Pradesh Phone: 01905-267136; Email: surya |  |

Visiting & Adjunct Faculties

| | | |
|---|--|---|
| • | <p>Dr. Purnima Bajre, Visiting Assistant Professor Specialization: Language Processing and Elementary Education along with Cognitive Psychology PhD from Indian Institute of Technology Bombay Home Town: Patna Phone: 01905-267942; Email: purnimabajre</p> |  |
| • | <p>Dr. Ingrid Shockey, Adjunct Associate Professor Specialization: Environmental Sociology Ph.D. from Brandeis University, USA Home Town: Northampton, MA, USA</p> |  |

3.7.1 Publication 2022-23

Books

- Devika Sethi (ed.) *Banned and Censored: What the British Raj Didn't Want Us to Read*, Roli Books, 2023.
- Manu V. Devadevan, *Avakashikalillatha Bhoomi (A World without Inheritors)* [in Malayalam], Insight Publications, 2022.
- Nilamber Chhetri, *The Politics of Ethnic Renewal in Darjeeling: Gorkhas and the Struggle for Tribal Recognition*, Routledge, 2023.

Journal Articles

- Ashish Bollimbala, P.S. James, and S. Ganguli. "Grooving, Moving, and Stretching Out of the Box! The Role of Recovery Experiences in the Relation between Physical Activity and Creativity," *Personality and Individual Differences*, 196:5, 111757, 2022
- Bhed Ram and Ramna Thakur, "Epidemiology and economic burden of continuing challenge of infectious diseases in India: Analysis of socio-demographic differentials," *Frontiers in Public Health (Frontiers)*, 10, 2022.
- Bhed Ram and Ramna Thakur, "Measuring the burden of accidental injuries in India: a cross sectional analysis of the National Sample Survey (2017–18)," *Humanities and Social Sciences Communications*, 9:1, 2022
- Saumya Malviya, translator, "Personal Integrity of an Artist:1," by Gajanan Madhav Muktibodh, *hākārā*, 16, 2022.
- Saumya Malviya, translator, "Personal Integrity of an Artist: 2," by Gajanan Madhav Muktibodh, *hākārā*, 17, 2022.
- Saumya Malviya, "The Ethics of Repetition and 'EkSāhityik Ki Diary'," *hākārā*, 17, 2022.
- Sujata, S., Bhed Ram, and Ramna Thakur, "Analysing the burden of morbidity, associated expenditure, and coping strategies among India's elderly population: Evidence from national sample survey 75th round," *Indian Journal of Public Health*, 66: 2, 2022.
- Dasgupta, S, Roy, J., Ghosh, M., Talukder, J. (2022). Willingness to pay (WTP) for arsenic-safe drinking water: A case study to understand societal embedding of ECAR technology in rural West Bengal, India. *Development Engineering*. Volume 7, 2022, 100096. DOI: <https://doi.org/10.1016/j.deveng.2022.100096>.
- Bommareddi, Aruna. "Hariakka: The Warrior Woman." New Delhi: Sahitya Academy, 2022.

Book Chapters

- Manu V. Devadevan, "The Vachanas", *Global Language Justice: Ecology, Diversity, Digital Vitality*, eds. Lydia H. Liu, Anupama Rao, and Charlotte A. Silverman, Columbia University Press, 2022.
- Thirthankar Chakraborty, "Collected Plays and Stories I and II", Reading Sri Aurobindo, eds. Gautam Chikermane and Devdip Ganguli, Penguin, 2022.
- Thirthankar Chakraborty, "Samuel Beckett and the World Republic of Letters", *Pascale Casanova's World of Letters and Its Legacies*, eds. Gisèle Sapiro and Delia Ungureanu, Brill, 2022.

Conference/ Resource Persons

- Dr. Shyamasree Dasgupta was a Guest Faculty for EPTRI (Environment Protection Training & Research Institute, Telangana)- International Training Programme (ITP) on Climate Change and Sustainable Development for the session on Climate Change Vulnerability Assessment, EPTRI, Telangana, on 6th February 2023.
- Dr. Shyamasree Dasgupta delivered an invited talk at St. Xavier's College, Jaipur. Delivered lecture on "The Economics of Climate Change" on 4th November, 2022.
- Dr. Shyamasree Dasgupta delivered an invited talk as a panelist in i-Connect, an initiative by Ministry of Science and Technology, Ministry of Earth Sciences, GoI, CSIR, NEERI, IITM Pune on Azadi ki Amrit Mahotsav (iCEN -54, Climate Vulnerability and Adaptive Practices. Topic: To cope or to adapt? A case study of Kulgam district in Jammu and Kashmir. 20th July 2022.
- Dr. Neethi Alexander delivered a talk on "Transcending Legacies of Loss: A Study of the Television Miniseries Ms Marvel" in the panel "Visualising Home and Homeland in Pan-Asian Film and Drama," Association for Asian Studies (AAS) Conference, Boston, USA, February 17-18, 2023.
- Dr. Neethi Alexander delivered a talk on "Angela Carter and 'The Sociology of Clothes'" in the panel "Dialoguing with Costumes and Character." Conference titled "The Beginner's Mind— Asking and Telling about Dress Studies," Dress and Body Association, University of Chicago, USA. November 5-6, 2022.

3.7.2. Research Projects Externally Sponsored Research Projects

| S. No. | Project No. | Project Title | Sponsoring Agency | Principal Investigator & Co-ordinator(s) | Dept./ School | Amount Sanctioned | Duration of Project | From | To |
|--------|----------------------|---|--------------------------------------|--|---------------------------|-------------------|---------------------|----------|----------|
| 1. | IITM/DST/SDG/367 | Climate Change Risk Assessment and Mapping at District and State level in India | DST, GoI | Dr. Shyamasree Dasgupta (PI) | SHSS | INR 1,12,01,608/- | 2 year | 02.04.22 | 01.03.24 |
| 2. | IITM/BSU-USA/SDG/353 | Race and Ethnicity as the Determinants of Racialized Coastal Experiences in the Indian Ocean Region | Social Science Research Council, USA | Dr. Shyamasree Dasgupta (PI in India) | SHSS | INR 13,00,000/- | 2 year | 01.09.21 | 31.08.23 |
| 3. | IITM/LU-SW/SYS/330 | Coal-based economies in developing countries: An environmental, health and cost evaluation around mega thermal power plants | VR: Swedish Research Council | Dr. Shyamasree Dasgupta (Co-PI) | SHSS (with SCENE) | INR 1,20,00,000/- | 3 years | 01.01.21 | 31.12.23 |
| 4. | IITM/DST/AKP/312 | Livelihood generation and improvement for women entrepreneurs in small scale fruits and vegetable farming and post- harvesting management | DST | Dr. Surya Prakash Upadhyay (Co-PI) | SHSS (with SPS) | INR 3,56,5540/- | 3 years | 24.12.20 | 23.12.23 |
| 5. | IITM/DST/MTH/319 | Sustainable irrigation advisories for mid-Himalayan farmers using smart satellite image analytics | DST | Dr. Ramna Thakur (CoPI) | SHSS (with SCEE, and SBS) | INR 9,92,9444/- | 3 years | 09.03.21 | 08.03.24 |

3.7.3. SHSS Talks, Book Discussion, and Event

| SHSS Talks 2022 | | | | |
|-----------------|--------------------------|--|------------|------------------------|
| Sl. No | Speaker | Title of the talk | Talk Date | Mode of Organized Talk |
| 1 | Prof. Vibha Arora | Visual Transactions and Imaginaries among the "Tribal" Lepchas of the Eastern Himalayas. | 23.09.2022 | Online & In person |
| 2 | Dr.Rahul Sarwate | Ideas,Text & Translation Sharad Patil's Marxism Phule- Ambedkarism | 27.10.2022 | Online |
| 3 | Dr. Prasenjeet Tribhuvan | Lies in Ethnographic Research | 11.11.2022 | Online & In person |
| 4 | Dr. Prasenjeet Tribhuvan | A workshop on doing Ethnography | 12.11.2022 | Online & In person |
| 5 | Dr. Deepak Kumar Singh | Book Discussion in the School of Humanities and Social Sciences of Dr. Nilamber Chhetri | 27.03.2023 | In person |

Young Graduate Meet 2022:

The 2nd Young Graduate Meet took place from 16 to 17 June 2022 along with a pre-conference workshop on Research Writing. Prof. Laxmidhar Behera, Director, IIT Mandi inaugurated the research photography exhibition and addressed the school highlighting its importance in the Indian Higher Education system. Prof. Gopal Guru and Prof. Suryakant Waghmore delivered the keynote addresses, while Dr Kamayani Kumar and Prof. Tanweer Fazal delivered the distinguished lectures. The theme of this year's event was 'Exclusion and Inclusion', which was explored from various perspectives by postgraduate and doctoral students from various prominent institutes across India. Their papers dealt with topics ranging from citizenship to the assertion of identity, disability and deformity, urban negotiations, caste and gender discrimination.

SHSS Talks 2022-23



Book Discussion & SHSS Events



YOUNG GRADUATE MEET 2022



3.7.4 M. A. Development Studies Field Work 2022

As a part of the M.A Development Studies programme, postgraduate students engage in a 4-credit "Field Study" course in the summer term between semester 2 and 3 during which they stay in rural or urban communities across the country. Through exposure to various on site and real-world scenarios during their fieldwork, students learn how to diagnose development challenges and apply their theoretical knowledge to gain a more refined understanding of real-world praxis.

During the last summer break, our students went on field visit to Jharkhand, Chhattisgarh, Odisha, Nagaland and Himachal Pradesh and gained an understanding of challenges pertaining to issues such as water conservation, health care and implementation of government health initiatives, and rural tribal welfare, among others.

3.7.5. Awards and recognitions:

- Dr. Puran Singh, Associate Professor, SHSS, was appointed to the position of Regional Coordinator in 2022 for the northern cluster of incubators of ISBA (Indian Science and Technology Entrepreneurs Parks and Business Incubator Association).
- Dr. Rajeshwari Dutt, Associate Professor, SHSS, was awarded a highly prestigious fellowship in 2022 at the Linda Hall Library to conduct research on a book project that examines the failed quest to build the Nicaragua Canal.
- Dr. Saumya Malviya for being awarded the prestigious Bharat Bhushan Agarwal Award, an award in Hindi literature given every year since 1980 to young poets. Dr. Malviya is awarded for his poetry collection Ghar Ek Namumkin Jagah Hai. The award was instituted in the memory of the well-known Hindi poet Bharat Bhushan Agarwal and is given by Raza foundation, Delhi.
- Muskan Dhandi has been awarded the prestigious Shastri Indo-Canadian Mitacs Globalink Research Award for 2022-23 (Muskan is 'Translating Haryanvi Folklore' for her Ph.D. thesis. This all-paid award will allow her to work at a Canadian University for four months to translate and document Haryanvi Folkloric traditions, Ahoi Asthami and Dev Uthan Ekadashi, in Canada.)

3.8 School Of Mathematical & Statistical Sciences (SMSS)

The School of Mathematical and Statistical Sciences offers two programs, M.Sc. in Applied Mathematics and B.Tech in Mathematics & Computing. The research within the school covers areas of Mathematics, Statistics, and Data Science. We have a research focus on Differential Equations, Mathematical Control Problems, Nonlinear Dynamics and Chaos, Theoretical and Computational Partial Differential Equations, Optimization, Mathematical Biology, Computational Fluid Dynamics, Harmonic Analysis, Algebra, Topology, Combinatorics, Functional Analysis, Image processing, Machine learning, Statistics and Data Science.

| Faculty Members | | |
|-----------------|--|---|
| S. No. | Name and other details | Photographs |
| 1. | Dr. Muslim Malik, Chairperson & Associate Professor Specialisation: Differential Equations and Mathematical Control Problems PhD from Indian Institute of Technology Kanpur (2006) Home Town: Balrampur, UP Phone: 01905-267918; Email: muslim@iitmandi.ac.in & chairsmss@iitmandi.ac.in |  |
| 2. | Dr. Syed Abbas, Professor Specialisation: Differential Equations and Ecological modelling PhD from Indian Institute of Technology Kanpur (2009) Home Town: Gonda, Uttar Pradesh Phone: 01905- 267914; Email: abbas@iitmandi.ac.in |  |
| 3. | Dr. Nitu Kumari, Associate Professor Specialisation: Mathematical Modelling, Nonlinear Dynamics, Differential Equations PhD from Indian School of Mines Dhanbad (2009) Home Town: Dhanbad, Jharkhand Phone: 01905-267109; Email: nitu@iitmandi.ac.in |  |
| 4. | Dr. Sarita Azad, Associate Professor Specialization: Statistical Time Series Analysis PhD from Delhi University and Indian Institute of Science (2008) Home Town: New Delhi Email: sarita@iitmandi.ac.in |  |
| 5. | Dr. Rajendra K. Ray, Professor Specialisation: "Mathematical Image processing" PhD from Indian Institute of Technology Guwahati (2009) Home Town: Sainthia, West Bengal Phone: 01905- 267041; Email: rajendra@iitmandi.ac.in |  |
| 6. | Dr. Manoj Thakur, Professor Specialisation: Optimization, Soft Computing, Machine Learning & its Application to Computational Finance PhD from Indian Institute of Technology Roorkee (2007) Home Town: Roorkee, Uttarakhand Phone: 01905-267913; Email: manoj@iitmandi.ac.in |  |

| | | |
|-----|---|--|
| 7. | Dr. Qaiser Jahan, Assistant Professor Specialisation: Harmonic and Wavelet Analysis PhD from ISI Kolkata (2014) Home Town: Allahabad Email: qaiser@iitmandi.ac.in |  |
| 8. | Dr. Samir Shukla, Assistant Professor Specialisation: Applied Topology and Combinatorics PhD from Indian Institute of Technology Kanpur (2017) Home Town: Allahabad Phone: 01905 267922; Email: samir@iitmandi.ac.in |  |
| 9. | Dr. Sampat Kumar Sharma, Assistant Professor Specialisation: Harmonic and Wavelet Analysis PhD from ISI Kolkata (2014) Home Town: Allahabad Phone: 01905-267717; Email: sampat@iitmandi.ac.in |  |
| 10. | Dr. Saswata Adhikari, Assistant Professor Specialisation: Harmonic Analysis PhD from Indian Institute of Technology Madras, India (2017) Home Town: Jalchak, West Bengal. Phone: 01905-72201; Email: saswata@iitmandi.ac.in |  |
| 11. | Dr. Preeti, Assistant Professor Specialisation: Operations Research PhD from Indian Institute of Technology (ISM) Dhanbad India (2021) Home Town: Delhi Email: preeti@iitmandi.ac.in |  |

3.8.1 Research projects from IIT Mandi seed grants, sponsored projects, brief progress of the work done against each project, highlighting the major achievements during this period. Names of PI, Co-PI, funding agencies and amount of grant received and amount spent etc.

| S. No. | Project No. | Project Title | Sponsoring Agency | Principal Investigator & Co-ordinator(s) | Dept./ School | Amount Sanctioned | Duration of Project | From | To |
|--------|----------------------------|---|-------------------|---|---------------|-------------------|---------------------|-----------|-----------|
| 1. | IIT/NBHM-DAE/MM/336 | Inverse problems for the abstract differential equations and fluid dynamics | NBHM | Dr. Muslim Malik (PI) | SMSS | 15,15,900 | 3 Years | 6.8.21 | 5.8.24 |
| 2. | IITM/SERB/SB/284 | Identification problem on dynamic equation on time scale | SERB | Dr. Syed Abbas (PI) | SMSS | 6,60,000 | 3 years | 19.2.20 | 18.02.23 |
| 3. | IITM/SERB/SAT/329 | Entropy region inequalities and their applications | SERB | Dr. Satyajitsinh Ajitsinh Thakor (PI) Dr. Syed Abbas (Co-PI) | SCEE & SMSS | 37,13,677 | 3 years | 5.4.21 | 4.4.24 |
| 4. | DST-Inspire faculty fellow | On the Bass-Suslin conjecture (IFA21-MA-164 | DST | Dr. Sampat Kumar Sharma (PI) | SMSS | 35,00,000 | 5 years | Dec. 2022 | Dec. 2027 |

| | | | | | | | | | |
|----|------------------------|---|-------------------|------------------------------|------|--------------|----------|------------|------------|
| 5. | IITM/SERB/ SKSh/397 | A study unimodular rows | SERB | Dr. Sampat Kumar Sharma (PI) | SMSS | 11,72,072 | 2 years | 13.01.23 | 12.01.25 |
| 6. | IITM/SERB/ QJ/309 | Theory of wavelets on local fields and shearletcoorbit spaces | SERB | Dr. Qaiser Jahan (PI) | SMSS | 6,60,000 | 3 years | 11.1.21 | 10.1.24 |
| 7. | Consultancy | " Consultancy Services for Computational Fluid Dynamic (CFD) Analysis of Intake Structure of Lower Arun HEP " | SJVN Ltd., India, | Prof. Rajendra Kr. Ray (PI) | SMSS | 15,00,000.00 | 2 months | 01.02.2023 | 31.03.2023 |

3.8.2 Publication Record

1. Books Published: None
2. Book Chapters Published: None
3. Papers Published in Reputed National Journals: None
4. Papers Accepted in Reputed National Journals: None
5. (a). Papers Published in Reputed International Journals: Total of 78 Publications

Dr. Muslim Malik

1. Inverse problem for the Atangana–Baleanu fractional differential equation
S Ruhil, M Malik Results in Control and Optimization
Journal of Inverse and Ill-posed Problems, 2023
2. Controllability results for singular switched system on time scales
M Malik, B Kumar
Journal of Control and Decision, 1-10 Pages, 10-01-2023
3. Optimal controls of impulsive fractional stochastic differential systems driven by Rosenblatt process with state-dependent delay
R Dhayal, M Malik, Q Zhu
Asian Journal of Control, 2023
4. Non-instantaneous impulsive stochastic FitzHugh–Nagumo equation with fractional Brownian motion
N Durga, M Malik
Mathematical Methods in the Applied Sciences, 2023
5. Dynamics for a hybrid non-autonomous prey–predator system with generalist predator and impulsive conditions on time scales
A Kumar, M Malik, Y Kang
International Journal of Biomathematics 16 (01), 2023
6. Numerical simulation for generalized space-time fractional Klein–Gordon equations via Gegenbauer wavelet
M Faheem, A Khan, M Malik, A Debbouche
International Journal of Nonlinear Sciences and Numerical Simulation, 2022
7. Controllability analysis of nonlinear switched singular system on time scales
B Kumar, M Malik, Asian Journal of Control, 2023
8. Results on Hilfer fractional switched dynamical system with non-instantaneous impulses
V Kumar, M Malik, D Baleanu Pramana 96 (4), 172, 8/9/2023
9. Controllability of singular dynamic systems on time scales
M Malik, M Sajid, V Kumar
Asian Journal of Control 24 (5), 2771-2777, 9/2023.
10. Existence, stability and controllability results of stochastic differential equations with non-instantaneous impulses
R Dhayal, M Malik, S Abbas, International Journal of Control 95 (7), 1719-1730, 3/7/2022

11. Trajectory controllability of Hilfer fractional neutral stochastic differential equation with deviated argument and mixed fractional Brownian motion
N Durga, P Muthukumar, M Malik Optimization, 1-27, 2022
12. Existence and Stability Results for Coupled Fractional Dynamic System with Impulses over Non-uniform Time Domains
V Kumar, M Malik, Nonautonomous Dynamical Systems 9 (1), 37-55, 2022

Dr. Syed Abbas

1. GA Satpute, S. Abbas, Parameter Identification for Vector Dynamic Equations on Arbitrary Time Scales, Acta Applicandae Mathematicae 183 (1), 1-19, 2023.
2. M Kumar, S Abbas, A Tridane; Optimal control and stability analysis of an age-structured SEIRV model with imperfect vaccination; Mathematical Biosciences and Engineering 20 (8), 14438-14463, 2023.
3. M Kumar, S Abbas, A Tridane; Optimal control and stability analysis of an age-structured SEIRV model with imperfect vaccination; Mathematical Biosciences and Engineering 20 (8), 14438-14463, 2023.
4. M. Kumar, S. Abbas, Modelling and prevention of crime using age-structure and law enforcement, Journal of Mathematical Analysis and Applications, 519 (2), 126849, 2023.
5. M Kumar, S Abbas, Diffusive size-structured population model with time-varying diffusion rate, Discrete and Continuous Dynamical Systems-B, 28 (2), 1414-1435, 2023.
6. M. Kumar, S. Abbas, R. Sakthivel, Analysis of Diffusive Size-Structured Population Model and Optimal Birth Control, Evolution Equations and Control Theory, 12 (2), 423-445, 2023.
7. S. Chandra, S. Abbas, S. Verma, Bernstein super super fractal interpolation function for countable data systems, Numerical Algorithm, 92, 2457-2481 (2023).
8. S. Abbas, Multinomial theorem procured from partial differential equation, Appl. Math. E-Notes, 22(2022), 457-459.
9. S. Chandra, S. Abbas, ON FRACTAL DIMENSIONS OF FRACTAL FUNCTIONS USING FUNCTION SPACES, Bull. Aust. Math. Soc., 106(3), December 2022, pp. 470 - 480.
10. S. Chandra, S. Abbas, FRACTAL DIMENSIONS OF MIXED KATUGAMPOLA FRACTIONAL INTEGRAL ASSOCIATED WITH VECTOR VALUED FUNCTIONS, Chaos, Solitons and Fractals, 164, November 2022, 112648.
11. M. Kumar, S. Abbas, Analysis of Diffusive Size-Structured Population Model with Stochastic Perturbation, Differential and Integral Equations, Volume 35, Numbers 9-10 (2022), 641-658.
12. S Chandra, S Abbas, Fractal dimensions of mixed Katugampola fractional integral associated with vector valued functions, Chaos, Solitons & Fractals 164 (112648), 2022.
13. M. Kumar, S. Abbas, A. Tridane, A novel method for basic reproduction ratio of a diffusive size-structured population model with delay, Nonlinear Dynamics, 109, 3189-3198 (2022).
14. M. Kumar, S. Abbas, Analysis of steady state solutions to an age structured SEQIR model with optimal vaccination, Mathematical Methods in the Applied Sciences, 45 (17), 2022, 10718-10735.
15. S. Chandra, S. Abbas, Box dimension of mixed Katugampola fractional integral of two-dimensional continuous functions, Fractional Calculus and Applied Analysis, 25, 1022-1036 (2022).
16. M. Kumar, S. Abbas, Age-Structured SIR Model for the Spread of Infectious Diseases Through Indirect Contacts. Mediterr. J. Math. 19 (2022), no. 1, Paper No. 14. M. Kumar, S. Abbas, Global Dynamics of an Age-Structured Model for HIV Viral Dynamics with Latently Infected T Cells, Mathematics and Computers in Simulation, 198, August 2022, Pages 237-252.
17. S. Chandra, S. Abbas, Analysis of Fractals Dimension of Mixed Riemann-Liouville Integral, Numerical Algorithm, 91, 1021-1046 (2022).
18. S. Abbas, S. Tyagi, P. Kumar, V. S. Erturk, S. Momani, Stability and bifurcation analysis of a fractional-order model of cell-to-cell spread of HIV-1 with a discrete time-delay, Mathematical Methods in the Applied Sciences, 45 (2022), no. 11, 7081-7095.
19. SR Grace, S Abbas, M Sajid, Oscillation of Nonlinear Even Order Differential Equations with Mixed Neutral Terms, Mathematical Methods in the Applied Sciences, 45 (2022), no. 2, 1063-1071.
20. A Kaur, M Sadhwani, S Abbas, Law Enforcement: The key to a Crime-free Society, The Journal of Mathematical Sociology, 46 (2022), no. 4, 342-359.

21. SR Grace, GN Chhatria, S. Abbas; Oscillation Properties of Solutions of Second Order Neutral Dynamic Equations of Non-canonical Type on Time Scales. Qual. Theory Dyn. Syst. 21 (2022), no. 1, Paper No. 17.
22. SR Grace, SS Negi, S Abbas, New oscillatory results for non-linear delay dynamic equations with super-linear neutral term, Applied Mathematics and Computation 412 (1), Article 126576, 2022.
23. A Deep, A Kumar, S Abbas, B Hazarika, An existence result for functional integral equations via Petryshyn's fixed point theorem, Journal of Integral Equations and Applications, 34, Issue 2, (Jun 2022), 165-181.
24. R Dhayal, M Malik, S Abbas, Existence, stability and controllability results of stochastic differential equations with non-instantaneous impulses, International Journal of Control, Volume 95, 2022 - Issue 7, 1719-1730.

Dr. Sarita Azad

1. S. Garg, and Sarita Azad (2023)WRF prediction for cloudburst events using high -resolution dataset over the Northwest Himalayas Natural Hazards (accepted) Impact factor 3.14
2. N. Poonia and Sarita Azad (2023) New Statistical Distribution Derived from Clayton Copula for Modeling Bivariate Processes Journal of Hydrometeorology (accepted) Impact factor 4.34
3. M. Karki, N. Poonia and Sarita Azad (2023) On accuracy of temperature estimates using statistical distributions over Northwest Himalayan region Journal of Earth System Science (accepted) Impact factor 1.9
4. S. Garg, P. Jena, U. Devi and Sarita Azad (2023) Performance evaluation of high-resolution IMDAA and IMERG for detecting cloudburst events over the Northwest Himalayas International Journal of Climatology 43(8), <https://doi.org/10.1002/joc.8055> Impact factor 4.069
5. S. Garg and Sarita Azad (2023) Regional selection of satellite precipitation products within Northwest Himalaya. Theoretical and Applied Climatology <https://link.springer.com/article/10.1007/s00704-022-04277-0> Impact factor 3.17
6. V. Kodesia, A. Suri and Sarita Azad (2023) An optimal vaccination strategy for pandemic management and its impact on economic recovery Current Science 124 (3), 319-326 doi: 10.18520/cs/v124/i3/319-326 Impact factor 1.17
7. A. Suri, P. Jena, and Sarita Azad (2023) Rainfall wet spells variability across temperature mean change years in the Northwest Himalayan region Earth and Space Science(AGU) 10 (2), e2022EA002568 <https://doi.org/10.1029/2022EA002568> Impact factor 3.7
8. N. Poonia and Sarita Azad (2022) On bivariate modeling using a new statistical distribution with homogeneous marginals International Journal of Climatology <https://doi.org/10.1002/joc.7888> Impact factor 4.069
9. N. Poonia and Sarita Azad (2022) Projections of annual maximum temperature over Northwest Himalayas using probability distribution models Theoretical and Applied Climatology 149, 1599–1627 DOI: 10.1007/s00704-022-04121-5 Impact factor 3.17
10. P. Jena and Sarita Azad (2022) Identification of wet-prone regions over Northwest Himalaya using high-resolution satellite seasonal estimates. Natural Hazards 112 (2), 1727-1748 DOI: 10.1007/s11069-022-05246-6 Impact factor 3.14
11. N. Poonia and Sarita Azad (2022) Alpha power exponentiated Teissier distribution with application to climate datasets Theoretical and Applied Climatology 149, 339–353 DOI:10.1007/s00704-022-04039-y Impact factor 3.17

Dr. Nitu Kumari

1. *Shubhangi Dwivedi and Nitu Kumari (2023)- Assessment of Parameters for Phase Synchronization of A Chaotic Food Chain System with Allee and Refugia Effects under Seasonal Fluctuations, Chaos , American Institute of Physics (Accepted) (IF = 3.74, MCQ = 0.35)
2. Kanav Singh Rana and Nitu Kumari (2023) Application of Dynamic Mode Decomposition and Compatible Window-Wise Dynamic Mode Decomposition in deciphering COVID-19 dynamics of India, Computational and Mathematical Biophysics, De Gruyter, (Accepted). (MCQ = 0.68)
3. Sumit Kumar, S. Sharma, A. Kashyap and Nitu Kumari (2023) Role of Pollution in the Recent Zika Outbreak in Colombia: A Mathematical Study, Journal of Applied Nonlinear Dynamics. (Accepted). ESCI, (MCQ = 0.07)

4. Shubhangi Dwivedi, S.Keerthana Perumal, Sumit Kumar, Samit Bhattacharyya and Nitu Kumari (2023)- Reverse Migration Induced Synchronization in Delhi and Uttar Pradesh during COVID-19 Lockdown, Computational and Mathematical Biophysics, De Gruyter, (accepted). (MCQ = 0.68)
5. Sumit Kumar, S. Sharma, A. Kashyap, Nitu Kumari and Ravi P. Agarwal (2023) Modelling the effect of environmental population on Zika outbreak: A case study of Brazil, Discrete and Continuous Dynamical Systems Series S, AIMS. (Accepted) (IF = 1.86, MCQ = 0.73)
6. Vikas Kumar and Nitu Kumari (2022) Stability and Bifurcation Analysis of Fractional-Order Delayed Prey–Predator System and the Effect of Diffusion International Journal of Bifurcation and Chaos (World Scientific) <https://doi.org/10.1142/S021812742250002X> (IF = 2.83, MCQ = 0.23)
7. *Nitu Kumari and Vikas Kumar (2022) Controlling chaos and pattern formation study in a tritrophic food chain model with cannibalistic intermediate predator, European Physical Journal Plus, 137, Article number: 345 (IF = 3.758)
8. V Kumar, Nitu Kumari, Ravi P Agarwal (2022) Spatiotemporal dynamics and Turing patterns in an eco-epidemiological model with cannibalism, Results in Control and Optimization 9, 100183.
9. Dwivedi, Nitu Kumari, R K Upadhyay (2022) Chaos synchronization: Using prey abundance to synchronize two chaotic GLV models, (Accepted), Journal of Dynamical Systems and Geometric Theories, Taylor & Francis Taru Publ. (MCQ = 0.15)
10. O.J. Peter, A. Yusuf, M.M. Ojo, Sumit Kumar, Nitu Kumari, F.A. Oguntolu (2022) A Mathematical Model Analysis of Meningitis with Treatment and Vaccination in Fractional Derivatives. International Journal of Applied and Computational Mathematics 8, 117, <https://doi.org/10.1007/s40819-022-01317-1> ESCI, (MCQ = 0.18)
11. Peter, O. J., Sumit Kumar, Nitu Kumari, Oguntolu, F. A., Oshinubi, K., & Musa, R. (2022). "Transmission dynamics of Monkeypox virus: a mathematical modelling approach". Modeling Earth Systems and Environment, Springer, 8, pp. 3423–3434.
12. Soumen Kundu, Nitu Kumari, Said Kouachi and Piu Kundu (2022) "Stability and bifurcation analysis of a heroin model with diffusion, delay and nonlinear incidence rate ", Modeling Earth Systems and Environment (Springer), 8, pp.1351–1362.

Dr. Rajendra Kumar Ray

1. A new perspective of higher order compact nonuniform Padé approximation based finitedifference scheme for solving incompressible flows directly on polar grids
P Das, SK Pandit, RK Ray
Computers & Fluids 254, 105793
2. Transient natural convective heat transfer and fluid flow in an undulated cavity: Effects of localized heat sources
P Choudhary, RK Ray
Heat Transfer 52 (2), 1971-2002
3. MHD natural convective flow in a porous corrugated enclosure: Effects of different key parameters and discrete heat sources
P Choudhary, RK Ray
International Journal of Thermal Sciences 181, 107730
4. Shape effect of nanoparticles and entropy generation analysis for magnetohydrodynamic flow of A 1 2 O 3-C u/H 2 O hybrid nanomaterial under the influence of Hall current
A Kumar, RK Ray
Indian Journal of Physics 96 (13), 3817-3830
5. Heat transfer past a rotationally oscillating circular cylinder in linear shear flow
A Kumar, RK Ray, HVR Mittal
Journal of Heat Transfer 144 (7), 071802
6. MHD natural convection in a corrugated enclosure with discrete isothermal heating
P Choudhary, RK Ray
Heat Transfer
7. A Fuzzy Edge Detector Driven Telegraph Total Variation Model For Image Despeckling
SK Jain, RK Ray, AK Majee
Inverse Problems and Imaging 16 (2), 367–396

Dr. Manoj Thakur

1. A novel approach to incorporate investor's preference in fuzzy multi-objective portfolio selection problem using credibility measure
H Jalota, PK Mandal, M Thakur, G Mittal
Expert Systems with Applications 212, 118583
2. Soft Computing for Problem Solving: Proceedings of the SocProS 2022
M Thakur, S Agnihotri, BS Rajpurohit, M Pant, K Deep, AK Nagar
Springer Nature
3. Variance reduction in feature hashing using MLE and control variate method
BD Verma, R Pratap, M Thakur
Machine Learning, 1-32

Dr. Samir Shukla

1. On Vietoris–Rips complexes (with scale 3) of hypercube graphs,
SIAM Journal on Discrete Mathematics, 37.3, pp. 1472-1495, 2023
2. Vertex cut of a graph and topological connectivity of its neighborhood complex, (with Rekha Santhanam)
Discrete Mathematics, 364.8, 113432, 2023.
3. Neighborhood complexes, homotopy test graphs and an application to coloring of product graphs,
Graphs and Combinatorics, 38.3, 1–14, 2022
4. Topology of Clique Complexes of Line Graphs (with Shuchita Goyal and Anurag Singh)
The Art of Discrete and Applied Mathematics, 5, no 2, Paper no: 2.06, 12 pp, 2022.

