

DIRECTOR'S REPORT



Prof. Ajit Kumar Chaturvedi
DIRECTOR, IIT MANDI

Dr. Raghunath Mashelkar, Chief Guest of the 8th Convocation of IIT Mandi; Professor Prem Vrat, Chairman of the Board of Governors; Members of the Board of Governors, IIT Mandi; Members of the Academic Senate; Faculty and Staff Members of the Institute; graduating students and their family members; distinguished guests: I welcome you all on the occasion of the 8th Convocation of the Indian Institute of Technology Mandi. I would like to take this opportunity to congratulate the graduating students for achieving this milestone in their lives. I'm sure this is a moment of pride for them and their families.

Today, we are delighted to have with us Dr. Raghunath Mashelkar as the Chief Guest. Dr. Mashelkar was conferred the Padma Vibhushan in 2014 and has been honoured as a Fellow of the Royal Society, Foreign Fellow of the US National Academy of Science and US National Academy of Engineering, Foreign Associate of the American Academy of Arts and Science, and Fellow of the US National Academy of Inventors. 42 universities from around the world have conferred honorary doctorate degrees to him.

I'm delighted to announce that 383 candidates will be graduating on the occasion of the 8th Convocation of IIT Mandi. This includes 147 B.Tech, 97 M.Tech., 77 M.Sc., 12 M.A., and 50 Research Scholars. Of the 50 Research Scholars, 11 are being awarded M.S. (by Research) degrees and 39 are being conferred Ph.D. degrees.

1. GRADUATING STUDENTS

147 B.Tech., which includes 2 B.Tech. (Honours) and 56 B.Tech. with Minor, 97 M.Tech. (23 in Mechanical Engineering with specialization in Energy Systems; 14 in Energy Engineering with specialization in Materials; 17 in Structural Engineering; 9 in VLSI; 14 in Power Electronics and Drives and 10 in Communications and Signal Processing), 77 M.Sc. (26 in Chemistry, 29 in Applied Mathematics and 22 Physics), 12 M.A. (Development Studies), 11 M.S. (by Research)

and 39 Ph.D. candidates will be graduating today. The following is a summary of the research being recognized today by the award of these degrees:

- **GRADUATING RESEARCH STUDENTS: Doctor of Philosophy**

1. AJAY

Ph.D. Supervisor: Dr. Samar Agnihotri

Title of the Thesis: Device-To-Device Multicast in Underlay Cellular Networks

The thesis introduces the problem of device-to-device (D2D) multicast in underlay cellular networks, provides various novel insights into this problem, and pragmatic solutions for the same.

2. KARAN SINGH

Ph.D. Supervisor: Dr. Kaustav Mukherjee

Title of the Thesis: Magnetic, Thermodynamic and Electrical Transport Properties of Ce-based Intermetallics: $\text{Ce}_{1-x}\text{La}_x\text{Ge}$ ($x = 0.0-0.76$), $\text{Ce}_{1-x}\text{Y}_x\text{NiGe}_2$ ($x = 0.0-0.4$) and CeAlGe

The thesis addresses some of the open problems around the research on 4f-electron-based compounds under the application of external non-thermal parameters like a magnetic field, doping, etc.

3. SUMEET KUMAR SHARMA

Ph.D. Supervisor: Dr. Vishal S Chauhan and Dr. S. C. Jain

Title of the Thesis: Electromagnetic Radiation Detection from Ferroelectric Ceramics for Wireless Sensing Applications

The thesis carries out theoretical and experimental investigation on wireless signal emission characteristics of the ferroelectric materials under the application of electric field, impact loading, and at low and high-temperature conditions.

4. VIBHA GUPTA

Ph.D. Supervisor: Dr. Arnav Bhavsar

Title of the Thesis: Ensemble and Deep Learning-based Approaches for Microscopy Image Analysis

The thesis work involves developing ensemble learning and deep learning algorithms for the classification of HEP2 cell images and breast cancer histopathology images; it also includes automatic methods to select features that are more important for the classification task.

