ANNUAL REPORT

2013-14

INDIAN INSTITUTE OF TECHNOLOGY MANDI

ANNUAL REPORT
2013 - 14

Indian Institute of Technology Mandi

Kamand - 175005, Himachal Pradesh, India

VISION

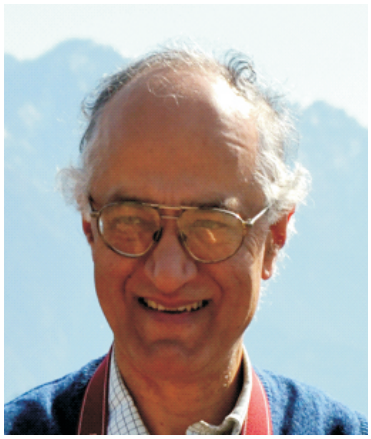
To be a leader in science and technology education, knowledge creation and innovation, in an India marching towards a just, inclusive and sustainable society.

MISSION

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

CONTENTS

From the Director's Desk



The year 2013-14 saw IIT Mandi coming of age – we graduated our first students, 1 Ph.D., 2 M.S. and 94 B.Tech.students, in a colourful ceremony on 20th October 2013. Most of these 1st batch students were placed in India's top companies. A few students went on for higher studies in prestigious universities in North America – University of Toronto, Georgia Tech, University of Wisconsin, etc. The year also saw us consolidate our achievement as the only new IIT to develop and occupy its new campus. 50% of our students, 30% of the faculty and a number of staff live and work in Kamand.

The 3rd stage of the unique Design & Innovation Stream in the BTech Curriculum, the ISTP, saw its maiden offering. The ISTP was an occasion for us to host 15 students and one faculty from WPI, Massachusetts for 2 months. During the year, 5 foreign faculty and a number of NRIs chose to spend significant time in IIT Mandi. A number of our students went to Germany for academic internships and semester exchanges. Altogether, these provide a good cross-cultural exposure for our students.

The Advanced Materials Research Centre (AMRC) building was inaugurated in March 2013. During the year, we have procured several sophisticated instruments costing over Rs. 16 crores to support state-of-the-art experimental research in materials for electronics, electrical, biomedical and agricultural applications. These include a 500 MHz NMR, a high-resolution TEM, a confocal microscope, a high-resolution mass spectroscope, a femto-second pump-probe laser and a single-crystal X-ray diffractometer.

The serene 530-acre permanent campus in the Uhl River valley at Kamand is one of the major attractions of IIT Mandi for bright young faculty and students. By the end of 2013-14, we had available about 15,000 sqm of academic and residential space accommodating 250 students and 30 faculty+staff.

In 2014-15, we expect to continue growing towards world renown. With the fast pace of campus development, we hope to become a fully residential Institute with 600+ students, 65+ faculty and 100+ staff working, playing and (many) living in Kamand. On the academic side, we plan to start 2 novel MTech/MSc programmes. Given the location in the Himalayas, we will recruit faculty in infrastructure and civil engineering, and start to design a BTech in Civil Engineering with the aim of admitting the first batch in August 2015. Finally, I am confident that our innovative faculty, students and alumni will achieve something quite unexpected!

Prof. Timothy A Gonsalves

Director

ACADEMIC STRUCTURE

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

Schools:

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

Currently, the Schools in the Institute are:

1. School of Computing and Electrical Engineering

Faculty members in the broad areas of computer science, computer engineering, electrical engineering including electronics and semiconductors, signal processing, automation and control and electrical energy systems are all part of this School.

2. School of Engineering

Faculty members from several areas of engineering including mechanical engineering and engineering material science are part of this School.

3. School of Basic Sciences

Faculty members from all areas of basic sciences, including physics, mathematics, chemistry and biology are all part of this School.

4. School of Humanities and Social Sciences

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

During the year 2013-14, 55 full time faculty members belonging to the different Schools and 9 visiting faculty members from established Institutes like IIT Madras and IIT Roorkee participated in different teaching programs. Also, some of the elective courses being offered at other institutions (IIT Delhi, Roorkee, Madras, MNIT, etc.) were conducted via NKN.

More detailed information on the list of faculty members in each schools may be found in the section 'Academic Schools'.