Dr. Sampat Kumar Sharma

1. M.K. Keshari, S. Sharma; Nice group structure on the elementary orbit space of unimodular rows,
Journal of Pure and Applied Algebra, Volume 226, Issue 4, April 2022, 106889.
2. S. Sharma, Absence of torsion in unimodular orbit space; Journal of Algebra and Its Applications Vol.21, No. 08, 2250157 (2022) .
3. S. Sharma; Unimodular rows over algebraic closure of a finite field, Journal of algebra and its applications. <https://doi.org/10.1142/S0219498824500464>. (2022).

Dr. Saswata Adhikari

1. Adhikari, S., Radha, R., A study of oblique dual of a system of left translates on the Heisenberg group, Results Math 78, 65 (2023). <https://doi.org/10.1007/s00025-023-01842-5>

Dr. Qaiser Jahan

1. Dilation operators in Besov spaces over local fields
Authors : Salman Ashraf and Qaiser Jahan Journal name, issue and pages : Advances in Operator Theory, 8 (2023), no. 2, paper no. 27, 13pp.
5. (b). Paper accepted in reputed international journals: total 08 paper accepted.

Dr. Syed Abbas

1. S. Abbas, SR Grace, JR Graef, SS Negi, Oscillation of second-order non-canonical non-linear dynamic equations with a sub-linear neutral term, Differential Equations and Dynamical Systems, 1-11, in press, 2022.
2. S. Chandra, S. Abbas, Y. Liang, On the box dimension of Weyl-Marchaud derivative and linearity effect, Fractals, in press, 2023.
3. L. Shaikhet, S. Abbas, Novel stability conditions for some generalization of Nicholson's blowflies' model with stochastic perturbations, ANZIAM, in press 2023.
4. A Das, B Hazarika, S Abbas, NH Kumar, A Deep; Existence of solutions for the fractional hybrid differential equation via measure of noncompactness; Rocky Mountain Journal of Mathematics, in press, 2023.

5. S. Bugalia, J.P. Tripathi, S. Abbas, H. Wang, General theory for significance of culling in two-way disease transmission between humans and animals, *Journal of Biological Systems*, in press 2023.
6. M. Kumar, S. Abbas, Stability and optimal control of age-structured cell-free and cell-to-cell transmission model of HIV, *Mathematical Methods in the Applied Sciences*, in press, 2023.

Dr. Rajendra Kumar Ray

1. Natural convection of MoS₂-water nanofluid inside a square cavity with corrugated bottom
M Samadder, RK Ray, D Sanpui
Indian Journal of Physics 97 (6), 1811-1832
 2. Effect of arc-shaped vertical control plate on heat and mass transfer in uniform flow past an isothermally heated circular cylinder
RK Ray, A Haty
Heat Transfer 52 (3), 2462-2489
6. National conferences attended and papers presented in the format: total 04 national conferences.

Dr. Syed Abbas

1. International Conference on Nonlinear Analysis and Applications-2022 (ICNAA-2022) (online)

Dr. Samir Shukla

1. Attended a conference titled "Cohen Macaulay simplicial complexes in graph theory" between 10-15th July at CMI Chennai and delivered a research talk on "Vietoris- Rips and Cech complexes".

Dr. Rajendra Kumar Ray

1. Numerical Study of Shear Flow Past Two Flat Inclined Plates at Reynolds Numbers 100, 200 Using Higher Order Compact Scheme
RK Ray, Ashwani
Nonlinear Dynamics and Applications: Proceedings of the ICNDA 2022, 301-312

Dr. Sampat Kumar Sharma

1. Conference of Ramanujan Mathematical Society hosted by SSN Chennai during 6th December 2022 - 8th December, 2022.
7. International conferences attended and papers presented in the format: - total 09 conferences.

Dr. Syed Abbas

1. Kumar, Manoj; Abbas, Syed Optimal birth control of population dynamics with time-varying diffusivity coefficient. *Advances in nonlinear dynamics*. Vol. 3, 163–174, NODYCON Conf. Proc. Ser., Springer, Cham, [2022]
2. Subhash Chandra, Syed Abbas; On fractal dimension of the graph of non stationary fractal interpolation function; 2023, *Contemporary Mathematics (CONM)* series of the American Mathematical Society (AMS), in press.

Dr. Muslim Malik

1. As a resource person given the talk on Applications of Differential Equation in Control Problems, in FDP, on 13 August 2022, Department of Mathematics, Jamia Millia Islamia University, New Delhi.
2. 5th International Conference On Mathematical Modelling, Applied Analysis and Computation (ICMMAAC-22), 04-06 August, 2022, JECRC Jaipur.
3. International Conference on Dynamical Systems, Control and their Applications, 01-03 July, 2022, IIT Roorkee.
4. Recent Development in Numerical Methods for Partial Differential Equations, 30th May-03rd June, 2022, NIT Hamirpur.

5. Invited speaker in ICMC 2023, BITS Pilani Goa Campus.
6. Resource Person in the Computational and Applied Mathematics workshop at IIT Tirupati, 15-16 April, 2023

Dr. Nitu Kumari

1. Shubhangi Dwivedi and Nitu Kumari (2023) "Potential of Optimal Coupling of Species Migration to Bring Synchrony in Seasonally Perturbed System", Book chapter in an edited volume entitled A Handbook of Emerging Trends in Mathematical Sciences & Computing, Nova Science Publishers, USA, (Accepted).
8. Invited Lecturers/Continuing education programs: 12 continuing education programs.

Dr. Muslim Malik

1. As a resource person given the talk on Applications of Differential Equation in Control Problems, in FDP, on 13 August 2022, Department of Mathematics, Jamia Millia Islamia University, New Delhi
2. Resource Person in the Computational and Applied Mathematics workshop at IIT Tirupati, 15-16 April, 2023

Dr. Syed Abbas

1. Invited talk: Shastra University and IIIT Allahabad & IIT BHU, 2 times in IIIT NDM Gwalior.

Dr. Rajendra Kumar Ray

1. 4 Lectures in: FDP-1, July-2022, IIT Mandi
2. 4 Lectures in: FDP-2, August-2022, IIT Mandi
3. 1 Lecture in: FMSM-2022, May-2022, NIT Hamirpur

Dr. Nitu Kumari

1. 2022 Invited Talk "Group Defense and Pattern Formation in Prey Predator Model", 88th Annual Conference of The Indian Mathematical Society: An International Meet, BIT Mesra Ranchi, December 27-30, 2022

Dr. Samir Shukla

1. Invited speaker, in the "Geometric Analysis Seminar Series" at Indian Institute of Technology Bombay and delivered a research talk on "Spectral gap bounds for the simplicial Laplacian and an application to random complexes".
2. Invited speaker, in the online seminar series "Applied Algebraic Topology Re-research Network (AATRN) Seminar Series" and delivered a research talk on "Vietoris-Rips complexes of hypercube graphs".

Dr. Sampat Kumar Sharma

1. Completion of unimodular rows, at Ramanujan Mathematical Society conference, SSN Chennai on 6th December, 2022.

Dr. Sarita Azad

1. March 2023 Covid-19 transmission in India, and the road ahead towards pandemic management, Presented at Delhi University Webinar.
2. July 2023 Monitoring and prediction of extreme rainfall events over Himalayan region, Presented at VIT Vellore Webinar.
9. Workshop/ Conference organized with high resolution soft copies of photographs: 03 workshops.

Dr. Neetu Kumari

1. Organised two minisymposia at 8 th China-India-Japan-Korea (CIJK) Conference on Mathematical and Theoretical Biology, Jeju Island, 27 June – 1st July, 2023.

Dr. Rajendra Kumar Ray

1. 67th Congress of the Indian Society of Theoretical and Applied Mechanics (ISTAM), an international conference (ISTAM-2022), held at IIT Mandi, Himachal Pradesh during 14-16 December 2022



Dr. Sarita Azad

Teachers Training Programme (State Council of Educational Research and Training, Delhi) at IIT Mandi, Himachal Pradesh -175005 FROM 26.02.2023 - 02.03. 2023





10. Patents filed/ awarded: NIL

11. Professional achievements, honors and awards: 02 awards.

Dr. Rajendra Kumar Ray

1. Elected as the Vice-President of the Indian Society of Theoretical and Applied Mechanics (ISTAM)

Dr. Nitu Kumari

1. Young Faculty Fellow Award 2023, IIT Mandi

12. Membership of Professional Societies: 03 membership.

Dr. Qaiser Jahan

1. Member of Asian and Oceanian Women in Mathematics (AOWM)

Dr. Rajendra Kumar Ray

1. Society for Industrial and Applied Mathematics (SIAM), Indian Society of Theoretical and Applied Mechanics (ISTAM), Calcutta Mathematical Society (CMS), Indian Mathematical Society (IMS)

Dr. Muslim Malik

1. Indian Mathematical Society

13. Visit to Academic Institutes and lectures delivered: 02 lectures.

Dr. Muslim Malik : Aligarh Muslim University (AMU)

Dr. Samir Shukla : Visited to Indian Institute of Technology Bombay for one week in July 2022 and delivered a research Talk on "Vietoris-rips complexes of Hypercube graphs".

14. Encyclopedia Entry: **NIL.**

15. Outreach Activities: **NIL.**

16. Any other information: **NIL.**

3.9 School Of Biosciences & Bio-Engineering (SBB)

School of Biosciences and Bioengineering (SBB), IIT Mandi since 2016 is focused on teaching and cutting-edge research in the broad areas of Biotechnology and Bioengineering. The current academic programs being offered are

- BTech in Bioengineering
- BTech-MTech in Bioengineering (Dual degree)
- MTech in Biotechnology
- MTech (Research) in Biotechnology
- PhD in Biosciences and Bioengineering

Within a few years of establishment, SBB has grown substantially in terms of academic activities, diverse research areas and infrastructure. SBB thrives for excellence with different academic programs at the level of PhD, post graduate, and undergraduate to create an academic niche, where state-of-the-art Bioscience meets cutting-edge Bioengineering technologies at IIT Mandi. Currently, SBB is the home to a vibrant group of 10 core faculties, 1 visiting faculty, several research scholars, and students. More than 130 undergraduate and postgraduate scholars and about 85 PhD scholars benefitted/benefitting from the programs.



The strength of SBB is its incredibly talented faculty carrying independent research, teaching, designing academic curriculum and imparting hands-on project-based learning to scholars. SBB faculty achieved Early Career Research Awards, carried projects of high impact in fundamental and translational research areas, widely published and filed patents. Few faculties also achieved INSA Young Scientists Award, Innovative Young Biotechnologist Award, SERB-STAR Award and Welcome Trust-DBT India Alliance Intermediate Fellowship. SBB faculty serve as Associate editors, editorial board members and founding members of various scientific journals and academic societies. Our faculty contributed to projects of national and international relevance such as Indo-UK, Indo-US, Indo-German, Indo-Russia, Indo-Danish, IMPRINT Health and Energy, Farmer Zone etc.

The high-quality research training and education to the next generation of scholars is successfully catering to the needs of the industries and academia eventually contributing to the Nation Building. Our Alumni started contributing in academia and industries nationally and internationally.

| Faculty Members | | |
|-----------------|--|---|
| S. No. | Name and other details | Photographs |
| 1. | <p>Shyam Kumar Masakapalli, Chairperson SBB & Associate Professor Specialisation: Metabolic Systems Biology, Fluxomics, Metabolomics, Biochemistry, Cellular Bioprocessing Technology, Smart Agriculture PhD from University of Oxford, UK (2012) Home Town: Rayagada, Odisha Phone: 01905-267147; Email: chairsbb@iitmandi.ac.in; shyam@iitmandi.ac.in</p> |  |
| 2. | <p>Prof. Tulika P. Srivastava, Professor Specialisation: Systems Biology and Multi-OMICS Applications for Health and Environment, Next Generation Sequencing Applications, Computational Biology, Microbiology Phd from IGIB, CSIR, Delhi (2005) Home Town: Delhi Phone: 01905-237922; Email: tulika@iitmandi.ac.in</p> |  |
| 3. | <p>Dr. Amit Prasad, Associate Professor Specialisation: Immunology, Neuro inflammation, Neuro infection, Parasitology, Microbiology, Yogic-immunology Phd from Sanjay Gandhi PG Institute of Medical Sciences, Lucknow (2008) Home Town: Ranchi, Jharkhand Phone:01905-267136; Email: amitprasad@iitmandi.ac.in</p> |  |
| 4. | <p>Dr. Prosenjit Mondal, Associate Professor Specialisation: Metabolic Syndrome, Diabetes, Obesity, Non-alcoholic fatty liver disease (NAFLD), PhD from Institute of Life Sciences Bhubaneswar (2008) Home Town: Babunpur, Burdwan Phone: 01905-267135; Email: Prosenjit@iitmandi.ac.in</p> |  |
| 5. | <p>Dr. Rajanish Giri, Associate Professor Specialisation: Biophysics and protein folding, Intrinsically Disordered Proteins, T Cell Engineering, Protein Engineering Molecular Virology, Intrinsically Disordered Proteins, Drug Discovery PhD from Sapienza University of Rome, Rome, Italy (2013) Home Town: Allahabad Phone:01905- 267154; Email: rajanishgiri@iitmandi.ac.in</p> |  |
| 6. | <p>Dr. Amit Jaiswal, Associate Professor Specialization: Nanobiotechnology, Materials Chemistry, Sensors, Biomaterials PhD from Indian Institute of Technology Guwahati (2013) Home Town: Kolkata, West Bengal Phone: 01905- 267137; Email: j.amit@iitmandi.ac.in</p> |  |
| 7. | <p>Dr. Prasad Kasturi, Assistant Professor Specialization: Protein quality control, Stress response, Aging, C.elegans PhD from University of Fribourg Home Town: Nizamabad Email: prasadkasturi@iitmandi.ac.in</p> |  |

| | | |
|-----|---|--|
| 8. | Dr. Trayambak Basak, Assistant Professor Specialization: Metabolic diseases, extracellular matrix, Proteomics PhD from CSIR-Institute of Genomics and Integrative Biology Home Town: Dhupguri, West Bengal Email: trayambak@iitmandi.ac.in |  |
| 9. | Dr. Baskar Bakthavachalu, Assistant Professor Specialization: Genetics and Molecular Neuroscience, Cell and Molecular Biology, Biochemistry, and Insect Biology PhD from National Centre for Cell Science, Pune Home Town: Chennai Email: baskar@iitmandi.ac.in |  |
| 10. | Dr. Sumit Murab, Assistant Professor Specialization: Tissue Engineering, Biomaterials, 3D printing/ bio-printing, Disease models, Intellectual property rights PhD from IIT Delhi/AIIMS New Delhi Home Town: Jabalpur Email : sumitmurab@iitmandi.ac.in |  |
| 11. | Prof. Shailja Gupta, Adjunct Professor Specialization: Science Research, Administration, Policy, outreach, Biochemistry, Biochemical Engineering PhD from IIT Delhi Home Town: Mandi Email :shailja.psa@gov.in |  |

3.9.1 Research projects carried/ongoing and their progress.

| S. No. | Project No. | Project Title | Sponsoring Agency | Principal Investigator & Co-ordinator(s) | Dept./ School | Amount Sanctioned | Duration of Project | From | To |
|--------|------------------------------|---|------------------------------|---|--|-------------------|---------------------|------|------------------------------|
| 1. | IITM/ DST/RSF/ SKM/420 | Enhancing the efficiency of clean energy production by intensifying anaerobic bioconversion of organic waste using solar energy | Indo Russia (DST-RSF funded) | Dr Shyam K. Masakapalli and other leads from MNIT Jaipur, CU Rajasthan and Russian PIs | 24.96 lakhs (IIT Mandi share out of 75 lakhs) | 3 Years | 2023 | 2026 | IITM/ DST/RSF/ SKM/420 |
| 2. | IITM/ ICAR/ SKM/380 | Rice rhizosphere metabolome- and microbiome functions for improved crop establishment, growth, and yield | ICAR- NASF | Dr Shyam K. Masakapalli and other leads from ICAR-IARI, IITCAU Imphal and PRL Ahmedabad | 21.21 lakhs (IIT Mandi share out of 91.99 lakhs) | 3 Years | 2022 | 2025 | IITM/ ICAR/ SKM/380 |
| 3. | IITM/DST/ MTH/319 | Sustainable irrigation advisories for mid-Himalayan farmers using smart satellite image analytics | DST Indo Danish | Dr Shyam K. Masakapalli and other COPIs from IIT Mandi, PI from DHI | 99.29 lakhs | 3 Years | 2021 | 2024 | IITM/ DST/ MTH/319 |

| | | | | | | | | | |
|-----|-----------------------------|--|---------------------------------------|--|-------------|----------|------|------|---------------------------------|
| 4. | IITM/ HPSAMB/ HT/326 | Engineering design improvisation of packaging material leading to market friendly prototypes that retains fruits quality | H.P State Agriculture Marketing Board | Dr Shyam K Masakapalli and Dr Mohammad Talha (Joint PIs) | 17.88 lakhs | 2 Years | 2021 | 2023 | IITM/ HPSAMB/ HT/326 |
| 5. | IITM/HDC/ SKM/287 | Farming of unexplored herbs of mid-Himalayan region and develop a sustainable supply model involving local farmers in the mid-Himalayan region | Himalaya Wellness Company, Bangalore | Dr Shyam K Masakapalli | 10.68 lakhs | 3 Years | 2020 | 2023 | IITM/ HDC/ SKM/287 |
| 6. | IITM/DBT- RF/PKS/315 | Unraveling the role of inter-tissue stress communication in maintaining organism-wide proteostasis during stress and aging | DBT | Dr. Prasad Kasturi | 42.50 | 5 years | 2021 | 2026 | IITM/ DBT-RF/ PKS/315 |
| 7. | IITM/ SERB/ BB/321 | Flavivirus RNA interacting stress granule complex as determinants of host adaptation and infectivity | SERB | Dr. Baskar Bakthavachalu | 38.40 | 3 years | 2021 | 2024 | IITM/ SERB/ BB/321 |
| 8. | IITM/ ICMR/ RG/322 | Drug discovery and folding mechanism against RNA dependent RNA polymerase of Japanese encephalitis virus | ICMR | Dr. Rajanish Giri | 5.66 | 3 years | 2021 | 2024 | IITM/ ICMR/ RG/322 |
| 9. | IITM/ DBT-WIA/ BB/331 | How does ataxin-dependent stress-granule assembly contribute to neurodegenerative disease | DBT WellcomeTrust India Alliance | Dr. Baskar Bakthavachalu | 360.73 | 5 Years | 2020 | 2025 | IITM/ DBT- WIA/ BB/331 |
| 10. | IITM/INT/ BioX-Co/22 | Establishment & Maintenance of ScienceLaboratory | | BioX Coordinator | 53.50 | 3 years | 2021 | 2024 | IITM/ INT/BioX- Co/22 |
| 11. | IITM/ SERB/ AJ/351 | Wearable NIR triggered on demand drug release skin patch containing microneedles loaded with gold nanocapsules for localized cancer treatment | SERB | Dr. Amit Jaiswal | 46.88 | 3 years | 2022 | 2025 | IITM/ SERB/ AJ/351 |
| 12. | IITM/ SERB/ PKS/356 | Roles for small heat shock proteins in protective protein aggregation and proteome protection | SERB | Dr. Prasad Kasturi | 54.78 | 03 years | 2022 | 2025 | IITM/ SERB/ PKS/356 |

| | | | | | | | | | |
|-----|---------------------------|--|------|-------------------------|--------------------------|----------|----------|------|---------------------------|
| 13. | IITM/ SERB/ TPS/283 | Evaluation and design of novel synthetic microbial consortia for the bioprocessing of natural and synthetic rubber waste to industrial biomolecules. | SERB | Dr. Tulika P Srivastava | 41.51 | 03 years | 2020 | 2023 | IITM/ SERB/ TPS/283 |
| 14. | IITM/ SERB/ TPS/371 | Sewage Surveillance of SARS-CoV-2 genome: a useful technique for tracking the epidemiology of COVID-19 through wastewater systems in Himachal Pradesh. | SERB | Dr. Tulika P Srivastava | 41.91 | 1 year | 2022 | 2023 | IITM/ SERB/ TPS/371 |
| 15. | IITM/DBT/ TPS/366 | Process optimization and up-scale production of lignocellulosic extremozymes from Himalayan microbes for biomass valorization/depolymerization | DBT | Dr. Tulika P Srivastava | 33.26 | 3 years | Mar 2022 | 2025 | IITM/ DBT/ TPS/366 |
| 16. | IITM/ ICMR/ RG/342 | Folding perspective and inhibitor discovery of Zika virus NS2B-NS3 protease complex | ICMR | Dr. Rajanish Giri | 16.31 (Year 1 budget) | 3 years | 2021 | 2024 | IITM/ ICMR/ RG/342 |

3.9.2 Research Projects and their progress by each PI

Dr. Shyam K Masakapalli

- Title:** Enhancing the efficiency of clean energy production by intensifying anaerobic bioconversion of organic waste using solar energy

Funding Agency: DST: Indo-Russia,

Fund Sanctioned: 24.60 lakhs (IIT Mandi Share)

Investigators: Dr Shyam Masakapalli (PI-India),

Start & End Year: 2023-2026

The main objective of the project is to study the process of anaerobic bioconversion of organic waste under complex electrophysical influence on the initial and the fermenting substrate using solar energy to offset the costs and enhance the process efficiency. The project started

- Title:** Sustainable irrigation advisories for mid-Himalayan farmers using smart satellite image analytics

Funding Agency: DST (Indo-Danish)

Fund Sanctioned: 99.29 lakhs (IIT Mandi Share)

Investigators: Dr. Shyam Kumar Masakapalli (PI), Prof. Yvonne Dittrich (PI) from IT University of Copenhagen, Denmark, Dr. Manas Thakur, Dr. Srikant Srinivasan Dr. Ramna Thakur (CoPI's) and DHI (Danish Industry partner)

Start & End Year: 2021 – 2024

Objectives jointly being carried by PIs include

- Irrigation advice delivery to small holding farmers of mid-Himalayas. We are developing a sustainable and reliable model to be embedded into the irrigation practices designed to reach small holders.
 - Satellite image analysis as a basis of dynamic irrigation advice specifically for the Himalayan region. DHI uses satellite-based irrigation algorithms. The algorithms, being region specific, are being further developed to serve as tools to deliver irrigation advice in the Himalayan region.
 - Development of a sustainable software ecosystem. To support the flexible interaction between providers and consumers of image analysis functionality, software architecture and governance models are needed that fit the emerging business models.
 - Business model for economic viability. To support economic viability for providing satellite image analysis and associated business models
3. **Title:** Rice rhizosphere metabolome- and microbiome functions for improved crop establishment, growth, and yield
Funding Agency: (Funded by ICAR: NASF, 2022-2025)
Fund Sanctioned: 21.21 lakhs (IIT Mandi Share)
Investigators: Dr Shyam Masakapalli
Start & End Year: 2022-2025
Objectives we are focusing on: To profile the rhizosphere metabolites and the recruited microbiome at selected growth stages of rice under flooded and aerobic conditions. We optimized the rice rhizosphere metabolome analysis at germination, reproductive and maturity stages. Further analysis under different N₂ conditions is ongoing.
4. **Title:** Engineering design improvisation of packaging material leading to market friendly prototypes that retains fruits quality
Funding Agency: (HPSAMB)
Fund Sanctioned: 17.88 lakhs
Investigators: Dr Shyam Masakapalli and Dr Mohammad Talha
Start & End Year: 2022-2023
Objectives and progress are: Design of improved prototype (s) of Apple packaging by engineering simulation/modelling tools and toundertake In-house and field tests of the developed prototype and analyse its impact on the fruit quality parameters using biochemical and other standard tests. A design was optimised based on which a prototype is being made for further studies. Studied the fruit quality parameters - visual, biochemical, firmness etc on ~20 apple varieties of Himachal Pradesh. Further field tests are ongoing.

Dr. Prosenjit Mondal

1. **Title:** Targeted Mass Spectrometry based approach to measure plasma acetylated High Mobility Group Box 1 level as a surrogate marker for hyperinsulinemia
Funding agency:- ICMR-DHR (DHR-GIA/2020/0007888)
Duration; Oct,2021 - Oct,2024
Fund Sanctioned: 45,19,450
Investigators: Dr Prosenjit Mondal ,Co-PI- Trayambak Basak
Summary of Project Objectives and progress: Hyperinsulinemia is an independent risk factor for a number of metabolic syndromes. A reliable and repeatable result when sampling insulin is still a challenging task. Considering the above facts, the research proposal aims to develop cost-effective methods to predict and diagnose hyperinsulinemia. Based on our preliminary data, we are proposing here to measure plasma acetylated HMGB1 as a surrogate marker for hyperinsulinemia
2. **Title:** Function and mechanisms of Sorcin in diet-induced fatty liver diseases and lipid metabolism
Funding Agency: DST-SERB
Duration: 2020-2023
Budget: 55,50,000
Investigators: Dr Prosenjit Mondal

Summary of Project Objectives and progress: This project aims to understand the molecular pathogenesis of high-sucrose diet-induced fatty liver disease and to identify cellular mediators that can be targeted to prevent or reverse the progression toward non-alcoholic steatohepatitis. The proposed studies will examine the function and molecular mechanisms of calcium channel blocker; sorcin in promoting high-fat diet-induced fatty liver disease. We will uncover molecular pathways of how hepatic sorcin reduces lipid accumulation during diet-induced NAFLD. The completion of the proposed study will gain critical knowledge regarding the molecular pathways driven by sorcin to promote the onset and progression of NAFLD. Studies have great potential in uncovering sorcin-based novel therapeutics for preventing or treating non-alcoholic fatty liver disease.

Dr. Rajanish Giri

1. **Title:** Folding perspective and inhibitor discovery of Zika Virus NS2B-NS3 Protease complex

Funding agency:- ICMR

Duration; 22/11/2021-21-11-2024

Fund Sanctioned: 16.30 Lakhs (1st Year Budget)

Investigators, PI, Dr Rajanish Giri

In the recently introduced project, we are procuring data on novel molecules to be tested against NS2B-NS3 protease using enzyme assays and antiviral assays.

Dr. Baskar Bakthavachalu

1. **Title:** How does ataxin-dependent stress-granule assembly contribute to neurodegenerative disease?

Funding agency: Wellcome-DBT India alliance Intermediate Fellowship

Duration;-(2020-2025)

Fund Sanctioned:) 3,63,00,000

Investigators. PI : Baskar Bakthavachalu

Summary of Project Objectives and progress: Neurodegeneration is a process of progressive loss of nerve cells. In addition to aging and environmental factors, genetic mutations in the assembly domains of RBPs are key causes of neurodegeneration. At the cellular level, the neurodegeneration mechanism is highly conserved between *Drosophila melanogaster* (fruit flies) and humans. The vast genetic resources and techniques make fruit flies an attractive model organism to study the neurodegenerative process. In our lab, we use flies to study RNA regulation in vivo. We are interested in understanding how RNA binding proteins (RBPs) with Intrinsically Disordered Regions (IDR) regulate RNP assemblies. We identified key protein domains in Ataxin-2 that can promote pathological aggregates in neurons that lead to diseases like ALS and SCA2 and structured domains that prevent RNP condensation. Using genetics, cell, and molecular techniques we separated the antagonistic functions of structured and disordered domains of Ataxin-2. With micro-computed tomography, we show that human ALS causative mutations replicate the progressive degenerative phenotypes in flies. We further show blocking RNP aggregates by deleting IDR can alleviate degenerative phenotypes. We used mass spectrometry and TRIBE techniques to identify the RNP composition and currently exploring the RNP aggregation, clearance, and translation control mechanisms in vivo.

2. **Title:** Flavivirus RNA interacting stress granule complex as determinants of host adaptation and infectivity.

Duration; (2021-2024)

Fund Agency : SERB-STAR

Sanctioned: – 38,40,000

PI Investigators: Dr Baskar Bakthavachalu

Summary of Project Objectives and progress: To investigate how Dengue viral proteins contribute to stress granule formation and behavior, we conducted an extensive review, considering its prevalence and social impact in India, we opted to focus on Dengue viral serotype 2. The open reading frames (ORFs) of dengue viral proteins were cloned into the eukaryotic expression vectors to express with an HA tag in the reading frame. These clones were sequence verified and

downstream cell biology experiments are being performed.

Dr. Trayambak Basak

1. **Title:** High-resolution Plasma Proteomic And Lipidomic Analyses For Fibrosis-Related Metabolic Assessment In Dilated Cardiomyopathy (DCM) Patients In India: A Multi-Center Based Study."

Funding Agency: ICMR

Fund Sanctioned: 24,08,327 (2022-2023); Total 90 lakhs

Investigators:

Start & End Year: 14.07.2021-13.07.2024

Summary of Project Objectives and progress: Plasma was separated from controls as well as patient samples and undepleted plasma was used for identification and quantification of plasma proteome and lipidome. We have comprehensively identified 395 protein species and quantitated ~1000 lipid species using targeted MS approaches. We have identified key proteins and lipid species particularly altered in the DCM patients.

Prof. Tulika P. Srivastava

1. **Title:** Sewage Surveillance of SARS-CoV-2 genome: a useful technique for tracking the epidemiology of COVID-19 through wastewater systems in Himachal Pradesh

Funding Agency: SERB

Fund Sanctioned: Rs. 41.91

Investigators: PI: Prof. Tulika Prakash Srivastava, Professor (School of Biosciences and Bioengineering) Indian Institute of Technology, Mandi HP;

Co-PIs: Prof. Sunite Ganju Professor (Department of Microbiology) Shri Lal Bahadur Shastri Government Medical College Ner Chowk, Mandi HP; Dr. Ramesh Guleria Assistant Professor (Microbiology) Shri Lal Bahadur Shastri Government Medical College Ner Chowk, Mandi HP

Start & End Year: June 2022 – Dec 2023

Summary of Project Objectives and progress: Sewage wastewater sampling from various localities in Mandi district has been carried out followed by testing for the presence of SARS-CoV-2 strains.

2. **Title:** Evaluation and design of novel synthetic microbial consortia for the bioprocessing of natural and synthetic rubber waste to industrial biomolecules.

Funding Agency: SERB

Fund Sanctioned: Rs. 41.51

Investigators: PI: Prof. Tulika Prakash Srivastava

Co-PI: Dr. Shyam K Masakapalli

Start & End Year: Feb 2020 – Aug 2023

Summary of Project Objectives and progress: Bioprocessing potential of novel microbial candidates on natural rubber has been tested followed by design and development of synthetic microbial consortia for the same.

3. **Title:** Process optimization and up-scale production of lignocellulosic extremozymes from Himalayan microbes for biomass valorization/ depolymerization.

Funding Agency: DBT

Fund Sanctioned: Rs. 33.26 (IIT Mandi Share)

Investigators: PI: Prof. Tulika Prakash Srivastava,

Start & End Year: Feb 2020 – Aug 2023

Summary of Project Objectives and progress: Novel microbial candidates have been identified using in silico approaches which have the potential for lignocellulosic waste biodegradation.

Dr. Sumit Murab

1. **Title:** Edible Nano composite-based 3D printing for gustatory interface

Funding Agency: TiH-HCI, IIT Mandi

Fund Sanctioned: 10747000/-

Investigators: PI: Dr. Sumit Murab, Co-PIs: Dr. Tanushree Parsai, Dr. Garima Agrawal

Start & End Year: 24.07.23- 23.07.25

Summary of Project Objectives and progress: Consumables and Instruments for the grant are being procured and Postdoc hiring process is under process.