5. SURENDER LAL

Ph.D. Supervisor: Dr. C. S. Yadav and Dr. Kaustav Mukherjee

Title of the Thesis: Structural, Magnetic, Dielectric and Thermodynamic Studies of Layered Perovskite LnBaCuFeO_5 ($\text{Ln} = \text{Rare-earth element}$) and its Derivatives

The thesis focuses on the exploration of the physical properties of layered perovskite compounds LnBaCuFeO_5 ($\text{Ln} = \text{Rare-earth element}$) and its derivatives, which are promising multiferroic materials.

6. ANSHUL THAKUR

Ph.D. Supervisor: Dr. Padmanabhan Rajan

Title of the Thesis: Automatic Pattern Analysis of Bioacoustic Signals: Exploring Shallow and Deep Learning Frameworks

This thesis proposes machine learning approaches to the problem of the classification of bioacoustic signals like bird and frog vocalizations.

7. MANU SHREE

Ph.D. Supervisor: Dr. Shyam Kumar Masakapalli

Title of the Thesis: Mapping Central Carbon Metabolism of *Xanthomonas Oryzae* and *Xanthomonas Campestris* by Integrating Metabolic Systems Biology approaches

*The thesis decodes the precise metabolic phenotypes of agriculturally and industrially relevant phytopathogens - *Xanthomonas campestris* and *Xanthomonas oryzae* by integrating robust metabolic systems biology approaches of comparative genomics, ¹³C tracer based metabolic pathway mapping, and ¹³C Metabolic Flux Analysis (¹³C MFA).*

8. SHAIKU GUPTA

Ph.D. Supervisor: Dr. Dileep A.D. and Dr. Timothy A. Gonsalves

Title of the Thesis: Online Resource Usage Prediction and Failure-Aware System for Resource Provisioning in Cloud Datacenters

The thesis focuses on improving the prediction of future resource usage and proactive prediction of resource contention failures of cloud resource provisioning system by analysing the nature of cloud workloads and by applying machine learning techniques.

9. NAINA ARORA

Ph.D. Supervisor: Dr. Amit Prasad

Title of the Thesis: Immuno-Proteomic Profiling of Excretory-Secretory Proteins of *Taenia Solium* Metacestode

*The thesis provides a study about the role of *Taenia solium* proteins in the immunopathogenesis of neurocysticercosis and host immune modulation. A new diagnostic tool for neurocysticercosis was established during this study.*

10. INDU YADAV

Ph.D. Supervisor: Dr. Hitesh Shrimali

Title of the Thesis: Design and Analysis of Front-End Electronics for CMOS Pixel Detectors

The thesis presents a design methodology for radiation hard CMOS pixel detectors along with its noise and crosstalk analyses. The work is supported with the measurement results of the fabricated chip in 180nm BCD technology for a pixel size of 288.

11. ADIL USMAN

Ph.D. Supervisor: Dr. Bharat Singh Rajpurohit

Title of the Thesis: Fault Diagnosis in Brushless Permanent Magnet Synchronous Motor Drive

This thesis provides a new fault modeling technique offering less computational time and a novel fault diagnostic signature for detecting, identifying, and localizing faults in the Permanent Magnet electrical machines.

12. ASHISH SHIRISH JOSHI

Ph.D. Supervisor: Dr. Satinder Kumar Sharma and Dr. Hitesh Shrimali

Title of the Thesis: Multivalent Energy-Efficient CMOS Amplifiers and Data Converters for Signal Processing Applications

The thesis presents an energy-efficient design of low noise instrumentation amplifier and ADC for a low frequency-based sensor, and biomedical applications such as EEG, ECG, and EMG.

13. GADHAVE KUNDLIK BHAGWAN

Ph.D. Supervisor: Dr. Rajanish Giri

Title of the Thesis: The Dark Side of Alzheimer's Disease and Amyloid Formation by Signal Peptide of Amyloid Precursor Protein

The thesis provides substantial insights on the intrinsic disorder profile of proteins from the amyloid cascade signaling and the Ubiquitin-Proteasome System and reports that the Signal Peptide of APP can self-assemble into β -sheet rich cytotoxic amyloid-like aggregates.