Research Groups:

The structure at IIT Mandi allows for the creation of a Research Group to act as a focus for R&D towards some specific goal. The Group will draw on faculty and students from either one School or from different Schools and Degree Programmes. The Group may have technical and support staff on short-term contracts. Once the goal is achieved, the Group may be disbanded.

An example of a Research Group at the Institute is the Intel Project Group formed for the execution of the Intel-IIT Mandi research project. The group consists of faculty members, post doctoral fellows and research students from the School of Computing and Electrical Engineering and School of Basic Sciences.

Degree Programmes:

1. Bachelor of Technology (B. Tech) in the following engineering disciplines

   a) Computer Science & Engineering (CSE)

   b) Electrical Engineering (EE) and

   c) Mechanical Engineering (ME)

2. M. S. (by Research) in the following engineering disciplines

   a) Computer Science and Engineering

   b) Mechanical Engineering and

   c) Electrical Engineering

3. Ph. D in Engineering, Basic Sciences and Humanities & Social Sciences

The Degree Programmes are designed according to the job and career needs of students. A student in a given Degree Programme may be taught and guided by faculty members from several Schools. The Degree Programmes may also be started and wound up based solely on job and student aspirations.

Currently, the intake in B.Tech. programme is 40 students in each branch. The institute has plans to introduce B.Tech. in Civil Engineering in the near future.

A B.Tech. student at IIT Mandi will study foundation courses in basic sciences, engineering sciences and practice, humanities and social sciences, and the core in his/her chosen discipline. Electives in the discipline will enable the student to develop significant knowledge in a specialized area with exposure to research trends and developments. The category of free/open electives outside the chosen discipline will enable the student to obtain significant inter-disciplinary knowledge. In addition, the curriculum allows specialization in a 'Minor' area, by taking a set of 3-4 courses in another discipline.

Two new PG programmes viz M.Sc. (Chemistry) and M.Tech. (Energy Materials) are planned to be started from the academic year 2014-15 with an initial strength of 12 students in each programme.

Design Practicum Approach:

The goal of the B.Tech curriculum at IIT Mandi is to train students to become design engineers capable of conceiving, designing and deploying innovative and cost-effective products and processes for widespread use in the society.

To this end, the curriculum aims at the integration of innovation and design into the learning process. This is achieved through a 'Design Practicum' Model of learning, which is built into the curriculum.

In the first year of the B.Tech programme, the students carry out a 'reverse engineering' project, where student teams dismantle a common gadget/equipment, understand how it works and then put it back together in working order. At the second year level, student teams propose product ideas and then build working prototypes of these products. Many of these product ideas are useful to the society. The products which were successfully built and demonstrated last year include an Autonomous Garbage Collection Machine for Parks and Beaches and Automated Road Repair System.

Details of the innovative products proposed and developed by the student groups during 2013-14 may be found in the section on Design Practicum.

At the third year level, the students have the option of working on an 'Interdisciplinary Socio-Technical Project' (ISTP). In this project, interdisciplinary student teams explore some of the issues/problems of society and propose technology-based solutions for them and also evaluate them from various angles. Some of the ISTP student teams have students from IIT Mandi and from WPI, Boston, working together. Finally, during the fourth year, the students have the option of doing a Final Year Project either individually or in a group.

Overall, the curriculum at IIT Mandi is designed to encourage and enable the student to become well-qualified and well-rounded engineers in all respects.

Academic Linkages

The Institute has developed promising research and teaching collaborations with several Institutions around the world. These collaborations have led to exchange visits by a number of Institute's students and faculty members. The existing collaborations include: Blekinge Institute of Technology, Sweden, the IT University, Denmark, Technical University (TU) of Stuttgart and the other eight TU Institutions of Germany, Dublin City University, Ireland, Worcester Polytechnic Institute (WPI), USA and HEPIA - University of Applied Sciences, Switzerland; and, the India-UK Advanced Technology Centre for research on next generation networks. The Institute has also such agreements with a few Indian Institutions. The collaboration with the IT University, Denmark has led to co-teaching of a Software Engineering course simultaneously to students located in India and Sweden. As mentioned earlier, the collaboration with WPI has led to a semester-long undergraduate research project (Interdisciplinary Socio-Technical Project), in which US-IIT Mandi students work together in teams to address socio-economic issues of the local community.

