

DIRECTOR'S REPORT



PROF. TIMOTHY A. GONSALVES

Mr. Subodh Bhargava, 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, ladies and gentlemen – it gives me great pleasure to extend a very warm welcome to you on the occasion of the First Convocation of the Indian Institute of Technology Mandi.

As the graduating students stand here today at IIT Mandi ready to set out to the world beyond, each of us present here is privileged. For in each student who is graduating we can see a brave, new world. Each of the students who will receive their degrees here today has made us proud.

Today is a moment of celebration and hope and I thank all those present here for being witnesses to this momentous occasion.

Today, we have with us Mr. Subodh Bhargava, Chairman of Tata Communications Ltd. and former MD of Eicher Motors, who graciously accepted our invitation to be the Chief Guest on our 1st Convocation. It is a privilege to have Mr. Bhargava here today not only for his many achievements but also for the model he presents to the students of the various ways in which an engineer can make major, lasting contributions to society.



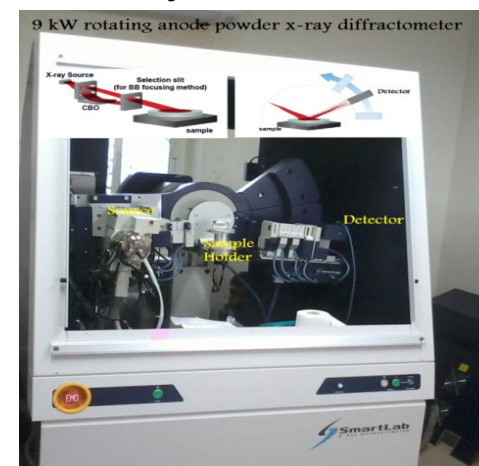
IIT MANDI – AN ODYSSEY TO THE FUTURE

For IIT Mandi, it has been a challenging but rewarding journey of four 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. I would like to share with you a brief account of our journey over the last four years, highlighting significant milestones.

Our successes have resulted from the concerted effort of all sections of the IIT Mandi family – the faculty, the staff and the students. It has also been made possible by the generous help given to us by other institutes. IIT Roorkee served as the mentoring Institute of IIT Mandi. The B. Tech. students graduating here today took their initial steps as budding engineers in IIT Roorkee where they spent their first year in 2009. After moving to Mandi in 2010, we were privileged to have the best of neighbours in Vallabh Government College who graciously and generously gave us the space and infrastructure we needed to begin operating in Mandi. Faculty from a number of other IITs have given unstintingly of their time to help us towards our vision. The continuous support of numerous people in the Government of India and the Government of Himachal Pradesh have been critical to our growth.

IIT Mandi has the distinction of being the first (and currently the only) new IIT to develop and use its main campus. We have adopted a 3-stage approach:

1. *Renovate and use the existing Animal Husbandry buildings.* E.g., the renovated Stable Complex houses a sophisticated X-ray Diffractometer, a PC Lab and a 120-seat Electronic classroom with 100



**HIGH RESOLUTION X-RAY
DIFFRACTOMETER (HR-XRD) AT AMRC**



Mb/s Internet connectivity

2. *Rapidly construct a few pre-engineered buildings.* Currently 10,000 sqm that houses over 250 students and 25 faculty plus staff
3. *Over a longer period, construct the bulk of the buildings.* 1,25,000 sqm of space to accommodate 1,800 students, 160 faculty and staff, serving the growing IIT until 2018

This approach enabled us to quickly capitalise on the attractions of our unique location. At an early stage, we have reached the point where some of our students enjoy the benefits of a residential campus that is the hallmark of the IITs. In each stage, we learn from the mistakes of the previous one for better and better infrastructure.

ACADEMIC ACTIVITIES

Despite the challenges of constructing and occupying our permanent campus, the academic activities of the Institute have flourished. Currently, we have 564 students including 109 research scholars in the Mandi and Kamand campuses. Offering B. Tech. in the three disciplines of Mechanical, Electrical and Computer Engineering and M.S. and Ph.D. in a wide variety of disciplines, IIT Mandi is firmly committed to excellence in teaching and research. Our innovative curriculum and organisation with an emphasis on interdisciplinarity helps our faculty to collaborate and teach across disciplinary boundaries.

