



IIT Mandi Scaling the Heights- a 10-year Odyssey

Mr Baba Kalyani, Chairman and Managing Director, Bharat Forge; Mr. Subodh Bhargava, 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; and distinguished guests: I welcome you all on the occasion of the 7th Convocation of the Indian Institute of Technology Mandi. I offer my congratulations to all graduating students on successful completion of their degrees. I am sure this would be a memorable day for you and your families.

Today, we are delighted to have with us Mr Baba Kalyani as the Chief Guest. Mr Kalyani is the Chairman & Managing Director of Bharat Forge. He has transformed Bharat Forge into one of the global leaders in its domain. Mr. Kalyani was conferred the Padma Bhushan and was made Commander First Class of the Royal Order of the Polar Star by the Swedish government in recognition of his contribution in furthering trade and business cooperation between Sweden and India. He has received many other awards. It is an honour for us to have him visit our campus on this august occasion

Timothy A. Gonsalves Director 5th Oct 2019



2011: North & South Campus

- 2010: 97 students + Director

During the past 10 years, our student strength has grown steadily from 97 to 1,620. Our degree programmes have expanded from the initial 3 BTech programmes to 7 BTech + 13 Master's + MS and PhD today. Notably, we have an MA (Development Studies) run by the Humanities School, and a BTech (Data Science & Engg) that is the first in the IIT system.

In February 2010, the first batch of 97 BTech students plus the Director visited the Kamand campus for the first time. The campus in the scenic, remote Uhl River Valley in the Himalayas was home to some horses. At that time, 8 new IITs had been started. IIT Mandi was considered by many to be a folly, destined to lag well behind the other 8.

The small band of students, the first ~20 faculty and other well-wishers set out to prove the naysayers wrong. We soon crafted a strategy for success: growth on par with our peers, define academic USPs that would attract talented faculty and students, excel by focussing on a few regional and national priorities, quickly develop and use our campus, and build an ethos of cooperation, responsibility and accountability. Individually and as an Institute, we put in place a system of annual goal setting and self-appraisal.



8th among 8 New IITs?

Strategy:

- Steady growth on par with peers
 - Define USPs to attract good faculty and students
 - Driven by local, regional and national problems
 - Leverage our locational advantage
 - Ethos: responsibility with accountability, cooperative spirit
 - Annual goal-setting and self-appraisal by each faculty
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Rigaku XRD Rs. 1.75 crores

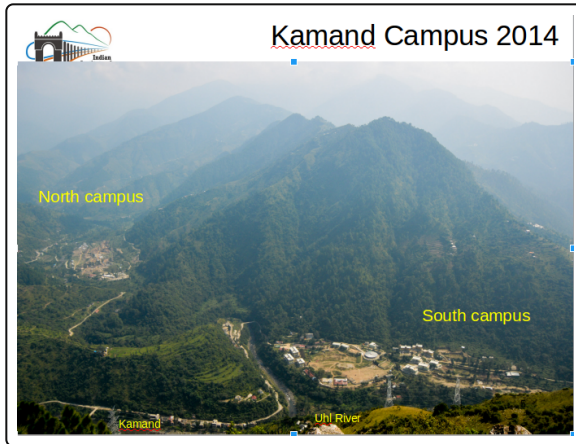
By mid-2012, the horses in the stables gave way to our first sophisticated instrument, an XRD costing Rs. 1.75 crores. The 1st Industry-Academia Conclave was held at the stable with 100 Mb/s connectivity to the world.



