

Director's Report

3rd Convocation, 31st October 2015



*Prof. Timothy A. Gonsalves,
Director, IIT Mandi*

Welcome

Prof. Sathyamurthy, Chief Guest of the Convocation; Mr. M. Natarajan, Chairman, Board of Governors; Members of the Board of Governors; Members of the Senate; distinguished guests; graduating students and their family members; my faculty and staff colleagues; dear students; media persons; and, ladies and gentlemen, it gives me great pleasure to extend a very warm welcome to you on the occasion of the 3rd Convocation of the Indian Institute of Technology Mandi.

It is a privilege to have among us Prof. Sathyamurthy, Director, IISER, Mohali. Prof. Sathyamurthy is an expert faculty in Chemistry, who served at IIT Kanpur for many years. Prof. Sathyamurthy's presence will inspire the graduating students in many different ways and make this day a memorable one, which the graduating batch will cherish for a lifetime.

It has been a challenging but rewarding journey of six years. IIT Mandi has grown steadily and surely towards its vision to become globally renowned while catering to the needs of society, both local and global. Thanks to yeoman efforts of our faculty, students, alumni and staff, IIT Mandi today is a full-fledged research University that is beginning to make its name in India and worldwide. Thanks are also due to the support of many well-wishers in India and abroad, and the Governments of India and Himachal Pradesh.

Academic Activities

Research

IIT Mandi places a great emphasis on the development of our research scholars. The first research scholars joined the Institute in October 2010, soon after the Institute started operating in Mandi. Despite the difficulties of doing globally competitive research in a nascent Institute, IIT Mandi has a total of 451 international publications up to this present academic year 2015. Our faculty published an average of 2.23 papers in refereed international journals in 2014. This is comparable to other IITs.

Today, a number of research scholars will be graduating with M.S. and Ph.D. degrees. These include:

1. Jai Prakash Tripathi

Thesis: Dynamical analysis of some Predator-Prey Models with the help and refuge.

Guides: Dr. Syed Abbas and Dr. Manoj Thakur

His thesis analyzed different types of predator-prey systems with different types of functional response and refuge. Numerical simulations were done using particular values of parameters to validate analytical findings.

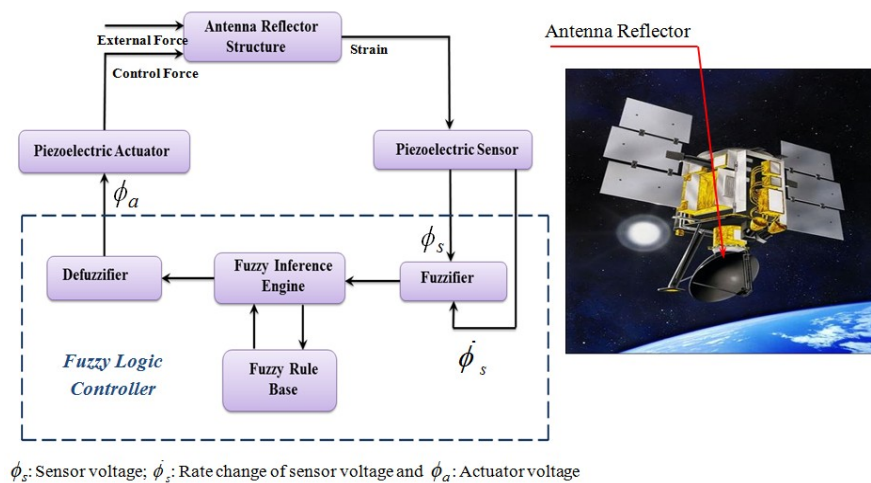
2. Mr. Anshul Sharma

Thesis: Active Vibration Control of Smart Structure using Fuzzy Logic Controller and its Experimental Implementation.

Guide: Dr. Rajeev Kumar

He designed an effective active fuzzy logic controller for vibration suppression of antenna reflector used in satellite communication. Using FEM, he developed a non-conventional controller to control/suppress the vibration in real time.

Block Diagram of Smart Structure in close loop with fuzzy logic controller



3. Mr. Sunil Dutt

Thesis: Morphology controlled synthesis of polyaniline nanostructures and its nanocomposites using swollen liquid crystals as templates.

Guide: Dr. Prem Filix Siril

He worked on the development of swollen liquid crystals as 'soft' templates for the synthesis of nanostructures of polyaniline and its nanocomposites with metals, metal oxides, and graphene.