2. **Title:** Mineralized Injectable Bioink for Bone Regeneration
Funding Agency: SERB
Fund Sanctioned: 2800000/-
Investigators: PI: Dr. Sumit Murab
Start & End Year: 05-09-23- 04-09-25
Summary of Project Objectives and progress: Mineralized Bioink has being formulated and tested for its rheological properties
3. **Title:** Mineralized Injectable Bioink for Bone Regeneration
Funding Agency: IIT Mandi
Fund Sanctioned: 1500000/-
Investigators: PI: Dr. Sumit Murab
Start & End Year: 26.10.2022- 25.10.2022
Summary of Project Objectives and progress: Mineralized Bioink has being formulated and tested for its rheological properties

Dr. Prasad Kasturi

1. **Title:** To identify and characterize novel modifier of protein aggregation
Funding Agency: IIT Mandi seed grant
Fund Sanctioned: Rs. 7,00,000
Investigators: Dr Prasad Kasturi
Start & End Year: 2021 to 2024
Summary of Project Objectives and progress: Objective of this project is to identify proteins that modify protein aggregation. We identified proteins that interact with meta-stable luciferase (a model protein) expressing in neurons of C.elegans. We found a few proteins that modify the protein aggregation in neurons in response to heat stress.
2. **Title:** Unraveling the role of inter-tissue stress communication in maintaining organism-wide proteostasis during stress and aging
Funding Agency: DBT
Fund Sanctioned: Rs. 42,50,000
Investigators: Dr Prasad Kasturi
Start & End Year: 2021 to 2026
Summary of Project Objectives and progress: Objective of this project is to identify secreted proteins that communicate stress among tissues. We analysed publicly available proteome data and identified secreted proteins that change their abundance levels during aging in wildtype and lifespan mutant C.elegans. We selected a few to find out their role in stress response and aging.
3. **Title:** Roles for small heat shock proteins in protective protein aggregation and proteome protection
Funding Agency: SERB
Fund Sanctioned: Rs. 54,78,000
Investigators: Dr Prasad Kasturi
Start & End Year: 2022 to 2025
Summary of Project Objectives and progress: We generated C.elegans strains expressing small HSP reporter and also deletion for the small HSPs. We analyzed expression pattern during normal aging and found that they form puncta like structures during aging similar to heat stress. This suggests that the small HSP are required for promoting protein aggregation. Now we are in process of analyzing protein aggregation in the small HSP deletion background.

3.9.3 Books/Book Chapters published

- Shagun Shagun, Masakapalli SK; Phytochemical Databases and their Relevance to Phytotherapy, Bioactive Phytochemicals from Himalayas: A Phytotherapeutic Approach (2023) 1: 128. Bentham Science Publisher (Book Chapter)<https://doi.org/10.2174/9789815123289123010013>
- Shagun Shagun, Masakapalli SK; Tools and Techniques to Tap the Potential of Himalayan Bioactive Molecules, Bioactive Phytochemicals from Himalayas: A Phytotherapeutic Approach (2023) 1: 157. Bentham Science Publisher (Book Chapter)<https://doi.org/10.2174/9789815123289123010014>
- Evaluation of activated sludge derived from wastewater treatment process as a potential biorefinery platform. Thakur J, Masakapalli SK Biofuels and Bioenergy: A Techno-Economic Approach, Year 2022, Pages 71-83 DOI:10.1016/B978-0-323-90040-9.00001-1
- Arora N, Keshri AK, Kaur R, Rawat SS, Prasad A*. "Immunoinformatic approaches for vaccine designing for pathogens with unclear pathogenesis". Vaccine Designs: Methods and Protocols (2nd Edition, Springer publication), 2412:425-437. doi: 10.1007/978-1-0716-1892-9_22. PMID: 34918259.
- Metagenomics for the Identification of Microbial Enzymes for Nutraceutical Production. Pratyusha Patidar and Tulika Prakash*. In Microbial Enzymes in Production of Functional Foods and Nutraceuticals. CRC Press Taylor & Francis 2023, (pp. 263-282).

3.9.4 Papers published in reputed National journals

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3.9.6 Conferences and Invited talks by SBB faculty (National/International)

- Dr. Baskar Bakthavachalu was Invited speaker at BioSangam 2022 - Health care and Pharmaceutical Biotechnology session, organized at MNIT, Allahabad.
- Dr. Baskar Bakthavachalu was Invited speaker for Colloquium at the Institute of Health Sciences, Presidency University (2022). *Drosophila* as a model to study human neurodegenerative disease mechanisms.

- Dr. Baskar Bakthavachalu - EMBO Lecture Course on RNA binding proteins: From RNA binding to condensation and aggregation (RNA binding proteins) (2022). Structured domains of Ataxin-2 regulate RNP phase separation and target mRNA interaction.
- Prof. Tulika P. Srivastava was an Invited Speaker in the Winter School on “Molecular Diagnosis of AMR (Anti Microbial Resistant) pathogen causing Mastitis in Cattle and Buffalo” at Animal Biotechnology Centre, National Dairy Research Institute Karnal from Feb 23 to Mar 15, 2023.
- Prof. Tulika P. Srivastava was an invited resource person for hands On “Bioinformatics Workshop On Plant and Microbial Genomics” at Univesity of Jammu from 23 Jan -30 Jan 2023.
- Prof. Tulika P. Srivastava was an Invited Speaker at hands on workshop on “Advancing Microbiology: from Culture to Sequencing” at IISER Kolkata from 12-14 th December, 2022.
- Prof. Tulika P. Srivastava was an invited speaker in DBT-sponsored hands-on workshop on Genomics, Proteomics and Metagenomics from July 20th to 23rd, 2022 at CSIR-IGIB, New Delhi.
- Prof. Tulika P. Srivastava was Speaker at the BioX Annual Conference 2022 held at IIT Mandi on 13 – 14 May 2022.
- Prof. Tulika P. Srivastava was an Invited Session Chair at the International Human Microbiome Consortia (IHMC) 2022 Meeting held at Kobe, Japan in Nov 2022
- Prof. Tulika P. Srivastava was an Invited speaker at the International Symposium on Bio-Polymers (ISBP) 2022 held at Sion, Switzerland in Sept 2022.
- Dr. Shyam K Masakapalli was an Invited speaker at AYURTECH, 20-25th June 2022, IIT Madras - "Technological intervention to standardize the indigenous system of medicine in India". Presented on “Global phytochemical vault of Himalayan Medicinal and Aromatic Plants (HMAPs): Vision and progress”
- Dr. Shyam K Masakapalli was a speaker at BioX Annual Conference 2022 (12-13th May 2022). Presented on "Unravelling cell metabolism with multiple Isotopic tracers". Lab members presented their research work through posters and oral talks.
- Dr. Shyam K Masakapalli was an invited guest speaker at Faculty Development Program on “Advances in Biological Wastewater Treatment Methods: Teaching and Learning Strategies” organized by the Department of Biotechnology, NIT Warangal during 5-9 December 2022. Delivered “Domestic wastewater treatment and value generation - at sustainable scales by integrating Bioengineering strategies”
- Dr. Shyam K Masakapalli served as an Invited Lead Expert from India on “Bioenergy technologies for a net zero transition: outcomes of UK-India bioenergy research scoping” <https://www.supergen-bioenergy.net/wp-content/uploads/2022/03/Bioenergy-Technologies-for-a-Net-Zero-Transition-UK-India-Final-Report-2022.pdf>
- Dr. Prasad Kasturi was an Invited speaker for 3rd Indian C.elegans meeting, Kerala, September 2022.
- Dr. Prasad Kasturi, Dr. Shyam K Masakapalli, Dr Amit Prasad and Dr Dr. Baskar Bakthavatchalu provided SCERT Teacher Training in Biosciences, 10th-15th March 2022, IIT Mandi. Trained hands-on biological experiments to about 100 teachers from Delhi schools (Ref : IITM/TP-SCERT/Science/142).
- Dr. Baskar Bakthavatchalu was an invited speaker at MRDG, IISc, (2022): Regulation and function of messenger Ribonucleoprotein assemblies.
- Dr. Baskar Bakthavatchalu was an invited speaker at Biosciences and Bioengineering, IIT Madras, (2022): Regulation and function of messenger Ribonucleoprotein assemblies.
- Dr. Prosenjit Mondal presented in Endocrine Research Conference @ University of Colorado School of Medicine September 21st, 2022: title of the talk: Liver Derived S100A6 Propels β Cell Dysfunction in NAFLD
- Dr Prosenjit Mondal Attended Janelia 4D Cellular Physiology Symposium, Oct 12-14,2022
- Dr Prosenjit Mondal delivered a seminar at IIT Madras, @Department of Biotechnology October, 18th 2022, the title of the talk: Exploring inter-organ communication to uncover mechanisms that regulate β -cell function and Non-Alcoholic Steatohepatitis (NASH)
- Dr. Prosenjit Mondal delivered a Seminar at Department of Molecular Reproduction, Development and Genetics (MRDG) Indian Institute of Sciences (IISc) December, 21st, 2022 Title of the Talk: Exploring inter-organ crosstalk to uncover mechanisms that regulate β -cell function and Non-Alcoholic Steatohepatitis (NASH) Exploring inter-organ crosstalk to uncover mechanisms that

regulate β -cell function and Non-Alcoholic Steatohepatitis (NASH)

- Dr Prosenjit Mondal delivered a Seminar at Jyoti & Bhupat Mehta School of Health Sci. & Tech. IIT Guwahati , 29th March, 2023 Title of the Talk: Exploring inter-organ crosstalk to uncover mechanisms that regulate β -cell function and Non-Alcoholic Steatohepatitis (NASH) Exploring inter-organ crosstalk to uncover mechanisms that regulate β -cell function and Non-Alcoholic Steatohepatitis (NASH)
- Dr Prosenjit Mondal delivered a talk at Advanced Research Unit on Metabolism, Development & Aging (ARUMDA) symposium on March 17th and 18th 2023 at TIFR-Hyderabad.
- Dr Trayambak Basak presented in Workshop of GBSTM @ IIT-Gandhinagar- "Collagen post-translational modifications at the interface of extracellular-matrix (ECM) remodelling, fibrosis, and regeneration."
- Dr Trayambak Basak was an Invited speaker at Advances in Cardiovascular Medicine and Research-2023 (ACMR-2023) organized by ISHR (Indian-Section) February 16-18, 2023
- Dr Trayambak Basak presented poster at the Young Investigator meet organized by IndiaBiosciences February 2022.
- Dr Trayambak Basak was an Invited speaker at the PSI-ICPP 2022 (14th Annual conference of Proteomics Society of India, India) organized by CSIR-IICB, Nov 2022.
- Dr Sumit Murab was an invited speaker in the Asian Polymer Association Annual Conference 2023, Goa India.

3.9.7 Workshop/ Conference organized with high resolution soft copies of photographs

- Dr. Shyam K Masakapalli Organised an Indo-Danish "Stakeholders workshop towards efficient delivery of crop irrigation advisories" on 10th -11th November 2022 at IIT Mandi. The event was funded by DST.
- Dr Sumit Murab and few SBB colleagues organised BioX Annual Conference 2022 at IIT Mandi

3.9.8 Patents filed/ awarded.

- A Method For Integrating Bioprocessing With Pyrolysis For Valuable Chemicals And Carbon From Biomass Dr Shyam Kumar Masakapalli, Dr Chandrakant Joshi, Dr Swati Sharma Patent no - 411230
- Herbal Extract Of Rhododendron Arboretum Fortreatment Of Sars-cov-2 Virus And Other Corona Viruses/covid Variants (filed) Dr. Shyam Kumar Masakapalli, Dr Maneesh Lingwan, Shagun Shagun, Dr Ranjan Kumar Nanda, Dr Sujatha Sunil
- System And Method For Concentrating The Waste And Producing Valuable Gases From Waste Of Treated Water (filed) Dr Shyam Kumar Masakapalli, Dr Atul Dhar

3.9.9 Professional achievements, honors and awards

Dr. Shyam K Masakapalli

- Board of Editors in ASM Journal mSystems (2023-2026)
- Invited for DD Himachal TV live interview - Waste to Value 2023
- Coordinated the efforts for SBB FIST grant worth 4.6 crores received from DST
- Established Farmer-Academia-Industry-NGO model network that benefitted ~100 farmer families and scaling up further at IIT Mandi
- Awarded "Chaiti Award for contribution to Science and Technology", Rayagada District 2023
- Founding member - Biological Engineering Society, India
- Contributing Member - American Society for Microbiology

Dr. Baskar Bakthavachalu

- EMBO Global Investigator Award

Dr. Prosenjit Mondal

- Short Research Trip to France (SRTF) 2023 funding program of the French Institute in India (IFI) / the Embassy of France in India.

Dr. Trayambak Basak

- Elected as the Executive Council (EC) member of Proteomics Society of India (PSI)
- Elected as the Executive Council (EC) member of International Society for Heart research (ISHR)- Indian Section
- Member - ASBMB, PSI, ISHR

Dr. Amit Parsad

- Speaker at Molecular Helminthology 2023
- Invited to participate for Hydra conference (Only 100 selected scientists are invited)
- Travel grant from DBT to attend ICOPA, Denmark (Not availed)
- Guest Editorial member of Molecular Parasitology, Vaccine, JOEV
- Associate editor Front Molecular Biology
- Member, International Society of extracellular vesicles,
- Member, Indian Society of clinical microbiologist
- Member, Indian Tropical Parasitology Society

Dr. Amit Jaiswal

- Emerging Investigator, Biomaterials Science, Royal Society of Chemistry
- Young Faculty Fellow Award 2023 by IIT Mandi
- Member, American Chemical Society (ACS), USA
- Member, Chemical Research Society of India
- Member, Materials Research Society of India

Prof. Tulika Srivastava

- Invited Session Chair at the International Human Microbiome Consortia (IHMC) 2022 Meeting held at Kobe, Japan in Nov 2022.
- Invited speaker at the International Symposium on Bio-Polymers (ISBP) 2022 held at Sion, Switzerland in Sept 2022.
- Invited Speaker in the Winter School on "Molecular Diagnosis of AMR (Anti Microbial Resistant) pathogen causing Mastitis in Cattle and Buffalo" at Animal Biotechnology Centre, National Dairy Research Institute Karnal from Feb 23 to Mar 15, 2023.
- Invited resource person for hands On "Bioinformatics Workshop On Plant and Microbial Genomics" at Univesity of Jammu from 23 Jan -30 Jan 2023.
- Invited Speaker at hands on workshop on "Advancing Microbiology: from Culture to Sequencing" at IISER Kolkata from 12-14th December, 2022.
- Invited speaker in DBT-sponsored hands-on workshop on Genomics, Proteomics and Metagenomics from July 20th to 23rd, 2022 at CSIR-IGIB, New Delhi.

Dr. Sumit Murab

- Cover page of Journal of Materials Chemistry B, RSC
- Invited Speaker in Asian Polymer Conference 2023, Goa
- Session Chair in Asian Polymer Conference 2023, Goa

Dr. Prasad Kasturi

- DBT-Ramalingaswami Fellowship

3.9.10 Outreach Activities

- SBB hosted the visits of students and faculty of other institutes - Sardar Patel University Mandi, Sundernagar College etc
- Dr Prasad Kasturi, Dr. Shyam K Masakapalli, Dr Amit Prasad and Dr Dr. Baskar Bakthavatchalu provided SCERT Teacher Training in Biosciences, 10th-15th March 2022, IIT Mandi. Trained

hands-on biological experiments to about 100 teachers from Delhi schools (Ref IITM/TP-SCERT/Science/142).

- Dr. Shyam K Masakapalli Organised the Swachhata Pakhwada event at IIT Mandi (1st Sept 2022 to 15th Sept 2022)
- Hosted eminent academic and industry visitors in SBB
 - Prof CS Pramesh (Director Tata Memorial Hospital) who shared experiences with the National Cancer Grid (<https://tmc.gov.in/ncg>).
 - Prof. Kasthuri Venkateswaran presented on “Challenges and Solutions about “Omics in Space”. Nov 2022.
 - Dr. Madhulika Dixit, IIT Madras interacted with all SBB PhD scholars and also presented research talk on "Insulin and impaired glucose metabolism: the atypical determinants of lymphocyte adherence

3.9.11 SBB- Students Achievements

Posters presented in National/International scientific events

- Shagun Shagun, Shyam Kumar Masakapalli. Phytochemistry from the Himalayan diversity – from molecular discovery and metabolic analysis to Health applications. 6th Plants and People "Exploring Plant(s)"-2023 held on 6th-7th Sept 2023 at Max Planck Institute of Molecular Plant Physiology, Potsdam, Germany
- Navya Kapoor and Dr. Shyam Kumar Masakapalli “Understanding polyamine polyamine metabolism in different biological systems. Anusandhan, 2023 25th June, IIT Mandi
- Yogesh Pant and Shyam Kumar Masakapalli. Fatty acid profiles of Mustard seeds and oil using 1H-NMR and GC-MS. International conference on food and nutritional security (iFANS-2023), held at NABI Mohali, Punjab, 6th-9th Jan 2023
- Yogesh Pant and Shyam Kumar Masakapalli. Fatty acid profiles of edible oils. HistCON 2023 at Shoolini University, Himachal Pradesh, 20th-21st May 2023
- Jyotika Thakur. Development of Thermobifida fusca into cell factory and synthetic consortia (SynCONS) partner for cellulose to valuables. BioX Annual Conference (13.05.2023-14.05.2023) Indian Institute of Technology Mandi Kamand, H.P. India.
- Portia D Singh, Sanjeev Kumar, and Shyam K Masakapalli. “Deciphering the metabolome of potato leaves infected with Phytophthora infestans.” International conference on food and nutritional security (iFANS-2023), NABI Punjab, 6th-9th Jan 2023
- Portia D Singh, Sanjeev Kumar, and Shyam K Masakapalli. “Deciphering the metabolome of potato leaves infected with Phytophthora infestans.” HISTCON 2023, Shoolini University, Solan. 19th-20th May 2023
- Prem Chand and Shyam Kumar Masakapalli. “The effect of oxygen concentration on cellulose production capability of Gluconacetobacter xylinus in Bioreactor”. Bio-X Annual Conference 2022, IIT Mandi, 13th – 14th May 2022
- Prem Chand, Vishali Dhiman, Shagun Shagun, Portia D Singh, Jyotika Thakur, Yogesh Pant and Shyam K Masakapalli. “Science and Technology for Sustainable Agriculture of Himalayan Apples” Anusandhan 1.0 organized by Research Society IIT Mandi, 23rd – 25th June 2023
- Akalya Sendrayakannan, Ashutosh Sahoo, Chandrakant Joshi, and Shyam Kumar Masakapalli. Comparative transcriptome analysis of solute carrier proteins in different cancer cell line. EMBO conference on Tumor metabolism: Current understanding and opportunities for novel drug discovery, 28-31st March 2023
- Ashutosh Sahoo, Amit K. Mohapatra, Dr Anjan Das, Dr Shyam Kumar Masakapalli, Dr Ranjan Kumar Nanda. Comparative genome analysis of Multidrug-resistant clinical strains of Mycobacterium tuberculosis provides novel insights. BioX Annual Conference, School of Biosciences and Bioengineering, IIT Mandi, Mandi, Himachal Pradesh
- Mr. Vivek Sarohi attended and presented a poster in the EUPA 2023, Newcastle, UK. He was also awarded the partial financial support from DST to attend this conference.
- Ms. Sanchari Chakraborty, Mr. Abhi Dutta presented their poster in the ISHR meeting Chandigarh,
- Keshav Bhardwaj, Fabrication of Plasmonic Nanorods based SERS Substrate for Pesticide Sensing, BioX annual conference at IIT Mandi, 2022
- Mr Prajnadipta Panda, Mr. Pritam Mukherjee and Ms. Rushali Kamath presented posters at 3rd Indian C.elegans meeting, Kerala, September 2022.

- Mr. Akash Kumaran, from Dr. Baskar Bakthavachalu's lab presented a poster on "3D cellular models for molecular analysis of novel ALS-associated gene identified through GWAS" in European Molecular Biology Organization's (EMBO's) "Modeling development and disease with human tissue organoids" at The Institute for Stem Cell Science and Regenerative Medicine (DBT-InStem) on 6th Feb-9th Feb 2023
- Mr. Akash Kumaran, from Dr. Baskar Bakthavachalu's lab presented a poster on "molecular analysis of novel ALS-associated gene identified through GWAS" at Genomics India 2023 Conference held on 2nd- 3rd Feb 2023 at NIMHANS, Bengaluru.
- Mr. Akash Kumaran from Dr. Baskar Bakthavachalu's lab presented a poster on "Molecular analysis of novel ALS-associated gene and development of cell-based screening platform" at 1st National Rare Diseases Research Summit (REDRESS – 2022), organized by Tata Institute for Genetics and Society, India (TIGS) and Organization for Rare Diseases, India on 24th and 25th Nov 2022 (Online).

Oral

- Yogesh Pant and Shyam Kumar Masakapalli. Metabolic Insights into lipid metabolism during oilseed germination. 10th European Symposium on Plant Lipids held at Conference center, Hotel Casa, Amsterdam, Netherlands. 9th-12th July 2023
- Jyotika Thakur and Shyam Kumar Masakapalli. Genomic and metabolic insights into *Thermobifida fusca*. 16th International Congress Thermophiles 2023, (29.09.2023-02.09.2023) Bangor University, Bangor, North Wales, UK.

Workshops/conferences attended

- Shagun attended a workshop AYURTECH 2022 held on June 20-25, 2022 at Indian Institute of Technology Madras.
- Prem Chand attended a workshop on "Idea to business plan" on April 23, 2022, IIT Mandi Catalyst.
- Prem Chand attended a workshop titled "Farmers awareness workshop on solar-based automated irrigation system for saving water and energy" on September 23, 2022, IIT Mandi
- Portia D Singh attended a workshop on "Efficient delivery of crop irrigation advisories" on November 9 and 10, 2022
- Ashutosh Sahoo attended a workshop on "Multicolour flow cytometry & single cell sorting with CytoFLEX SRT" held on 25th to 27th July, 2023 at International Centre for Genetic Engineering and Biotechnology (ICGEB), New Delhi
- Yogesh Pandey attended EMSL Summer School: Demystifying Multiomics with Data Science. July 24-28, 2023.
- Yogesh Pandey attended Artificial Intelligence Summer School 2022. August 26th-28th, 2022, IIIT-Delhi.
- Ms. Vanshika Saxena from Dr. Baskar Bakthavachalu's lab participated in the 11th RNA meeting organized by the National Centre of Cell Science on 30th November - 3rd December 2022.

Other Achievements

- Swetha R awarded Khorana fellowship 2023. Carried project in Dr. Srivatsan Raman's Laboratory at University of Wisconsin-Madison, WI, USA on "Bacterial gene complementation in T7 phage genome" June-August 2023
- Naziya Faizy awarded Khorana fellowship 2023.
- Jyotika Thakur received SERB Travel award for attending Thermophiles 2023: International Travel Grant (ITS)-SERB
- Vanshika Saxena Received Prime Minister's Research Fellowship Award
- Akash Kumaran Received Prime Minister's Research Fellowship Award. Also Teaching Bio-informatics and Enzymology at Sardar Patel University, mandi (May-June 2023)
- Suraj Singh Rawat- 3rd Poster award at annual conference of IATP 2021, Tropacon 2021, 1st Poster award at 31st annual conference of ISP (2022)
- Anand Kumar Keshri- Best Poster award at BioX annual conference at IIT Mandi, 2022
- Yogesh Pant received Best Poster award in HistCON 2023 at Shoolini University, Himachal Pradesh

- Mr. Sanchita Sarkhel, PhD scholar, has received Prime Minister's Research Fellowship (PMRF) by lateral entry Cycle 9 (2022)
- Keshav Bhardwaj received Best Poster award at BioX annual conference at IIT Mandi, 2022
- Shounak Roy received Best Oral Presentation award at BioX annual conference at IIT Mandi, 2022
- Rashmi received 2nd Position in Oral Presentation / Bio-X Annual Conference 2022 IIT Mandi, India.
- Rashmi received outstanding presentation in the "International Conference on Recent Advances in Biotechnology and Environmental Science (ICRABES)-2022" Vellore Institute of Technology, Vellore in collaboration with Association of Biotechnology and Pharmacy.
- Snehlata Rao received Gold Medalist for topping MTech. Biotech 2020-2022 IIT Mandi
- Mr Prajnadipta Panda received poster prize in 3rd Indian C.elegans meeting, Kerala, September 2022.

3.9.12 SBB facilities including BioX Centre

SBB-BioX Centre (<https://www.iitmandi.ac.in/research/biox/>)

SBB-BioX Centre provides high end facilities that support research on key focus areas of health, agriculture and the environment. The Centre was established for activities in the life sciences in the broad areas of immediate relevance to the Himalayan region, and health care, particularly for the rural and lower-income strata of society. This serves to meet the immediate needs to extend the benefits of advanced knowledge and technology to traditional farmers, particularly those engaged in the cultivation of fruits, vegetables, saffron, and medicinal plants in this region. Also, with the advancements in technology, better health care regimes need to be evolved. As a part of this initiative the BioX Centre was conceived at IIT Mandi in 2012, driven by the need for affordable health care for India, and advanced technology interventions in agriculture and for the preservation of the environment in the Himalayan Region. The faculties in School of Biosciences and Bioengineering along with the faculties from the other Schools from science and engineering disciplines of IIT Mandi are engaged in highly interdisciplinary research in the focus areas of life sciences, biophysics, nanotechnology, bioinformatics, tissue engineering, plant systems biology, and others. In addition, IIT Mandi also made an initial investment of Rs. 10 crores for purchasing lab equipment related to these areas. A similar amount of funding has also been received by the individual faculties and researchers working in the Centre from different funding agencies including DBT, DST, SERB, MHRD, etc.

The broad vision of the SBB-BioX Centre at IIT Mandi is to perform cutting-edge research in Health care, Agriculture, and Environment. The Centre is envisioning to push the frontiers of technology development and engineering toward advancements in disease prevention and affordable health care, agricultural practices concerning the Himalayan region, and Himalayan Biodiversity exploration for biotechnological applications by bridging the gap between life sciences, physical sciences, and engineering. Some of the important missions of the Centre include:

- To tackle major health-related and agri-based challenges and perform cutting-edge research.
- To encourage multi-institutional and inter-disciplinary collaborations to attract extramural funding.
- To develop industry-academic partnerships.
- To facilitate interaction between engineers, computational scientists, and physical and life science researchers.
- To pursue excellence in research, innovation, and discovery with a focus on life sciences and technology development.

Some pics of research facilities: <https://www.iitmandi.ac.in/research/biox/>



The Small Animal Research Facility (SARF- <https://sbb.iitmandi.ac.in/sarf/>)

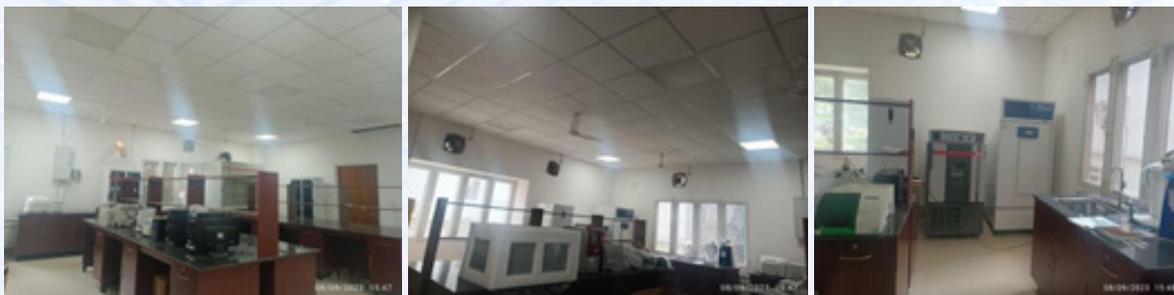
SARF is a state-of-the-art facility developed @IIT-Mandi. The facility is registered with the Committee for Control and Supervision of Experiments on Animals (CPCSEA), Ministry of Fisheries, Department of Animal Husbandry and Dairying, Government of India, with the registration number 2137/GO/ReBi/S/21/CPCSEA. The SARF has permission for conducting small animal research for educational purposes, and breeding for in-house use, after obtaining due approvals from the Institutional Animal Ethics Committee. SARF is equipped with various state-of-the-art facilities for performing experiments and research. Some of the facilities are shown below:



SBB Teaching Lab

There are two teaching labs in School of Bioscience and Bioengineering

1. M.Tech Biotechnology



2. B.Tech Bioengineering Lab:



For more details:

Website: <https://sbb.iitmandi.ac.in/>

Email: sbboffice@iitmandi.ac.in

4. International Relation

International Bachelor’s, Master’s and Ph.D. students can spend up to a year at IIT Mandi under student exchange. Also, international students can pursue graduate degree programs at the Institute. Students coming for student exchange or degree programs can get credit for courses they take at IIT Mandi. International students can work with the Institute’s faculty on collaborative research topics involving institutional, regional, and national interests. IIT Mandi also provides possibilities for faculty members at international universities/institutes to spend time for the purposes of teaching and research. The fields in which IIT Mandi is currently involved at the Bachelor’s, Master’s, and Ph.D. levels include: Computer & Electrical Engineering, Civil & Environmental Engineering, Chemical Sciences, Physical Sciences, Mathematical & Statistical Sciences, Biosciences & Bio Engineering, Mechanical & Materials Engineering, Management and Humanities and Social Sciences. The exchange visits are being performed as per the terms and conditions of the MoU/agreements.

Under an existing MoU with Worcester Polytechnic Institute (WPI), USA, IIT Mandi invites a team of undergraduate students and two faculty mentors from WPI to visit the Institute for two-months between mid-March and early-May, and these students work with similar number of IIT Mandi undergraduate students in solving a number of socioeconomic issues concerning the local communities in Mandi and Kamand.



International Activities of IIT Mandi with Overseas Institutions

International Students at IIT Mandi

15 International students are currently enrolled for Undergraduate, Masters and PhD programs at IIT Mandi. Of these, 04 students are from Bangladesh, 05 students are from Nepal, 03 students are from Ethiopia, 01 student from Pakistan, 01 students from Canada and 01 student is from America.

Mr. Chen Luo, a Ph.D. scholar from Linköping University, Sweden visited IIT Mandi in March 2023.

18 students from Worcester Polytechnic Institute visited IIT Mandi from 14th March to 3rd May 2023 under ISTP Project.

Events with International Participation

There were a number of workshops/Talks conducted online at IIT Mandi involving visitors from universities abroad between April, 2022 and March, 2023. The details of these workshops/talks are given below.

- Dr. Y J Park, Director, Indo-Korean Center for Research and Innovation, New Delhi and Shri Hyo Hee Lee, the science and technology attaché at the embassy of the Republic of Korea, visited the IIT Mandi between 16th to 18th June 2022. IIT Mandi discussed ways in which collaborations with Korean Universities could contribute to the Institute's vision of serving the stakeholders of both communities via technological interventions and research
- The 13th edition of the JTG/IEEE ITSoc summer school was successfully conducted from 20th to 23rd June 2022 at the Indian Institute of Technology Mandi. The summer school attracts world-renowned academics, researchers, and a large number of research students. Prof. David Tse, from Stanford and the Shannon Awardee 2017, delivered a lecture series on the bitcoin protocol for blockchains. Prof Raymond W. Yeung, from CUHK and Shannon Awardee 2022, delivered a lecture series on the foundational concepts of information theory and network coding. Prof. Aylin Yener, from Ohio State and the IEEE/ITSoc Distinguished Lecturer 2019-2021, delivered a lecture series on 6G wireless communications. Research talks were delivered by Prof. Sharayu Moharir, IIT Bombay, Dr. Mayank Bakshi, Arizona State University, Prof. Lakshmi Prasad Natarajan, IIT Hyderabad, Prof. Lalitha Vadlamani, IIIT Hyderabad, and Prof. Rahul Singh, IISc. Industry sessions were from experts from two industries: Qualcomm and Saankhya Labs. More than 280 students and researchers participated in the summer school including participants from sixteen IITs, IISc, TIFR, two IIITs, two NITs, and other eminent universities from India, Australia, China, Hong Kong, Iran, Israel, Netherlands, Singapore, Taiwan, Turkey, and the USA.
- Indian Institute of Technology Mandi celebrated its 10th Convocation, with a graduating class of 462 students (348 male & 114 female) on 5th December 2022. In 2022, the Institute awarded 64 PhDs, which is the highest number of PhDs awarded at IIT Mandi in an academic year till date. Prof. Stuart R. Hameroff, University of Arizona, U.S.A., graced the occasion as the Chief Guest. Dr. Akhilesh Gupta, Secretary, Science and Engineering Research Board (SERB), New Delhi; Dr. Kingshuk Banerjee, Director, Hitachi India Pvt. Ltd., Bengaluru, and Mr. Woonchan Chang, Director, KOICA India, New Delhi, were the Guests of Honor. Prof. Prem Vrat, Chairman, Board of Governors, IIT Mandi, presided over the Convocation event.
- IIT Mandi successfully concluded the 67th Congress of the Indian Society of Theoretical and Applied Mechanics (ISTAM-2022)- an international conference which was held during 14th to 16th December, 2022 at IIT Mandi. The conference was held in offline mode with more than 250 participants and 20 invited speakers from all over the globe. The conference was inaugurated by the Honourable Director of IIT Mandi, Prof. Laxmidhar Behera. In this conference, two lectures were delivered by Prof. Vijay P. Singh (Texas A&M University, USA) and Dr. Makrand Joshi (Scientist, DRDO, Pune) and five Memorial Lectures were delivered in honor of Prof. G.I. Taylor, Prof. B.R. Seth, Prof. P.L. Bhatnagar, Prof. B. Karunesh, and Prof. A.S. Gupta by Prof. J. N. Reddy (Texas A&M University, USA), Prof. D. Pham Van Bang (University of Québec, Canada), Prof. C. Kong (Chosun University, South Korea), Prof. Sarit K. Das (IIT Madras, India), and Prof. Sanjay Mittal (IIT Kanpur), respectively. Numerous invited lectures were also organized to discuss the recent trends in Mechanics by Dr. Debanik Roy (Scientist, BRNS, BARC, India), Prof. Premanand Bera (IIT Roorkee, India), Prof. Khoo Boo Cheong (National University of Singapore, Singapore), Prof. Arun Srinivasa (Texas A&M University, USA), Prof. Jiten C. Kalita (IIT Guwahati, India), Prof. Trilochan Sahoo (IIT Kharagpur, India), Prof. Adrian Muntean (Karlstad University, Karlstad, Sweden), Prof. Prabal Talukdar (IIT Delhi, India), Prof. Manoranjan Mishra (IIT Ropar, India), Prof. Chia-Cheng Tsai (National Taiwan Ocean University, Keelung, Taiwan), Prof. Abhijit Mukherjee (Curtin University, Australia), and Dr. Miguel Zapata (University of Québec, Canada).
- Darshil Shah, a Master's student from Freie Universität, Berlin, who did his Master's thesis under Dr. Varun Dutt's guidance at ACS Lab, IIT Mandi on the effects of tDCS and repeated experience in N - back and Sternberg working memory tasks, has got the best grade (1.0) in his thesis exam.