RESEARCH

We place a great emphasis on the development of our research scholars. The first research scholars joined in October 2010, soon after we started operating in Mandi. Despite the difficulties of doing globally



competitive research in a nascent Institute, I am pleased to report that one of these pioneers, T. Shejin, will be graduating today. Guided by Dr. Anil Sao of the School of Computing & Electrical Engineering, Shejin will receive the first M.S. degree from IIT Mandi for his thesis titled *Significance of Dictionary for Sparse Coding based Face Recognition*. This thesis justifies the significance of dictionary by proposing and analyzing the novel WD Face dictionary on various aspects of sparse-coding based face recognition. Shejin is now an imaging researcher with DigitalOptics Corporation in the Republic of Ireland.

Today, we will also award our first PhD degree, to Priyanka Manchanda for her thesis *Magnetic Properties of Multilayers and Some Bulk Alloys: An Ab-Initio Study*. She was guided by Dr. Arti Kashyap of the School of Basic Sciences. Magnetic multilayers, used in applications such as ultrahigh density magnetic recording, spin valves and read heads of disk drives are studied with *ab-initio* techniques. She has also studied control of magnetic properties with the application of external electric field in thin films and in organometallic systems. Priyanka will take up a postdoc fellowship in the University of Nebraska.

IIT Mandi organized its first Research Fair on 26th June 2013. About 40 of our research scholars showcased their research. They gave enthusiastic oral and poster presentations on their research in front of faculty and students.

As the only IIT in the Himalayas, IIT Mandi is uniquely positioned for R&D that will benefit the people of the Himalayan region, along with globally important research. This is reflected in our research thrust areas that include:

- ✧ Green and renewable energy technologies
- ✧ Technologies for the Himalayan region
- ✧ Materials for electrical, electronics and bio applications



- ✧ Condensed matter physics
- ✧ Next generation networking and communications
- ✧ Speech, vision and image processing

Future thrust areas include integrated mountain development, environmental engineering and policy, and life sciences and bio-technology.

Our faculty has been successful in competing for research grants from several agencies including DST, DRDO, DBT, DAE, NIXI and Intel. They have over 20 grants totalling about Rs. 8 crores. Noteworthy projects include:

- ✧ Rs. 76 lakhs from DIT for development of text to speech systems in Indian languages (Rajasthani). PI: Dr. Anil Sao
- ✧ Rs. 80 lakhs from DST for the Centre for Innovative Technologies for the Himalayan Region. Village-scale industries for economic exploitation of pine needles is a major activity. PI: Dr. Arti Kashyap + 3 other faculty
- ✧ Rs. 85 lakhs from DST for the Indo-UK Advanced Technology Centre for Next Generation Networks. 7 faculty. Collaborating with 6 other Indian and 9 UK universities.
- ✧ \$315,000 from Intel, USA to develop novel resists for EUVL at the 16 nm node and beyond, for use in VLSI fabs. PI: Dr. K. Gonsalves + 3 other faculty



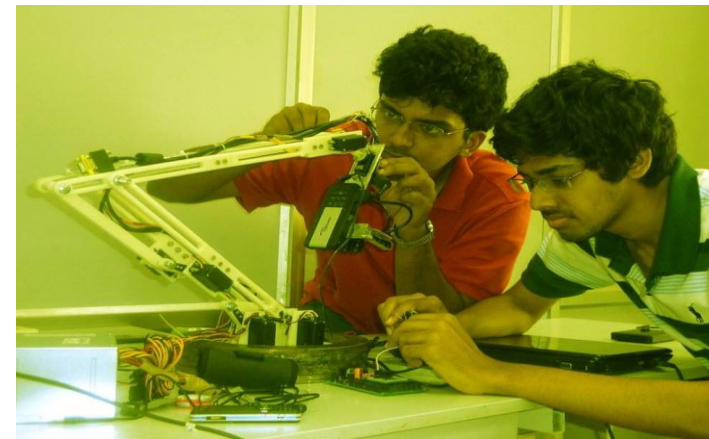
TEACHING

With globalisation, the Internet Age, and the march of technology, the life of an engineer is changing rapidly. Today's graduate needs to be flexible, to be able to learn quickly, and to be able to innovate to produce products that cater to local needs and global standards. We have designed the B. Tech. curriculum from the ground up to produce technology-savvy leaders and product designers for the future India. The curriculum has a broad base of courses in sciences, engineering, humanities, creative arts and management. Students have considerable flexibility to specialise in some aspects of their major discipline and optionally in 1 or 2 minor areas. Two of the innovative features of the curriculum are *Practicums* and the *Design & Innovation stream*.