Stable & Horses, Jun 2011



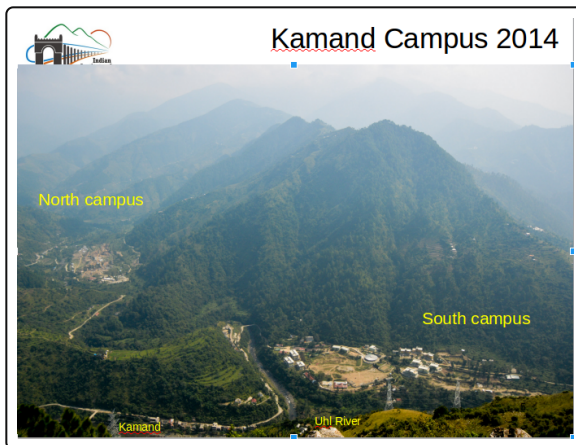
Renovated Stable, May 2012

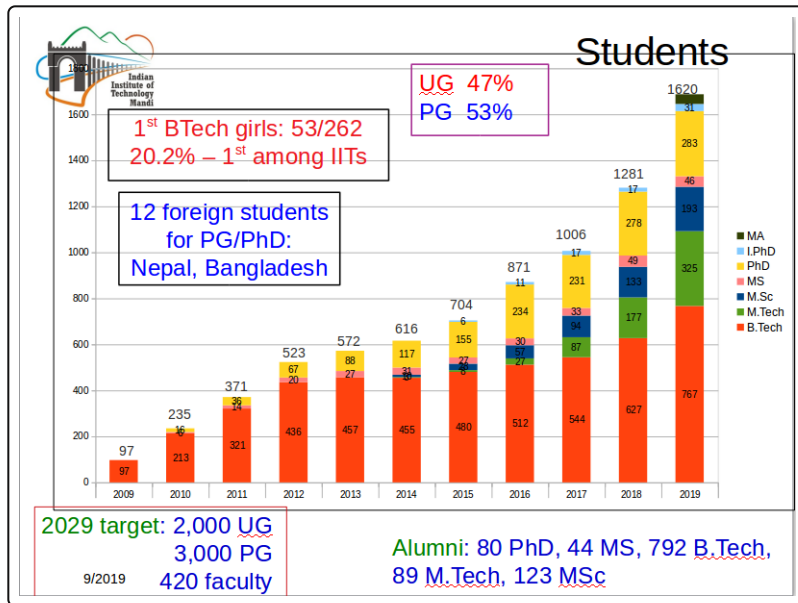


Kamand Campus 2014

By 2014, construction was underway and by 2015 almost all students were living and studying the Kamand, along with about half the faculty. Despite the remote mountainous terrain, we accomplished this ahead of the other 7 new IITs.

Kamand Campus 2017





Students

In the 7th Convocation today, IIT Mandi is graduating 276 students: 130 B.Tech. including the first batch of B.Tech. (Civil Engineering); 60 M.Tech. including first batches of M.Tech. (Power Electronics and Drives) and M.Tech. (Communications and Signal Processing); 54 M.Sc. including first batch of M.Sc. (Physics). Of the 32 research scholars, 10 are being awarded M.S. (by Research) degrees and 22 are being awarded Ph.D degrees.

The total degrees awarded since the 1st Convocation is 1,135 which includes 89 Ph.Ds; 50 M.S. (by Research); 87 M.Tech.; 121 M.Sc. and 788 B.Tech. While the graduands have reached milestones after 2 or 4 or more years spent at IIT Mandi, IIT Mandi has reached a milestone after its first decade since inception. It is hence appropriate at this juncture to outline the development of the Institute from 2009 to 2019.

Degree

7 foundational B.Tech programmes

- Computer Science & Engg
- Electrical Engg
- Mechanical Engg

- Civil Engg

MS (research) and PhD

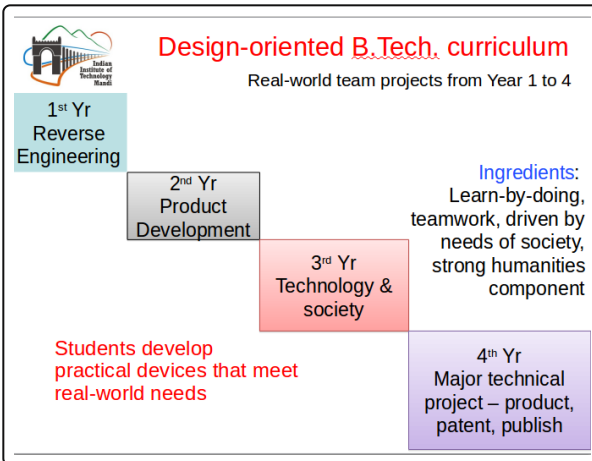
- Engineering, sciences and humanities

13 specialised MTech/MSc/MA programmes:

- Energy Engg
- Mech Engg
- Chemistry
- Physics
- Biotech,
- Appl. Maths
- VLSI
- Power
- SPComm
- Dev Studies

New from Aug 2019

- Bio Engineering (DD)
 - Data Science & Engg
 - Engineering Physics
-

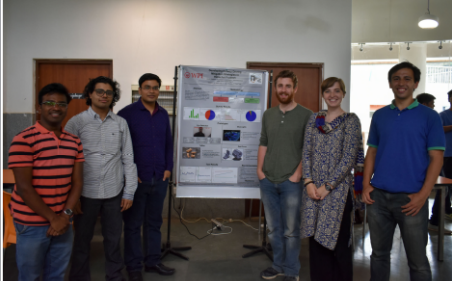


To prepare students to become technology-based leaders in a rapidly changing world, IIT Mandi has an unusual design-oriented curriculum. From day 1 until graduation, students work on real-world projects, work in teams, deliver working solutions. For the B.Tech, we have Reverse Engineering in year 1, quick prototype development in year 2, a unique socio-technical practicum in year 3, and a major technical project in year 4. Teams from the graduating batch built this automated cooking station and a wall-climbing kit in their 2nd year. In their 3rd year, they worked on social problems such as dispensing of medicines in rural areas, and combatting drowsy driving in the hills.



ISTP

3rd B.Tech Practicum
B.Tech 2019 projects on
social impact of
technology



Medication Dispensing

Drowsy Driving



Student Achievements

- 1,140 alumni well-placed in industry, academia, public sector – in India and globally
 - [Nitesh Kumar](#): 13 Int'l Para-badminton gold/silver/bronze, '17-'19
 - [Pradeep Seervi](#): GATE(EE) topper, 2015
 - [Aamir Khan](#): Civil Services 2nd rank, 2015
 - [IITians Tech](#) – 1st startup in 2014, others since
- Student Gymkhana for self governance
 - 240 events in past year – 40% technical



Thanks to the rigorous foundations coupled with many opportunities for learning by doing, our students have fared very well after graduation. Their record of achievements and placements is on par with the older IITs. We are proud that Nitesh Kumar during the past 2 years while doing his BTech has won 13 gold/silver/bronze medals for India in international Para-badminton events, in Ireland, Turkey, Indonesia, India and other countries. During the past 10 years, generations of students have developed the Gymkhana for self-governance. In the last 1 year, the Gymkhana and its Societies and Clubs organised 240+ events, a remarkable achievement given the student strength of 1,280. About 40% of these events were technical, in keeping with the priorities of this institute of technology.



Outside the Classroom

Setting up
cloud.iitmandi.ac.in

BTech 2019 at
Griffon Peak



PGs to Armehar



Research & Development

Thrust Area Research Centres:

- AMRC – Advanced Materials Research Centre
- C4DFED – Centre for Fabrication & Design of Microelectronics
- BioX – Systems and Synthetic Biology

- Rs. 110 cr funding
- Scopus publications/faculty 6th of 23 IITs



Starting with just 20 faculty in 2010, IIT Mandi adopted a strategy of focussing on a few areas based on regional and national priorities. IIT Mandi started the AMRC, BioX and C4DFED Centres. Each has 10-25 faculty with a shared research vision. Seeded by total funding of about Rs. 100 crores, the Centres have state-of-the-art equipment that is among the best in India. The open web-based reservation system gives access to all researchers in the Institute. The faculty in each of these Centres have brought in external funding of Rs. 10-25 crores.