IIT Mandi students visiting Institutions abroad

A number of IIT Mandi graduate and undergraduate students visited several EU institutions under academic exchange in the year 2022. The undergraduate visits included: 06-students to RWTH Aachen, 04-students to Technical University of Munich, 03 students to Technical University of Darmstadt, 06 students to Technical University of Dresden. 02 students to Technical University of Braunschweig, 02 students to Norwegian University of Science and Technology, Norway and 02-students of M. Tech. to Germany under DAAD (KOSPIE) program.

IIT Mandi faculty visiting Institutions abroad

- Prof. Laxmidhar Behera (Director, IIT Mandi) and Dr. Tushar Jain (Assoc. Professor) visited United States of America in August in various organizations to pursue collaborations with international universities to establish and strengthen the academic bonds to benefit the Student and Faculty communities of both sides: 1. Intel Foundry Services, San Francisco 2. Mehta Family Foundation, San Francisco 3. University of California, Berkeley 4. Doshi Foundation, Los Angeles 5. California Institute of Technology, Caltech, California 6. California Institute of Technology, Caltech, California 7. Resnick Sustainability group, Caltech, California 8. Cahill Center for Astronomy and Astrophysics, Caltech, California, 9. Graduate Studies Office, Caltech, California, 10. Center for Autonomous Systems and Technologies, Caltech, California, 11. Alumni Meet, Seattle, USA 12. The University of Texas at San Antonio 13. Texas A & M University, College Station 14. Sharman Foundation, Dallas 15. Waves World Association for Vedic Studies, Dallas 16. Missouri S & T, Rolla Missouri 17. PanIIT USA 18. University of Maryland, Baltimore (UMBC).
- Several IIT Mandi faculty members visited institutions in Singapore, Sweden, France, Germany, UK, Italy, Japan, USA, Switzerland, Greece, Belgium, Netherlands, Thailand, Israel, Norway, Austria, Bilbao, Czech Republic, New Zealand, Malta, Bangladesh, Srilanka, Maldives and Saudi Arabia in 2022-23 for participating in conferences and furthering industry and academic collaborations. The visits included four faculty members from the School of Humanities and Social Sciences; twelve faculty members from the School of Computing and Electrical Engineering; one faculty member from the School of Chemical Sciences; three faculty members from the School of Physical Sciences; three faculty members from the School of Mathematical & Statistical Sciences; nine faculty members from the School of Civil & Environmental Engineering; two faculty members from Biosciences & Bio Engineering; Seven faculty members from the School of Mechanical & Materials Engineering.

International Visitors at IIT Mandi

- Dr. Alan Mickelson Associate Professor, a Fulbright Specialist, University of Colorado at Boulder, USA, visited IIT Mandi in May 2022.
- Prof. Chin Tsan Wang, director of S&T division, (TECC Director of Taiwan MOST in India), TECC and Ms. Yi Ting Chiang (Ellie), assistant director of S&T division, TECC visited IIT Mandi in June 2022.
- Prof. Sajal K Das from Missouri University of Science and Technology, USA visited IIT Mandi in September 2022 in order to strengthen the collaborative ties of IIT Mandi and Missouri S&T.
- Ambassadors Mrs. Deepa Gopalan Wadhwa and Ambassador Mr. Anil Wadhwa visited IIT Mandi in September 2022 for the Distinguished Lecture.
- Mr. Woochan Chang, Director KOICA India, visited IIT Mandi in November and December 2022 along with his team (7 members)
- Mr. Woochan Chang, Director KOICA India
- Dr. Jin suk Lee, Professor, Department of Biomedical Engineering, Principal Researcher, Korea Institute of Energy Research.
- Dr. Seongki Lee, KOICA expert team
- Dr. Jongwon Choi, Academic advisor for a student researcher, Energy Management System Laboratory, KIER School, Korea Institute of Energy Research.
- Mr. Daeyong Choi, KOICA expert team
- Ms. Sinae Won, KOICA team
- Dr. Jinho-Lim, KOICA expert team
- Dr. Kasthuri Venkateswaran, Senior Research Scientist at NASA – Jet Propulsion Laboratory and supports Biotechnology and Planetary Protection Group at Caltech, USA visited IIT Mandi in November 2022

- Mr. Keskinen Pietari, post-doc scholar, IT University, Denmark, under Indo-Danish project visited IIT Mandi in November 2022.
- Prof. Yvonne Dittrich from IT University, Denmark visited IIT Mandi as part of a project in November 2022.
- Prof. Stuart Roy Hameroff, Professor at the University of Arizona, Tucson, USA visited IIT Mandi in December 2022.
- Mr. Michael Oppenheimer, International Relationship and Student Recruitment Manager from Dalarna University, Sweden visited IIT Mandi in December 2022.
- Dr. Ingrid Shockey and Dr. Uma T Kumar, from Worcester Polytechnic Institute visited IIT Mandi in March to May 2023 under Interactive Socio-Technical Practicum (ISTP) project.

MOUs

- The Curators of the University of Missouri on behalf of Missouri University of S&T, USA in August 2022.
- Indian Network of Indian Institute of Technology and French Network of Engineering Schools in June 2022.
- Shraman Foundation, USA in June 2022.
- Cincinnati Children's Hospital Medical Center, USA in October 2022.
- Dalarna University, Sweden in November 2022.
- Study in India, EdCIL India Limited in November 2022. (renewed)

Signing of MoU between Missouri University of S&T, USA and Indian Institute of Technology Mandi. Dr. Y J Park, Director, Indo-Korean Center for Research and Innovation, New Delhi and Shri Hyo Hee Lee, the science and technology attaché at the embassy of the Republic of Korea, visited the IIT Mandi between 16th to 18th June 2022.

IIT Mandi successfully concluded the 67th Congress of the Indian Society of Theoretical and Applied Mechanics (ISTAM-2022) - an international conference which was held during 14th to 16th December, 2022 at IIT Mandi.

The 13th edition of the JTG/IEEE ITSoc summer school was successfully conducted from 20th to 23rd June 2022 at the Indian Institute of Technology Mandi.

5. Thrust Area Research Centres

5.1 Advanced Material Research Centre (AMRC)



The Advanced Material Research Centre's (AMRC) Annual report April 2022 –March 2023 provides an intricate map of the services, research, activities, and users detail for the centre. In the year 2022-23 research output of IIT Mandi paced a new height with a good number of qualitative research paper publications which open the window of opportunities to achieve PhD and Post-doctoral positions and Job in the renowned universities and companies around the globe. Like every year, we also rendered our services at the door steps of the external academic institutes and research laboratories throughout India to promote their research excellency. We have procured a few new instruments and equipment like Ultra Microtome, Table Top X-Ray Diffractometer, Fourier Transformed Infra-Red Spectroscopy and Fluorescence Spectrophotometer, Vacuum Oven, Turbo Molecular Pump, Clinical Microscope, and Analytical Balance in this year. We have arranged internship on several instruments for few students of Sri Sai University of Himachal Pradesh. Training sessions for several sophisticated instruments, where 68 research scholars including few staffs of AMRC got trained in sophisticated instruments like HRTEM, XPS, Ultra microtome and few other basic instruments. AMRC also continued to expand its services for internal researcher, support for faculty across the disciplines, and outreach to all external academic institutes, research labs and industries.



AMRC Team:

Coordinator: Dr.C.S.Yadav
Co-Coordinator: Dr. Aditi Halder
Project Scientist: Ms. Isita Mahanty Nandi
Project Engineer: Mr. Sunil Kumar
Project Engineer: Mr. Puneet Sood
Project Engineer: Mr. Navin Kumar
Office Assistance: Mr. Dushyant Gumra
Lab Attendant: Mr. Karm Singh
Contact: Email: amrcoffice@iitmandi.ac.in
Web page: www.iitmandi.ac.in/research/amrc/index.php
Phone: 01905-267027

Research facility

AMRC has a state of art centralised instrumental facility. The objective of this centralised facility is to

bring the diverse filed of instruments under one umbrella. The instruments are classified in (i) Microscopy (ii) Advance Spectroscopy (iii) Electronic Transport & Magnetism (iv) General Characterization facility. The main equipment under these facilities mentioned below:

Instrument facility at AMRC

Microscopic Instrument

- Electron microscopy: High Resolution Transmission Electron Microscopy & Field Emission Scanning Electron Microscopy
- Optical microscopy: Confocal Microscopy and Optical Cum Polarisingf Microscopy

Spectroscopic Instruments

- Optical Spectroscopy: Raman Spectrometer, Pump Probe Laser System, Nuclear Magnetic Resonance Spectrometer,
- Mass Spectrometer: High Resolution Mass Spectrometer, Inductive Coupled Mass Spectrometer

Physical measurement instrument

- X-ray Diffractometer: Single Crystal X-ray Diffractometer & Powder X-Ray Diffractometer
- Electronic Transport & Magnetism:Physical Property Measurement System, Magnetic Property Measurement System, BET, Chem BET, Rheometer, Thermo Gravimetric Analysis, Differential Scanning Chalorimetry.

Chromato Graphy instrument

- High Performance Liquid Chromatography, Gel Permeation Chromatography, Nano Liquid Chromato Graphy, Gas Chromatography

Other Characterisation instruments

- UV-Vis Spectroscopy, Fluorescence Spectrophotometer, Circular Dichroism, Dynamic Light Scattering, Fhourier Transformed Infra Red Spectrometer

Newly Procured Instruments

In the financial year 2022-23 AMRC has procured following new equipment and instruments like,

1. UltraMicrotome
2. Tabletop X-Ray Diffractometer.
3. Fluorescence Spectrophotometer
4. Fourier Transformed Infra-Red Spectrometer
5. Vacuum Oven
6. Clinical Microscope
7. Analytical Weighing Balance
8. Turbo Molecular Pump.



Ultra Microtome



Turbo Molecular Pump



Fluorescence Spectrophotometer



Vacuum Oven with Pump



FTIR Spectrum Two



Microscope



Analytical balance



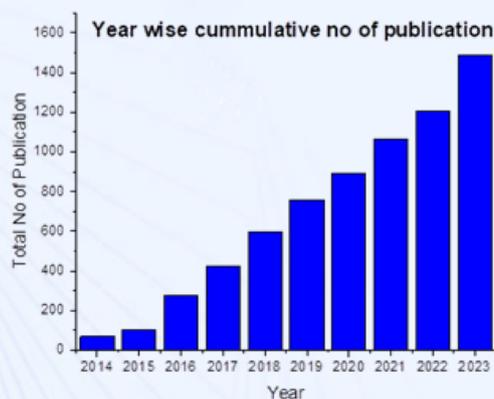
Installation & training of new equipment

Research Quality and Output

The internal students, who are the key users of the AMRC facility, have published more than 285 research articles in the high-quality international journals this year. The number of research publications from the users has shown the consistent growth, with the cumulative number reaching to more than 1500 in the short span of 10 years.

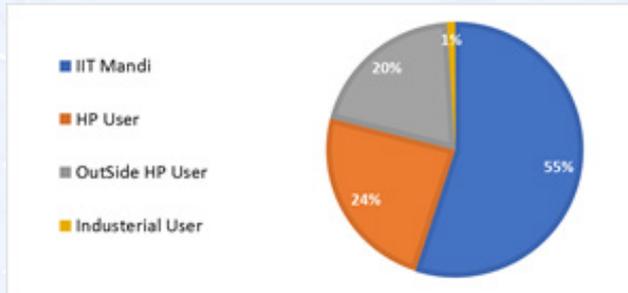


Some reputed journal where AMRC scholars' have published their work



External User Statistics

A total no of 300 students of IIT Mandi, students of 22 academic institutes of Himachal Pradesh and students of 50 external academic institute (other than Himachal Pradesh) also using the AMRC facilities on regular basis. Beside these few industries are using the AMRC facilities.



Facility used by internal & externals.

List of some External Users is as follows

- Name of the Institutes in Himachal Pradesh
 1. NIT Hamirpur.
 2. CSIR-IHBT Palampur.
 3. HPU Shimla, HP
 4. Shoolini university.
 5. Sri Sai University, Palampur.
 6. Jaypee University.
 7. Carrier Point University.
 8. Arni University.Kangra.
 9. Maharaja Agrasen University.
 10. Laureate Institute of Pharmacy.
 11. M Pharmacy Institute.
 12. Indus InternationalUniversity.
 13. A.P.Goyal Shimla University.
 14. Baddi University, Baddi.
 15. Eternal University, Baru Sahi.,
 16. School of Pharmacy& immerging Science.
 17. YS Parmar University, Solan
 18. Central University of Himachal.
 19. JNG Engineering college.Sundar Nagar.
 20. Govt College Bilaspur.
 21. Sardar Patel University.Mandi.
 22. IEC Baddi.
- Name of the institutes other than Himachal Pradesh
 1. NIT Manipur
 2. NIT Delhi, NewDelhi.
 3. NIT Durgapur, W. B.
 4. NIT Karnataka.
 5. NIT Trichy, Tamil Nadu
 6. IITGandhinagar

7. IIT Guwahati,Assam
8. IIT Patna, Bihar.
9. IIT Ropar, Punjab.
10. IIT Madras. Tamil Nadu
11. Punjab University, Patiala
12. Manipur University.
13. Shiv Nadar University, New Delhi
14. HNBBG University, Uttarakhand
15. CSIR-IMMT, Bhubaneswar
16. IIT Kharagpur.
17. IIT Delhi.
18. JNU New Delhi
19. CSIR NPL New Delhi
20. IISC Bangalore.Karnataka.
21. INST Mohali. Chandigarh.
22. Jamia Millia Islamia University, New Delhi.
23. Doon University, Uttarakhand.
24. Kuruhshetra University.
25. Agra University, Agra.
26. Indian Institute of Petroleum. Dehradun
27. Jamia Millia Islamia University, New Delhi
28. Central Univerity Bhatinda.
29. Punjab University
30. Matat vaishadevi University.Jammu
31. NIT Srinagar.
32. Jammu University
33. Kashmir University.
34. BSBA University. Lukhnow.
35. IIT ISM Dhanbad.
36. Amity University.
37. IISER Berhampur Odisha.
38. NIT Rourkella.
39. SOA University. Bhubaneswar.
40. University BBSR Odisha.
41. IISER Mohali. Chandigarh.
42. Gurucharan College Silchar. Assam.
43. Visva Bharati University. W.B.
44. UPUS dehradoun University. U.K.
45. IIT Indore.
46. ISR Pune.
47. VIT Vellor. Tamil Nadu
48. SRM institute .Tamil Nadu
49. Pondicherry University.
50. Guru Jamdeswar University of Science & Technology.

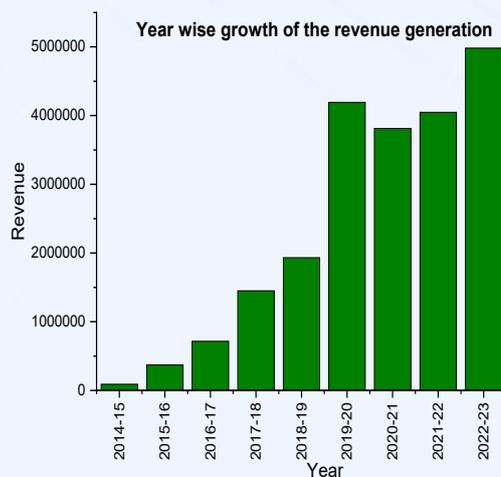
Name of the Industries:

1. Crystal Morfix Technology
2. Chemtel Co. New Delhi
3. Hindustan Organic Chemical Ltd. Kerala

Revenue Details

The total expenditure for the financial year 2022-23 was Rs.2,35,22,610/-. Which includes purchasing of new instruments and equipments along with repair and service of several instruments of the centers. As the centre was established in 2013 few instruments become 10-11 years old and used daily basis by a good no of students of internal as well as external institutes. Hence additional instruments were required. Such as Tabletop X-Ray Diffractometer(Rs. 58,00,000.00), Fourier Transformed, Infra-Red Spectroscopy (Rs.22,42,000.00) and Fluorescence Spectrophotometer(Rs.17,99,150.00), Vacuum Oven Rs.489700.00. Turbo Molecular Pump (Rs.1321916.24), Clinical Microscope 122,760.00, and Analytical Balance (Rs. 124,950). As we didn't have Ultramicrotome which is required to prepare the biological and polymer sample for TEM characterization. Hence, we have procured one Ultramicrotome (Rs.1,39,50,000.00) this year.

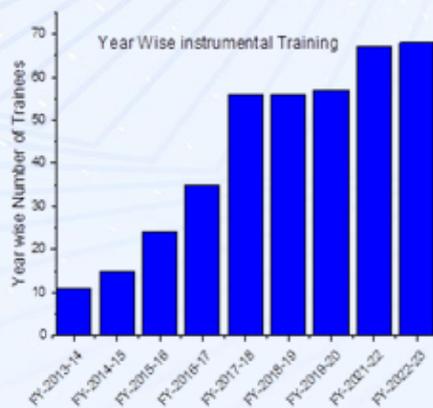
It is worth mentioning that we have generated a sum of Rs.4981474/- in the financial year 2021-22 by providing instrumental facility to both internal as well as external students.



Outreach activity and Training

AMRC encourage students for technical and research oriented studies for the development of the country. Therefore we arrange instrumental facility tour and internship on the several instruments to the school students, graduate students and post graduate students of Himachal Pradesh and nearby states. This year we have arranged internship programme & tour for the below mentioned school students.





AMRC Visit by Himachal Pradesh School Student



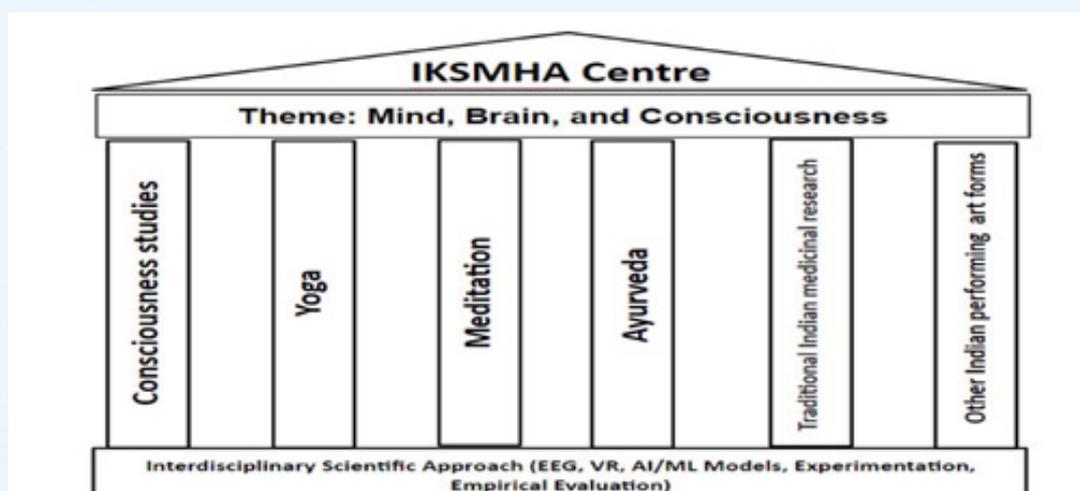
Future plan:

1. Colaboration with industries
2. Certifying the nalyased data.
3. Organising seminar for internal Scholars.
4. Organise the instrumental workshop for external students.
5. Extend the AMRC facilities.
- 6.. Initiation for exchange programme.

5.2 Indian Knowledge System and Mental Health Applications (IKSMHA)

According to a study by Charlson et al. (2016), it is estimated in 2025, 38.1 million years of healthy life will be lost to mental illness in India. This statistic is a 23% increase. Also, the same study estimated that the mental ill-health burden would become even heavier in India, projected to increase by 25% by 2025. To address the sharp increase in mental health problems, the Indian Institute of Technology Mandi (IIT Mandi) conducted a Workshop on the Indian Knowledge System and Mental Health (IKSMH) between 25th and 27th March 2022. The workshop was widely attended by renowned researchers in the Indian Knowledge System (IKS) and Mental Health (MH) from India and abroad. Also, 20+ faculty and staff from IIT Mandi participated in this Workshop. As a part of the deliberations that took place in the Workshop, the following IKS topics emerged: Mind, brain, and consciousness with applications from consciousness studies, yoga, meditation, Ayurveda, traditional Indian medicine research, and other Indian performing arts (like dance, music, and Indian languages, etc.).

Consequently, as per the deliberations of the workshop, the Indian Knowledge System and Mental Health Applications (IKSMHA) Centre was set up on 6th July, 2022 at IIT Mandi after approval from the Board of Governors of IIT Mandi. The IKSMHA Centre focuses on research concerning IKS, which has several benefits for the human body, mental health, and well-being. In fact, IKS has deep roots grounded in Indian history, philosophy, society, arts, languages, science and technology, and life sciences. Thus, the IKSMHA Centre is incorporating the study of mind, brain, and consciousness and includes applications from several areas like consciousness studies, yoga, meditation, Ayurveda, traditional Indian medicine research, and other Indian performing arts.



Vision and Uniqueness

The conceptualization of the IKSMHA Centre is grounded in mind, brain, and consciousness via applications from consciousness studies, yoga, meditation, Ayurveda, traditional Indian medicinal research, and Indian performing arts (music, dance, traditional Indian languages, etc.).

The Vision Behind IKSMHA Centre:

To be a world leader and serve India via research, skill development, translation, and collaborative activities in areas concerning the Indian knowledge system and mental health.

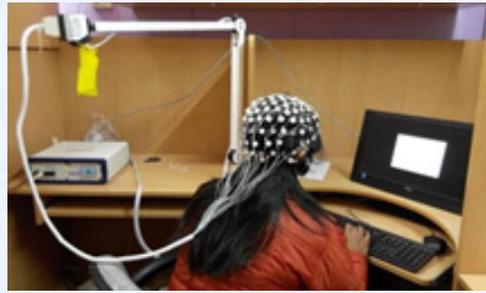
Uniqueness:

- First of its kind in India to integrate IKS and mental health
- A socio-technical wellness facility for outreach
- Truly interdisciplinary research and collaboration

Instrumental facilities at IKSMHA Centre



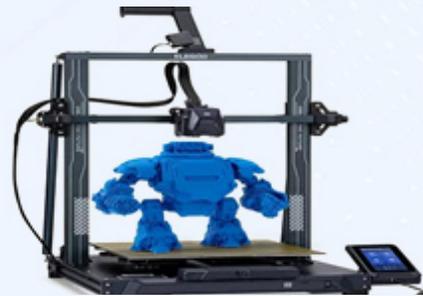
Oculus Rift S VR Headset



EmotivPRO 32-channel saline EEG headset



TobiiEyeX Eye tracker



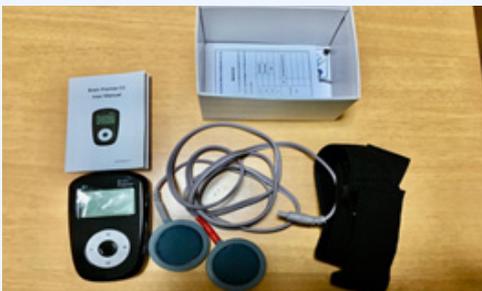
3-D Printer



Meta Quest 2 VR Headset



HTC Vive Pro VR Headset



CaputrontDCS administering device



BHaptics Haptic Vest



OpenBCI 16-channel gel-based EEG headset



Muse S 4-channel EEG Device



Thrustmaster T1600M/Logitech 3D Joystick



Shimmer-Consensys ECG Sensors



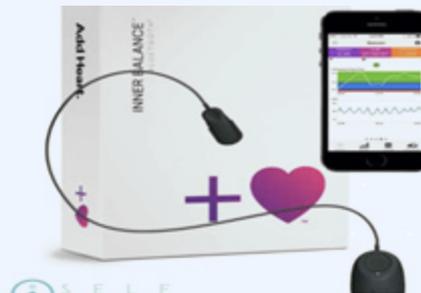
G29 Driving Simulator (Wheels, pedals, and gear shifter)



Polar band HRV Device



Samsung Gear VR MobilVRHeadsets



emWave Pro HRV device



Insta360 X3 camera/360 video recording device

Current Research at IKSMHA Centre

Some of the existing research themes at IKSMHA Centre include:

- Impact of Indian classical raga on human cognitive function: A neuropsychological study using EEG
- Biomarkers of Prana and its application for Overall Wellbeing.
- Studying efficacy of longitudinal Maha-mantra chanting-based intervention on brain networks
- NadiPariksha based on heart rate variability from ECG
- Prakriti assessment via machine learning
- Semantic Space and Samkhya-inspired Mind-Body Simulation
- Development of a multisensor low-cost digital nose to detect abnormally high BGLs and heart disease

- Understanding the different levels of consciousness in plants.



VR Raga intervention



Odissi Dance intervention



Studying the different levels of consciousness in plants



Digital nose for healthcare

Teaching at IKSMHA Centre (2022-23)

The course teaching at IKSMHA Centre includes courses at undergraduate and graduate levels. The following courses are offered at the IKSMHA Centre for students:

| S.No. | Course Code: Course Title | Credits |
|-------|--|---------|
| 1. | IK 593_1: Selected topics in Indian Astronomy and Mathematics | 3-0-0-3 |
| 2. | IK 593_2: Selected topics in Odissi dance | 3-0-0-3 |
| 3. | IK 591_3: Selected topics in Odissi dance | 1-0-0-1 |
| 4. | IK 591_4: Selected topics on Vedic Thoughts and Cultural Behaviour | 1-0-0-1 |
| 5. | IK 592_5: Selected topics in Music and Musopathy | 2-0-0-2 |
| 6. | IK 592_6: Selected topics in Indian Knowledge System and Consciousness Studies | 2-0-0-2 |
| 7. | IK 593_7: Contemplative Psychology/Contemplative Studies | 2-0-0-2 |
| 8. | IK 501: Yogasutra | 2-0-2-3 |
| 9. | IK 502: Biosignals | 3-0-0-3 |
| 10. | IK 503: Cognitive Psychology and the Indian Thought System | 3-0-0-3 |
| 11. | IK 504: Bhagavad Gita Comprehensive | 3-0-0-3 |
| 12. | IC 181: Introduction to Consciousness and Wellbeing | 2-0-2-3 |



Cognitive psychology and Indian thought system (42 hours)



Bhagavad Gita - Comprehensive (42 hours)



Introduction to Yogasutra (42 hours)



Introduction to biosignals and cognitive biomarkers (42 hours)



Spoken Sanskritam Immersion (14 hours)

Students/Scholars Admitted to the Centre during the Year 2022-23

Post-Doctoral Fellows: 2

Total No. of Students: 18 Ph.D., 5 M.Tech. (R), 2 M.Tech(R) + Ph.D.(Dual degree)

Outdoor Activities and Training

Some of the outdoor and training activities organized by the IKSMHA Centre are given below in Table 3:

Table 3: Some of the outdoor and training activities organized by the IKSMHA Centre**Yoga and Meditation Lab Environments****Hiking and Practice of Yoga in Nature****Ayurvedic Cooking Sessions****Mantra Meditation****North Region Seminar on ONOHS****Workshop on IKSMHA Centre**

Publications

1. Katakwar, H., Aggarwal, P., & Dutt, V. Understanding adversarial decisions for different probing-action costs in a deception game via cognitive modeling.
2. Sharma, M., Kumar, M., Gonzalez, C., & Dutt, V. (2022, November). How the Presence of Cognitive Biases in Phishing Emails Affects Human Decision-Making?. In International Conference on Neural Information Processing (pp. 550-560). Singapore: Springer Nature Singapore.
3. Gupta, A., Uttrani, S., Paul, G., Kanekar, B., & Dutt, V. (2022, November). Multi-human Intelligence in Instance-Based Learning. In International Conference on Neural Information Processing (pp. 540-549). Singapore: Springer Nature Singapore.
4. Katakwar, H., Uttrani, S., Aggarwal, P., & Dutt, V. (2022, September). Influence of different honeypot proportions on adversarial decisions in a deception game. In Proceedings of the Human Factors and Ergonomics Society Annual Meeting (Vol. 66, No. 1, pp. 120-124). Sage CA: Los Angeles, CA: SAGE Publications.
5. Rao, A. K., Chandra, S., & Dutt, V. (2022). Learning from feedback: Evaluation of dynamic decision-making in virtual reality under various repetitive training frameworks. *Frontiers in Psychology*,

- 13, 872061.
6. Semwal, T., Priyanka, P., Kumar, P., Dutt, V., & Uday, K. V. (2022, September). Predictions of Root Tensile Strength for Different Vegetation Species Using Individual and Ensemble Machine Learning Models. In *International Conference on Trends on Construction in the Post-Digital Era* (pp. 87-100). Cham: Springer International Publishing.
 7. Bhargav, S., Kaushik, S., & Dutt, V. (2022). Development of Ensemble Tree Models for Generalized Blood Glucose Level Prediction. *Annals of Computer Science and Information Systems*, 33, 55-61.
 8. Kumar, P., Priyanka, Uday, K. V., & Dutt, V. (2022, December). DR-A-LSTM: A Recurrent Neural Network with a Dimension Reduction Autoencoder a Deep Learning Approach for Landslide Movements Prediction. In *International Advanced Computing Conference* (pp. 35-49). Cham: Springer Nature Switzerland.
 9. Priyanka, Kumar, P., Chaturvedi, P., Uday, K. V., & Dutt, V. (2022, December). Data-Driven Approach for Predicting Surface Subsidence Velocity from Geotechnical Parameters. In *International Advanced Computing Conference* (pp. 64-81). Cham: Springer Nature Switzerland.
 10. Priyanka, Kumar, P., Devi, A., Akshay, K., Gaurav, G., Uday, K. V., & Dutt, V. (2022, December). Univariate, Multivariate, and Ensemble of Multilayer Perceptron Models for Landslide Movement Prediction: A Case Study of Mandi. In *International Advanced Computing Conference* (pp. 106-118). Cham: Springer Nature Switzerland.
 11. Uttrani, S., Sharma, S., Dabas, M., Kanekar, B., & Dutt, V. (2022, December). Modeling Human Performance in Complex Search and Retrieve Environment Using Supervised and Unsupervised Machine Learning Techniques. In *International Advanced Computing Conference* (pp. 319-327). Cham: Springer Nature Switzerland.
 12. Gupta, A., AC, I., Dabas, M., Uttrani, C. S., & Dutt, C. V. Learning from Single and Multi-human intelligence via Cognitive and Reinforcement Learning.
 13. Gupta, A., Dabas, M., Uttrani, S., Sharma, S., & Dutt, V. (2023, September). Modeling Human Actions in the Cart-Pole Game Using Cognitive and Deep Reinforcement Learning Approach. In *International Conference on Social Computing, Behavioral-Cultural Modeling and Prediction and Behavior Representation in Modeling and Simulation* (pp. 189-198). Cham: Springer Nature Switzerland.
 14. Katakwar, H., Aggarwal, P., & Dutt, V. (2023). Modeling the effects of different honeypot proportions in a deception-based security game. *Human Factors in Cybersecurity*, 91(91).
 15. Choudhary, G., Rao, A. K., & Dutt, V. (2023). Does correlation heuristic dependence reduce due to classroom teaching? A case study from India. *Frontiers in Psychology*, 14, 1040538.
 16. Dutt, V., & Chandra, S. (2023). Human decision-making in combat situations involving traditional and immersive visual technologies. *Frontiers in Psychology*, 14, 1166115.
 17. Gupta, A., Uttrani, S., Paul, G., Kanekar, B., & Dutt, V. (2022, November). Multi-human Intelligence in Instance-Based Learning. In *International Conference on Neural Information Processing* (pp. 540-549). Singapore: Springer Nature Singapore.
 18. Sharma, M., Kumar, M., Gonzalez, C., & Dutt, V. (2022, November). How the Presence of Cognitive Biases in Phishing Emails Affects Human Decision-Making?. In *International Conference on Neural Information Processing* (pp. 550-560). Singapore: Springer Nature Singapore.
 19. Mukherjee, Sumitava & Dutt, Varun & Srinivasan, Narayanan. (2023). *Applied Cognitive Science and Technology: Implications of interaction between human cognition and technology*.
 20. Rajasekar, S. J. S., Jaswal, G., Perumal, V., Ravi, S., & Dutt, V. (2023, May). Parasite. ai—An Automated Parasitic Egg Detection Model from Microscopic Images of Fecal Smears using Deep Learning Techniques. In *2023 International Conference on Advances in Computing, Communication and Applied Informatics (ACCAI)* (pp. 1-9). IEEE.
 21. Uttrani, S., Aggarwal, P., & Dutt, V. (2023). Does subnetting and port hardening influence human adversarial decisions? An investigation via a HackIT tool. *Frontiers in Big Data*, 6, 988007.
 22. Garg, A., Tripathi, K., Goyal, S., Behera, L., & Dutt, V. (2023, July). The impact of Odissi dance on stress, anxiety, and depression levels among young adults. In *Proceedings of the 16th International Conference on Pervasive Technologies Related to Assistive Environments* (pp. 754-759).
 23. Shah, D., K Rao, A., Bhavsar, A., Roy Chowdhury, S., Chandra, S., & Dutt, V. (2023, July). Does longitudinal, anodal tDCS improve working memory? A behavioral investigation: tDCS and Working Memory. In *Proceedings of the 16th International Conference on Pervasive Technologies Related to Assistive Environments* (pp. 780-786).