DESIGN PRACTICUM

As mentioned earlier, the B.Tech curriculum follows a 'Design Practicum' approach to inculcate design and innovation skills among engineering students. As part of this, all students must take a course called Design Practicum during the second year. In this one-semester course students were asked to design and build innovative products that address real world problems in our society. Interdisciplinary teams of six students each were randomly formed from electrical, computer science and mechanical engineering branches. Each team of six students reported its progress to an interdisciplinary team of two faculty members drawn from engineering, science and humanities disciplines. In the first week the students were informed about some basics of designing and developing a new product, during the second week they were asked to talk to people and prepare a list of problems faced by people and also a list of new ideas that will help to solve these problems.

Out of these several ideas they were asked to pick a few and come up with a product design. After thorough analysis of the feasibility and other parameters such as time and cost, one of the designs was chosen for product development. At this stage the students prepared a budget and got approval from the faculty mentors. After detailed designing they prepared a mock-up and analyzed the pro's and con's. Next, they worked hard on building a real model prototype that works. This stage was really challenging as they faced many common problems like getting things in time, compatibility of components brought for different purposes and finally getting it work. On the final day the students demonstrated their prototypes for public display. At the end of the day satisfaction and benefit the student derivedwas immense which will stay with them forever.

The following prototypes were developed during the year.

Product No.1: Smart Cane

This product is developed for the blind persons so that they can walk without any assistant. Basically this product is a cost effective and efficient navigation for blind which gives a sense of artificial vision by providing information about the environmental scenario of static and dynamic objects around them.

Product No.2 : Mr. Library Assistant

This product is a tool for transferring books within the library. In big libraries, the library staff faces many problems, just to keep the books back to the original position keeping the monotonous tiredness of "doing it again and again the every next day" in mind, considering this Mr. Library Assistant is designed.

Product No.3: Electric Bicycle

An electric bicycle is developed to climb on sloppy road with less effort.

Product No.4: Aero-Drone

An innovative aero-drone is designed which can give live video footage while flying and provides more safety concerns.

Product No.5: Dynamic Vehicle-Weighing System

This product has the capability to measure the weight of the moving vehicle. Piezoelectric technology is used to make this product.

Product No.6: RC Fire ExtinguisherVehicle

It is a fire extinguishing robotic vehicle, whose motion can be controlled by the remote to direct the sprinkler in a desired direction.

Product No.7: Voice Commanded Desiccant Dehumidifier

This product is designed to remove moisture from the air up to a certain level. It can be operated and controlled through voice commands and also manual switches in case of failure of the voice recognition modules.

Product No.8: Unmanned Ground Vehicle

An unmanned ground vehicle (UGV) is developed that operates while in contact with the ground and without an onboard human presence.UGV can be used for many applications where it may be inconvenient, dangerous, or impossible to have a human operator present.

Product No.9: Unmanned Aerial Vehicle

An innovative unmanned aerial vehicle is developed which has favorable characteristics such as lightweight, portable, water resistant and able to fly in every season.

Product No.10: Anti Collision System in Blind Turns (Hill station and Fog)

This product is designed to reduce the vehicle collision in hill station and especially during fog condition. In a blind turn it will notify the vehicles about the obstacles on other side. In a fog, it will notify by sound and at other times through visual. It must be able to distinguish between day, night and fog. If there is no vehicle on the other side it will alert vehicle about road end.

Product No.11: Easy Drive

It is a cost effective, two wheeled, self-balancing, battery powered electric vehicle. Motion of vehicle can be controlled by the user's body posture.