4. Mr. Anshul Kumar Mishra

Thesis: Design and development of induction Machine Drive for performance Optimisation.

Guide: Dr. Bharat Singh Rajpurohit

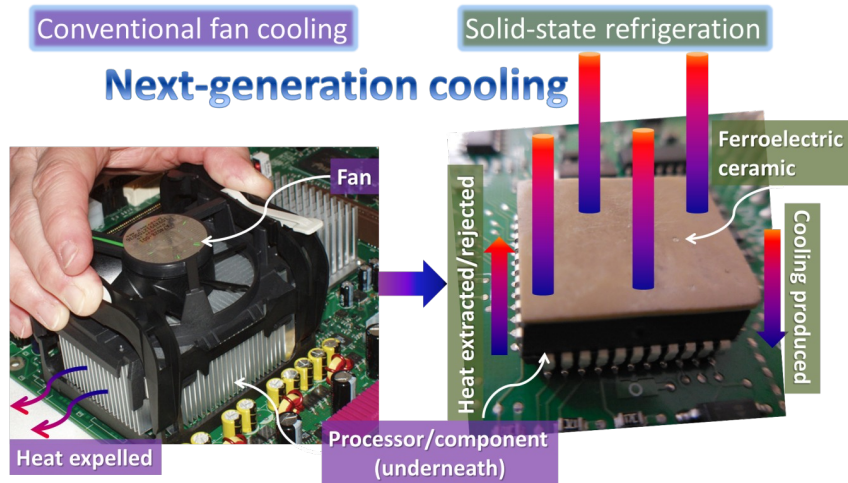
He worked on design and development of Induction Machine Drive for performance optimization in terms of torque ripple minimization and power factor improvement.

5. Mr. Aditya Chauhan

Thesis: Stress Mediated Tuning of Ferroelectric Properties in $0.68 \text{ Pb} (\text{Mn}_{1/3} \text{Nb}_{2/3}) \text{O}_3$ - 0.32 PbTiO_3 Single Crystals.

Guide: Dr. Rahul Vaish

His work mainly focused on development of suitable (ferroelectric) ceramics for energy applications with primary applications for next generation cooling/refrigeration.



Microprocessor Cooling via Ferroelectric ceramic

6. Mr. Ankit Sharma

Thesis: Numerical Simulation of Radiation Losses in a Decaying Laser Spark Using LBL Method.

Guide: Dr. Anil Kishan

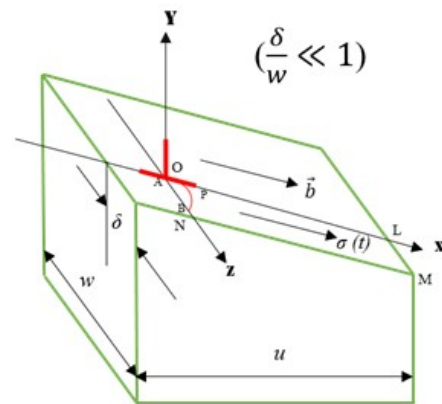
His thesis focused on an investigation to numerically simulate the radiation losses which occur due to laser energy deposition.

7. Mr. Anmol Kothari

Thesis: Effect of Strain Hardening Parameters on Deformation Induced Electromagnetic Radiation from Metals and Alloys.

Guide: Dr. Vishal Singh Chauhan and Dr. Rajeev Kumar

The thesis emphasized the effect of strain hardening parameters and the Peierls' stress on electromagnetic radiation.



Idealized model representing a vibrating dislocation during plastic deformation

8. Mr. Deepak Kumar Sharma

Thesis: High-k TiO_xNy based MFIS Structure for Next Generation Applications.

Guide: Dr. Satinder Kumar Sharma

He worked on next generation Ferroelectric Random Access Memory (FeRAM) because of its potential advantages such as fast read and write time and low voltage operations than other emerging non-volatile memories.

9. Mr. Sujeet Kumar

Thesis: Design and Implementation of Crossbar Switch in NS-2.

Guide: Dr. Samar Agnihotri

He worked on Packet switches, which include network switches, routers, bridges, etc. to improve and maintain the high performance of the Internet.

10. Mr. Tarun Kumar

Thesis: Finite Element Modeling and Analysis of a Bistable Piezoelectric Energy Harvester.

Guide: Dr. Rajeev Kumar

Tarun worked on a Bistable Piezoelectric Energy Harvester for lightweight electronic devices without traditional batteries. The harvester has been modeled using Finite Element Method.