24. Chandra, S., Chand, K., & Dutt, V. (2023). Impact of Indian Classical Raga in Immersive Environments on Human Psycho-physiological Parameters. In Proceedings of the 16th International Conference on Pervasive Technologies Related to Assistive Environments.
25. Kumar, P., Priyanka, P., Dhanya, J., Uday, K. V., & Dutt, V. (2023). Analyzing the Performance of Univariate and Multivariate Machine Learning Models in Soil Movement Prediction: A Comparative Study. IEEE Access.
26. Nandanwar, A., & Dutt, V. (2023, July). Assessing stress, anxiety, and depression with social robots via conversational AI. In Proceedings of the 16th International Conference on Pervasive Technologies Related to Assistive Environments (pp. 732-738).
27. Jaswal, G., Sharma, G., Dutt, V., & Bhavsar, A. (2023, July). Learning channel attention for decoding of visual imagined text from multi-band EEG using metric learning. In Proceedings of the 16th International Conference on Pervasive Technologies Related to Assistive Environments (pp. 720-727).
28. Choudhary, G., Tadia, K., & Dutt, V. (2023). Effects of Simulation Tools and Videos on People's Cognizance of Climate Change. In Proceedings of the 16th International Conference on Pervasive Technologies Related to Assistive Environments.
29. K Rao, A., Y Trivedi, G., Bajpai, A., Singh Chouhan, G., G Trivedi, R., Kumar, A., ... & Ramani, H. (2023, July). Predicting Adverse Childhood Experiences via Machine Learning Ensembles. In Proceedings of the 16th International Conference on Pervasive Technologies Related to Assistive Environments (pp. 773-779).
30. K Rao, A., Fatma, Z., K Menon, V., Bhavsar, A., Roy Chowdhury, S., Chandra, S., ... & Chand, K. (2023, July). Prediction of decision-making performance post-longitudinal tDCS administration via EEG features and machine learning. In Proceedings of the 16th International Conference on Pervasive Technologies Related to Assistive Environments (pp. 760-765).
31. Ameta, D., Garg, A., Kumar, P., Behera, L., & Dutt, V. (2023, July). Evaluating the Effectiveness of Mantra Meditation in a 360 Virtual Reality Environment. In Proceedings of the 16th International Conference on Pervasive Technologies Related to Assistive Environments (pp. 766-772).
32. Sharma, M., Singh, K., Aggarwal, P., & Dutt, V. (2023, July). How well does GPT phish people? An investigation involving cognitive biases and feedback. In 2023 IEEE European Symposium on Security and Privacy Workshops (EuroS&PW) (pp. 451-457). IEEE.
33. Uttrani, S., Sharma, S., Dabas, M., Kanekar, B., & Dutt, V. (2022, December). Modeling Human Performance in Complex Search and Retrieve Environment Using Supervised and Unsupervised Machine Learning Techniques. In International Advanced Computing Conference (pp. 319-327). Cham: Springer Nature Switzerland.
34. Kumar, P., Priyanka, P., Uday, K. V., & Dutt, V. (2023). Addressing Class Imbalance in Soil Movement Predictions. EGU sphere, 2023, 1-16.
35. Uttrani, S., Rao, A. K., Kanekar, B., Vohra, I., & Dutt, V. (2023). Assessment of Various Deep Reinforcement Learning Techniques in Complex Virtual Search-and-Retrieve Environments Compared to Human Performance. In Applied Cognitive Science and Technology: Implications of Interactions Between Human Cognition and Technology (pp. 139-155). Singapore: Springer Nature Singapore.
36. Maqbool, Z., Pammi, V. C., & Dutt, V. (2023). Behavioral Game Theory in Cyber Security: The Influence of Interdependent Information's Availability on Cyber-Strike and Patching Processes. In Applied Cognitive Science and Technology: Implications of Interactions Between Human Cognition and Technology (pp. 91-107). Singapore: Springer Nature Singapore.
37. Chowdhury, S. R., & Dutt, V. Prediction of multitasking performance post-longitudinal tDCS via EEG-based functional connectivity and machine learning methods.

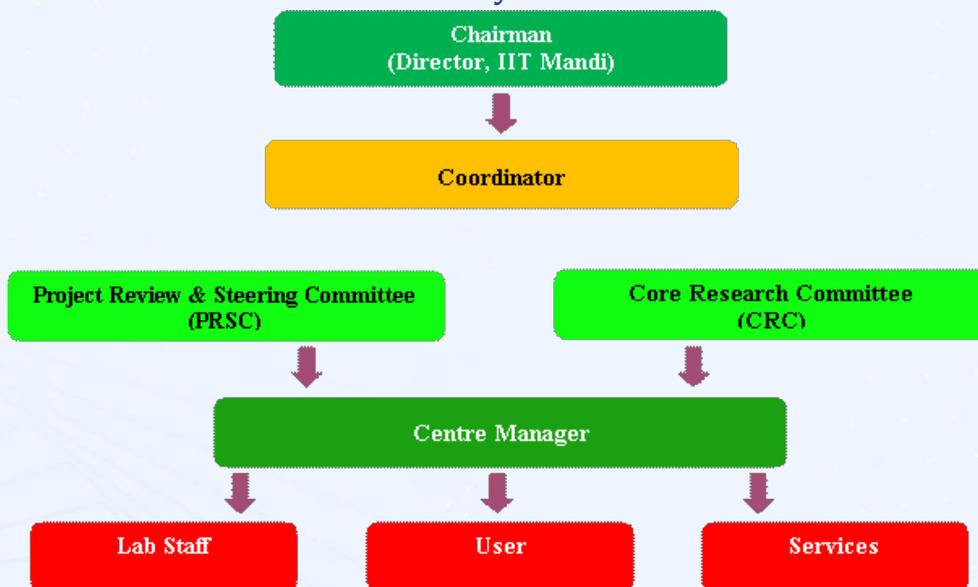
5.3 Centre for Design & Fabrication of Electronic Devices, (C4DFED)

@ Indian Institute of Technology (IIT)-Mandi, (Himachal Pradesh), India



Co-ordinator: Prof. Satinder Kumar Sharma
<https://c4dfed.iitmandi.ac.in>

Organizational Structure C4DFED Facility



C4DFED facility at IIT Mandi is a unique facility for multidisciplinary research on device design and fabrication at IIT Mandi where many state of the art facilities and utilities are housed inside class 100, class 1000 and class 10000 clean laboratories. This high end state of the art facility was inaugurated by Shri R. Subrahmanyam, Secretary (HE), Ministry of Human Resource Development (MHRD), and Government of India on 31st October, 2018.

The ultimate goal of this Centre is to cater the different need of IIT Mandi research and scientific community for various ongoing projects and futuristic and also train the students to provide skilled professionals and researchers to serve India and semiconductor industries/society in the long run. The

C4DFED facility at IIT Mandi is fully operational from last two years and is now capable of handling research projects like Development and Application of Nanoelectronics, Development of Extreme Ultraviolet Lithography (EUL) resists materials for the next generation technology node, IC design and fabrication and Nano-Micro (NEMS & MEMS) systems and designs etc. A good number of researchers, students from the institute and neighboring institutes are benefited from this infrastructure available at IIT Mandi and this is also a source of revenue generation for the self-sustainability of facility. The user charges collected in two past quarter are around 4 Lakhs. Along with that, many government institute like ISRO, DRDO, DST etc. or industrial funded projects have been successfully completed or still going on. In the present projects, center manager, two project staff and instrument operators are hired for the proper day to day operations of center facilities. Whereas, two technical staff members are taking care of the complete clean room & plant room operations, which are equipped with AHUs, MAUs, Chillers, UPS and BMS.

To make C4DFED facilities self-reliance and self-sustainable, a cumulative effort has been started. In this regard, an expert committee from different institutes/organizations from India (IIT Mandi, IIT Delhi, IISc, IIT Ropar, ISRO, DRDO and company etc) and abroad have visited in person/skype IIT Mandi C4DFED facility, on 11th Dec 2019 and as per their suggestions center is going to organizing more training programs, workshops and conference like previous year.

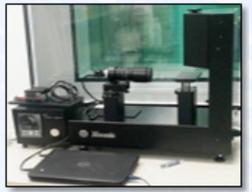
Highlights of C4DFED:

| Sr. No. | | | |
|---------|---------------------------|---|------------------------|
| 1 | Users | <ul style="list-style-type: none"> All IIT Mandi faculties who have similar research interest. Masters and PhD students of IIT Mandi & other institutes Academic, Research & Industrial institutes | |
| 2 | Total Cost of the project | Rs.10 Crores + | Rs.40 Crores Equipment |
| 3 | Electrical Power required | 600 KVA | |
| 4 | Class 100 area | 1200 Sq Ft | |
| 5 | Class 1000 area | 450 Sq Ft | |
| 6 | Class 10000 area | 350 Sq Ft | |
| 7 | Class 100000 area | 2000 Sq Ft | |

List of Facilities/Equipment's at C4DFED

| Sr. No. | Equipment | Model | Make | Category | Images |
|---------|-------------------------|------------------------------|----------|-------------------------|---|
| 1 | Atomic Force Microscope | Dimension ICON PT | BRUKER | Sophisticated Equipment |  |
| 2 | Optical Profilometer | CONTOURGT-K Automated System | BRUKER | Sophisticated Equipment |  |
| 3 | Ellipsometry | EP4 | Accurion | Sophisticated Equipment |  |

| | | | | | |
|----|---|-----------------------------------|---------------------------------------|-------------------------------------|---|
| 4 | Field Emission Scanning Electron Microscope | GeminiSEM 500 | Carl Ziess Microscopy | Sophisticated Equipment |  |
| 5 | Helium Ion Beam Lithography | ORION Nano Fab | Carl Ziess Microscopy | Sophisticated Equipment |  |
| 6 | Maskless Lithography | SF - 100 Xpress Maskless Exposure | Intelligent Micro Patterning | Sophisticated Equipment |  |
| 7 | Electron Beam Lithography | eLINE Plus | RAITH | Sophisticated Equipment |  |
| 8 | Mask Aligner | EVG610 | EV Group | Sophisticated Equipment |  |
| 9 | Atomic Layer Deposition (ALD) | S100 G2 | Savannah | Sophisticated Equipment |  |
| 9 | Stylus Profilometer | Nano Map - LS | AEP Technology | Sophisticated Equipment |  |
| 10 | Glove Box | SGI 200/750TS | SciLab - Vigro Gas Purification tech. | General Characterisation Instrument |  |

| | | | | | |
|----|------------------------------------|-------------------|--|-------------------------------------|---|
| 11 | Optical Microscope | BX 51 | Olympus | Sophisticated Equipment |  |
| 12 | Contact Angle | SEO Phoenix 300 | SEO (Surface electro Optics) Phoenix 300 | Sophisticated Equipment |  |
| 13 | Electro Chemical Analyzer | CH Instruments | CH Instruments | General Characterisation Instrument |  |
| 14 | Spin Coater | WS-650MZ-23NPP | Laurell | Sophisticated Equipment |  |
| 15 | Sputtering System | Self-Assembled | Advance Process Technology | Sophisticated Equipment |  |
| 16 | Reactive Ion Etching | PlanarRIE-6S | PLANAR Tech. | Sophisticated Equipment |  |
| 17 | Thermal Evaporator | BC-300 | Hind High Vacuum | Sophisticated Equipment |  |
| 18 | Electrical Characterization System | Keithley 4200 SCS | Tektronics (Keithley) | Sophisticated Equipment |  |

| | | | | | |
|----|-----------------|-----------------------------|-------------------------|------------------------------|---|
| 19 | Nanofiber Unit | Super-ES2 | E-Spin nanotech | Sophisticated Equipment |  |
| 20 | 3 Zone Furnance | Lindberg Blue M | Thermofisher scientific | General laboratory equipment |  |
| 21 | Vacuum Oven | | Nanosemi Technology | General laboratory equipment |  |
| 22 | Hot Air Oven | MAC | MACRO Scientific Works | General laboratory equipment |  |
| 23 | Centrifuge | Spinwin MC 03 | Tarsons | General laboratory equipment |  |
| 24 | Probe Sonicator | Frontline FS- 750 Sonicator | | General laboratory equipment |  |
| 25 | Ultra Sonicator | | Riviera Glass | General laboratory equipment |  |
| 26 | 3D Printer | | XYZ Printing Pro | General laboratory equipment |  |

| | | | | | |
|----|------------------|-----------|---------------------|------------------------------|---|
| 27 | Weighing Machine | ME-204 | Mateller Toledo | General laboratory equipment |  |
| 28 | Hot Plate | M10102003 | AxivaSichem Biotech | General laboratory equipment |  |
| 29 | Vacuum Filter | | AxivaSichem Biotech | General laboratory equipment |  |

Number of Students/Researchers Benefited from C4DFED facility at IIT Mandi so far

- i) Academic year (2022-2023): 41

No. of Publication from C4DFED in 2022-23: 5

Ongoing Projects and funding at the Centre:

- C4DFED (Clean Room) Facility Project (IITM/INT/C4DFED-CO/27) funded by IIT Mandi.
- Fund for Improvement of S&T Infrastructure (FIST) program 2020, "Engineering Sciences-FIST 2020. Funded by Department of Science & Technology (DST), Govt. of India: ~92 Lakhs (Dec, 2021 – Dec, 2026)
- Design and Optimization of Room Temperature, Heater - less, Cost effective CO (Carbon Mono Oxide) Gas Sensor using Metal Doped OMS2 Nano fibers, Funded by SERB, Govt. of India: 10 Lakhs (Dec, 2021 – Dec-2024)
- Development of bifacial indoor photovoltaics prototype for self-powering smart internet of things (IoTs)", Funded by Department of Science & Technology (DST), Govt. of India: 50 Lakhs (March, 2023 – March, 2026).
- Development of artificial skin integrated with multipurpose sensors and creating perceptual explanations through artificial skin", Funded by Department of Science & Technology (DST), Govt. of India: 2 CR. (July, 2023 – July, 2025)

5.4 Centre for Continuing Education (CCE)

Programs Conducted under CCE (Center for Continuing Education) 2022-23

The Centre effectively participates and contributes to the institute's commitment of providing a broad base of learning opportunities through a variety of continuing and distance education programs for students, academic, scientific and technical staff, and professionals to gain knowledge and/or develop skill sets for professional growth.

CCE is taking care of all such extension and academic outreach education activities of IIT Mandi

A. Completion of Short-Term Courses under CCE: A total of 537 young individuals from Himachal Pradesh successfully finished the following courses at IIT Mandi through the CCE initiative:

- Hands-On Course on Embedded Systems (Completed from 7th Dec, 2022, to 31st Dec, 2022)
- Model Predictive Control for Industrial Systems (Completed from 9th Jan 2023 to 29th Jan 2023)
- Hands-On Training in Computational Fluid Dynamics (Completed from 1st Nov. to 19th Nov. 2022)
- Finite Element Modeling for Engineering (Completed from 23rd Nov. to 13th Dec, 2022)
- Hands-On Course on Product Design and Manufacturing (Completed from 9th Dec to 31st Dec 2022)
- School Camp on Robotics and Artificial Intelligence (Completed from 01st July to 23rd July 2022)



B. Completion of Faculty Development Programs under CCE: CCE organized three faculty development programs for polytechnic and engineering college faculties in collaboration with Directorate of Technical Education, Vocational & Industrial Training, H.P. Sundernagar (DTE).

Total of 153 faculty members successfully completed the following programs at IIT Mandi:

- Faculty Development Updation Program for Polytechnic and Engineering College Faculty (FDP-01) completed from 18th to 24th July 2022, with 56 participants.
- Faculty Development Updation Program for Polytechnic and Engineering College Faculty (FDP-02) completed from 29th August to 03rd September 2022, with 65 participants.
- Faculty Development Program for Polytechnic and Engineering College Faculty (FDP-03) started on 29th January to 03rd February 2023, with 32 participants.



C. Completion of Teachers Training Programs under CCE:

In the initial phase, two teacher training programs were conducted, each accommodating 50 teachers:

- Training of teachers in science, including Physics, Chemistry, and Biology (Completed from 10th March to 15th March 2023).
- Training of teachers in Mathematics (Completed on dated: 26th Feb to 02nd March 2023).



D. Online Courses: IIT Mandi, in collaboration with NSDC, offered the following online courses:

- Certification in Data Science and Machine Learning by CCE IIT Mandi (completed).
- Advanced Certification in AI and Machine Intelligence by CCE IIT Mandi.

E. Events such as Children Science Congress, Mathematics Day, and Training programs under CCE:

- IIT Mandi hosted the Himachal Pradesh 30th State Level Children's Science Congress (CSC) jointly with HIMCOSTE from 31 December 2022 to 3 January 2023, with 900 student participants from various schools in Himachal Pradesh.
- CCE organized Mathematics Day in collaboration with HIMCOSTE on 22nd December 2022, with 300 students from Government and Private schools, along with teachers' participation.
- CCE conducted Hands-On Activity for Science Teachers in collaboration with HIMCOSTE from 22nd December to 24th December, with 60 participants from Government and Private schools.
- CCE organized a two-day residential training program on 20th to 21st December 2022 for State officials on "Ayushman Bharat Digital Mission," with 25 State officials participating in the training.





F. DST - Under the VigyanJyoti Scheme:

Visits of Registered VigyanJyoti Girls (Phase-II) and VigyanJyoti Girls (Phase-III) were organized to provide counseling and encourage higher education.



G. Educational Visits of School Students:

CCE conducted educational visits for school students from various Government and Private schools in Himachal Pradesh throughout the year, including schools such as GSSS GhanagughatArki, GSSS Gumma, DAV Gohar, and more.



6. Central Library

Central Library plays a vital role in furthering the academic and research mission of IIT Mandi and facilitates creation and dissemination of knowledge. Library provides essential support by offering current library services which are integrated with teaching, learning and research activities. Central library is rapidly developing its collection of books, reference books, reports, periodicals, and electronic resources. The Text Book Collection in the Library provides vital supports for on-going undergraduate teaching programs.

It provides access to the various e-journals databases. This includes access to hundreds of journal titles on different subjects. Central Library is completely automated by using open source library management software KOHA. All documents are RFID technology enabled. Transaction of books is also automated. Library has introduced various innovative services including CAS/SDI, On-line status of ILL, On-line reservation of books, Remote access of resources etc. By using Web OPAC, users can check their borrowing details online. Two workstations have been set up for users to access library holdings.

Locations

At present three different units of library are operational at two different campuses i.e. South Campus and North Campus. Detail of these libraries are given below:

1. Central Library @ North Campus (A16 Building)

Maximum collection pertaining to the print books are available within this unit. Almost all collection related to the different course subjects except Physics, Chemistry and Biotechnology are available within this building for circulation purpose. A16 is a big building having three floors having 192 seating capacity.

2. Satellite Library cum Archive Section @ North Campus (A9 Building – IIIrd Floor)

Satellite Library has facility of reading room with 150 seating capacity, One meeting room and collection pertaining to the general reading books.

3. Library @ South Campus (A5 Building – First Floor)

Book Circulation facility alongwith the Reading room with almost 75 seats are available within this section. Collection pertaining to the different courses (Physics, Chemistry and Biotechnology) is available for circulation alongwith the Xerox and scanning facility are also available in this unit.

Software Used in Library

- (i) **KOHA:** For automation purpose.
- (ii) **DSpace:** For digitization purpose.
- (iii) **Linux:** For operating system.
- (iv) **Piwigo:** For photographs repository

1. Collection Development and Management

Collection building is one of the important functions of the library that supports academic and research work of the students, faculty, staff, and other users. Library collection comprises of books, journals, reports, pamphlets and other reading material in science, engineering, technology, humanities and social sciences.

1.1 Print Documents added during the year 2022-23

During the period of 2022-23, Central Library acquired 956 books. It also added few periodicals/magazines, besides reprints, technical reports and annual reports of other universities/institutions.

A list of new additions of books is released every month and can be accessed on the library home page. This list also circulated by e-mail. An email alert is also sent to the requesting faculty members(s) about the arrival of publications requested by them.

1.2 Electronic resources subscribed during the year 2022-23

Central Library provides web-based access to the following e-resources:

1.2.1 Full-text e-journals: Access to 8000+ full-text journals from the following databases:

AIP, ACM Digital Library, ACS, APS, ASME, IOP, Elsevier's ScienceDirect, IEEE Electronic Library, JSTOR, SIAM, Springer Link, Taylor & Francis (S&T and SHSS complete Collections),

Annual Reviews etc.

1.2.2 Bibliographic e-databases: MathSciNet& Web of Science.

1.2.3 Thesis & Dissertations: Institute's Thesis Database, etc.

1.2.4 Archives: Institutional Archives, Sabin Americana

1.2.7 E-Books: Central Library provides access to a collection of more than 21774 e-Books in various disciplines. The e-book collection contains the titles which are a rigorous recommendation by the subject experts of the institute and cater to the needs of the users. The publishers of e-books collection include Science-Direct (Elsevier), McGraw Hill, Pearson, T&F, IEEE,IEEE-MIT press, IEEE-Wiley, Morgan Claypool, CUP, ASME, World Scientific and John Wiley. The e-books collection also includes the Lecture Notes Series on Mathematics (LNM), Physics (LNP) & Computer Science (LNCS) of Springer publisher.

The process of e-book collection development for this year has already been started. The efforts are being made to include the book collection of other renowned publishing houses.

2. Circulation

Circulation activities are now automated. Library users can check their borrowing details by using WebOPAC. We serve the users consisting of the faculty, research scholars, students and staff. Circulation desk is kept open for 60 hours a week. On an average, the monthly circulation transactions are about 730.

3. Digital Library

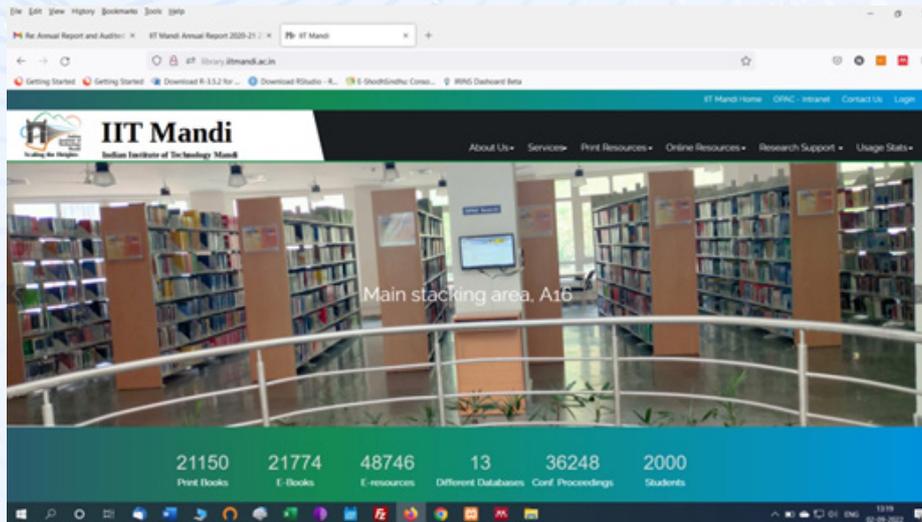
Central Library has its own homepage (<http://library.iitmandi.ac.in/>), which provides web-based access to its resources, procures over 50000 electronic resources, 21774 electronic books and databases.

4. OPAC (On-line Public Access Catalogue)

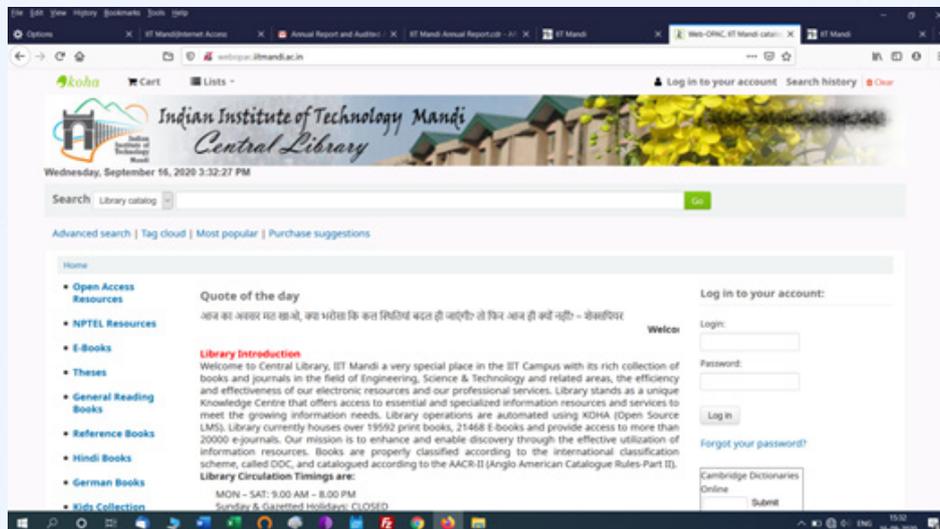
The OPAC is one of the most heavily used databases of the library and is accessible 24*7 via library web page (<http://www.webopac.iitmandi.ac.in/>). Besides listing all the documents available in the library, it allows on-line renewal and reservation, circulation and tells the current status of each & every book. OPAC is searchable by author, title, accession number, subject and several other fields.

5. Services Offered

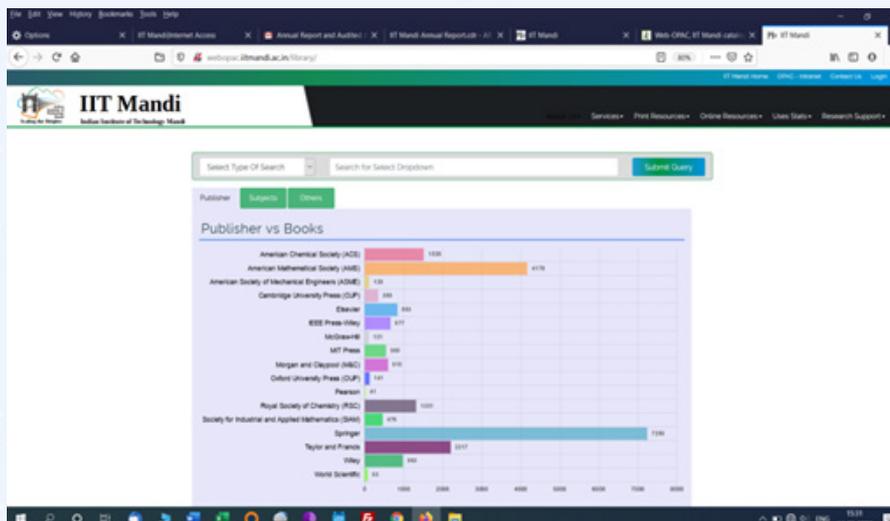
- Fully automated Circulation facility
- Online book reservation, Information search, Patron's library book loan status check
- WebOPAC (Web based Online Public Access catalogue)
- Reserve collection development for student's in-house reading
- New Arrival Book Section
- Reference Service
- Inter-Library Loan
- Document Delivery Service
- Information Alert Services
- E-Journals/Databases
- Digital library services
- User education program
- Mobile App Services
- Research Support Service
- Remote Access Service
- RFID
- Subject Guides
- Faculty Research Data
- Institutional Repository
- Institutional Archives



Library Home Page



WEB OPAC



E-Book Portal

7. Tenth Convocation

As part of this Convocation 188 B.Tech.students, 76 M.Tech., 95 M.Sc. (Chemistry, Mathematics, Physics), 10 M.A. in Development Studies, 29 M.S. (by Research) and 64 Ph.D. Scholars graduated from the Institute.

| Sl.No. | Roll No. | Name | Medal/Prize |
|--------|----------|---------------------|---|
| 1 | B18077 | PIYUSH GOYAL | President of India Gold Medal |
| 2 | B18036 | VISHAL KUMAR | Institute Silver Medal:B.Tech. Civil Engineering |
| 3 | B18077 | PIYUSH GOYAL | Institute Silver Medal:B.Tech. Computer Science & Engineering |
| 4 | B18106 | ASHISH ANAND | Institute Silver Medal:B.Tech. Electrical Engineering |
| 5 | B18156 | ABHISHEK SINGH | Institute Silver Medal:B.Tech. Mechanical Engineering |
| 6 | B18012 | BHUMANYU GOYAL | Director's Gold Medal |
| 7 | B18143 | SHRIKHA | Rani Gonsalves Memorial Medal |
| 8 | T20211 | SOUMYA RANJAN NAYAK | Institute Gold Medal: Among PG Programmes: M.Tech. Power Electronics and Drives |
| 9 | V20003 | ANJALI SAINI | Institute Silver Medal:M.Sc. (Chemistry) |
| 10 | T20005 | RAHUL DOGRA | Outstanding Academic Achievement Award: M.Tech. in Structural Engineering |
| 11 | T20249 | MEGHVERN PATHAK | Outstanding Academic Achievement Award: M.Tech. in VLSI |
| 12 | T20413 | SNEHLATA RAO | Outstanding Academic Achievement Award: M.Tech. in Biotechnology |
| 13 | T20211 | SOUMYA RANJAN NAYAK | Outstanding Academic Achievement Award: M.Tech. Power Electronics and Drives |
| 14 | T20045 | PREMKUMAR M | Outstanding Academic Achievement Award: M.Tech. Energy Engineering with Specialization in Materials |
| 15 | T20042 | SHUBHAM RODWAL | Outstanding Academic Achievement Award: M.Tech. Energy Engineering with Specialization in Materials |
| 16 | A20007 | GAUTAM MISHRA | Outstanding Academic Achievement Award: M.A. in Development Studies |
| 17 | S19012 | SAI SUSHMA P | Ms. Kiran Bala Arora Memorial Award |

8. Students' Amenities and Activities

At IIT Mandi, the orchestration of student amenities and activities is masterfully conducted, with students assuming a pivotal role in their management and execution. This collaborative endeavor is meticulously overseen by the sagacious guidance of the Dean of Students, who steers the collective efforts towards excellence. In the academic year 2022-23, a comprehensive overview encapsulates the myriad initiatives undertaken to enhance student life.

Under the aegis of participatory management, students at IIT Mandi have actively shaped and propelled various endeavors aimed at bolstering the overall student experience. From career development to placement facilitation, the institution has diligently worked towards cultivating an environment conducive to academic and professional growth. The seamless integration of student-led initiatives underscores a commitment to fostering a dynamic and thriving community.

An intrinsic facet of this concerted effort lies in addressing the holistic well-being of the student body. Recognizing the importance of mental health, initiatives have been implemented to provide comprehensive support and resources for students navigating the challenges of academic life. The commitment to nurturing not just academic prowess but also emotional resilience underscores the institution's dedication to the holistic development of its student populace.

As the pages of the academic year unfold, the chapters of student life at IIT Mandi are imbued with a spirit of collaboration, innovation, and care. Through participatory management and visionary leadership, the institution continues to be a crucible for academic excellence and personal growth, ensuring that the journey of each student is enriched with a tapestry of experiences that extend beyond the confines of the classroom.