14. DEEPAK KUMAR

Ph.D. Supervisor: Dr. Rajanish Giri

Title of the Thesis: Zika Virus Helicase: From Biophysics to Drug Discovery of a Moving Target

The thesis deals with the wholistic study of intrinsically disordered proteins of Zika virus proteome and further focuses on a Zika virus protein NS3 helicase which utilizes the intrinsic disorder to gain multifunctional abilities. The biophysical characterization of NS3 helicase was carried out to establish structure-function relationships.

15. SUBRATA MONDAL

Ph.D. Supervisor: Dr. Rajesh Ghosh

Title of the Thesis: Biomechanical Analysis and Design Considerations of Tibial Component for Total Ankle Replacement

The thesis focuses on investigating the load transfer, strain distribution, implant-bone micromotion, measurement of wear depth and the implant-induced bone adaption, and their relationships with the failure risk, using finite element (FE) analysis.

16. NAVNEET CHANDRA VERMA

Ph.D. Supervisor: Dr. Chayan Kanti Nandi

Title of the Thesis: Single Molecule Blinking and Localization Based Superresolution Microscopy of Carbogenic Fluorescent NanoDots

The thesis establishes carbogenic fluorescent nanodots (FNDs) as a specific bio-labeling probe for new-age 3D, deep-tissue confocal, super-resolution microscopy, and electron microscopy. FNDs were explored for their use as an efficient probe for the most advanced correlative light and electron microscopy.

17. RAJESH DHAYAL

Ph.D. Supervisor: Dr. Muslim Malik and Dr. Syed Abbas

Title of the Thesis: Study of Deterministic and Stochastic Differential Equations with Applications in Control Problems

The thesis deals with the investigation of various kinds of deterministic and stochastic differential equations in finite as well as in infinite-dimensional spaces. It provides insight into the different types of controllability, existence, uniqueness, stability, and existence of optimal controls for non-instantaneous impulsive differential equations of order one, two, and non-integer.

18. SHEKHAR SINGH

Ph.D. Supervisor: Dr. Syed Abbas and Dr. Muslim Malik

Title of the Thesis: Study of Dynamic Equations on Time Scale with Applications

In this thesis, the focus is to derive oscillatory results for the first and second-order dynamic equations on a time scale. The results are established by using less restrictive conditions. Furthermore, a new unified derivative of continuous, discrete, and quantum calculus is introduced.

19. MEDHA KUMAR

Ph.D. Supervisor: Dr. Varun Dutt

Title of the Thesis: Understanding and Improving Human Decisions Against Climate Change via Computer Simulation Tools

The main contribution of this thesis is the use of simulation tools and computational models to understand people's decisions individually or in a group against climate change via the use of microworlds and public goods game for studying climate change decision making, and reinforcement learning techniques to model learning and decision making.

20. SHIKHA GUPTA

Ph.D. Supervisor: Dr. Dileep A.D.

Title of the Thesis: Dynamic Kernels and Semantic Representations for Recognition of Varying Size Scene Images

This thesis addresses issues in designing dynamic kernel-based SVM classifier for varying size scene image recognition and to learn semantic multinomial representation as a semantic representation of scene images that captures the constituent concept information better and further bridges the semantic gap for improving the recognition performance.

21. BANDHANA DEVI

Ph.D. Supervisor: Dr. Aditi Halder and Dr. Rik Rani Koner

Title of the Thesis: Metal-Organic Materials Derived Nanostructures for Energy Conversion and Storage Applications

The thesis deals with the design and synthesis of electrocatalysts from metal-organic materials (MOMs) through controlled pyrolysis processes. To evaluate the newer strategies for coupling energy conversion devices with energy storage devices like supercapacitors, both electrochemical study and device fabrication were carried out.