Research Centres



Secy MHRD inaugurates Clean Room


PES



Research & Development

- 125 highly qualified faculty, mostly young
- *Nature Index 2017* (60+ science journals):
 - IIT Mandi ranked 5th of 23 IITs (per faculty)
- *Scopus* (2018) publications/faculty: 6th of 23 IITs
- Sponsored R&D worth Rs. 110 crores
- Strategic partnership with TU9, Germany

This strategy has borne rich fruits. IIT Mandi ranks near the top of the 23 IITs in measures of scientific publication. Publications from IIT Mandi have made it to the cover pages of a number of leading international journals. I'd like to give a sampling of the many successes of our researchers.

 Indian Institute of Technology Mandi
2014

Intel US, \$300K in 2012: <22nm

VLSI Resists

20 nm Feature

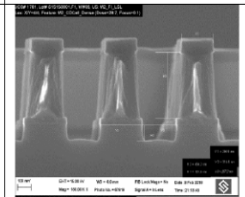
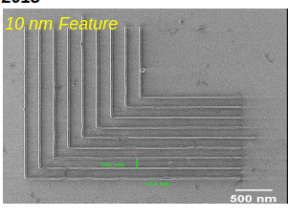
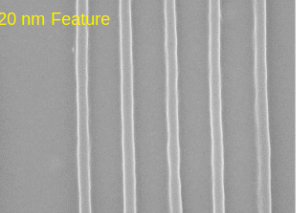
Validation at 180 nm fab line of SCL


2018

10 nm Feature

IIT Mandi indigenizing 11 out of 34 chemicals used at SCL, Mohali

Indian patents filed
No. 201611044190
No. 201611018061
No. 201611022219






 Indian Institute of Technology Mandi

MANAS

Multimedia Analytics Networks Systems

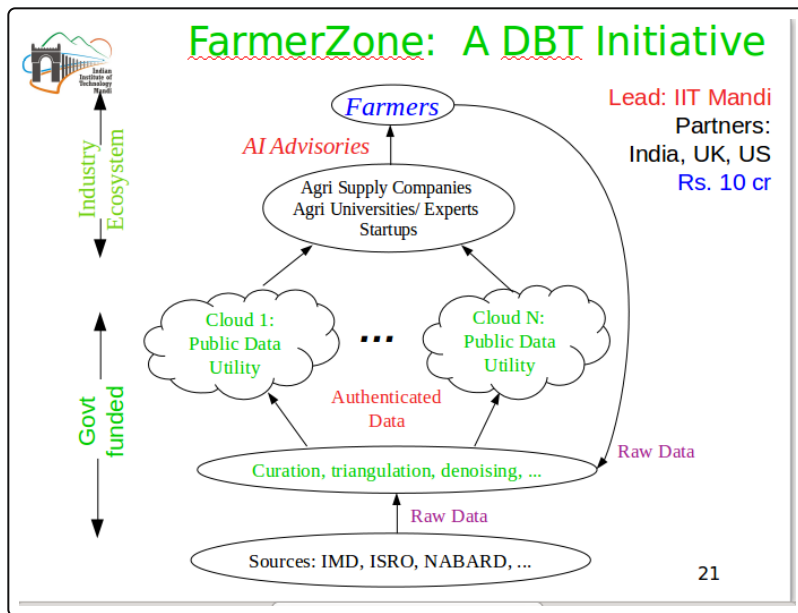
Medical Image Processing: Detection of cervical cancer cells

- 3 years R&D with KIDWAI Memorial Institute of Oncology, PGI Chandigarh, Aindra Pvt. Ltd, Bangalore
- Aindra product based on IIT Mandi algorithms




In the area of VLSI, starting in 2012 with a grant of \$300K from Intel, US, IIT Mandi faculty have been at the cutting edge of resist materials, going from 20nm in 2014 to 10nm in 2018. This has led to commercialisation with SCL, Mohali.

Driven by the need for affordable healthcare in rural areas, IIT Mandi has contributed to a low-cost product by Aindra, Bangalore. The Manas Group has developed AI-based image processing for screening for cervical cancer.