8.1 Career And Placement Cell (CnPC)

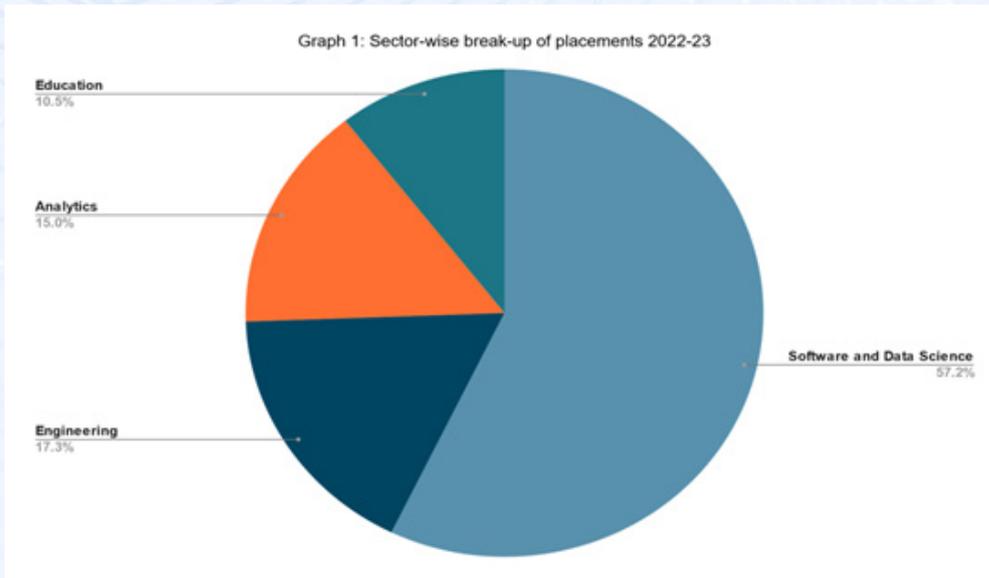
Career and Placement Cell (CnPC) helps students find suitable careers by organizing various career and guidance sessions. The CnP Cell also conducts campus internship and placement drives in which companies from various domains participate and recruit interns and employees from IIT Mandi.

Career and Placement Cell organized the following Career Sessions in the academic year (April 2022 to March 2023)

1. **Webinar on "The Right Approach to Secure Top Ranks in GATE/ESE" on 1st April 2022:**
Speaker: Mr. C Seravan Kumar, IIT Delhi Alumnus ESE -AIR 66, Sr. Faculty, ACE Engineering Academy.
2. **Webinar on the topic "Future of Blockchain and Cryptocurrency" on 8th April 2022.**
Speaker: Mr. Ajoy Pathak, Crypto University.
3. **Online session on "Help People Manage their Own Money" on April 20th, 2022:**
Topics discussed in this session: About SEBI, Primary Vs Secondary Market, Trading and Demat Account, Due Diligence, Public Issue, Rights of A Shareholder, Modes of Placing orders, and Contract Note.
Speaker: Mr. Shamsher Singh, Certified Financial Trainer, SV Wealth Partners
4. **Colloquium on the topic "How to put your best foot forward in interviews to kick start your corporate career." on 26th April 2022.** In the session, Speaker chalked out the building blocks which need to be focused on and prepared for interviews by the students much before D-day. Also, there will be learnings shared for performing well in the interviews and the pitfalls to be avoided.
Speaker: Mr. Arun Kumar Malhotra: Mr. Arun has an experience of over three decades in the corporate world, he has been part of many interview panels for recruitment from prominent engineering/management institutions. His diversified profile includes but is not limited to being MD for Nissan Motors, India (2014 - 18).
5. **Leadership webinar on 'Machine Learning at Amazon' scheduled on June 16, 2022:**
The objective of this session is to provide an overview of ML opportunities at Amazon and help students learn about building careers in ML.

Speakers from Amazon: Rajeev Rastogi, Vice President, Applied Science, International Machine Learning, Ashwin Tengli, Director, Supply Quality, Amazon Advertising, Srujana Merugu, Principal Applied Scientist, International Machine Learning.

6. **Session on ASK TI: All About Software Engineering on 30th June 2022:** Topics discussed in this session were: TI's cutting-edge innovations in AI and autonomous systems, Networking, IoT, Security, Safety, etc, What kind of technical challenges the processor's software team in India solve, How can you part of TI's processor's team and contribute to revolutionary innovations.
Speaker: Jayant Thakur, Director, Worldwide Processors Software, Texas Instruments.
7. **Career guidance session for Electrical core on 12th July 2022:**
Speaker: Sudhanshu Chauhan, B.Tech in Electrical Engineering (2018- 2022), Working at Qualcomm, and Shrinivas Khatavkar, B.Tech in Electrical Engineering (2018 - 2022) Working at Ceremorphic.
8. **Career Guidance Session for Data Science on 20th July 2022:**
Speaker: Parinaya Chaturvedi B. Tech in Computer Science and Engg (2015 - 2019), Working at Ola.
9. **Career Guidance Session for Software Engineering 31st July 2022:**
Speaker: Mr. Sahil Arora, B. Tech in Computer Science and Engineering (2014 - 2018), Working at Amazon as Software Engineer II, Previous experience - Google (SDE), Goldman Sachs (Associate and Analyst), Linux Foundation (GSoC) and Khosla Labs.
10. **Career Guidance Session for Higher Studies on 21st August 2022:** The agenda for the webinar will be: Understanding TOEFL and GRE General Test, Understanding the structure of these tests, Overview of Questions and types, Understanding the registration process, Sending the Test score reports, TIPS, and Strategies for these exams, Using the preparation material.
Speaker: Bhanu Sharma, Senior Manager of Business Development(ETS India).
11. **Career Session on Business Analyst Role on 17th September 2022:**
Speaker: Rishabh Dharmani B. Tech in Electrical Engineering (2017 - 2021) Working at Rupeek as a Business Analyst
12. **Career Guidance for Mechanical Engineering on 26th September 2022:**
Speaker: Divya Ranjan B. Tech in Mechanical Engineering (2015 - 2019), Working at Tork Motors as Sr. Research and Development Engineer.
13. **Career guidance session for Mechanical core on 1st October 2022:**
Speaker: Arjun Sahdev B.Tech in Mechanical Engineering (2017 - 2021), Working at Blister Packing Mfg Co. as a Design Engineer and Neelotpal Dutta, B.Tech in Mechanical Engineering (2018 - 2022), Pursuing his Ph.D. from The University of Manchester.
14. **How to build your career in Data Analytics on 2nd October 2022:**
Speaker: Mr. Ashwini Jain, Co-founder, and CEO of Foreign Admits. He is a well-known speaker in the Data Science community, having spoken at multiple Microsoft conferences. He is also a certified business analyst and PMP certified from the Project Management Institute (PMI).
15. **Webinar to build your own streaming platform like Netflix with React JS on 12th February 2023:**
Speaker: Soumya Mangaraj (SDE-2 at Paypal).
16. **Career Management on 15th February 2023:**
Speaker: Mr. Kamal Stephen, Director, Earlier Career Talent Attraction, SAP Labs.
17. **Interactive Session for ISB's Young Leader's Program and Admissions in Top B-School on 13th March 2023.**
The Young Leaders Programme (YLP) is a deferred admission to ISB's Post Graduate Programme in Management (PGP), and it is designed for pre-final and final-year college students pursuing their undergraduate or post-graduate degrees.
Speaker: Kumar Ketan Tiwari, Sr. Manager, Admissions & Financial Aid, Indian School of Business.



Placement drive 2022-23

| | |
|-----------------------------|---------------------------|
| Total Number of offers | 354 |
| No. of Accepted offers | 312 |
| No. of internship offers | 238 |
| No. Pre- Placement offers | 75 |
| No. of international offers | 19 |
| Average Salary B.Tech (LPA) | 27.86 |
| Median salary PG(LPA) | 9.6 |
| Top recruiting Sector | Software and Data Science |

8.2 Guidance and Counseling Service (GCS)

GCS offers mental health support to all the students of the institute. The counseling includes individual sessions, group sessions, suicide prevention and understanding of warning signs, support groups for students undergoing distress, communication skills and other relevant mental health sessions.

There are various activities conducted throughout the year. Activities conducted by the GCS during the academic year 2022-23 are detailed below.





Orientation for PG and PhD students

For PG and PhD students, Online Orientation programs were organized as per the following details. The program included sessions on academic and professional skills.

Aug-Dec 2022 semester: For MSc/MTech/MA/MS/PhD/PhD students on 4th and 5th August 2022.

The welcome function by Deans and introduction to the program structure and familiarization with the research facilities by the school chairs and faculty mentors were followed by sessions on different topics relevant to the scholars. These included sessions on Professional ethics and etiquette, Study hacks: Reading, Listening, and Note-taking, Presentation skills and public speaking, and Work-life balance. Handling Stress and Managing failure, creating a Professional and Gender Sensitive Work Environment, Introduction to international Opportunities, campus facilities like the Library and high-performance computing facility, and a session by the Teaching and Learning Committee regarding TA responsibilities.

JEE Open house for prospective undergraduate students, 18.09.2022

An online open house for prospective UG students was organized to popularize the B.Tech programs at IITMandi. 126 prospective candidates and their parents attended the open house. A team consisting of Deans, Tech program faculty advisors, Chief warden, Career and Placement advisor, JEE Chair, and student representatives answered queries about the admission process, and course details of different B. Tech programs, campus life, future prospects, etc.

An overview of the mental health sessions conducted in the academic year 2022-2023

- Meditation session in collaboration with IIT Delhi: Number of online sessions held = 13 (between April 2022-October 2022)
- “Beyond What You See”; A LIVE Session By: Sailee B Rupani, Psychologist, 10th October 2022, by YourDOST
- “Unearth Your Strengths via Self Discovery” A LIVE webinar by, Dr. Neeraja Padigapati, Psychologist, 11th July 2022, by YourDOST.
- Orientation to Mental health, Feb’23, by student counselor
- Understanding and Embracing Individual Differences, Feb’23, by student counselor
- Knowing your self-worth, Guest Lecture by Mr. Kevin Simon in March’23
- GCS webpage awareness mailers and support guides available for all students.
- Online counseling support for students on internship and semester exchange by GCS.
- NSS volunteers’ mental health training by student counselor
- Mental health support books for students.
- Regular mailers for mental health support.
- Mental health support guides are available at various spots in the institute.
- Emergency suicide prevention support system for students facing extreme distress.

8.3 Students Gymkhana Report (2022-23)

Cultural Society: The cultural society is a group of students who are passionate about various forms of art and expression. They organize events, workshops, competitions and performances to showcase their talents and promote cultural diversity. The cultural society has several clubs that cater to different interests and skills. Following clubs are part of Cultural Society:

- Art Geeks
- Dance Club
- Designauts

- Drama Club
- Ek Bharat Shreshta Bharat
- Music Club Photography
- Movie Club

Cultural Society held many cultural events and competitions, following are some major to include:

- **Celebration of Independence Day:** The college celebrated the 75th anniversary of India's independence with a flag hoisting ceremony, followed by a cultural program that included patriotic songs, dances, and speeches by the students and faculty members.
- **Navrang:** The college celebrated the festival of Navratri with a grand event called Navrang, where the students dressed up in colorful traditional outfits and participated in various activities such as garba, dandiya, rangoli making, and photo booths.
- **Aakarshan:** For freshers, the cultural society organized a talent hunt event called Aakarshan, where the students got an opportunity to showcase their skills and abilities in various domains such as singing, dancing, acting, painting, photography, etc. The event was judged by some eminent personalities from the field of art and culture, and the winners were awarded with prizes and certificates.
- **Foundation Day:** The college marked its 14th anniversary with a grand celebration that included cultural program. The cultural program featured some spectacular performances by the students and faculty members in various genres such as classical music, folk dance, rock band, etc.
- **Kala:** The college celebrated the Kala, where the students displayed their creativity and innovation in various forms of art such as painting, sketching, collage making, origami, etc. The event also had some workshops on different art techniques such as glass painting, low poly art, UI/UX designing, etc.
- **Exodia:** The college hosted its annual techno-cultural fest called Exodia, where it invited students from other colleges and institutes to participate in various events and competitions such as robotics, coding, gaming, quiz, debate, fashion show, etc. The fest also had some star attractions such as live concerts, DJ nights, etc.
- **Unity Day Celebration / Jana Gana Mana:** The college observed the birth anniversary of Sardar Vallabhbhai Patel as Unity Day, where it paid homage to his contributions to India's freedom struggle and integration. The Unity Day Celebration was organized in collaboration with Sports Society, and the National Service Scheme of IIT Mandi.
- **Garba Workshop:** The society organized a garba workshop for its students, where it taught them the basics and steps of the traditional Gujarati dance form. The workshop was conducted by a professional garba instructor, who also gave some tips and tricks on how to perform garba gracefully and elegantly.
- **Design Workshop I [Basics of Illustrator]:** The college conducted a design workshop I for its students, where it taught them the basics of Illustrator, a software used for creating vector graphics. The workshop covered topics such as tools, layers, shapes, colors, gradients, etc., with practical examples and exercises. The workshop was facilitated by the designaunts club of the college.



- **SPICMACAY:** The society hosted 3-4 events under the banner of SPICMACAY, where it invited some eminent artists and performers from the field of Indian classical music and culture. The events included a Santoor Vadan by Padam Shree Harish Vyas Ji, Shri Rajendra Prasanna Ji. Performance by Padam Shree Rani Khanam Ji was organized in another event. Himachali Folk dance group also performed during the event. The events also helped to promote and preserve the rich and diverse heritage of India among the young generation.

These are a few to list, but there are many more other events which are regularly held by the society.

Technical Society: SNTC is a student body that aims to promote scientific and technical temperament at our institute. It is composed of teams, clubs, and wings. SNTC consists of 8 technical clubs for programming, automotive engineering, robotics, astronomy, mechanics, bioengineering, civil engineering and entrepreneurship. Members of the SNTC also enthusiastically represent the college in national & international events.

This year, the society improved performance in the Inter-IIT tech meet by winning a total of 5 medals. Intra-college competitions were conducted for team selection and multiple induction sessions were given, along with resources listed on discourse. The society stood ninth, which was the best ranking achieved by IIT Mandi in last 6 years. This year, despite of some hurdles, the society continued to win several accolades for the institute. The technical society saw the rejuvenation of various clubs such as Nirmaan, Yantrik and SAE Collegiate in the past year.

The technical society has several clubs that cater to different interests and disciplines. These are:

- Programming Club
- Robotronics Club
- Space Technology and Astronomy Cell (STAC)
- E-Cell
- Yantrik Club
- Nirmaan Club
- SAE Collegiate
- Kamand Bioengineering Group

Projects:

- URC Mars Rover: The society continued the legacy of representing IIT Mandi in International Robotics competitions.
- Project Micro Drone: A team of 8 people was formed to work on this project
- Jet bot: The URC Team built a 4 wheeled robot, to test the software and electrical system of the Mars rover.
- Efficycle: Efficycle is the Hybrid three-wheeler EV that is designed and fabricated by SAE.
- Watershed Model: Under Watershed Model Nirmaan club planned to design and develop a working watershed model that may be used to demonstrate the water cycle and other phenomena related to Fluid Mechanics.
- RC Plane Project: The aim of this project was to build a prototype of an RC Plane using thermocol.
- CanSat Challenge: For the first time this year, our Astronomy club (STAC) participated in the CanSat challenge sponsored by American Astronautical Society (AAS).
- DYNASYNC: The project is focused on developing a general-purpose Brain Computer Interface (BCI) system based on electroencephalography (EEG) for motor imagery detection and control.

Other Initiatives:

- KBG faculty guided projects
- Intern Fair (E-Cell)
- 3D Design Layout - A19 & D3 - SAC
- Algo University Collaboration (PC)
- ISRO's START Program
- SWAN Set-Up
- Winter Hackathon Projects

Sports Society: The sports society is a society under Gymkhana, which includes the students who are enthusiastic about various forms of physical activity and fitness. They organize events, tournaments,

camps, and expeditions to promote sportsmanship, health, and adventure. The sports society has several clubs that cater to different sports and hobbies. Besides, following two clubs work under Sports Society:

- **MTB Club:** This club is for those who enjoy mountain biking and cycling. They explore different terrains, trails, and routes, and also participate in races and challenges.
- **HnT Club:** This club is for those who are interested in hiking and trekking. They embark on various expeditions to the hills, mountains, and forests, and also learn about survival skills and environmental awareness.

Sports Society regularly holds several physical and mental health related activities. These include:

Inter-IIT Sports Meet: The students participated in an inter-college sports competition, where they competed with students from other colleges and institutes in various sports such as cricket, football, basketball, volleyball, badminton, table tennis, chess, etc. The competition was a great opportunity for the students to showcase their talent and spirit, and also to interact and network with their peers. The students performed well and managed to be among top 5 teams in different games.



Rann-Neeti: IIT Mandi successfully hosted and concluded 7th edition of its annual sports festival, Rann-Neeti-the biggest sports fest of the Himalayas. The fest was held for three days in the campus from 6th to 8th of November. It offered a competitive arena in the shadow of the Himalayas for many sporting prodigies from different colleges across the nation who raised the standard once more and obtained triumph. Rann-Neeti has earned a reputation as a true battlefield of vigor with a footfall of over 1000 participants and more than a dozen sports ranging from cricket to chess and weightlifting to e-sports. Rann-Neeti is providing opportunities for budding athletes to showcase their talent on a grand scale. Throughout the event, students get to learn and grow while competing and polishing up their skills to grow as a sportsperson. The event was completely managed by the students of IIT Mandi with support from the community of IIT Mandi.

International Yoga Day: The sports society celebrated the International Day of Yoga, where a yoga instructor was invited to conduct a session on various yoga poses and techniques. The event was attended by the students and faculty members of the institute, who participated in the session with enthusiasm and interest. The event aimed to raise awareness and appreciation of yoga as a holistic way of life that can benefit the physical, mental, and spiritual well-being of the individuals and the society.

Besides, Sports society has been involved in conducting regular sports and physical activity related programs such as:

- Foundation Day Sports activities
- Inter-Hostel Tournament
- Aagaaz
- Sangharsh
- Physical Fitness Camps/summer camp
- Kamand Premier Leagues (KPLs)
- Sports camps
- Fitness/sports activities for new entrants (under induction program)

Gymnasiums: IIT Mandi has started a new Gym facility in North Campus with advanced machines and instruments for users of IIT Mandi. The institute now has 3 gyms including two in North Campus and one in the South Campus.

9. Resource Generation & Alumni Relations

IIT Mandi has instituted a new section, Dean's Office of Resource Generation and Alumni Relations (DORA) on 6th April 2022. The office of the DORA is one of the key pillars of IIT Mandi. The section is currently headed by Prof. Chayan K. Nandi as the Dean (Resource Generation and Alumni Relations) and Dr. Varun Dutt works in the capacity of an Associate Dean (Resource Generation and Alumni Relations). The office works extensively towards arranging financial resources to meet the growing needs of IIT Mandi through corporate connections, philanthropists, and alumni. The office actively conducts several activities including campaigns involving fundraising to support research and excellence at the Institute, creating centers in emerging areas of science and technology, endowments for faculty chairs, honoring and awarding alumni, providing scholarships/fellowships to students, and promoting infrastructure growth of the Institute. The DORA office engages in creating multiple events and global outreach programs with our alumni, corporates, and philanthropic organizations. IIT Mandi has had several notable alumni who have gone on to scale newer heights of success. IIT Mandi has a special place for its alumni, and it works hard to stay connected with its alumni and other stakeholders to ensure mutual growth and success. The Institute is grateful for generous and philanthropic contributions from different alumni and stakeholders, which have enabled the Institute to become self-sustaining in the times to come.

AIM

The DORA aims to establish sustainable relationships with alumni, corporates, and other stakeholders, for resource generation. The office works extensively to arrange financial resources to meet the growing needs of IIT Mandi through corporate connections, philanthropy, and alumni. The office actively conducts several activities including campaigns involving fundraising to support research and excellence at the Institute, creating centres in emerging areas of science and technology, endowments for faculty chairs, honouring and awarding alumni, providing scholarships/fellowships to students, and promoting infrastructure growth of the Institute. The DORA office engages in creating multiple events and global outreach programs with our alumni, corporates, and philanthropic organizations. It also organizes the Reunion of the Alumni and also recognizes the achievements of the Institute's alumni by nominating them for the "Young Achiever Award (YAA)".

Glimpses of Major Activities in 2022-23

An Alumni Meet was organized at USA to set up the IIT Mandi Foundation Inc. in USA

In the first week of August 2022, Prof. Laxmidhar Behera, Director, IIT Mandi along with Dr. Tushar Jain visited the USA and met with the Alumni of the Institute (Ms. Divya Gandhi, Mr. Uday and 4 others). Dr. Jain presented a few slides to highlight the progress of IIT Mandi over the years. Prof. Behera proposed to set up an IIT Mandi Foundation in the USA for which Mr. Uday and Ms. Divya had to take the initiative with the help of other alumni, if required. This will further strengthen the strong bond between the Donors/Alumni in the US and IIT Mandi.



Prof. Behera visited the Doshi foundation on 3rd August 2022 in Los Angeles, USA
 Prof. Behera visited Mehta Family Foundation on 2nd August 2022 in San Francisco, USA



Letters sent to the Companies under the category of Corporate Social Responsibility:

- Total No. of letters sent to the CSR Head of the Companies: 91.
- Total No. of responses received from the companies: 11.
- Total No. of CSR companies and foundations where proposals have been submitted: 24.
- Total No. of the companies in Hot Leads: 10.

Letters sent to the Philanthropists:

- Total number of letters sent to the Philanthropists: 61

MoU signed:

- Shraman Foundation.
- Shri Badrika Ashram (SBA).
- SJVN Chair Professorship.

Scholarship:

- Sri Badrika Ashram (SBA) Scholarship.
- TCS Research Scholar Program.
- Shraman Scholarship.
- PanIIT merit cum means endowed scholarship scheme titled "Vidyalakshmi Scholarship Scheme.
- Dhawan's Family Scholarship.
- Foundation For Excellence (FFE) Scholarship.

Other Scholarships under follow up:

- Swami Dayanand Education Foundation's "merit-cum-means scholarships".
- Kotak Kanya Scholarship.
- Panasonic Ratti Chhatr Scholarship.
- Amazon Future Engineer Scholarship (AFE) (from Foundation For Excellence (FFE)).
- Reliance Foundation Scholarships Program for UG and PG students.
- SPDC Scheme (Scholarship Programme For Diaspora Children).
- National Scholarship for Higher Education of ST students.
- Scholarship for PG/PhD/Postdoctoral Studies Abroad JN.
- Tata Endowment Loan Scholarship.
- Your Space Scholarship.
- State Bank of India Foundation (SBIF) Scholarship.

Meetings with the CSR Head of the companies for collaborations and funding support:

We have organized several meetings with Wipro, Samsung, TCS, Col-Pal, ITC, etc., and presented the proposals in line with their CSR focus areas. Discussions with these companies are in the next stage and follow-up meetings are being planned which hopefully will lead to generating some funds in the near future.

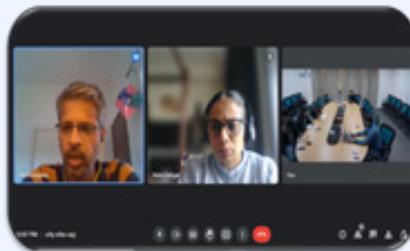
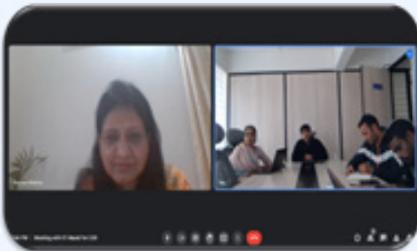


Inauguration of Dean's office of Resource Generation and Alumni Relations



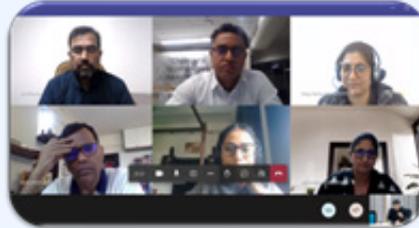
Institute Chair Professor

Meeting with Col-Pal Meeting with Wipro Meeting With Samsung

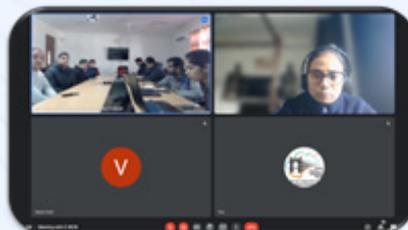


Meeting with ITC

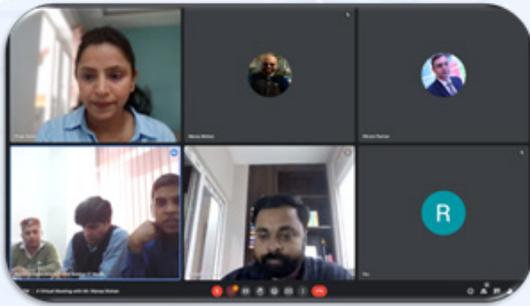
Meeting with TCS



Meeting with EWOK



Meeting with INTEL



Sri Badrika Ashram (SBA) delegates visited the Institute



Shining Himachal - A State Promotion Event at Ottawa Canada was organized by the Himachali Pravasi Global Association (HPGA)



Himachali Pravasi Global Association (HPGA) in Collaboration with the High Commission of India at Ottawa, Canada has organized the event on 19th March 2023. The IIT Mandi DORA Team had set up a Stall/booth there with the help of HPGA and exhibited some of its products and also attended the event virtually to represent the Institute and to update the attendees about various Research and Developments of the Institute. The HPGA has shown its willingness to help us to connect with the people/organizations who attended the event for further collaborations.

The Team DORA visited the Sri Badrika Ashram, Sirmour, H.P.

The DORA team visited Sri Badrika Ashram (SBA) at Shalamun, Sirmour, Himachal Pradesh. Representatives of IIT Mandi attended the annual event of the Sri Badrika ashram to represent the Institute on 4th March 2023. The SBA honored all the attendees of the Institute. Also, an MoU for scholarship for UG students was signed with them. It is proud to have SBA Scholarships for economically weaker students. Many students have benefitted from this scholarship.



Dr. Y. J. Park's visit to IIT Mandi

Dr. Y. J. Park, Director of the Indo-Korean Center for Research and Innovation, New Delhi, and Shri Hyo Hee Lee, the science and technology attaché at the embassy of the Republic of Korea, visited IIT Mandi during 16th June to 18th June 2022. We explored the ways in which collaborations with Korean Universities could contribute to the Institute’s vision of serving the society of both communities via technological and research interventions.

A visit of Mr. Bhagya Chander at IIT Mandi

Mr. Bhagya Chander, President of Himachal Pravasi Global Association (HPGA) visited IIT Mandi on 26th April 2022 to discuss how Himachali in abroad could contribute to the Institute/their home state H.P. and for research in different ways. Thereafter, on the invitation of Mr. Chander, the Director IIT Mandi appeared for an interview on the Himachal Darpan program in July 2022.



Visit of Mr. Naveen Doshi’s Family to IIT Mandi (Prospective Donor, Doshi Foundation, USA) Meeting with Mr. Doshi and his Family

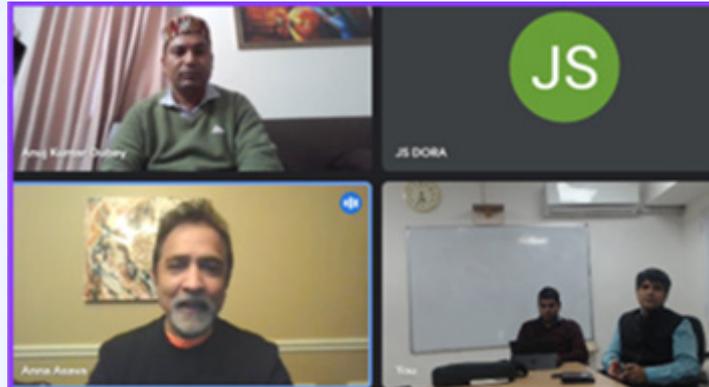


Mrs. Doshi and her grandchildren from Shri Naveen Doshi’s (Doshi Foundation, USA) family visited

the IIT Mandi campus. The DORA team accompanied Doshi's family during their visit to the campus. Post this visit, a follow-up meeting with Mr. Navin Doshi & Family was held virtually on 10th January 2023. During the meeting, collaboration and funding for the IKSMHA Centre were discussed. Mr. Doshi was quite pleased with the hospitality shown by the DORA staff and assured funding for the IKSMHA Centre, IIT Mandi.

Virtual Meeting with Mr. Raj Asava, Co-Founder, HungerMitao Foundation, USA

A virtual meeting with Mr. Raj Asava (Co-Founder of HungerMitao Foundation in the USA) was held on Thursday 30th March 2023 to explore the possibilities of collaboration with the HungerMitao Foundation and to discuss the possibility of funding to establish a wellness centre under the IKSMHA centre and also to apprise Mr. Asava about the EWOK/EPOK. Mr. and Mrs. Asava is also planning a visit to the IIT Mandi campus in the coming July 2023.

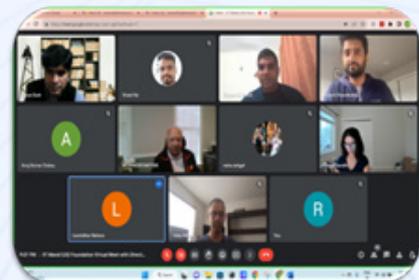
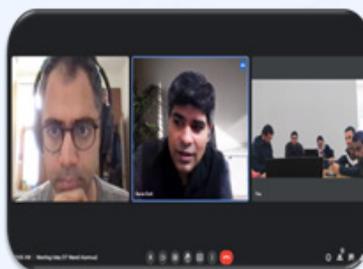


Creation of IIT Mandi Foundation Inc., USA:

IIT Mandi Foundation Inc. was created in the State of Washington, USA. The Board of Directors (BoDs) of the IIT Mandi Foundation have already been appointed. Recently, the BoDs have submitted Form-1023 along with all relevant enclosures to get the IRS/Tax Exemption status for the foundation, so as to enable the foundation/BoDs to initiate the fundraising activities in the USA.

| Name of the Board of Directors (BoDs) | | |
|---------------------------------------|--|----------------|
| Sl. No. | Name | Designation |
| 1. | Ms. Divya Gandhi, Alumni, B. Tech CSE (2013) batch | BoD |
| 2. | Mr. Uday Mittal, Alumni, B. Tech CSE (2013) batch | BoD |
| 3. | Mr. Anand Dhandhanian, B. Tech EE (2014) batch | BoD |
| 4. | Dr. Venugopal R. Damerla, MD, Veterans Affairs Eastern Colorado Health Care System, Denver, USA | BoD |
| 5. | Prof. Ramana Vinjamuri, Assistant Professor, University of Maryland, College Park, USA. | BoD |
| 6. | Mr. Mohinder L. Nayyar, 1966 batch BTech (ME) of IIT Roorkee and a Distinguished Alumnus Awardee of 2016, IIT Roorkee. Settled in Virginia, USA. | Senior Advisor |

Glimpse of the meetings with the BoDs of the IIT Mandi Foundation Inc, USA.

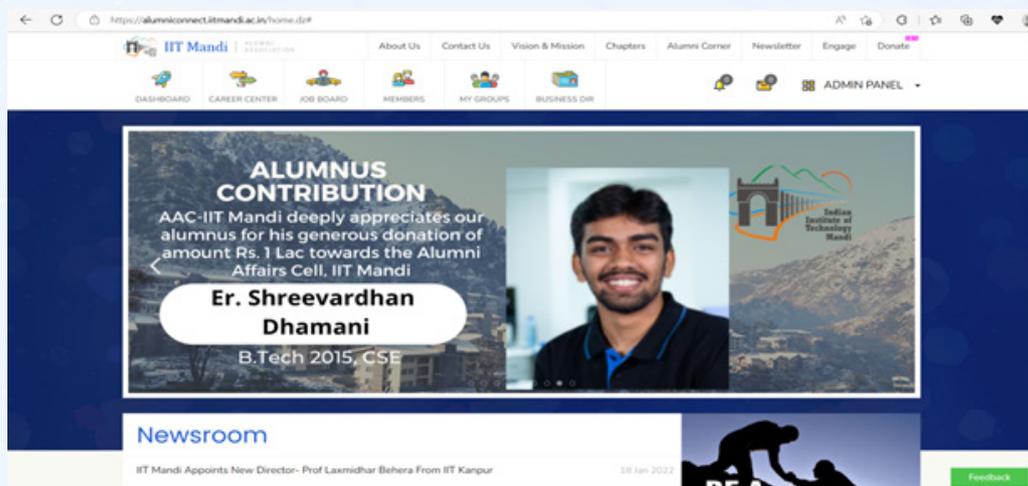


1. Building relationships with the Alumni

The IIT Mandi Alumni Association is an incredibly valuable resource for the community. It proudly serves as the official association for alumni around the world, providing them with unwavering support and unparalleled opportunities. The association's network of alumni and friends is dedicated to promote the Institute, providing graduates with job opportunities, and offering guidance and inspiration for academic/research work. With its vast array of networking opportunities, professional resources, and Institute-led trips, the association ensures that its members have access to the best connections and experiences available. Through its unwavering commitment to fostering relationships with accomplished and knowledgeable alumni and friends, the association continues to lead the way in supporting the success of its members. If you have a degree from IIT Mandi, you are part of the Alumni Association. Our goal is to keep our Alumni connected with each other and with IIT Mandi.