22. SHIVANI

Ph.D. Supervisor: Dr. Hitesh Shrimali and Dr. Satinder Kumar Sharma

Title of the Thesis: High-K Gate Dielectrics for Two-Dimensional Multilayer Hafnium Disulfide based Interdigitated Electrodes-Field-Effect Transistors: Next-Generation Technology

In the thesis, a high purity 2DML HfS₂ is chemically synthesized through the Hot injection method to utilize as a channel material for the μ -IDEs-FETs applications.

23. IMRAN AHAMED

Ph.D. Supervisor: Dr. Arti Kashyap

Title of the Thesis: Ab-initio studies of exotic properties of ϵ -Fe₂O₃: A rare polymorph of iron oxide

The thesis investigates the exotic properties of ϵ -Fe₂O₃ which is a rare polymorph of iron oxide. He has also explored the heterostructure of ϵ -Fe₂O₃/ α -Fe₂O₃ for reducing the electron-hole pairs recombination for a better photocatalytic activity.

24. ROHIT PATHAK

Ph.D. Supervisor: Dr. Arti Kashyap

Title of the Thesis: First-Principles Investigation of Some Rare-Earth Free Permanent Magnets

The thesis investigated three different kinds of materials: transition metal borides, cobalt-based intermetallic, and binary (four phases of Fe-Pd) and ternary (four phases of boron-doped Fe-Pd) intermetallic compounds. All of them are important and potential candidates for rare-earth free permanent magnets.

25. PRAVAT KUMAR JENA

Ph.D. Supervisor: Dr. Sarita Azad

Title of the Thesis: Observed and Projected Changes in Indian Monsoon Rainfall Extremes Under Changing Climate RCP8.5 Scenario

The thesis aims to identify and predict extreme events such as drought and flood in the Indian Summer Monsoon by analysing the observed data and Coupled Model Intercomparison Project Phase 5 (CMIP5) model simulations of time period 1901-2014 and 2006-2100, respectively.

26. NITIN SHARMA

Ph.D. Supervisor: Dr. Rajanish Giri

Title of the Thesis: Zika Virus: Role of Envelope Protein in Entry and Therapeutics

The thesis is on viral entry mechanisms, in particular the drug discovery and folding analysis of Envelope protein. It led to the identification of a drug F1065-0358 that inhibits Zika virus, using structure-based drug discovery and following the antiviral experiments using Zika virus cultures.

27. ABHILASH M

Ph.D. Supervisor: Dr. Manu V. Devadevan

Title of the Thesis: Land Regime, Agricultural Production and the Politics of Credit Money in Eighteenth-Century Malabar

The thesis investigates the institution of landed proprietorship in eighteenth century Malabar and its relationship with tenancy, mercantile credit, and politics and demonstrates the emergence of a contradictory relationship between ground rent and interest-bearing credit money, which transformed the region's political economy in general and landholding patterns.

28. SANDEEP KUMAR SHUKLA

Ph.D. Supervisor: Dr. Satvasheel Powar and Dr. Rahul Vaish

Title of the Thesis: BaTiO₃ Based Ferroelectric Ceramics for Bacterial Remediation in Aqueous Systems

The thesis outcome indicates that ferroelectric materials may be a sustainable and effective tool to combat bacterial and organic impurities in water carrying systems.

29. ABHIMANYU

Ph.D. Supervisor: Dr. Deepak Swami

Title of the Thesis: Fate and Transport Study of contaminant through Saturated Porous Media

The thesis deals with the model development for contaminant transport through a heterogeneous porous medium. The developed model is versatile and semianalytical solved.

30. RAJESH MANJIBHAI PINDORIYA

Ph.D. Supervisor: Dr. Bharat Singh Rajpurohit and Dr. Rajeev Kumar

Title of the Thesis: Experimental Investigation of Acoustic Noise and Vibration of High-Performance PMSM Drive

The thesis focuses on the reduction of Acoustic Noise and Vibration and the development of rotor position sensor-less operation of Permanent Magnet Synchronous Machine drive.