Plant Biodiversity Conservation and Research

Selected Medicinal Plants of Kamand




Rauvolfia serpentina
(Sarpagandha)




Bergenia ciliata
(Pashanbheda)

Selected Wild Edible Plants of HP



Fagopyrum esculentum
(Phaphra)



Pteridium aquilinum
(Lingad)

- Eco-management plan for conservation, education and research
- Botanical and Medicinal Plant Garden with 200 species
Houses Arboretum, edible plants of HP, micro-orchards of Kaphal, Aakhe & Daru and medicinal plants
- Website, [herbarium](https://research.iitmandi.ac.in/herbarium/), QR codes, plantation drives and hosting school visits

Upcoming book: "Flora of Kamand"

<https://research.iitmandi.ac.in/botanical/>

The FarmerZone project, funded by DBT, aims to provide AI-based crop management advisories to small and medium farmers. This multi-institutional, multi-national project is led by IIT Mandi. The initial sentinel is working with 1,000+ potato farmers in Punjab, UP and HP.

IIT Mandi has a Botanical Garden for research and recreation. Here, medicinal plants of the region are conserved and studied. A herbal tea formulation is being commercialised.

Eco-friendly Utilisation of Dry pine needles



- ✓ Economically viable method for making briquettes and pellets from pure dry pine needles, **Patent is filed**
- ✓ Govt. of HP announced **50% subsidy on capital cost** with a provision for funds for collection and transportation of DPN



Support from **DST** and **Forest Department, HP**



Transitioning to E-Autos in hill states

An initiative of IIT Mandi



 <p>Understand the incumbent Petrol-Auto landscape in Mandi Town.</p>	 <p>Compare them with possible E-Auto landscapes.</p>	 <p>Technically assess existing E-Autos, shortlist suitable ones for hilly terrain</p>	 <p>Adapt P-Auto model to create appropriate business model for E-Auto</p>	 <p>Develop future proposals to support a market based transition to E-Autos</p>
← Understand	Compare	Assess	Adapt	Develop →

Dry pine needles are a forest fire hazard in the Himalayas. IIT Mandi has developed an eco-friendly, economically viable method for converting pine needles into fuel briquettes.

With India's desire to achieve 100% e-vehicles by 2030, IIT Mandi is working on adapting e-Autos for this hilly terrain. Interestingly, this project is a collaboration between an economist and an electrical engineer.



A low-cost landslide monitoring

- India tops global landslide list: More than INR 1,000 crores/year in economic losses and more than 1000 deaths/year
- Existing landslide monitoring solutions extremely costly

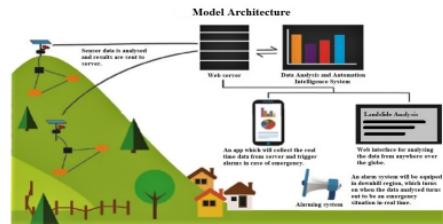


Movement & Rainfall Alerts

Price: INR 20,000 per system



A major landslide at Kotrupi village, Mandi district on August 12th, 2017: 46 dead, buses and houses buried



Globalisation



Strategic MoU with TU9 Germany since May 2011

IIT Mandi is nodal institute for Germany for SPARC

~100 foreign visitors per year

12 foreign students registered for Masters/PhD



Landslides are an ever-present danger in the Himalayas, leading to much loss of life and property. IIT Mandi researchers have combined AI, IoT and soil mechanics to develop a low-cost landslide warning system. This is being commercialised through our first faculty-led startup, IoTs.

The best research universities today are strongly global. In 2011, the fledgling IIT Mandi signed a strategic MoU with the TU9, the leading technical universities of Germany. Under this, over 25 of our faculty have made visits of 3 months to a TU, with reciprocal visits by German academics. Significant academic collaborations and output have resulted. When MHRD started the SPARC scheme, IIT Mandi was selected as Nodal Institute for Germany. Attracted by our unique academic ethos and the sylvan setting in the Himalayas, IIT Mandi has attracted dozens of foreign faculty and students for short visits. Since 2018, foreign students have registered for degrees at IIT Mandi, a result of recruitment visits by our faculty to targetted countries.



Helping Kamand women take command!