Achievements and Awards

Exceptional students flourish under exceptional faculty. Our faculty have received a number of awards and honors. Some of the notable achievements in the past 6 months:

1. Dr. Shubahjit Roy Chowdhury was nominated as Coordinator of Wearable Devices, Embedded Systems, and Computer Aided Diagnosis theme under Health Care Sector of the pan-IIT-IISc project IMPRINT, MHRD in 2015.
2. Dr. Ramna Thakur got a 6-month Research Fellowship under the ERASMUS MUNDUS program to the Oxford University, UK in 2015.
3. Dr. Devika Sethi delivered an invited lecture titled, “The Ban Formula: Non-Indian Authors and the Colonial State in the 1920s-30s”, at the Indian Council of Historical Research (ICHR), New Delhi, in June, 2015.
4. Dr. Varun Dutt, Palvi Aggarwal, Antra Grover, Saumya Singh and Zahid Maqbool won the best paper award at the IEEE International Conference on Cyber Situational Awareness, Data Analytics and Assessment (CyberSA 2015), June 2015, London, UK, 2015.
5. Dr. Varun Dutt was nominated as the Review Editor of *Frontiers in Cognitive Science* journal in July, 2015.

B. Tech. Program

Despite the challenges of constructing and occupying our permanent campus, the academic activities of the Institute have flourished. Currently, we have 752 students including 487 students in four different B. Tech. Programmes.

Achievements of the Graduating Batch

Pradeep Servi topped the GATE-2015 (EE) exam, in competition with 1.26 lacs candidates nationwide. A number of students have opted for higher studies, at IITs, universities abroad and management institutes.

Shubham Ajmera of the graduating B. Tech. batch became the 1st student from IIT Mandi to get a direct job offer from abroad, landing a job with Google, California.

Kshitiz Saraswat got selected in Air Force officer cadet becoming the first of our students to join the Defence Forces.



Pradeep Seervi tops GATE (EE), 2015

The third placement of IIT Mandi students took place in 2015. Despite its remote location many top companies visited IIT Mandi and hired our students. These companies included Altair Engineering, Benchmark, CAD Studio, Amazon, Cisco, Cognizant, DRDO, Finisar, HPCL, Infosys, Microsoft, Nucleus Software, Samsung, Sigmoid Analytics, Tesra, eClerx, IP Infusion, Khosla Labs, Amber Group, L&T, TCS, Tata Motors and several others. In all, 90% of eligible students from were placed.

New PG Programmes

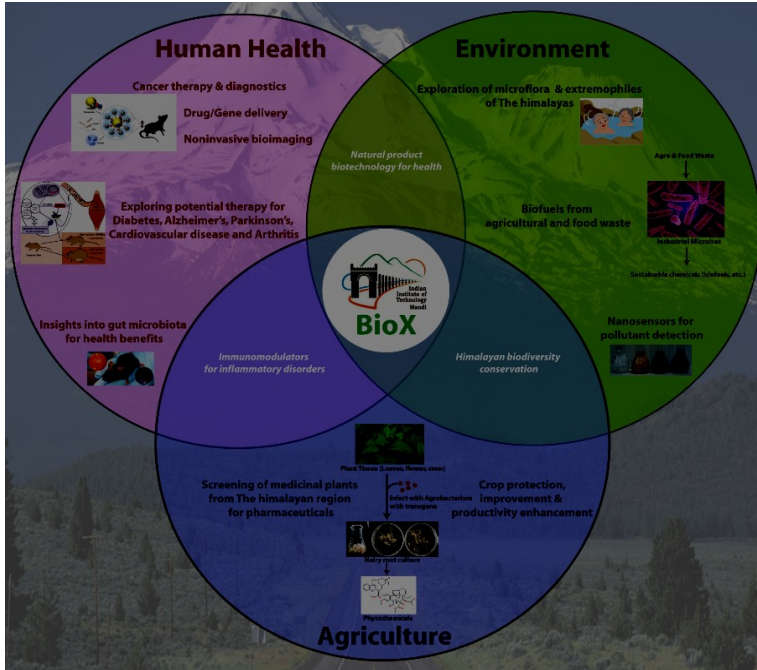
In 2014, IIT Mandi expanded the breadth of its academic programs by starting two Masters programmes: M. Tech. in Energy Materials and M.Sc. in Chemistry. This year, the Institute started an integrated M.Sc. - Ph.D. program in Physics (iPh.D. Physics). Currently, the proportion of PG students (including MS and PhD) in the Institute is about 35%, with UGs comprising about 65%.