A Practicum is a lab-based course that precedes the corresponding theory course. It encourages self-learning by doing. In some cases, there is no formal theory course.

The Design & Innovation Stream exposes students to various facets of real-world engineering activities throughout their 4 years. Students learn to work in teams to conceive, solve and deploy useful products. This Stream comprises:

1. *Reverse Engineering* in 1st year: understand existing products
2. *Design Practicum* in 2nd year: given a need of society, devise a solution and build a working prototype by the end of the semester



**B.TECH PROJECT CALLED “JUNIOR”
WON 2ND PRIZE AT JED-I AT IISc**



3. *Interactive Socio-technical Practicum* in 3rd year: explore the interaction of technology and society
Major Technical Project in 4th year: capstone project of the B. Tech. programme demonstrating a high degree of technical competence in the discipline.

This curriculum is a work-in-progress, and its efficacy can be judged only after a few batches have graduated. However, our B. Tech. 2009 batch has already notched up a number of notable achievements that make us optimistic for the future:

- ⤴ The IIT Mandi website was designed by 1st year students in early 2010 and run by them for several years
- ⤴ The Online faculty application portal, started as a 3rd semester Practicum project. It became extremely popular as the students supported over 3,000 applicants in early 2011, and is the most successful example of automation of IIT Mandi
- ⤴ Design Practicum projects by 2nd year students: Intelligent drip-irrigation system, Automatic clothes drier, Temperature-controlled magnetic stirrer, 6 different mobile chargers, and many others
- ⤴ Second prize (Rs. 70,000) in the Joy of Engineering Design and Innovation (JED-I) held at IISc, Bangalore. Their entry was a Robotic Arm-Controlled Projected Augmented Reality Interface
- ⤴ Other notable projects include a polling and opinion ranking system, optimisation of building structures for our Kamand campus, and the energy project.
- ⤴ *Road to Rutas* industry simulation competition at IIT Indore: IIT Mandi won the first prize consecutively for two years, 2010 and 2011, against tough competition from the likes of IIT Bombay, BITS Pilani, and IIT Kharagpur
- ⤴ Initiated *Exodia*, the annual technical-cultural fest of IIT Mandi



- ✧ Initiated assorted cultural, literary, sports and technical events, and student magazines
- ✧ Volunteering for NSS activities such as Blood Donation Camps, teaching underprivileged children, etc.

It is clear that our students are an outstanding lot. In this Convocation, we are awarding prizes to those who stand out exceptionally. I congratulate the proud recipients of IIT Mandi's first Institute awards.

INTERNATIONAL LINKAGES

Partnerships with leading institutes abroad are an important part of the educational setup of IIT. Foremost among these are the TU9 Universities in Germany, renowned for their rigorous approach to engineering and science. We also have collaborations with smaller, newer institutions that have diverse approaches to education – Blekinge Institute of Technology (BTH) in Sweden, the IT University in Copenhagen, and WPI in Massachusetts. A number of our students, UG and PG, have visited some of these Universities.

Innovation in engineering and in research requires thinking out of the box. This is facilitated by exposure people from widely different cultures, who are likely to approach a problem in very different ways. To this end, we have taken advantage of our serene location and institutional philosophy to attract a number of faculty and students from foreign countries. During 2013, a total of 6 foreign faculty are on extended visits to IIT Mandi for teaching and research.

This year we are running the 3rd year ISTP course in collaboration with WPI, USA. Fifteen WPI students spent 2 months in Kamand working on socially-relevant projects with our students.

Since 2011, we have been running a global software engineering course jointly with the IT University, Copenhagen. The class consisting of students from both sides is taught by faculty from the two institutions.



Students work on term-projects in teams consisting of members from Mandi and Copenhagen. These foreign faculty and students form a significant multi-cultural presence in our small community. Besides foreign faculty, we have a number of the best Indian faculty from other IITs visiting especially during May-June. Many of them continue their interactions in research and remote teaching throughout the year.