Product No.12: Smart Room

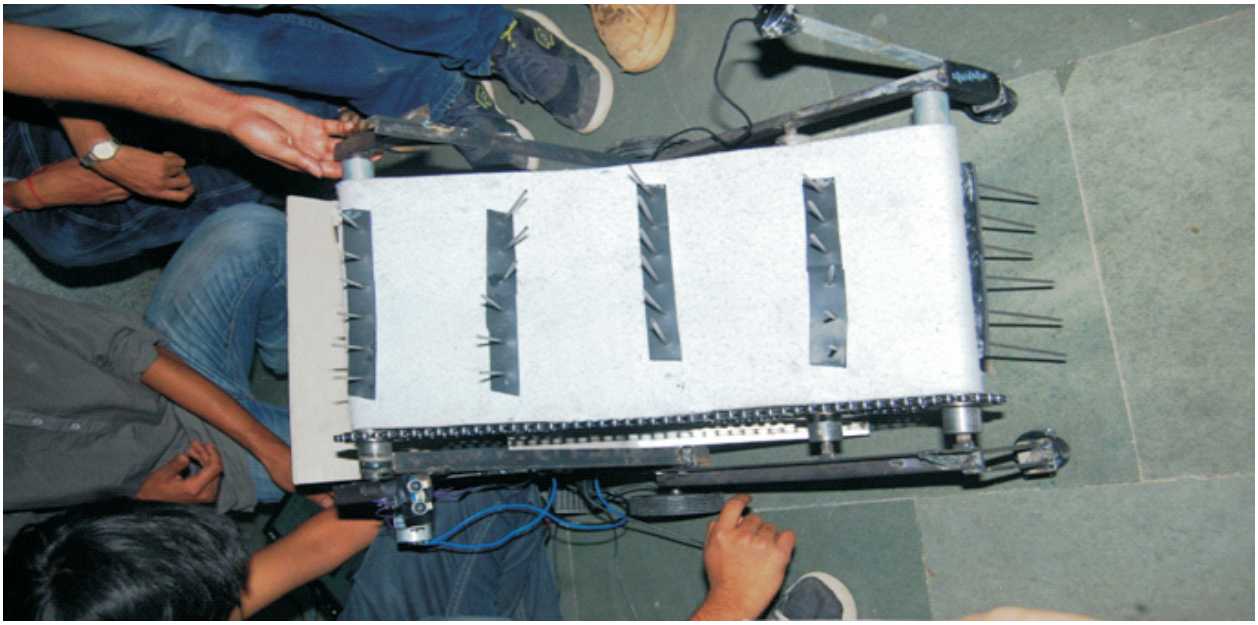
It is an automated room equipped with modern technologies to make the life of human simple and luxurious. The basic target of our project is to reduce human effort.

Product No.13: Intelligent Railway Crossing System

This product is related to an automatic railway crossing. It will consist of automatically closing gate when the train is at a particular distance from the crossing.

Product No.14: Autonomous Garbage Collection Machine for Parks and Beaches

It is a bot that identify the garbage from surrounding, pick it and collect it in a storage bin. Beaches/parks are often littered with lot of garbage like plastic wrappers, plastic and glass bottles. These cause grave inconvenience to public as well as birds, animals and sea life. Hence cleaning up of parks/beaches is important the developed product is targeted to solve this problem.



Product No.15: Segway PT

The Segway PT is a two-wheeled, self-balancing, battery-powered electric vehicle. The objective of the project is to produce this existing technology at a very low price and with a high ground clearance to make it useful for the faculty of IIT Mandi to move around in the campus. It will reduce dependence on oil, use the existing energy supply efficiently and reduce pollution. Even an amateur can ride the Segway easily, all a person need to do is instruct by bending.

Product No.16: Smart Cycle

This product is related to cycle which is equipped with the interesting features such as a GPS display which will provide the cycling enthusiast with the exact location on earth, a USB charger for charging mobiles & other accessories and some sensors which will alert the cyclist if some vehicle is coming from rear side adding to the safety measure.

Product No.17: Unmanned Aerial Surveillance Vehicle (UASV)

Unmanned Aerial Vehicle is developed for geographical information. It is designed to capture, store manipulate, analyze, manage and present all type of geographical data.

Product No.18: Animal Friendly Animal Repellant System

This product is developed to repel animals using a combination of water sprinkling and ultrasonic sound.

Product No.19: Automated Road Repairing System

This product is intended to address the repairing of roads by developing an autonomous road repair system that would use an unconventional repair approach, i.e. spray injection patching to repair potholes. The system is assisted by an on board image processing unit to identify and profile potholes so that the repair process can be carried out without external inputs, thus making the process faster, durable and cost effective.

Product No.20: Monitoring Water Quality in Municipal Water Supply

In this product, a sensor is developed which evaluates the water quality on the basis of pH, TDS and conductivity.