31. KRISHAN SHARMA

Ph.D. Supervisor: Dr. Renu M. Rameshan

Title of the Thesis: Exploring Geometrical Structures in Image and Video Data for Classification: From Subspaces to Matrix Manifolds

The thesis deals with the creation of geometrical - subspace and manifold - models for image sets and video and kernels whose underlying function preserves the distance in manifold were designed.

32. HARMANPREET SINGH

Ph.D. Supervisor: Dr. Pradyumna Pathak

Title of the Thesis: Phonon Assisted Non-Linear Interaction and Quantum Entanglement in Semiconductor Cavity Quantum Electro Dynamics

In this thesis, proposals for entangled photon sources and nonlinear interaction is explored in semiconductor nanophotonic systems.

33. MANOJ DAS

Ph.D. Supervisor: Dr. Pradyumna K Pathak

Title of the Thesis: Study of Hybrid Optomechanical Systems

In this thesis, optomechanical systems and generating quantum states of mechanical motion are explored.

34. JUHI PANDEY

Ph.D. Supervisor: Dr. Ajay Soni

Title of the Thesis: Light-Matter Interactions in Metal Chalcogenides Investigated by Optical Spectroscopy

The thesis is on the study of light-matter interaction in chalcogenide materials for excitonic excited states, charge density wave, electron-phonon interactions, and ferroelectric polarization and plasmon-phonon coupling in typical materials.

35. PIYUSH KUMAR AVASTHI

Ph.D. Supervisor: Dr. Viswanath Balakrishnan

Title of the Thesis: Surface Engineering of CVD Grown Carbon Nanostructures for Supercapacitor Electrode Applications

The thesis is mainly focused on the surface engineering of carbon-based materials for supercapacitor performance. Different CVD-grown materials have been investigated for tuning their contact angle by electrolyte engineering, conformal coating of metal oxides, and plasma treatment. Detailed electrochemical measurements have been carried out in symmetric and asymmetric device configurations.

36. MD ZAHID

Ph.D. Supervisor: Dr. Rajneesh Sharma And Dr. Syed Abbas

Title of the Thesis: Two-Scale Thermo-Mechanical Analysis of Multidirectional Carbon/Carbon Composites using Image-based Finite Element Method

The thesis developed a novel technique for the realistic implementation of the finite element method for the thermos-mechanical characterization of multidirectional c/c composites. The method is applied to predict the thermal shock behavior of 3D hybrid and 4D inplane c/c composites. The results are in good agreement with the experiments.

37. ASHISH TIWARI

Ph.D. Supervisor: Dr. Jaspreet Kaur Randhawa

Title of the Thesis: Magneto-fluorescent carbon-coated superparamagnetic iron oxide nanoarchitectures (SPIONs) for multimodal imaging and cancer theranostics

The central hypothesis of this thesis was to enable multimodal imaging ability in magnetic nanoparticles by associating fluorescence into their structures and in-situ tuning of the magneto-fluorescent properties. This thesis accomplished all the above biomedical applications and significantly addresses the challenges as stated above and stand potentially in achieving the high throughput results in real-time cancer theranostics.

38. SHARAD KUMAR GUPTA

Ph.D. Supervisor: Dr. Dericks Praise Shukla

Title of the Thesis: Computational Mapping of Landslide Susceptibility Zones Using Satellite and Field Data

The subjectivity in weightage selection, selection of scale and study area, selection of factors, and finally problems associated with data imbalance in the general practice of landslide susceptibility mapping are few important issues that have been addressed and attempted to solve in this research thesis.

39. MOHAMMAD AMIR

Ph.D. Supervisor: Dr. Mohammad Talha

Title of the Thesis: Geometrically Nonlinear Analysis of Functionally Graded Cellular Panels with Material Stochasticity

In this thesis, an effort has been made to study the large amplitude free flexural vibration analysis of the geometrically nonlinear functionally graded shell panels, graded cellular panels, and sandwich panels with the graded cellular core in a deterministic and stochastic environment

- **GRADUATING RESEARCH STUDENTS M.S. (by Research)**

1. PRAKASH PRATIK

M.S. Thesis Supervisor: Dr. Kunal Ghosh

Title of the Thesis: Modelling and Analysis of Thermal Profile of Photovoltaic Module Installed on Rooftop

The thesis develops a numerical model for analyzing the thermal profile of photovoltaic modules under different operating conditions.