Alumni Portal:

To Connect with The Official Alumni Network of Alumni Association IIT Mandi, please follow the link: <https://alumniconnect.iitmandi.ac.in>



Total number of registered Alumni:

- 2509 (Till 31/03/2023)

Membership Benefits:

- Stay connected with batchmates and friends.
- Can take part in networking opportunities organized by IIT Mandi.
- Enjoy various on- and off-campus alumni events.
- Become influential ambassadors of your alma mater in the corporate world.

2. Creation of Alumni Chapters:

Total No. of Alumni Chapters (International): 02

- USA Chapter.
- Japan Chapter.

Total No. of Alumni Chapters (National): 04

- NCR Chapter.
- Bombay Chapter.
- Hyderabad Chapter.
- Bengaluru Chapter.

Name of Chapter Secretaries/Joint Secretaries:

- North America (USA)- Ms. Divya Gandhi (Batch 2013).
- Japan - Mr. Gopal Aggarwal (Batch 2017),
- Mr. Chandan Purbia, Joint Secretary (Batch 2017).
- Bangalore – Mr. ChamundeswarNadh (Batch 2015).

- Delhi (National Capital Region) – Mr. Vivek Sharma (Batch 2017).
- Hyderabad – Mr. Ayush Yadav (Batch 2017).
- Mumbai - Mr. Mandar Karpe (Batch 2015).

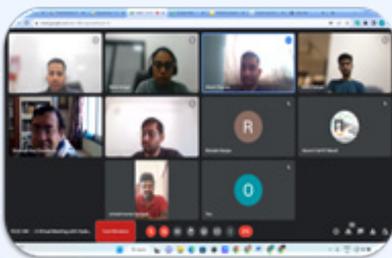
Activities carried out for the Alumni:

- Alumni Meet and Reunion Every Year.
- Young Achiever Award.
- Alumni Chapters Meetings.
- Webinar by the Alumni on various topics for current students.
- Lectures/ Conferences /Workshops on various topics.
- Motivation/sensitization to Alumni for donations on small intervals.
- Processing of all the paper formalities for release of caution money.
- Career Guidance by the Alumni.
- Provided a platform to extend support to the Alumni, as and when required.
- Issuance of Alumni I-cards.
- Registration of graduands.
- Generation of data for Higher Studies.
- Organizing donation drives.

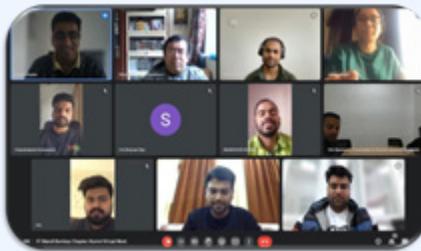
GLIMPSE

Alumni Chapters Meetings

HYDERABAD CHAPTER



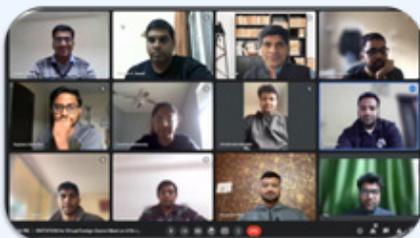
MUMBAI CHAPTER



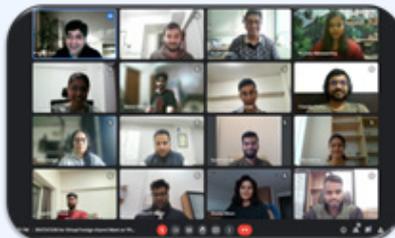
NCR CHAPTER



USA CHAPTER



JAPAN CHAPTER



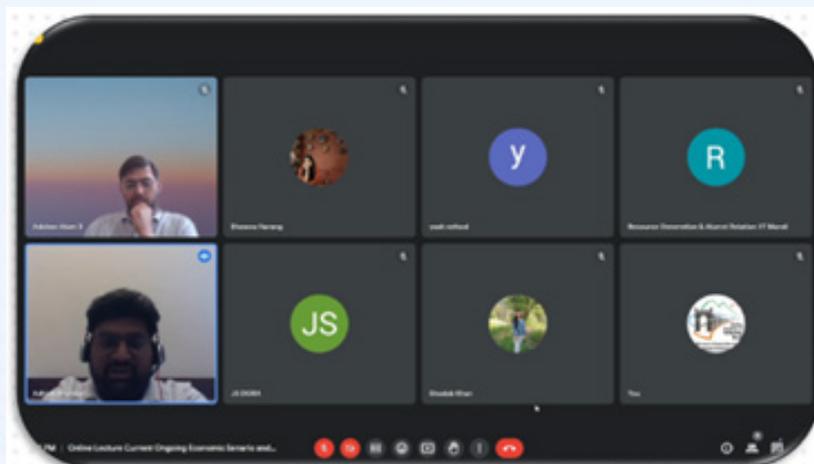
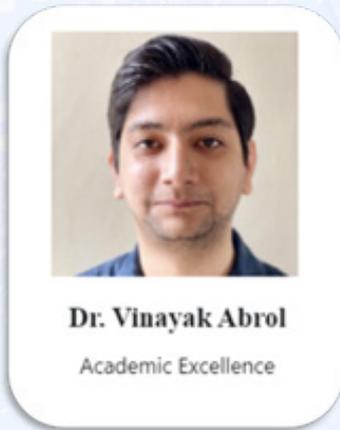
FOREIGN ALUMNI



In-Person Alumni Meet with Graduated Batch 2022



YOUNG ACHIEVER AWARD - 2023



Social Media Links:

- **Facebook** : <https://www.facebook.com/groups/Iitmandialumniclub>
- **Instagram** : <https://www.instagram.com/alumni.iitmandi/>
- **Twitter** : https://twitter.com/AAS_IITMandi
- **LinkedIn** : <https://www.linkedin.com/in/alumni-affairs-cell-2a33ba228/>

10. Women Cell

Women call is committed to create a gender-sensitive environment at IIT Mandi and in this regard organises internal as well as external seminars from time to time. The International Womens' Day was celebrated on 9th March, 2022. The Chief Guest for the occasion was Dr. Jatinder Kishtwaria (Former Director, ICAR Women Agriculture University, Odisha). She gave motivational and inspiring speech on leadership of women and how women can be a good leader. There was a Panel Discussion on Gender Equity. Chairperson, Women Cell, Prof Arti Kashyap emphasised that in today's world, Gender Sensitization is not only a preferable scenario, but it is the need of the hour when women have successfully launched themselves in every sphere. However, Gender Parity remains a big challenge; even the UN recognizes it as one of the sustainable development goals in their 2030 Agenda. The Govt. of India has also launched many initiatives such as GATI to meet the requirement of Gender Inclusivity.

IIT Mandi has also started an Initiative "WE (women employees)" where women employees gather and share their stories, ups and downs and benefit from each others experience sharing.



11. Hindi Cell

In compliance with the Official Languages Policy of Govt of India, the Official Languages Act., 1963 and the Official Languages Rules, 1976, Hindi Cell was established on April 2010 with the following objectives:

- i. To implement Official Languages Policy, and compliance of provisions of Official Languages, Act., 1963 and Rule 1976 in the Institute. To achieve this goal the Official Languages Implementation Committee (OLIC) was constituted, which meets in every quarter and takes decisions on policy matters and reviews the progress of Rajbhasha Implementation in the Institute. Accordingly, Hindi Cell takes follow-up actions. This includes achieving the targets of the Annual Programme for transacting the Official work of the Union in Hindi, organizing Hindi day/Fortnight, monitoring the internal progress of the Institute regarding the use of Hindi, submitting quarterly progress reports, preparing for inspections by the Ministry of Education, Ministry of Home Affairs and Parliamentary Committee on Official Languages.
- ii. Translation work of Annual Report, Annual Accounts, Prospectus, Convocation related work, and all other circulars/orders/Official correspondences as and when required.
- iii. Publication of 'Uhal' Annual Hindi Magazine.
- iv. Trainings/Workshops/Seminars, etc:
 - To organize Hindi Typing/Translation/Language training/workshops for staff members to motivate/ promote them to perform their Official work in Hindi.
 - To organize scientific and technical seminars/ workshops for Research Scholars and faculty to promote technical writing in Hindi.

Activities of Hindi Cell during the period of 2022-23 are as follows:

- Hindi Pakhwara was organized from 14-28 September 2022. A number of activities/ programmes were organized during the Hindi Pakhwara.
- Hindi Workshop on "Rajbhasha Adhinyam Ka Anupalan" was organized on 21 February 2023 for Staff members of the Institute.
- Online Workshop on "Hindi Typing" was held on 03 March 2022 for Staff members of the Institute.

IIT Mandi has the following committees to ensure compliance regarding Official Language:

1. Official Language Implementation Committee (OLIC)
2. Hindi Advisory Committee (HAC)

12. Infrastructure and Services

The Institute Deanery of Infrastructure and Services is responsible for planning, designing and construction of IIT Mandi infrastructure in the campus. An important and tedious responsibility of the infrastructure unit is the Operation, Maintenance and Construction of buildings and furnish services to the campus students, faculty and staff like Sports Complex, Auditorium, Health Centre, Recreation, Guest House, Campus School, Day Care, Water supply, Electric supply, Horticulture, Networking etc.

12.1 Infrastructure

Presently, North Campus has fully functional Infrastructure of 1,59,370 sq.mt. area. This part of the campus has Academic Blocks, hostels/houses for 1260 students and 255 faculty/staff members. The Sports Complex including swimming pool, Hockey field, Tennis and Basketball Court, Volleyball court and Health Centre. Dining hall cum Student activity centre is completed in the current year having an area of 4,111 sq. mt.

Aerial view of North and South Campus



North Campus



South Campus

The South Campus has a fully functional infrastructure of about 61,646sqmt. area. This campus presently provides Academic Blocks hostels/houses for 1100 students and 81 faculty/staff members and having full fledged sports facilities like Cricket Ground, Football Ground, Tennis Court, Basketball Court, Volleyball Court and Sports Complex having yoga room, Badminton Hall, T.T. hall etc.

Unification of the North & South Campus has been planned by constructing a road from the Campus School to South Campus which shall also connect land parcel recently (forestland) transferred to IIT Mandi. Efforts to construct a hostel for EWS (634students, another hostel of about 1500 capacity, the academic building of 10000 sqm area and lecture hall complex are in full swing with support from an amount of Rs. 333.72 Cr under HEFA term loan.

The academic space built over the years started yielding fruits –several new schools and centers are being accommodated in the new buildings. Further infrastructure support is being extended.

12.2 Services

12.2.1 Water Supply Scheme of IIT Mandi (0.50MLD Capacity)

WTP stage-1 is established near Kamand Bridge on the UHL River which is passing along the Reyagadi road. From UHL River, a suction pipe of dia 6 inches lifts water through 7.5HP mono submersible pumps to raw water tank-1 of capacity 1,00,000 litres. 40HP Submersible pumps lift water through a G.I. pipe of dia 6" from raw water tank-1 to raw water tank-2(Stage-2) of capacity 3,35,000 liters. WTP stage-2 is established in the Gharpa area (LP-6) of the South Campus of IIT Mandi. Water flows under gravity from Raw water tank-2(Stage-2) of Capacity 3,35,000 to the Pre-Settling tank, then to the flocculator, then to the settling tank and then through the Slow sand filter bed. After all these filtration processes water gets collected in a Clear Water tank of capacity 3,35,000 litres. Water from the clear water tank gets lifted by 100HP Submersible pumps from the clear water tank to the Main overhead storage tank of capacity 3,35,000 litres.

12.2.2 Electrical Power Supply System

The main source of the Power supply of IIT Mandi is Himachal Pradesh State Electricity Board. IIT Mandi is getting the power supply From HPSEBL through the 33 kV HT transmission line from Nandli Substation near the campus. Further, Institute has a house 33/11 kV Receiving Substation (RSS) at the North campus. The total connected load of the IIT Mandi campus is 10.90 MW. For catering, this load Inst. has 2x5 MVA power transformers installed at RSS. 33 kV supply is stepped down to 11 kV and distributed to the different 11/0.415 kV Substations installed at the North and South campuses.



Figure 1: 33 kV Indoor panel



Figure 2: 11 kV Distribution panel



Figure 3: Indoor 11/0.415 kV (800 kVA) Transformer



Figure 4: Indoor LT distribution panel

In addition, Institute has 4 Substations at the North campus and 3 Substations at the South campus.

Presently, Institute is being fed through the Nandli substation, which is fed from Mandi 132/33 kV Substation. One more power source, stand by 33 kV HT line from Pandoh to Nandli Substation has been completed by HPSEBL during September 2022.

In near future for getting an uninterrupted power supply to our campus, one more source has been planned and taken up with HPSEBL. The following alternate lines of work are under progress:

33 kV feeder from Kullu to Nandli Substation. The power can be transferred on this line in the event of failure of the dedicated feeder.

12.2.3 Healthcentre

Health Centre, IIT Mandi is situated on the North campus, having one extension unit on the South campus. It is a non-dieted patient care unit that provides routine and emergency medical cover to all

faculty, staff and students of Kamand. It also provides first aid and emergency care to Mind Tree school students and workers/casual laborers of the campus, with the scope of referral to higher Centre who require admission and special care as and when required via 24 hr. ambulance service. The Health Centre consists of a team of full-time Medical Officers, Visiting Specialists and Para Medical staff.



Figure 5: Health Centre (North and South Campus)

The following facilities are available at Health Centre

- ROUTINE OPD: taken care of by medical officer and visiting consultant.
PHARMACY: Reliable quality medicines are available to beneficiaries on doctor's prescription during OPD hour's as well as emergency timings without any cost. Routine over-the-counter medicines are provided by Para medical staff themselves/after consultation with the doctor on duty during emergency hours.



Figure 6: Pharmacy – North Campus Figure 7: Pharmacy - South Campus



Figure 8: Physiotherapy Room

Figure 9: Ambulance Services

- CLINICAL PATHOLOGY LAB: Trained laboratory staff providing their services, which include routine blood tests and urine tests. Some specialized tests through kits include CRP, malaria, scrubtyphus, pregnancy test, HIV, VDRL, HBs AG, typhoid, etc are also available.

- Further, Dr. Lal's PathLab staff also visits the health center twice monthly to enhance the services of the Lab on the IIT campus.
- X-RAY ROOM: Health Centre has fully equipped Digital radiography (DR) room. Trained X-ray technician staff providing services, which include all routine X-Rays i.e. Chest X-Ray, Abdominal X-Ray, KUB X-Ray, whole Spine X-Ray, Joint X-Ray and Full, body Stitching X-Ray etc.
- Visiting Consultant of ENT, Medicine, Obs & Gyane, Paediatrics and Orthopaedic.
- Dental service & physiotherapy are also fully functional.
- Institute also has MOU with super specialty hospitals like Maxcare and Fortis hospital in Mohali, Chandigarh where critically ill patients are referred via ALS Ambulance.
- Ambulance Services:- Institute has two ambulances (One Basic Life Support and another ALS ambulance) which is used to referred the patients to higher centre / empanelled hospitals.
- Emergency Services: Health centre has 24 X 7 Emergency cares with the provision of emergency drugs, and equipped with Multi para monitor, ECG, Nebulization, automated defibrillator, oxygen concentrator, and central oxygen system etc.



Figure 10 : Minor Operation Theatre

12.2.4 Green Measures for Environment Friendly Campus

The green activities of the campus are categorized into the following subsections and different sub committee's under the Green committee manage each domain.

- Beautification and biodiversity conservation: Landscaping and horticulture, biodiversity monitoring and preservation.
- Waste Management: Waste collection, segregation, processing and disposal. Awareness campaigns.
- Environmental monitoring: Monitoring air and water quality, groundwater and land usage.
- Energy efficiency and conservation: Monitoring energy usage, and assisting in the implementation of green energy technologies on campus.

Housekeeping: Cleaning & Upkeep of Campus and its buildings, Waste collection and transport, Biogas plant operation standardized (70 -110 kg / day food waste is daily treated)

Highlights of Green Activities carried out during the year 2022-23

- Successfully organized Swachata Pakhwada event 01-15th Sept 2022 with a focus on cleanliness drives, pruning, plant pots maintenance, Awareness and advisory camps against Single-use plastic, reducing plastic and waste segregation
- Cleanliness drives on the campus on World environment day
- After successful pilot testing of Sanitary napkin incinerators, expansion across the campus is being taken up
- Plantation drives along with NSS and UBA -about 500 plants were planted in July 2022
- Planted >6000 plants (trees largely) covering 39 species and lawn grass in Sept-Oct 2022

1. Unwanted weed and Bio-waste all around the South campus is removed by the workers on daily basis.



Figure 11: Weed Removed by Workers

2. Housekeeping staff collect the wet & dry food waste from all the Hostels, Canteens, Mess & Faculty houses and same is dispose by the agency at North campus dispose site on daily basis



Figure 12: Dry Waste Collection

3. The sweeping/ cleaning/ scrubbing / vacuum cleaning etc. all being carried out by machines only. However, in exceptional cases where cleaning is not possible with machines, manual cleaning is undertaken.



Figure 13: Vacuum Cleaning

Water management- “Catch the Rain” National water mission’s campaign as “Jal Shakti Abhiyan” on the campus.

To redress the water scarcity situation on the campus following steps are being taken for rain water harvesting and its conservation:

- Construction of soak pits for water conversion and recharge of ground water.
- Providing earthen gaps in the storm water drain at every 10 meters interval to recharge the ground water table.
- Mass plantation drives along the roads and path ways of the campus.
- Grey water from kitchens & bathrooms after the treatment in the Sewage treatment plant and ultra filtration is being used for irrigation purposes in garden areas on the campus.
- Utilization of treated sewage water from STPs for arboriculture and planning a double piping system for utilizing this treated water for flushing systems.

Horticulture

The IIT Mandi is situated at Kamand Valley which lies about 18km from Mandi city, an unexplored lush green beautiful valley.

The area is enriched with floral wealth; important species of trees found in the area are Pine (*Pinus roxburghii*), Mulberry (*Morus alba*), Willow Tree (*Salix alba*), Blue Jacaranda (*Jacaranda mimosifolia*), Toshi (Silver Oak), Walnut (*Juglans regia*), Gulmohar (*Delonix regia*), Chinar (*Plananus orientalis*), Toona (*Toona ciliata*), Deodar (*Cedrus deodara*), Cypress Plant (*Cupressus sempervirens*), Brass (*Rhododendron lepidotum*), etc.

Besides this there are a lot of medicinal plants and IIT Mandi also maintained the Botanical Garden containing the following main species Senna (*Cassia tora*), Nerium (*Nerium indicum*), Cockscomb (*Celosia argentea*), Peach (*Prunus persica*), Plum (*Prunus domestica*), etc.

IIT Mandi also organizes the plantation drive towards creating awareness among students and the IIT fraternity to understand the importance of plants in mitigating the effects of pollution and saving the environment.

In the year of 2022-23 IIT Mandi has planted more than 1000 plants of various varieties at North Campus, South Campus and Botanical garden. The new species are planted along with the roads & pathways. The new plantation have some new species and some fruit trees.

Botanical and Medicinal Plant Garden

IIT Mandi is committed to building a Green Campus. Based on the Eco-management plan the Green Panel of the institute recognized that establishing a Botanical Garden would help in achieving the commitment. The Botanical Garden was started in July 2015 with complete support from IIT Mandi with the following main objectives: Study of the flora of the Kamand region, Establish a Botanical Garden with a collection of local flora, Develop and maintain the Herbarium, In-situ conservation, collection and maintenance of medicinal plants, Documentation, digitization and dissemination of the related information, Undertake R&D in the related area (Phytochemical profiling of selected plants, understanding the local edible plants, Bioengineering plants, etc.)

Activities in 2022-23

- Maintenance of the Botanical and medicinal plant garden on regular basis.
- Involves irrigation, mulching, maintaining the trees, etc.
- Conservation and documentation/digitization of the flora of the Kamand region
- About ~200 plant species in multiple copies exist and growing well.
- For beautification purposes, the rose garden with 65 different varieties is being maintained. Initiated Bio fencing with duranta which will be visible in a few years.
- More species added to our existing herbarium Physical as well as e-herbarium <https://research.iitmandi.ac.in/botanical/herbarium.php>
- Seasonal plantation of various herbs and regular maintenance activities.
- Collection and drying of the herbs for Research work
- Supported with the technology of herbal in fusion to EWOK. Planning to formalize the transfer of the technology.
- The Medicinal Plant Lab, IIT Mandi advised and supported EWOK in the formation of Three

Farmer Producer Companies with the NABARD grant

- The Medicinal Plant Lab, IIT Mandi completed a research cum outreach project with Himalaya Drug Company (now Himalaya wellness company). The project received a further extension
- The Medicinal Plant Lab, IIT Mandi completed a DST- funded WOS(B) project which led to the promotion of essential oil crops by local farmers.
- Water supply to the Botanical Garden was facilitated by the Deanery

Sewage Treatment Plants

We have well-equipped four Sewage Treatment plants with a total capacity of about 725 KLD (450KLD + 75KLD + 75KLD + 125 KLD) based on SBR/MBBR processes. The solid waste & treated water coming out are being used for manure & irrigation purposes respectively.



Figure 14 : Sewage Treatment Plant

12.2.5 Guest House



To facilitate the lodging & dining services for the guests arriving at IIT-Mandi campus, guest house services are provided in both the campuses. The main guest house is situated in the North campus is named after the great Indian scientist and Nobel laureate Sir. C. V. Raman. In the South campus Manirang apartment (two accommodations) and a smaller semi-furnished guest house with three rooms (Uhl guest house) are available.

Apart from these two guest houses there are few sets of fully furnished apartments available in both the campuses to provide accommodation to eminent Institute guests. Guest house remains a pleasant heaven for the Institute's guests, whether from academia, guests from centre/ state government administration, Institute alumni, or the parents/wards of students.

12.2.6 Transport Facilities

Indian Institute of Technology Mandi is situated in Kamand valley of district Mandi (H.P.). The Institute is offering transport facilities to its students, faculty and staff members at very nominal charges. The Institute shuttle buses are plying between both the campuses (North & South campus of IIT Mandi) and the transport facilities are also available from Mandi Town to the IIT Mandi campus.

The Institute vehicle schedule is regularly updated on the website for information on all. IIT Mandi is also providing an advanced online seat-booking facility to its community. Presently Institute is providing a transport facility from morning 07:30 am to 12:00 am and at present 7 no. of buses (30 seaters) and 1 Van (12 seaters) is operational.



Figure 16: Transport Services in the Campus

12.5.7 Commercial Establishments

Currently, 10 nos. of commercial establishments are running in the Institute, which includes canteens, provision store, super market, vegetable & fruit stall, stationer shop & unisex saloons. The services are available in both the campuses. As the infrastructure is developing in the campus, few more shops are coming up and the same will be allotted to start news services/facilities in the campus.

12.5.8 Daycare

The daycare facilities are housed in safe and pleasant units with infrastructure available for feeding, sleeping and conducting various indoor and outdoor activities. The division into four sections, i.e. Infants (below 1 year), toddlers (1-3 years), pre-schoolers (3-4 years) and schoolers (above 5 years), help in providing specific care as required. For instance, the infant & toddler sections are provided with separate cribs for sleeping and high chairs for feeding. The pre-schoolers and schoolers are provided help with homework and sleeping facilities after school hours.

Located on the South and North campuses, these facilities provide a fun-filled learning environment for children of IIT Mandi's students and employees. Parents can leave their children confidently in the care of experienced and caring staff appointed after a selection process. The teachers and caregivers tend to the specific needs of infants and children upto 10 years. The tots are kept engaged in age-appropriate schedules that cater to their overall development. Parents can avail of the facilities either part-time or full-time.

12.3 Web Information and Networks Group (WING)

WING, Website Information and Networks Group, IIT Mandi is a faculty, staff & students group which is involved in the development, management, budgeting, monitoring and maintenance of the institute's websites, networks, software and voice/data communication. WING is responsible for providing the IT infrastructure, implements the governance for the use of network and information systems and it assists the IIT Mandi community by providing them the functionality they need. It is ensured that the organization's systems, networks, data and applications all connect and function properly. WING has a skilled technical team to deploy and maintain the web applications, services and IT infrastructure like Servers, Networks and Storage etc.

12.3.1 Servers, Software's and Email Services:

WING has deployed various software and web services locally on-campus. Physical Rack Servers are used to host the local as well as the global web portals. E-learning platform, cloud storage, ERP system,

centralized authentication, internet access, tally solutions etc. are few services which WING offers to the IIT Mandi community. WING provides personal email accounts with IIT Mandi domain to all the students/staff and faculty. WING is responsible for upkeep the various services offered and managing the backups/restore to avoid the service failure losses. WING has commissioned a storage cloud server locally on premises which provide a dedicated cloud space of 100 GB to each faculty and 50 GB to each staff.

A Fortigate Next Generation Firewall is commissioned in IIT Mandi for better security and reliably on the network services. Two devices are installed in parallel to handle any device failure.

12.3.2 Website and Intranet Services

WING manages all the contents of main website and Intranet portal and update them time to time. Web development team coordinate with each section/department to get content to upload and update on the web portals. It also manages databases, design and user interphase of web portals. Team use tools like word press, drupal, laravel etc. to design the web portals as and when needed for events like conferences, workshops, convocation etc. WING has re-developed the Institute main websites and other websites for different schools/centers with better UI and information flow.

12.3.3 Network and Telecommunication Services

WING is responsible for designing and implementing both the physical and wireless networks, maintaining network performance, managing the electronic equipment that activates any network pieces, troubleshooting network problems and researching & integrating new technologies into the network life cycle. WING takes care of telecommunication system in an organization such as telephone lines, WAN links, NKN VC links etc. Team ensures that these technologies work uninterruptedly.



Figure 17: Server Room: South Campus Figure18: Network Monitoring System Figure 19: Switch Panel: Server Room

12.3.4 Computer Labs

The computer lab serves as the center for learning and research. WING provides computer lab facilities to the students, faculty and staff for various activities like lab courses, workshops, online exams, placements, online interviews etc. Our computer labs have a total capacity of 300 computers as of now in four separate labs. These labs are also being used by NTA/AICTE for conducting online examinations like JEE Main, UGC-NET, CUET etc.

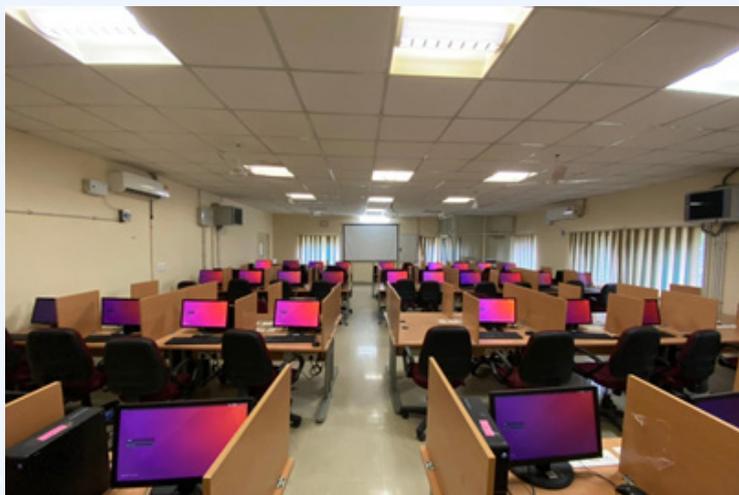


Figure 20: Computer Lab 2: A5 South Campus



Figure 21: Computer Lab 1: A5, South Campus

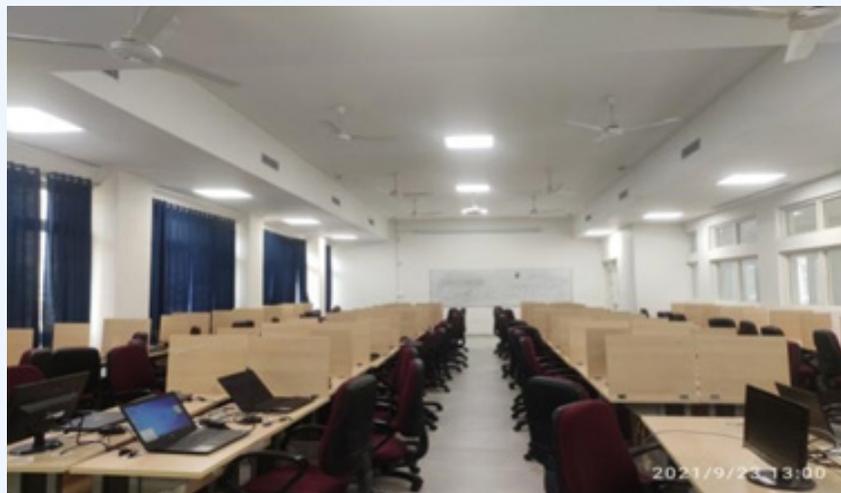


Figure 22: Computer Lab 3: A10, North Campus

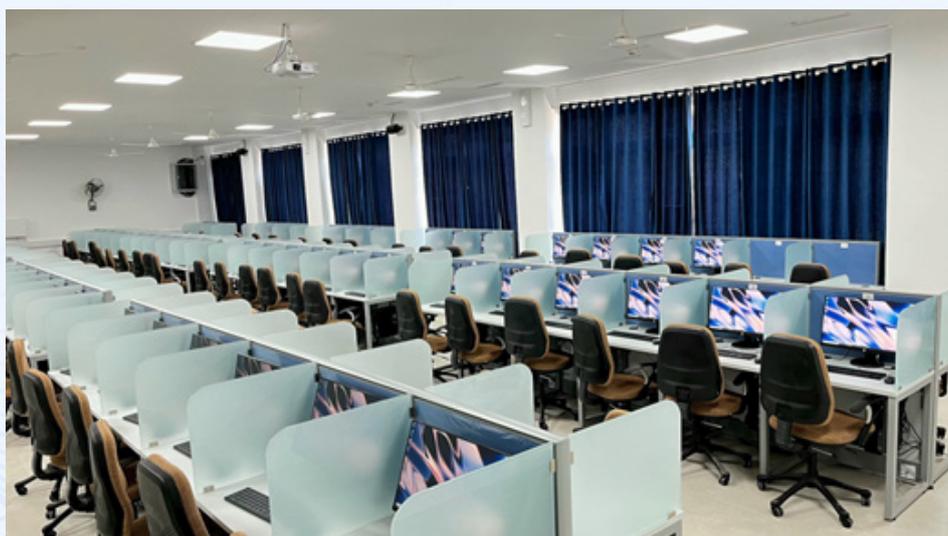


Figure 23: Computer Lab 4: A11, North Campus

12.3.5 Office Automation/ERP System

The IIT Mandi has an ERP system named as OAS (Office Automation System) which helps to automate various Academics and Administrative processes of the Institute. The OAS helps various departments/sections to digitize and assist in various processes. The various modules like Academics, Estate, Establishment, SRIC, Hostel, Accounts, Accounts, and Guest House etc are utilized by the Institute to assist Faculty, Students, Staff and Project Staff.

12.3.6 High Performance Computing (HPC) facility at IIT Mandi

There are 550 users at IIT Mandi who are using this facility. IIT Mandi hosts a high-performance computational (HPC) facility with a cluster containing 171 nodes based on Intel Xeon processors that have 3000 processor cores, memory of 12 TB and a 986 TB storage space. In addition, the facility hosts a GPU cluster of 33 Nvidia graphical processing units (GPU) best suited for deep learning and molecular dynamics applications. The nodes are connected to each other through dedicated Gigabit and 10 Gigabit Ethernet. The facility has 400+ registered users from the research community of IIT Mandi working on applications including avalanc dynamics, multiphase flow modeling, engineering, biotechnology, molecular dynamics, and computational chemistry, amongst others.

The facility currently hosts two sub clusters -- CPU HPC and GPU HPC, both running Centos 7. The CPU HPC cluster hosts compute nodes optimized for cpu-parallel jobs whereas the GPU HPC cluster hosts nodes containing high-end Nvidia GPU cards optimized for gpu-intensive parallel jobs. Two file systems are available on the HPC clusters: home and working directory with limits of 10 GB and 2 TB, respectively. Standard libraries are software installed on the cluster. State-of-the-art containerisation is enabled on the clusters for the users to install their own software without depending on the HPC administrators, drastically reducing the waiting time and increasing productivity. Account creation on the cluster is automated through the scripting codes that take care of the approval process, creation of new accounts, and sending off welcome emails.