Civil Engineering

In addition, IIT Mandi started research in Infrastructure and Civil Engineering for mountain regions, and a B. Tech. program in Civil Engineering with 25 undergraduate students joining in August 2015. This program was carefully planned in a series of 3 brainstorming workshops held between April, 2014 and March, 2015. Civil engineering experts from academia and industry from India and Germany participated in these workshops. Experts included Prof . V.S. Raju, former Director, IIT-Delhi and one of India's foremost experts on foundation design; and, Prof.

Balthasar Novak, University of Stuttgart, an expert in structural design. Already, 4 young faculty have joined and more are expected shortly.

BioX



IIT Mandi has expanded in BioX with new faculty joining in different BioX areas. These areas include Human Health, Environment, and Agriculture. Here, the Institute's focus is on developing technologies for improving agricultural practices for farmers in the Himalayan region and for biomedical applications.

Teaching

In 2014, the Design Practicum (DP) saw a number of successful projects from the graduating batch of students. Some of these projects included: Low cost 3D Printer, Intelligent Parking System, and Volumetric 3D LED Display. The low cost 3D printer project won the 1st prize in the 2014 DP Open House.

In 2014, the second Interactive Socio-Technical Practicum (ISTP) was conducted at IIT Mandi with several of the graduating students participating in it. As part of this course, the graduating students worked on socio-technical problems under the guidance of Institute faculty. Some of these projects included: Study of landslides in hilly terrain, Garbage disposal in Mandi city and Milk Adulteration in Mandi district. These projects and several others were presented at an Open House held in May, 2014.

The project titled, "Garbage Disposal in Mandi City," by Jyoti Lakra, Vishnu Priyanka, Saket Panwar, Gnaneshwar Reddy,



A low-cost 3D Printer – Design Practicum Project by graduating batch

and Bhupesh Kumar under the mentorship of Dr. Arti Kashyap won the 1st prize in the 2014 ISTP Open House. The project titled, “Milk Adulteration in Mandi Town and Surrounding Villages,” by Ritesh Rana, Harkaran Singh, Abhinav Singh, and Surendra Anuragi under the mentorship of Dr. P. C. Ravikumar and Dr. Ramna Thakur won the 2nd prize in the 2014

ISTP Open House. Finally, the project titled, “Construction in Hilly Areas,” by Abhay Chowdary, Nishank Kumar Gupta, Mohit Rawat, Ankit Srivastava, and Omair Azmi under the mentorship of Dr. Aniruddha Chakraborty won the 3rd prize in the 2014 ISTP Open House.

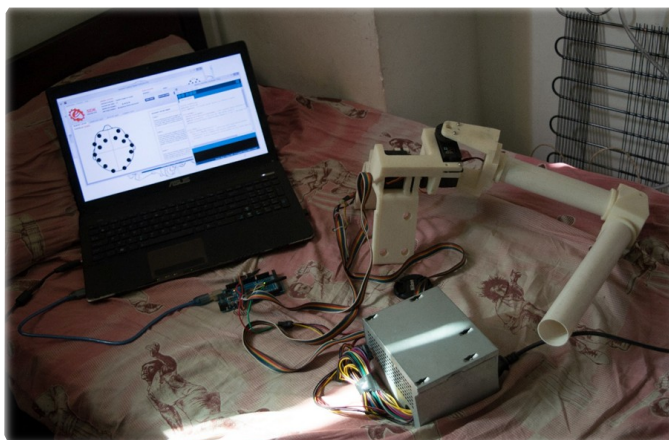
Several of the graduating batch of students participated in their capstone Major Technical Projects (MTPs) in 2014-15. Among the Computer Science and Engineering MTPs, one of the noteworthy projects included, “Human activity recognition,” by Pranav Kumar Singh and Syed Jafar Shahid Rizvi (Mentor: Dr. Arnav Bhavsar). Among the Electrical Engineering MTPs, one of the noteworthy projects included, “Connected DC Grid System,” by Nagarjun Narayan and Suleman Alam (Mentor: Prof. Ramesh Oruganti). Finally, among the Mechanical Engineering MTPs, one of the noteworthy projects included, “Brain-Controlled Robotic Arm,” By A nkit Gupta and Chamundeshwar Nadh (Mentor: Dr. Rajeev Kumar).