2. SEEMA KUMARI

M.S. Thesis Supervisor: Dr. Arnav Bhavsar

Title of the Thesis: Learning-Based Depth Map Estimation: Considering Noise and Scene Categories

In this thesis, novel deep learning-based methods are proposed to enhance depth maps, and estimate depth maps from corresponding single intensity images, for different types of scenes and noise conditions.

3. AKASH K RAO

M.S. Thesis Supervisor: Dr. Varun Dutt

Evaluation of Human Performance in Indirect Visual Displays and Virtual Reality

The thesis evaluated human performance in the indirect visual display (IVDs) and virtual reality (VR) interfaces under varying target-distractor base-rates, manned or unmanned training, and difficulty training.

4. BHARAT VARDANI

M.S. Thesis Supervisor: Dr. Narsa Reddy

Title of the Thesis: A Single Stage Inductive Wireless Power Transfer Using Matrix Converter for an Electric Vehicle Application

The thesis work proposes a control strategy for a single-stage wireless power conversion topology that is easy to implement and more importantly can achieve a unity power factor (UPF) using a single controller.

5. TEJINDER THAKUR

M.S. Thesis Supervisor: Dr. K V Uday

Title of the Thesis: Study on the Factor Contribution of Micropile Pullout Resistance

The thesis investigates quantitative factor contribution to improve the micropile uplift capacity revealed that the displacement is influenced by the soil unit weight and grouting pressure, whereas the higher uplift capacity can be achieved by varying the geometry of the micropile.

6. CHANDNI

M.S. Thesis Supervisor: Dr. Deepak Swami

Title of the Thesis: Modelling of Solute Transport through Saturated Porous Media: Experimental and Numerical Approach

The thesis deals with the application of the model based on a random walk and dual porosity bifurcation of the porous medium, along with the application of the various porosity models, for heterogeneous porous medium.

7. BODHAYAN NANDI

M.S. Thesis Supervisor: Dr. Shubhajit Roy Chowdhury

Title of the Thesis: Closed-Loop Control of Blood Glucose Level through Simultaneous Estimation of Blood Insulin and Glucose

The thesis presents the design and implementation of a model predictive controller for the artificial pancreas and adds to the body of knowledge in compartmental modelling techniques for modelling different physiological phenomena of the blood glucose system.

8. NAYAN PUNDHIR

M.S. Thesis Supervisor: Dr. Sunny Zafar and Dr. Himanshu Pathak

Title of the Thesis: Impact Behaviour of Microwave-Assisted Compression Moulded HDPE/Kenaf and HDPE/MWCNT Composites

The thesis work deals with a novel manufacturing route, microwave-assisted compression moulding (MACM), for fabricating high-density polyethylene (HDPE) based composites. The composites were tested for impact applications, using experimental and simulation techniques.

9. SHETE SNEHAL DILIP

M.S. Thesis Supervisor: Dr. Srikant Srinivasan and Prof. Timothy A. Gonsalves

Title of the Thesis: Image Analysis and Synthesis for Maize Phenotyping

In this thesis, a computer vision system (algorithms) for phenotyping maize is developed and shown to be efficacious on images taken in natural field environments. Deep learning is also used for the synthesis of artificial data, to make up for the paucity of natural data.

10. PRAVEEN KUMAR

M.S. Thesis Supervisor: Dr. Varun Dutt and Dr. K. V. Uday

Title of the Thesis: Slope Movement Prediction and Early Warnings via Machine Learning Algorithms and IoT Technologies

The thesis deals with the development, deployment, and calibration of a new low-cost IoT-based landslide monitoring system. Also, it deals with the development of different machine learning algorithms to predict slope movement captured by the landslide monitoring system.