Aligned with UN Sustainable Development Goals	8 DECENT WORK AND ECONOMIC GROWTH 	45+ women impacted through * incubation * skills training * capacity building		
5 GENDER EQUALITY 	Creating eco-system of women-centric entrepreneurship & employment		12+ rural women led startups incubated	
	1 NO POVERTY 	60+ employment created		Bridging industry, academia, government and local community

1st TBI in HP
First high end, low cost, residential incubation program for budding entrepreneurs in the state

>34 Startups Supported
10 HP based or focused startups

>1 cr Funding Given
Grants and Investments

31 Employment Created
Plus 11 Internship opportunities

10 Awards/Honours
3 international level
3 national level
4 state level

Catalyzing Entrepreneurs in Himachal Pradesh

- Tourism
- Road Safety
- Healthcare
- Agriculture
- Disaster Prevention

A spinoff of 2 years of BTech ISTP projects, faculty at IIT Mandi started EWOK, a business incubator for rural women. Working towards an ecosystem of women-centric entrepreneurship and employment in the villages surrounding IIT Mandi, EWOK has already achieved significant successes: these include the first women-owned business in Salgi village, the first women PWD labour contractors, 12+ startups and 60+ jobs created.

Given the paucity of industry in Himachal, IIT Mandi Catalyst launched in 2016 is Himachal's first technology-business incubator (TBI). Funded largely by DST and IIT Mandi, Catalyst has already begun to change the mindset of Himachalis and our students towards entrepreneurship.



2019: IIT Mandi = 1,630 students,
125 Faculty, 250 staff, 1,135 alumni,
Rs.110 crores Research Projects,
Nat'l & Int'l awards & recognitions



Position of IIT Mandi in IIT System, May '19

Performance Measure	Rank: 8 New IITs	Rank: all 23 IITs
Outreach and Inclusivity (NIRF)	1	1
Scopus publications per faculty (2018)	2	6
Teaching, Learning, Resources (NIRF)	3	8
Research funding/faculty	3	12
Engineering Overall (NIRF)	4	13
% females in 1 st BTech	1	1
% female faculty	1	1

Starting from 97 students and 1 Director in a green-field in the Kamand Valley in 2009-10, in 10 years IIT Mandi has grown to 1,630 students, 125 faculty, 1,135 alumni and a fully residential campus with 1,30,000 sqm buildings completed and 86,000 sqm in progress.

At the end of our 10-year odyssey, the table indicates where IIT Mandi stands. Overall, in the NIRF ranking, IIT Mandi is 4th among the new IITs and 13th out of all 23. In Outreach and Inclusivity and in percentage of female faculty, we are No. 1 among all 23 IITs. It is a matter of great pride that we are in the middle or near the top in many measures, a great improvement over our last position in 2009.



Scaling the height



First decade: a modest beginning on the arduous journey
to excellence
Second decade: IIT Mandi helps transform India
IIT Mandi best in the world in X
Congratulations & Best Wishes to all Graduands!

In this report, I have focused on IIT Mandi's achievements over the first decade. Thanks to the efforts of legions of faculty, students and staff, IIT Mandi has transformed the bucolic Kamand Valley into a bustling hub of academic activity. Already, Himachal is benefitting from technology interventions by IIT Mandi. Over the next decade, IIT Mandi aims to make major contributions to India's development, and to become the best in the world in some area of endeavour. In what areas these occur will depend on the passion, innovation and hard work of IIT Mandi's highly talented faculty and students.

I thank Mr. Baba Kalyani for visiting and honouring us with his gracious presence on this occasion. Sir, we hope that your visit will lead to cooperation between Bharat Forge and IIT Mandi. Mr Subodh Bhargava's guidance and support during the past 3 years have been invaluable in achieving IIT Mandi's goals – I hope he will continue as Chairman for a 2nd term. Finally, I congratulate the graduating students for your truly remarkable achievement of becoming IITians today. IIT Mandi is proud of you. I am sure that as you scale the heights in your careers, you will carry ever higher the name of IIT Mandi, fulfilling the expectations of the Nation!

Prof Timothy A Gonsalves
Director, IIT Mandi
5th October 2019

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