Various queues are available to the users depending on the expected size and runtime of the job. All details are available on the cluster website, available to the college users post authentication.

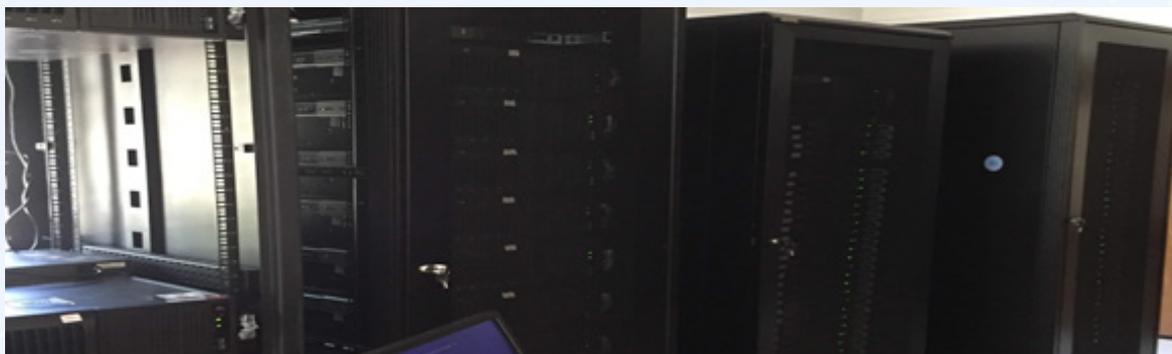


Figure 24: HPC cluster at IIT Mandi

12.3.7 Supercomputing facility Param Himalaya

A supercomputer is a computer that has very high speed in its operation and higher memory. This supercomputing system can perform assigned tasks including multiple tasks at very high speeds than any other normal personal computer and in many cases are able to operate at speeds that are millions of times faster than ordinary PCs.

IIT Mandi has established Super computer Param Himalaya.

Speed is 650 Teraflops. Documented 833 Teraflops with GPU documents

3 DLC Racks. 2 utility rack service nodes and service nodes.

Computer Nodes: 75

39 High Memory Nodes

GPU ready nodes: 32

GPU nodes: 10

3 Spare nodes

Total – 159



Figure 25

1. (BMS) A building management system (BMS) is a control system that can be used to monitor and manage the mechanical, electrical and electromechanical services in a facility. Such services can include power, heating, ventilation, air-conditioning, and physical access control, pumping stations, elevators and lights.
2. DLC racks have compute and GPU nodes, with a Storage system in Storage racks.
3. 500 KVA DG for 24x7 electricity for Param Himalaya.
4. High performance Computing lab for student’s research.
5. InRow AC for current HPC Hot aisle containment.
6. Novec fire suppression system and Vesda fire safety system.

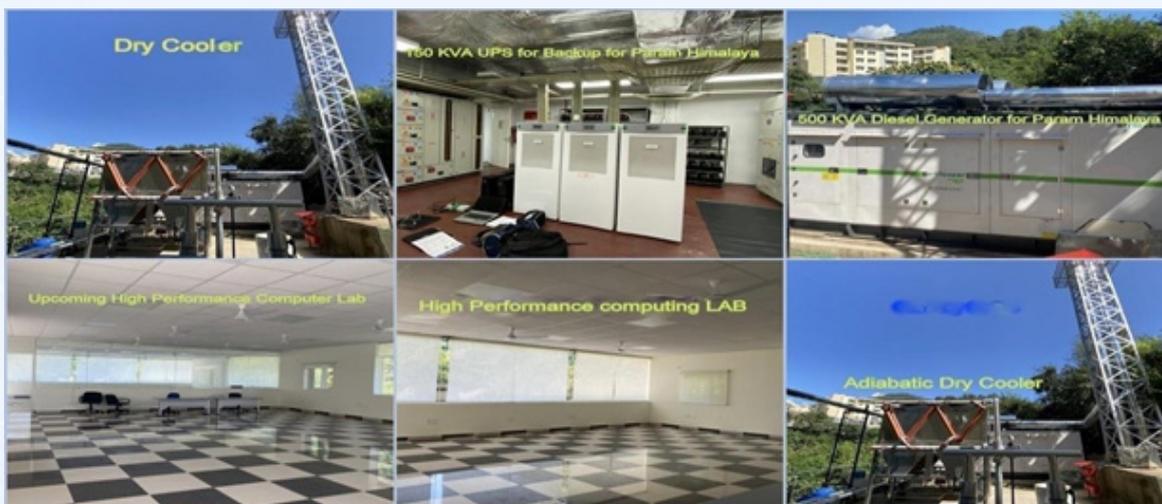


Figure 26

12.3.8 NKN IIT Mandi

Operation and Maintenance of Digital & Smart Classrooms, Conference rooms, Auditorium comes under the provision of NKN. NKN has created multiple state of the art Digital Infrastructure for serving IIT Mandi Community. All conference rooms, Smart classes are connected through National Knowledge Network (NKN) connectivity whose purpose is to bring together all the stakeholders in Science, Technology, Higher Education, Research & Development and Governance. The NKN is a revolutionary state-of-the-art multi-gigabit Pan-Indian resource-sharing network aimed at digitally connecting all national universities, colleges and research establishments to create country-wide virtual classrooms. Currently, 20 classrooms at IIT Mandi campus are connected with NKN.

13. Organisational Structure

| | |
|--|---|
|  | <p>Chairperson Prof. Prem Vrat Chairperson, BoG IIT Mandi Retired Professor, IIT Delhi & Founding Director, IIT Roorkee 1240, Sector-A, Pocket-A Vasant Kunj, New Delhi-110070</p> |
| <p>Members Prof. Laxmidhar Behera Director, IIT Mandi (Ex-officio) Indian Institute of Technology Mandi Mandi – 175 075 (H.P.)</p> <p>The Additional Secretary (TE)/ Joint Secretary (Ex-officio) MoE, Government of India Shastri Bhawan, New Delhi- 110 001</p> <p>Dr. Pradeep Kumar Agrawal Scientist, Directorate of Special Projects D.R.D.O. Hyderabad H.No. 16-142, Green Rich Avenue Badangpet Nagar Panchyat Hyderabad- 500 058</p> <p>Prof. Rahul Vaish (till 31.12.2022) Professor School of Engineering Indian Institute of Technology Mandi Mandi – 175 075 (H.P.)</p> <p>Prof. Manoj Thakur (w.e.f 01.01.2023) Professor, School of Mathematical & Statistical Sciences Indian Institute of Technology Mandi Mandi – 175 075 (H.P.) Secretary</p> <p>Shri K. K. Bajre (up to 15.09.2022) Prof. Satinder K. Sharma (w.e.f 16.09.2022) Registrar (Ex-officio) Indian Institute of Technology Mandi Mandi – 175 075 (H.P.)</p> | <p>The Chief Secretary/Secretary (TE) (Ex-officio) Government of Himachal Pradesh Shimla – 171 002</p> <p>Shri Kishan Chandra Sharma Site Head & Sr. Vice President Manufacturing, LUPIN Pharma Limited 198 - 202, New Industrial Area No. 2 Mandideep – 642 046, Distt, Raisen (M.P.)</p> <p>Shri Hemant Sood Managing Director & Promoter (Financial Services group) Findoc Financial Services Group 5thFlr, Kartar Bhawan, Near PAU, Gate No.1 Ferozpur Road, Ludhiana-141 001 (Punjab)</p> <p>Prof. Suman Kalyan Pal (till 31.12.2022) Chairperson, School of Basic Sciences Indian Institute of Technology Mandi Mandi – 175 075 (H.P.)</p> <p>Prof. Satinder Kumar Sharma (w.e.f. 01.01.2023) Professor, School of Computing & Electrical Engineering Indian Institute of Technology Mandi Mandi – 175 075 (H.P.)</p> |

*During this year, meetings of the Board of Governors were held on 11.05.2022 (Special Meeting), 14.06.2022, 26.10.2022 and 10.02.2023.

13.1 Finance Committee

| | |
|--|---|
| Chairperson (Ex-officio) Prof. Prem Vrat Chairperson, BoG IIT Mandi Retired Professor, IIT Delhi & Founding Director, IIT Roorkee 1240, Sector-A, Pocket-A Vasant Kunj, New Delhi-110070 |  |
| Members | |
| Prof. Laxmidhar Behera Director, IIT Mandi (Ex-officio) Indian Institute of Technology Mandi Mandi – 175 075 (H.P.) | The Addl. Secretary/Bureau Head(T.E.) (Ex-officio) MoE, Government of India Shastri Bhawan, New Delhi-110 001 |
| The Joint Secretary&Finance Advisor (Ex-officio) MoE, Government of India Shastri Bhawan, New Delhi – 110 001 | Prof. Ashok Gupta (up to 31.12.2022) Professor Department of Civil Engineering IIT Delhi, Hauz Khas New Delhi – 110 016 |
| Prof. B. K. Mishra (w.e.f. 01.01.2022) Professor Mechanical & Industrial Engineering IIT Roorkee | Prof. B. V. Phani (w.e.f. 01.01.2023) Professor, Department of Industrial & Management Engineering, IIT Kanpur |
| Shri K. K. Bajre (up to 15.09.2022) Prof. Satinder K. Sharma (w.e.f. 16.09.2022) Registrar (Ex-officio) Indian Institute of Technology Mandi Mandi – 175 075 (H.P.) | Dr. Vishal Singh Chauhan(up to 24.08.2022) Dr. Viswanath Balakrishnan (w.e.f. 25.08.2022) Dean (F & A) (Ex-officio) Indian Institute of Technology Mandi Kamand – 175075(H.P.) Secretary |

*During this year meetings of the Finance Committee were held on 11.05.2022 (Special Meeting), 14.06.2022, 26.10.2022 and 10.02.2023.

13.2 Building & Works Committee

| | |
|--|---|
| Chairman (Ex-officio) Prof. Laxmidhar Behera Director, IIT Mandi (Ex-officio) Indian Institute of Technology Mandi Mandi – 175 075 (H.P.) | Dean (I&S) (Ex-officio) Indian Institute of Technology Mandi Kamand – 175075, Himachal Pradesh |
| Member Prof. B. Bhattacharjee Professor Department of Civil Engineering Indian Institute of Technology Delhi Hauz Khas, New Delhi - 110 016 | Er. A.K. Jain Senior Consultant, IIT Mandi & Special DG, CPWD (retired) Mandi – 175 075, Himachal Pradesh |
| Er. K. N. Rai (w.e.f. 01.01.2021) Former Chief Executive Civil Works, DRDO (Retired) New Delhi | Member Secretary Er. Sunil Kapoor(up to 31.01.2023 A/N) Dr. Deepak Swami, Superintending Engineer I/c (w.e.f. 01.02.2023) |
| | Superintending Engineer (Ex-officio) Indian Institute of Technology Mandi Kamand Campus, VPO Kamand Distt. Mandi – 175 075, (H. P) |

*During this year meetings of the Building & Works Committee were held on 25th April, 2022 and 14th October, 2022.

13.3 SENATE (as on 31.03.2023)

Chairman

Prof. Laxmidhar Behera
Director, IIT Mandi (Ex-officio)

Professors

Prof. Subrata Ghosh, Professor, SCS, IIT Mandi
Prof. Prem Felix Siril, Professor, SCS, IIT Mandi
Prof. Suman Kalyan Pal, Professor, SPS, IIT Mandi
Prof. Chayan K. Nandi, Professor, SCS, IIT Mandi
Prof. Pradeep C. Parameswaran, Professor, SCS, IIT Mandi
Prof. Bharat Singh Rajpurohit, Professor, SCEE, IIT Mandi
Prof. Satinder K. Sharma, Professor, SCEE, IIT Mandi
Prof. Arti Kashyap, Professor, SPS, IIT Mandi
Prof. Rajeev Kumar, Professor, SMME, IIT Mandi
Prof. Rahul Vaish, Professor, SMME, IIT Mandi
Prof. Syed Abbas, Professor, SMSS, IIT Mandi
Prof. Manoj Thakur, Professor, SMSS, IIT Mandi
Prof. Aniruddha Chakraborty, Professor, SCS, IIT Mandi
Prof. Tulika Srivastava, Professor, SBB, IIT Mandi.
Prof. Rajendra Kr. Ray, Professor, SMSS, IIT Mandi.
Prof. Venkata Krishnan, Professor, SCS, IIT Mandi.

External Members

Prof. Siddhartha Mukhopadhyay, Dept. of Electrical Engineering, IIT Kharagpur.
Prof. Binay Kumar Pattnaik, Dept. of HSS, IIT Kanpur.
Prof. Sandeep Verma, Dept. of Chemistry, IIT Kanpur & Secretary (SERB).

Registrar

Prof. Satinder K. Sharma, Registrar I/c, IIT Mandi.

Deans

Dr. Rahul Vaish, Dean (Academics), IIT Mandi
Dr. Viswanath Balakrishnan, Dean (F&A), IIT Mandi.
Dr. Hitesh Shrimali, Dean (Students), IIT Mandi.
Prof. Rajeev Kumar, Dean (I&S), IIT Mandi
Prof. Syed Abbas, Dean (SRIC & IR), IIT Mandi.
Prof. Satinder K. Sharma, Dean (Faculty), IIT Mandi.
Prof. Chayan K. Nandi, Dean (DORA), IIT Mandi
Prof. Arti Kashyap, Dean (DCS), IIT Mandi.

Chairpersons

Dr. Samar, Chairperson, SCEE, IIT Mandi.
Dr. Shyamasree Dasgupta, Chairperson (SHSS), IIT Mandi
Prof. Pradeep C. Parameswaran, Chairperson, SCS, IIT Mandi
Prof. Suman Kalyan Pal, Chairperson, SPS, IIT Mandi
Dr. Muslim Malik, Chairperson, School of Mathematical and Statistical Sciences (SMSS), IIT Mandi.
Dr. Shyam Kumar Masakapalli, Chairperson, School of Biosciences & Bioengineering (SBB), IIT Mandi.
Dr. Atul Dhar, Chairperson, School of Mechanical & Materials Engineering (SMME), IIT Mandi
Dr. Dericks P. Shukla, Chairperson, School of Civil and Environmental Engineering (SCENE), IIT

Mandi.

Prof. Manoj Thakur, Chairperson, School of Management (SoM), IIT Mandi.

Co-ordinators/Chairpersons - Centres

Dr. C.S. Yadav, Co-ordinator, AMRC, IIT Mandi.
Prof. Satinder K. Sharma, Co-ordinator, C4DFED, IIT Mandi.
Dr. Prosenjit Mondal, Co-ordinator, BioX Centre, IIT Mandi

Dr. Varun Dutt, Chairperson, IKSMHA, IIT Mandi
 Dr. Amit Shukla, Chairperson, CAIR, IIT Mandi
 Nominees from Schools
 Dr. Rahul Shrestha, Associate Professor, SCEE, IIT Mandi.
 Dr. Jinesh Machhar, Assistant Professor, IIT Mandi.
 Dr. Satyajitsinh A. Thakor, Associate Professor, IIT Mandi
 Dr. Bindu Radhamany, Associate Professor, SPS, IIT Mandi.
 Dr. Deepak Swami, Associate Professor, SCENE, IIT Mandi.
 Dr. Kala, Venkata Uday, Associate Professor, SCENE, IIT Mandi.
 Dr. Bhaskar Mondal, Assistant Professor, SCS, IIT Mandi.
 Dr. Satvasheel Ramesh Powar, Associate Professor, SMME, IIT Mandi.
 Dr. Amit Prasad, Associate Professor, SBB, IIT Mandi.
 Dr. Surya Prakash Upadhyay, Associate Professor, SHSS, IIT Mandi.
 Dr. Nitu Kumari, Associate Professor (SMSS), IIT Mandi
 Dr. Puran Singh, Associate Professor (SoM), IIT Mandi
 Dr. Arnav Bhavsar Vinayak, Associate Professor, IKSMHA, IIT Mandi.
 Dr. Narendra Dhar, Assistant Professor, CAIR, IIT Mandi.
 Nominees from Industries and R&D
 Mr. Rajesh Sinha, Chief Scientist & Head - Smart Machines Research Program, TCS.
 Mr. Hemachandra Bhat, General Manager and Practice Head, Robotics Platforms, Wipro.
 Invitees
 Dr. P. Anil Kishan, Associate Dean (Courses), IIT Mandi.
 Dr. Amit Jaiswal, Associate Dean (Research), IIT Mandi.
 Mr. Naresh Singh Bhandari, Deputy Librarian, IIT Mandi.
 Shri Suresh K. Rohilla, DR (Academics), IIT Mandi.
 Dr. Tushar Jain, Head CCE, IIT Mandi.
 Prof. Tulika Srivastava, Professor, SBB, IIT Mandi
 Dr. Devika Sethi, Assistant Professor, SHSS, IIT Mandi.
 Special Invitees
 Student Research Affairs Secretary, IIT Mandi.(Special Invitee)
 Student General Secretary, IIT Mandi. (Special Invitee)
 Student Academic Affairs Secretary, IIT Mandi. (Special Invitee)
 *During this year meetings of the Senate were held on 02.06.2022, 15.09.2022, 07.10.2022 and 08.02.2023.

13.4 Academic Officials As On 31.03.2023

| | |
|--|--|
| DIRECTOR | |
| Prof. Laxmidhar Behera | |
| DEANS | |
| Prof. Satinder Sharma Dean (Faculty) | Prof. Rajeev Kumar (w.e.f. 06.04.2022) Dean (Infrastructure and Services) |
| Dr. Manoj Thakur (upto 11.09.2022) Dr. Hitesh Shrimali (w.e.f. 12.09.2022) Dean (Students) | Dr. Vishal Singh Chauhan (up to 24.08.2022) Dr. Viswanath Balakrishnan (w.e.f. 25.08.2022) Dean (Finance & Accounts) |
| Prof. Rahul Vaish Dean (Academics) | Dr. Venkata Krishnan (up to 12.03.2022) Dr. Syed Abbas (w.e.f. 13.03.2022) Dean (SRIC& IR) |

| | |
|---|---|
| Prof. Chayan Kanti Nandi(w.e.f. 06.04.2022) Dean (DORA) | Prof. Arti Kashyap (w.e.f. 09.03.2023) Dean (DCS) |
| ASSOCIATE DEANS | |
| Dr. P. Anil Kishan (w.e.f. 07.04.2022) Associate Dean (Courses) | Dr. Tulika Srivastava (w.e.f 10.02.2022) Associate Dean (International Relations) |
| Dr. Viswanath Balakrishnan (w.e.f. 07.07.2022 to 24.08.2022) Associate Dean (Finance & Accounts) Vacant w.e.f. 25.08.202 | Dr. Rajanish Giri (up to 09.10.2022) Dr. Amit Jaiswal (w.e.f. 10.10.2022) Associate Dean (Research) |
| Dr. Arnav Bhavsar Associate Dean (SRIC) | Dr. Deepak Swami (w.e.f. 07.04.2022) Associate Dean (Infrastructure) |
| CHAIRPERSONS | |
| Dr. Samar Agnihotri School of Computing and Electrical Engineering (SCEE) | Dr. Atul Dhar (w.e.f. 15.02.2022) School of Engineering (SE) ** Dr. Viswanath Balakrishnan (up to 14.02.2022) |
| Prof. Suman K. Pal (up to 10.07.2022) School of Basic Sciences (SBS) ** | Dr. Shyamasree Dasgupta School of Humanities and Social Sciences (SHSS) |
| * The Board of Governors (BoG) in its 34th Meeting held on 19th March, 2022 vide item no. 34.03.10 has approved to establish the School of Management (SoM). | |
| Prof. Manoj Thakur(w.e.f. 13.09.2022) School of Management (SoM)* | |
| **The Board of Governors (BoG) in its 35th Meeting held on 14th June, 2022 vide item no. 35.3.3. has approved to Constitute following 6 Schools by splitting School of Engineering (SE) and School of Basic Sciences (SBS). | |
| Prof. Suman Kalyan Pal (w.e.f. 01.08.2022) School of Physical Sciences (SPS) | Prof. Pradeep C. Parameswaran (w.e.f. 12.07.2022) School of Chemical Sciences (SCS) |
| Dr. Atul Dhar (w.e.f. 18.07.2022) School of Mechanical and Materials Engineering (SMME) | Dr. Dericks P. Shukla (19.07.2022) School of Civil and Environmental Engineering (SCENE) |
| Dr. Muslim Malik (w.e.f. 14.07.2022) School of Mathematical and Statistical Sciences (SMSS) | Dr. Shyam Kumar Masakapalli (w.e.f. 11.07.2022) School of Biosciences & Bioengineering (SBB) |
| Centre Co-ordinators/Chairpersons | |
| Dr. Prosenjit Mondal, Coordinator, Bio-X Centre | Prof. Satinder K. Sharma, Coordinator, Centre for Design Fabrication of Electronic Devices (C4DFED). |

| | |
|---|--|
| Dr. C.S. Yadav, Coordinator, Advance Material Research Centre (AMRC). | Dr. Varun Dutt, Chairperson, Indian Knowledge System and Mental Health Applications (IKSMHA) Centre. |
| Dr. Amit Shukla, Chairperson, Centre for Artificial Intelligence & Robotics (CAIR). | Dr. Tushar Jain, Head, Centre for Continuing Education (CCE). |

13.5 Administrative Officials As on 31.03.2023

| ADMINISTRATIVE OFFICIALS AS ON 31.03.2023 | |
|---|---|
| Mr. K. K. Bajre, Registrar (on Deputation) (Relieved on 16.09.2022) | Er. Sunil Kapoor, Superintending Engineer (Retire on 31.01.2023) |
| Prof. Satinder Kumar Sharma Registrar i/c (w.e.f. 16.09.2022) | Mr. J.R. Sharma, Officer In-charge (Finance & Accounts) |
| Mr. Naresh Singh Bhandari, Deputy Librarian | Dr. Chander Singh, Principal Medical Officer |
| Mr. Suresh Kumar Rohilla, Deputy Registrar (Academics/Store & Purchase) | Mr. Yadvinder Project Engineer & Estate Officer (Relieved on 30.06.2022) |
| Mr. Vinod Malik, Deputy Registrar (Finance & Accounts) (Relieved on 20.06.2022) | Mr. Parminder Jit, Deputy Registrar (Faculty Estb. and Recruitment, Audit & Legal) |
| Mr. Vivek Tiwari, Deputy Registrar (Directorate, Staff Administration & Recruitment) | Mr. Anuj Kumar Dubey, Assistant Registrar (MORC & DORA) |
| Ms. Shelika, Assistant Registrar (Dean Students Office) | Dr. Milan Behl, Medical Officer (Ayurveda) |
| Mr. Dushyant Sharma Assistant Registrar (SRIC & IR) | Dr. O. P. Mahendru Medical Officer (GDMO) |
| Dr. Shib Nath Jha, Principal Sports Officer (Relieved on 10.02.2023) | Dr. Rushali, Medical Officer (GDMO) |
| Dr. Utsav Thakur Medical Officer | Ms. Parul Malik, Counselor |
| Dr. Parul Thakur, Female Medical Officer (GDMO) (Relieved on 30.09.2022) | |
| Dr. Rajeev Shrivastava Placement Officer | |

Employee Data in on 31.03.2023

| LIST OF Non-Teaching Staff (Deputation + Permanent + Contract Against Pay Scale) | | |
|--|-----------------------------|--|
| Sr. No. | Name | Designation |
| GROUP 'A' STAFF | | |
| 1 | Prof. Satinder Kumar Sharma | Registrar i/c |
| 2 | Mr. K. K. Bajre | Registrar (On Deputation) (Relieved on 18.09.2022) |
| 3 | Er. Sunil Kapoor | Superintending Engineer (Retired on 31.01.2023) |
| 4 | Mr. Naresh Singh Bhandari | Deputy Librarian |
| 5 | Mr. Suresh Kumar Rohilla | Deputy Registrar (Academics/Store & Purchase) |
| 6 | Mr. Vinod Malik | Deputy Registrar (Finance & Accounts) (Relieved on 20.06.2022) |

| | | |
|------------------------|---------------------------|---|
| 7 | Mr. Yadvinder | Project Engineer & Estate Officer (Relieved on 30.06.2022) |
| 8 | Mr. Vivek Tiwari | Deputy Registrar (Directorate & Staff Administration & Recruitment) |
| 9 | Mr. Parminder Jit | Deputy Registrar (Faculty Estb. & Recruitment & Audit & Legal) |
| 10 | Ms. Shelika | Assistant Registrar (Dean Students Office) |
| 11 | Dr. Chander Singh | Principal Medical Officer |
| 12 | Mr. Anuj Kumar Dubey | Assistant Registrar (MORC & DORA) |
| 13 | Mr. Dushyant Sharma | Assistant Registrar (SRIC & IR) |
| GROUP 'B' STAFF | | |
| 1 | Ms. Monika Kashyap | Senior Superintendent |
| 2 | Mr. Hardeep Singh | Security Officer |
| 3 | Ms. Chandan Sharma | Senior Superintendent |
| 4 | Mr. Puneet Kumar | Senior Assistant Engineer (Civil) (on Lein) |
| 5 | Mr. Siddharth Jamwal | Assistant Engineer (Civil) |
| 6 | Mr. Vikas Kumar Chaudhary | Assistant Engineer (Civil) |
| 7 | Mr. Neeraj Chauhan | Assistant Engineer (Electrical) |
| 8 | Mr. Abhijeet Tiwari | Assistant Library Information Officer |
| 9 | Mr. Vinod Kumar | Assistant Library Information Officer |
| 10 | Dr. Sonali Malhotra | Senior Library Information Assistant |
| 11 | Mr. Jitendra Namdev | Senior Library Information Assistant |
| 12 | Mr. Lalit Kumar | Junior Technical Superintendent |
| 13 | Mr. Hardeep Kumar Singh | Junior Technical Superintendent (Relieved on 27.07.2022) |
| 14 | Mr. Rakesh Kumar | Junior Technical Superintendent |
| 15 | Mr. Ramesh Kumar | Junior Superintendent (Accounts) |
| 16 | Mr. Kaul Singh | Physical Training Instructor |
| 17 | Mr. Pawan Kumar | Junior Superintendent |
| 18 | Ms. Lishma Anand | Junior Superintendent |
| 19 | Mr. Pavin S. Samuel | Junior Superintendent |
| 20 | Ms. Sushma Kumari | Junior Superintendent |
| 21 | Mr. Hira Singh Negi | Deputy Security Officer |
| 22 | Ms. Bhavneswari Devi | Staff Nurse |
| 23 | Mr. Ankush Kapil | Junior Technical Superintendent |
| 24 | Mr. Veomesh Rawat | Junior Superintendent |
| 25 | Mr. Vishal Parmar | Junior Superintendent |
| 26 | Mr. Girish Pal | Junior Superintendent |
| 27 | Mr. Rajeev Kumar Sharma | Junior Superintendent |
| 28 | Mr. Vineet | Junior Superintendent |
| 29 | Mr. Ajay Kumar Singh | Junior Superintendent (Relieved on 15.06.2022) |
| 30 | Mr. Anoop Kumar | Junior Superintendent |
| 31 | Mr. Tarun Thakur | Junior Engineer (Civil) (Joined IIT Mandi on 24.06.2022 & Relieved on 31.07.2022) |
| 32 | Mr. Omjeet Thakur | Junior Engineer (Civil) |
| 33 | Mr. Gavin Dhiman | Junior Engineer (Civil) |

| | | |
|------------------------|------------------------|--|
| 34 | Mr. Nitin Singh Tomar | Junior Superintendent (Rajbhasha) |
| 35 | Ms. Suchetna Shachi | Junior Superintendent |
| 36 | Mr. Sunil | Junior Superintendent |
| 37 | Mr. Sushil Kumar Pal | Junior Superintendent |
| 38 | Mr. Amit Sharma | Junior Technical Superintendent |
| 39 | Mr. Abhay Pratap Singh | Junior Technical Superintendent |
| 40 | Ms. Sonia Gupta | Junior Superintendent |
| 41 | Mr. Sandeep Kumar | Junior Superintendent |
| GROUP 'C' STAFF | | |
| 1 | Mr. Aditya | Senior Assistant |
| 2 | Mr. Prakash Singh Negi | Senior Assistant |
| 3 | Mr. Desh Raj | Senior Lab. Assistant |
| 4 | Mr. Dinesh Thakur | Senior Lab. Assistant |
| 5 | Mr. Tarun Verma | Senior Lab. Assistant |
| 6 | Mr. Sanjay Kumar | Junior Accountant |
| 7 | Mr. Vikram Jeet | Junior Accountant |
| 8 | Mr. Gopal | Junior Lab. Assistant (Technical) |
| 9 | Mr. Dashmesh Singh | Junior Lab. Assistant (Technical) |
| 10 | Mr. Lakhmi Chand Yadav | Junior Lab. Assistant (Medical) (Relieved on 30.03.2023) |
| 11 | Mr. Anil Kumar | Junior Assistant |
| 12 | Mr. Nishant Kumar | Junior Assistant |
| 13 | Mr. Kuldeep | Junior Assistant |
| 14 | Mr. Prateek | Junior Assistant |
| 15 | Ms. Nalini Singh Gill | Junior Assistant |
| 16 | Mr. Sameem Khan | Junior Assistant |
| 17 | Mr. Vijay Singh | Junior Assistant |
| 18 | Ms. Sruchi Devi | Junior Assistant |
| 19 | Mr. Amit Kumar | Junior Assistant |
| 20 | Mr. Shiv Kamal | Junior Assistant |
| 21 | Mr. Gaurav Katoch | Junior Assistant |
| 22 | Mr. Amit Kumar | Junior Assistant |
| 23 | Ms. Renu | Junior Assistant |
| 24 | Mr. Vivek Kumar Dongre | Junior Assistant |
| 25 | Ms. Kavita Enamdar | Junior Assistant |
| 26 | Mr. Balbir Singh | Junior Assistant |
| 27 | Mr. Mukesh Kumar | Junior Assistant |
| 28 | Ms. Mamta | Junior Assistant |
| 29 | Mr. Arvind Thapliyal | Junior Assistant |
| 30 | Mr. Saurav Saini | Junior Assistant |
| 31 | Ms. Arsheen Gurung | Junior Assistant |
| 32 | Mr. Anurag Rawat | Junior Assistant |
| 33 | Mr. Anugrah Rawat | Junior Assistant |
| 34 | Mr. Ambrish Yadav | Junior Assistant |
| 35 | Mr. Shyam Singh | Driver |

| 36 | Mr. Manoj Kumar | Attendant |
|---|-----------------------------|----------------------------------|
| 37 | Mr. Leela Dhar | Junior Attendant (Multi Skilled) |
| LIST OF CONTRACT EMPLOYEES (On Consolidated Emoluments) As on 31.03.2023 | | |
| Sr. No. | Name | Designation |
| 1 | Mr. Mandheer Bali | Junior Engineer (Civil) |
| 2 | Ms. Debashrita R. Chowdhury | Web - Content Developer |
| 3 | Ms. Nimisha N. B. | Career & Placement Executive |
| 4 | Mr. Deen Dyal | Junior Engineer (Civil) |
| 6 | Ms Isita Mahanti Nandi | Project Scientist (Ad-hoc) |
| 7 | Mr. Ashish Srivastava | Manager |
| 8 | Dr. Milan Behl | Medical Officer (Ayurveda) |
| 9 | Dr. O. P. Mahendru | Medical Officer |
| 10 | Dr. Utsav Thakur | Medical Officer (GDMO) |
| 11 | Dr. Rushali | Medical Officer (GDMO) |
| 12 | Mr. Mohit | Legal Assistant |
| 13 | Ms. Parul Malik | Counselor |
| 14 | Dr. Rajeev Shrivastava | Placement Officer |

14. Status Of Filling Up Of Backlog Vacancies During The Year

To report the status of filling up of backlog vacancies in the teaching cadre

The Ministry of Education, Department of Higher Education has intimated all the IITs to implement Central Educational Institutional (Reservation in Teacher's Cadre) Act 2019. Further, the Ministry vide DO Letter No.33-2/2021-TS-III (Pt.I) dated August 24, 2021 has instructed all IITs regarding filling of backlog vacancies in a mission mode.

The process of recruitment for getting the best candidates from reserved categories is taken up in mission mode through Special Recruitment Drive (SRD) as well as Standing/Specific advertisement mode in which some of the selection process has been completed and few are under process.

| | |
|--|-----|
| The current status of Faculty recruitment is as under: | |
| Sanctioned positions (10:1 Students: Faculty ratio) | 238 |
| Faculty in positions on Regular pay Scale | 163 |
| Vacancy | 75 |
| | |

Faculty Recruitment conducted during September 2022 August 2023:

| Particulars | September 2022 to August 2023 |
|---|-------------------------------|
| Total no. of offer letter issued | 46 |
| Out of 46, offer letter issued in Reserved Category | 16 |



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MANDI

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CONTACT:

The Registrar,

Indian Institute of Technology Mandi

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