11. AIJAZ HAMID LONE

M.S. Thesis Supervisor: Dr. Srikant Srinivasan

Title of the Thesis: Effect of Scaling on Tunnel Magnetoresistance and Thermal Stability in Magnetic Tunnel Junction

Quantum transport and magnetization dynamics study of magnetic tunnel junctions were carried out to study the effect of size downscaling and to investigate different regimes of device operation. The contribution of different conducting modes towards the magnetoresistance was explicitly investigated and quantified, aiding in a better understanding of spintronic devices.

2. ACADEMIC ACTIVITIES

● Current Students

Currently, 4-year B.Tech. programs are offered in six branches, viz., Civil Engineering (CE), Computer Science and Engineering (CSE), Electrical Engineering (EE), Mechanical Engineering (ME), Data Science and Engineering (DSE), and Engineering Physics (EP) along with B. Tech. – M.Tech. integrated dual degree in Bioengineering (5-year program). There are three M.Sc. programs in Physics, Chemistry, and Mathematics; M.Tech. in Mechanical Engineering with Specialization in Energy Systems and Materials, M. Tech. in Power Electronics and Drives, M.Tech. in Communications and Signal Processing, M.Tech. in Biotechnology, M.Tech. in Structural Engineering, and M.Tech. in VLSI. There is one MA program in Development Studies, one MS (by Research) program, and a Ph.D. program.

Four schools are hosting the academic programs: Schools of Basis Sciences (SBS), School of Computing and Electrical Engineering (SCEE), School of Engineering (SE), and School of Humanities and Social Sciences (SHSS). In 2020, 310 B.Tech. students, 101 M. Tech. students, 109 M.Sc. students, and 13 M.A. students secured admission at IIT Mandi. We now have a total of 1,833 students including 352 Ph.D., 62 M.S., and 22 I-Ph.D. research scholars.

● Life after IIT

Despite several disruptions created by the pandemic, the Career and Placement Cell (CnPC) at IIT Mandi worked actively throughout the year and conducted several career counseling sessions. During the 2019-20 placement season, 85% of the registered undergraduate students received job offers. A total of 45 companies took part in campus placement. Among the registered postgraduate students, 35% received job offers from good companies, including core companies. Some of the students decided to go for higher education in institutes, such as the University of Glasgow, Scotland; University of Bristol, England; Delft University of Technology, Netherlands; Indian Institute of Management, Calcutta; Indian Institute of Management, Kozhikode; Indian Institute of Technology Kanpur; Indian Institute of Technology Roorkee; Indian Institute of Technology Bombay; Indian Institute of Technology Delhi; and Indian Institute of Science, Bangalore, etc.

- **Major institute-level achievements during the past year**

- Owing to the thriving academic environment of the Institute along with the presence of effective business incubation, i.e., IIT Mandi Catalyst, IIT Mandi has made a debut in the Atal Ranking of Institutions on Innovation Achievements, Ministry of Education, Government of India. The rankings were announced on 18th August 2020, by the Hon'ble Vice President Shri. M. Venkaiah Naidu. The Institute has been ranked #7 in the centrally funded institutions category in India of ARIIA 2020. IIT Mandi is the only institute from the second generation of IITs to be featured in ARIIA 2020. Before this achievement, the Institute was also ranked 6th in India by India Today among the centrally funded institutions in India.
- IIT Mandi has also set up a Technology Innovation Hub (TIH) in the human-computer interaction area under the “national mission on the interdisciplinary cyber-physical system (NM-ICPS)” supported by DST. Under this project, the TIH (a section-8 company) titled, “IIT Mandi iHub and HCI Foundation,” has been established, which will focus on the verticals of technology (interface) development and evaluation, HRD & skill development, incubation and entrepreneurship, and collaborations. This project is headed by several faculty from SCEE and SBS working in HCI and AI/ML areas, and it is the largest such project bagged by the Institute since its inception in 2009 worth INR 110 crores.