ACADEMIC SCHOOLS

School of Computing and Electrical Engineering

The School of Computing and Electrical Engineering (SCEE) of IIT Mandi aims to maintain excellence in teaching and research in technologies related to Computing, Communication, Electronics and Electrical Engineering. The area of research covers a broad spectrum of theoretical and application-based topics such as: smart grid, renewable energy, materials for efficient semiconductor devices, next generation communication and efficient human-computer interaction etc. At the undergraduate level, we emphasize the hands-on learning approach by providing students with a firm foundation of both the theory and practice of Computer Science and Electrical Engineering. We also have joint faculty positions with the School of Basic Sciences and School of Humanities to expose students to the social, ethical, and liberal education to make significant contributions to the society. The first batch of B.Tech. Students completed their graduation and enter the world of innovation as capable engineers. At the post-graduate level our faculty provide a deeper mastery of the basics and opportunities for research and professional capabilities for students in the field of Computer Science and Electrical Engineering. Our faculty are engaged in both practical and theoretical research, often in partnership with government agencies, private industry and non-governmental organizations. National and international collaborations are one of the prime focus of the faculty. This aims towards advancement of knowledge within our disciplines and also to contribute to society.

Faculty

Dr. A. K. Sao
Chairperson
Assistant Professor
Specialisation: Image processing
PhD from Indian Institute of Technology Madras, Chennai.
Home Town : Bhilai, Chattisgarh
Phone: 01905-237918
EMail: anil

Dr. Arnav Bhavsar
Assistant Professor
Specialisation: Image analysis, Computer vision
Ph.D. from Indian Institute of Technology Madras, Chennai, India (2011)
Home Town: Surat, Gujarat, India
Phone: 01905-300049
EMail: arnav

Dr. Anand Srivastava
Dean Infrastructure and Services
Visiting Professor
Specialisation: Optical and Access Networks
PhD from IIT Delhi.
Home Town: Delhi
Phone: 01905-237991/300069
EMail: anand

Dr. Arti Kashyap
Associate Professor (Joint Appointment)
Specialisation: Magnetism and magnetic materials
PhD from IIT Roorkee.
Home Town: Mandi, Himachal Pradesh
Phone: 01905-237907/300042
EMail: arti

Prof. B. D. Chaudhary
Dean(SRIC)
Visiting Professor
Specialisation: Software Technology
PhD from I.I.T. Kanpur in 1979 year
Home Town: Darbhanga, Bihar
Phone: 01905-237998
EMail: bdchaudhary

Dr. Dileep A. D.
Assistant Professor
Specialisation: Pattern Recognition, Kernel Methods for Pattern Analysis, Machine Learning, Speech Technology, Computer Vision
Ph.D. From Indian Institute of Technology Madras, Chennai in year 2013
Home Town: Udupi, Karnataka
Phone: 01905-300047
EMail: addileep

Dr. Ramesh Oruganti
Dean Academics
Visiting Professor
Specialisation: Power Electronics, Solar photovoltaic energy systems
PhD from Virgina Tech
Phone: 01905-237976/300068
EMail: ramesho

Dr. Sukumar Bhattacharya
Visiting Associate Professor
Specialisation: Web-scale Information Retrieval
PhD from IISc Bangalore (1997).
Phone: 01905-300046
Email: sukumar

Dr. Satyajit Thakor
Assistant professor
Specialisation: Communication Theory, Information Theory, Network Coding
PhD from Institute for Telecommunications Research, Uni. of South Australia in 2012.
Home Town: Anand, Gujarat
Phone: 01905-237999
EMail: satyajit

Dr. Bharat Singh Rajpurohit
Assistant Professor
Specialisation: Power Electronics Application to Power Systems
PhD from IIT Kanpur in 2009.
Home Town : Jodhpur, Rajasthan
Phone: 01905-237921
EMail: bsr

Dr. Padmanabhan Rajan
Assistant Professor
Specialisation: Speech processing, speaker recognition
PhD from IIT Madras in year 2012.
Home Town : Cochin, Kerala
Phone: 01905-300049
EMail: padman