Teaching is one of the pillars of IIT Mandi. To improve the standards of teaching and learning, IIT Mandi has taken the help of the Teaching and Learning Centre (TLC) of IIT Madras to conduct several workshops on teaching for its young faculty members during 2014-15.

International Linkages

IIT Mandi provides international Bachelor’s, Master’s and Ph.D. students with possibilities for spending up to a year at IIT Mandi. By visiting 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 to spend some time at the Institute for teaching and research.

Between April and August 2014, IIT Mandi had 2 students spend a semester from HES-SO, Haute école du paysage, d’ingénierie et d’architecture de Genève (HEPIA). These two students from HEPIA worked on their capstone projects under the mentorship of IIT Mandi faculty. In addition, in 2014, IIT Mandi had one student each from the following institutions: University of Durham, U.K.; University of Benin, Nigeria; Georg-August Universität Göttingen, Germany; and, Asian Institute of Technology, Thailand. Recently, in 2015, IIT Mandi also had two students visit from Rose-Hulman Institute of Technology, USA.



MTP: Brain-Controlled Robotic Arm

IIT Mandi and TU9, Germany jointly organized a collaborative workshop on "Emerging Semiconductor Technologies (IECRAIETS – 2014)" at the Institute's Kamand Campus in September, 2014. The objective of this collaborative confluence was to involve experts from semiconductor fields, especially micro/nano electronics, VLSI technology, and explore possible future collaborations.

Furthermore, IIT Mandi's graduate and undergraduate students have visited several EU institutions under academic exchange in the last 1-year. These visits include: 12 students to TU9 and 1 to Friedrich-Alexander University Erlangen-Nürnberg in Germany; 5 students to Blekinge Institute of Technology, Karlskrona, Sweden; and 1 student as a part of Indian Government's Youth Delegation to China. Two of these students were awarded the 2014 DAAD-WISE scholarship. In addition, one PhD student went to Oxford University with a UK EXPERTS4Asia scholarship.

We initiated long-term faculty exchange programmes with the TU9 in Germany, with generous funding from MHD and the German BMBF. Three faculty from IIT Mandi each spent 2-3 months with their collaborators in Stuttgart University and TU-Berlin. German Professors from Stuttgart University and Karlsruhe Institute of Technology visited IIT Mandi. A further 3 such exchange visits have been approved for 2015. In addition, Dr. Astrid Kiehn (IIT Delhi) and Prof. Mark Yoder (Rose-Hulman Institute of Technology, USA) visited IIT Mandi for 1-semester each in 2015.

In 2014, a MoU was signed between the Consortium of Finish Higher Education Institutions, Finland and Indian Institutes of Technology, India (including IIT Mandi). The MoU covers research collaboration, and exchange of faculty and students.

Sponsored Research and Industry Interactions

Most of our faculty are active in sponsored research. Much of the funding is from Indian Government agencies as DBT and DST; however, a few faculty have funding from international agencies and industry too.

To encourage industry interactions, IIT hosted the 2nd Industry Academia Conclave jointly with CII Northern Region at Kamand. About 20 participants came from regional and national industries. This conclave was instrumental in developing R&D interactions and in opening up placement and internship opportunities for our students.

During the year, enhanced industry-sponsored R&D has included AIndra, Bangalore (medical image-processing) and Purdue Pharma, USA (decision-making in the Pharmaceutical industry). The latter has funded a project worth close to US\$100,000 over a 3 year period. The Intel Project, sponsored by Intel, USA to the tune of \$350,000 has entered its 3rd year. Now, state-of-art results have been achieved and Intel is considering further funding.

The first patent was filed by IIT Mandi. Dr. Om Prakash Singh and his students have claimed protection for their invention Dye Sensitized Solar Panels using 3D printing technique.

IIT Mandi faculty were active in organizing workshops and conferences for bringing industry and academia together. A three-day Workshop was held on May 2015, on theme,

“Computational Intelligence Techniques for Smart Grid Applications”. The main objective of this Workshop was to discuss the various computational intelligence techniques that can be applied to Smart Grids. A workshop on Machine Learning for Medical Image Analysis (WMLMIA 2015), was held in June 2015. The workshop focused on improving the awareness of research in medical image analysis, among young researchers, both from theoretical and practical perspectives. It also aimed to facilitate networking of domain experts in machine learning and medical image analysis from academia, industry and hospitals.