- **Selected achievements by faculty and students**

- There are some notable achievements by the faculty and the students on the academic front. IIT Mandi researchers had more than 300 peer-reviewed publications during the academic year 2019-20. This includes peer-reviewed journals, books and book chapters, and conference proceedings.
- Dr. Manu Devadevan, Assistant Professor, School of Humanities and Social Sciences, IIT Mandi, won the prestigious Infosys Prize in 2019 for his extensive research on the cultural, literary, economic, and political vividness of South India.
- Dr. Syed Abbas, Associate Professor, School of Basic Sciences, is among the 40 young scientists, globally, to be inducted as a member of the prestigious Global Young Academy (GYA) for a term of 5 years, i.e. from June 2020 to May 2025.
- IIT Mandi students gained top three positions in the Institute of Electrical and Electronics Engineering, Industry Application Society (IEEE - IAS) Student Thesis Contest 2020 under the non - Ph.D. Category.

- **Significant research and technology development:**

- There are some significant contributions to technology development. Dr. Anil Sao and Dr. Arnav Bhavsar have contributed to developing an Artificial Intelligence-powered point-of-care device to screen for cervical cancer by analysing microscopy images with high accuracy. This project has been taken up in collaboration with Aindra Systems Pvt. Ltd.,

Bengaluru. This Artificial Intelligence-powered device does away with the need for women, especially those in remote and rural areas, to make the trip to a hospital to get themselves tested. A patent has been filed.

- Dr. Satvasheel Ramesh Powar and Dr. Atul Dhar, along with their research scholar Mr. Ankur Kaundal, have designed the innovation of Atuvik, an affordable cooking stove to combat indoor air pollution and decrease dependency on firewood. Atuvik produces a range of cooking and heating solutions from the simple single-burner cooking stove to the integrated cooking and heating solution for higher elevation areas. A patent has been filed.
- Technology development and scientific research also remained significant in terms of next-generation spintronic technology, jute and kenaf fibre reinforced plastics through microwave energy, environmentally safe and cost-efficient heterogeneous catalysts for industrial applications, and the effectiveness of drug used in treating opioid addiction in reversing some type 2 diabetes-associated adverse events, etc.
- In the face of the outbreak of the pandemic, IIT Mandi researchers worked relentlessly to develop various affordable health intervention technology: Wi-Fi Operated Smart Ventilator, UV-C Disinfection Box and Foot Operated Hand Sanitizer Dispenser to minimize the risk of COVID-19, Indigenous technology for high-efficiency face Masks from waste 'PET bottles' are few of them.
- Dr. Varun Dutt and Dr. K. V. Uday with a team of B.Tech. graduate students, and members from their faculty-led startup, iIoT's, helped the Indian army by developing and deploying A social distancing app, ACSA, in the Indian army canteens. This app has successfully catered to more than 15,000 army personnel since its inception during the prevailing COVID-19 pandemic.

3.INTERNATIONAL LINKAGES

IIT Mandi has remained an attractive destination for international students and faculty and fostered its linkages with the wider academic world through student and faculty mobility, as well as joint research projects and MoUs. In the past 10 years, the Institute has signed MoUs with as many as 11 international universities. IIT Mandi has been made the national coordinating Institution for Germany under the Scheme for Promotion of Academic and Research Collaboration (SPARC) of the Government of India. Additionally, it has also assumed leadership among the eight-second generation IITs for attracting students from SAARC nations.

Since 2013, over 50 of our students have had the chance to go for semester exchange to RWTH Aachen University, Technical University of Munich, Blekinge Institute of Technology, Hepia, Switzerland, IT University of Copenhagen, and McMaster University, Hamilton, Ontario. Over 120 international students have experienced the project-based learning and other academic offerings of IIT Mandi since 2015, the majority from Worcester Polytechnic Institute (WPI), USA.

Fulbright Fellow at IIT Mandi: Prof. Sumant Nigam, Distinguished Professor, Department of Atmospheric and Oceanic Science, University of Maryland (USA) opted to take up a fellowship funded by the Fulbright-Nehru program and based himself at IIT Mandi. He was invited as the Chief Guest at the 11th Foundation Day program of the Institute on 24th February 2020.