Dr. Samar Agnihotri
Assistant Professor
Specialisation: Information Theory, Communication Complexity, Wireless Communications
Ph.D. From Indian Institute of Science in year 2009
Home town: Delhi
Phone: 01905-237907
EMail: samar

Dr. Satinder Kumar Sharma
Assistant Professor
Specialisation: Nanoelectronics,Sensors,Photovoltaic& self assembly.
PhD from Kurukshetra University in 2007.
Home Town : Mandi, Himachal Pradesh
Phone: 01905-237908
EMail: satinder

Dr. Timothy A Gonsalves
Professor
Specialisation: Computer networks and distributed software systems
PhD from Stanford University in 1986.
Home Town: Ooty, Tamil Nadu
Phone: 01905-300001
EMail: tag

Dr. Varun Dutt
Assistant Professor (Joint Appointment)
Specialisation: Artificial Intelligence, Human-Computer Interaction, Judgment and Decision Making, Environmental Decision Making
Ph.D. From Carnegie Mellon University (USA) in year 2011
Home Town: Lucknow, Uttar Pradesh
Phone: 01905-237932/300043
EMail: varun

Mentor Professors

Prof. Deepak Khemani
Professor, Department of Computer Science and Engineering, IIT Madras
Specialisation: Artificial Intelligence
PhD from IIT Bombay.
Phone: +91 44 2257 4365
EMail: khemani@iitm.ac.in

Prof. Hema A Murthy
Professor, Department of Computer Science and Engineering, IIT Madras
Specialisation: Speech, Signal processing, Computer networks
Ph.D. from IIT Madras, 1992
EMail: hema@csc.iitm.ac.in

Dr. Sanjeev Manhas
Associate Professor, Department of Electronics and Communication Engineering, IIT Roorkee
Ph. D. from De Montfort University, Leicester, UK in Electronics and Electrical Engineering, 2003.
Phone: +91-1332-285174
EMail: samanfec@iitr.ac.in

Research Projects

	Project	Sponsoring agency	Investigators	Project cost (in lac)
1.	Development of text to speech systems in Indian Language Date of sanction: 01.01.2012 Date of completion: 31.12.2014	DIT	Anil Sao	76,90,000
2.	India-UK Advanced Technology Centre (IU-ATC) Date of sanction: 11.09.2012 Date of completion: 10.03.2015	DST	Arti Kashyap, TA Gonsalves, Nitu Kumari, Samar, Sarita Azad, Tricha Anjali Manoj Thakur	81,48,000
3.	Centre for Innovative Technologies for the Himalayan Region Date of sanction: 28.08.2012 Date of completion: 27.08.2013	DST	Arti Kashyap, TA Gonsalves	13,86,776

4.	Aakash Education Proposal Date of sanction: 01.08.2012 Date of completion: 31.07.2014	MHRD	Arti Kashyap	50,00,000 + 25% grant-in-aid 12.5 lacs
5.	Structured Programming through E-Learning Date of sanction: 01.08.2012 Date of completion: 31.07.2013	BCI	Arti Kashyap, Anil Prabhakar, Hansfangohr	1,77,07,350
6.	Surface Plasmon Based Flexible Colloidal Crystal Sensors	SERB	Satinder Sharma	10,20,000

Progress of the Research projects

Operation and Maintenance of Virtual Class Rooms at IIT Mandi
Bharat Singh Rajpurohit and Anil Sao

This internal projects keeps the e-classrooms/video-conferencing facility fully operational and performing day-to- day maintenance for such high end facility. We have already established the good e-classrooms/video-conferencing facility through the partial funding of NIC, Delhi at IIT Mandi under the project "Creation of Virtual Classroom at IITs over NKN" and these facilities are being efficiently used to hold distant classes, guest seminars, conferences, workshops, regular classes, short courses, conducting interviews and meetings. At IIT Mandi, now we have one e-classrooms of seating capacity of 125 persons and one e-conf. room of seating capacity of 35 persons, at both places, at Mandi and Kamand campus. Generally, we are having, in each academic semester, around 7-8 courses taught by other institutes over NKN while utilizing e-classrooms at IIT Mandi. As per the NIC, Delhi IIT Mandi is one of the highest user of NKN facility with more than 60 % utilization. Now we are planning to augment/extend the same facilities for few more such e-classrooms.