Campus Development

The year 2014-15 saw IIT Mandi completing 6 years and consolidating our achievement as the only new IIT to develop and occupy its new campus. All of our B. Tech. students and over half the PG students, 35% of the faculty and a number of staff live and work in Kamand. The campus has all the basic amenities of a residential IIT with the addition of some sports fields and several canteens. Currently, 20,000 square metres of space is in use. This consists of a mix of renovated buildings, pre-engineered LGSF buildings that are economical and well insulated, and some regular masonry buildings. The pace of construction has picked up with the help of NBCC and CPWD. We expect most of the remaining students to shift to Kamand by early 2016, along with a substantial fraction of the 90+ faculty and 100+ staff.

About 1,50,000 square metres of space is being constructed primarily in the North Campus using RCC technology. This space will cater to about 2,000 students, serving the Institute for the next 5 years. It will become available from early 2016 to late 2017.

Situated in a pristine Himalayan river valley, in 2014, IIT Mandi followed its “Green Agenda” by setting up a Green Panel. The campus is



IIT Mandi North and South Campuses in 2015

planned such that most movement will be on foot or on bicycles. Furthermore, in order to preserve the Bio-diversity of the Kamand campus, a project on ethno-botanical mapping of the IIT Mandi vicinity has been started. This project aims at mapping the existing plant species and identification of unique medicinal plants within 10-12 km of area surrounding the Kamand campus. A first-aid Herbal garden has been created to provide herbal products to campus residents for health and cooking. A Botanical Garden cum Childrens’ Park has been started to popularise native flora of this area. These gardens will also serve the needs of some of our BioX researchers.

The Kamand campus already possesses basic facilities like banks, medical unit, day care, indoor and outdoor sports facilities, shops and canteens. In 2014, we started the IIT Mandi Takshila School. Currently, the School has over 40 students in classes ranging from KG to 4th Std. As a gesture of our commitment to the development of the Kamand Valley, about 75% students are from nearby villages, many of them with scholarships provided by IIT.

Extracurricular

Developing extracurricular facilities on our permanent campus at Kamand is a priority. Currently, the Kamand campus has volleyball, tennis, basketball, badminton, football, and cricket facilities on its South campus. Dr. S.N. Jhaa recently joined IIT Mandi as Principal Sports Officer to lead student's sports activities at Kamand. He had been working in the physical Education section at IIT Bombay for over 30 years and his experience is proving invaluable in improving the sports and outdoor activities at IIT Mandi. Thanks to Dr. Jhaa's efforts, I'm confident that we'll win several medals in the Inter-IIT Meet in December 2015!



AAGAZ '14 Success

In sports, the girls' Table Tennis Team won the first medal (bronze) for IIT Mandi in the 50th Inter-IIT Students' Sports Meet, 2014 held at IIT Bombay during December, 2014. In the 22nd Inter-IIT Staff Meet, IIT Mandi continued its leadership in cricket by winning the bronze medal. Beyond sports, there is a music room and a Student Lounge, where students can perfect their extracurricular skills. In November, 2014, the Science & Technology Council (STC), IIT Mandi



Inter IIT Tech Meet'15

organised Utkarsh 2014, the first Intra-college technical festival. Also, in the same month, the Cultural Society organised YUVYOM 2014, the first youth festival organised on the Institute's Kamand campus.

Beyond these intra-IIT events, students from IIT Mandi won a gold medal in the "Data Analytics"

event and silver medal in the events "Hardware Modelling" and "Tech-Biz Quiz" in 3rd Inter-IIT

Tech Meet, held at IIT Kharagpur in January, 2015. IIT Mandi obtained the 3rd place in the overall General Championship Tally, beating a number of Institutes including the older IITs. The graduating batch has several students who were a part of the 3rd Inter-IIT Tech Meet. Inspired by this success, IIT Mandi will be hosting the 4th Inter-IIT Tech Meet in January 2016.

It is clear that our students, staff, and faculty are an outstanding lot, not only in academics, but also in extracurricular activities. In this Convocation, we are awarding prizes to those students who stand out exceptionally. Here, I congratulate those students who are the proud recipients of IIT Mandi's Institute awards, and all those who have set the highest standards for themselves even if they have not won awards.

Conclusion

You graduates are now embarking on a new phase in your lives. In the years ahead, you will often recall moments you have known at our IIT, the friendships made, and the wise words and helping hands of your teachers. You are going forth into the world to make your mark, and I hope to serve your fellow humans, especially those less advantaged than you.

Your successes in the future will bring satisfaction to you and enhance the prestige of your *alma mater*. May the world welcome you with open arms and may you leave the world a better place for your passage through it.