CONNECTING WITH INDUSTRY

Our faculty are active in organising workshops and conferences to bring industry and academia together. Recent workshops include:

- ✧ “CII-IIT Industry Conclave”, June 2012
- ✧ A Workshop on “Strategic Research Vision to Build a Smarter Grid”, June 27-29, 2013.
- ✧ A Workshop on “Turbomachinery aerodynamics: design and optimization using CFD”, June 21-24, 2013. Organized by GearedOx, a start-up from IIT Mandi.
- ✧ IIT Mandi hosted the IUATC Workshop on 8-9 March 2013, and the 2nd workshop on Text-to-speech synthesis (TTS) in the Kamand campus on 14-15 June 2013.
- ✧ The “1st National Symposium Nanobiotechnology” was held in June 2012, and the *Society for Nanobiotechnology* was formed with headquarters at IIT Mandi.
- ✧ A 1-week short course on “Computer Aided Drafting for Engineers and Designers”

Experts from industry are invited for guest lectures in on-going courses, and some of them teach courses on



specialised topics. We have sponsored research projects worth over Rs. 2 crores from industry.

PLACEMENTS

The first placements of IIT Mandi students took place this past year. Despite its remote location many top companies visited IIT Mandi and hired our students. These included Altair Engineering, Benchmark, CAD Studio, Cisco, Cognizant, DRDO, Finisar, HPCL, Infosys, Microsoft, Nucleus Software, Samsung, Amazon and others. In all, 88% of our students were placed with an average package of 7.7 lakhs and the highest package of 18 lakhs. Some of our students have gone on for higher studies in research at Carnegie Mellon University, University of Toronto, Penn State and Georgia Tech, and for MBA in IIM and Delhi University.

FACULTY ACHIEVEMENTS AND AWARDS

Exceptional students flourish under exceptional faculty. During the past 3 years, research by our faculty has resulted in over 140 publications in peer-reviewed journals and book chapters. Our faculty have received a number of awards and honours, some are listed below:

Dr. Rahul Vaish received the INSA medal for Young Scientists (2013), and the IEI Young Engineers Award (2012-13)

Dr. Varun Dutt was invited as a lead author of Chapter 2 “Integrated Risk and Uncertainty” in the United Nation's Intergovernmental Panel on Climate Change (IPCC) 5th Assessment Report, Addis Ababa, Ethiopia, July, 2013

Dr. Bharat Singh Rajpurohit received the IEI Young Engineers Award 2013-2014 in Electrical Engineering. He received an Alexander V. Humboldt Foundation Fellowship to visit the Technical University of



Dresden, Germany during July 2013

Dr. Sarita Azad received the President's Award for Excellence in 2011 at the Institute for Defence Studies and Analyses (IDSA), New Delhi.

Dr. Ashok Kumar Mocherla received an M. Louise C. Gloeckner Research Fellowship to visit the Drexel University College of Medicine, USA during June-July 2013

In a new, growing IIT, faculty take-up many “Institute building” tasks. Many faculty have enthusiastically given of their time well beyond the call of duty for building the academic programmes, the hostels, extra-curricular activities, planning the new campus, etc. They have not grudged the sacrifice of time from the more usual academic pursuits. Without their unstinting efforts, we would not be where we are today.

CONCLUSION

As I stand here today at the end of these four momentous years, I am deeply thankful to everyone who has made this journey possible. Today, the journey of the graduating students towards an IIT education is complete. You graduands are now embarking on the journey towards the rest of your life. In the years ahead, you will often recall the moments you have known at IIT, the friendships made, the wise words and helping hands of your teachers. You are going forth into the world to make your mark, to serve your fellow humans, especially those less advantaged than you. In your journey into the future, always cherish the years that you spent in this nascent institute, and hold high the banner of IIT Mandi. May the world welcome you with open arms and know the keen minds and the caring hearts that we have all come to love and cherish.





Addendum to Director's Report

Ranjit Singh will receive the M.S. degree for his thesis titled *Modeling and Performance Analysis of Three Phase Grid Connected Solar Photovoltaic System*. He was guided by Dr. B. S. Rajpurohit of the School of Computing & Electrical Engineering. Ranjit has proposed several efficient and intelligent maximum power point tracking algorithms for a grid connected solar photovoltaic system. He is interested in pursuing an academic career.