NKN Electronic Classroom
Bharat Singh Rajpurohit and Anand Srivastava

We have already established the good e-classrooms/video-conferencing facility through the partial funding of NIC, Delhi at IIT Mandi under the project "Creation of Virtual Classroom at IITs over NKN" and these facilities are being efficiently used to hold distant classes, guest seminars, conferences, workshops, regular classes, short courses, conducting interviews and meetings. The objective of the National Knowledge Network (NKN) has been to bring together all the stakeholders in Science, Technology, Higher Education, Research & Development and Governance. The NKN is a revolutionary state-of-the-art multi-gigabit pan-Indian resource-sharing network aimed at digitally connecting all national universities, colleges and research establishments to create country-wide virtual classrooms. Network will consist of an ultra-high speed Core (multiples of 10Gbps and upwards), and over 1500 nodes. It is scalable to higher speed and more nodes also. The Core shall be complemented with a distribution layer at appropriate speeds. The participating institutions can directly or through distribution layer connect to the National Knowledge Network at speeds of 100 Mbps /1 Gbps. The infrastructure bandwidth will facilitate high speed classroom sessions. The facility can be used to transmit satellite television programmes also. With just 4 megabit connectivity an institution can simultaneously conduct up to 250 classroom sessions. At IIT Mandi, now we have created the similar facility by creating four e-classrooms /conf. rooms. Generally we are having, in each academic semester, around 7-8 courses taught by other institutes over NKN

while utilizing e-classrooms at IIT Mandi. Now we are planning to augment/extend the same facilities for few more such e-classrooms. As per the NIC, Delhi IIT Mandi is one of the highest user of NKN facility with more than 60 % utilization.

Person authentication using audio-visual biometrics
Anil Kumar Sao

In audio-visual biometrics speech is utilized together with static video frames of the face or certain parts of the face, and /or video sequences of the face or mouth area.The focus of the work has been to explore suitable representations of audio and video, which will help in efficient extraction of correlation between the two modalities to recognize the person. The main objectives have been to explore a suitable representation of audio and visual modalities which can characterize the subject specific unique information and to develop an approach to compensate for asynchrony between audio and visual modalities.

We have have explored the significance of dictionary in sparse coding based face recognition. We primarily address the problem of sufficiency of training data in various illumination conditions. The dictionary has been generated using a lower dimensional representation of image, which emphasizes the subject specific unique information of the face image. This representation is called weighted decomposition (WD) face image, because it attempts to give more weightage to unique information of face image. The effect of illumination in computation of WD face image is reduced using edginess based representation of image, which is derived using one-dimensional (1-D) processing of image. 1-D processing provides multiple partial evidences, which are combined to enhance the face recognition performance. The experimental results suggest that the proposed approach addresses the issue of sufficiency of training data efficiently. We are also exploring to extract the suitable features from audio-visual modalities and use the compressive sensing based approach to compute the identity of the given person.

Grid Connected/Stand Alone Power Electronic Converter Control
Bharat Singh Rajpurohit

In the growing electricity supply industry and open access market for electricity worldwide, renewable energy sources (RES) are getting added into the electric grid system. A significant emphasis is placed on the cost-effective utilization of this energy resource to simultaneously achieve a quality and reliable power supply. Power electronic systems (PES) are the crucial interfacing devices which matches output voltage, perform DC to AC (or AC to DC) conversion, control power quality and power flow, and have high efficiency on 10% to 100% power range. The objective of this project has been to develop simulations and experimental set-ups for interfaces for RES with grid connected PES control using intelligent and advanced digital signal processing techniques.The literature review has been done. Permanent equipment has been procured. The research team has already developed a detailed mathematical model for common-platform simulation model for 100 kW Solar Photovoltaic (SPV) system connected with power systems and feeding power to it. This common simulation model has been used to compare different switching algorithms performance for an efficient power injection to power systems. An algorithm has been developed for Maximum Power Point Tracking (MPPT) based on Perturb-and-Observe (P&O)

method and the Incremental Conductance (INC) method. Recently many Computational Intelligence based algorithms has been developed and tested. Now we working on developing the experimental prototype for validation of hardware and simulation results.

The work will be developing and testing of a small-scale grid-connected prototype systems. The prototype system will be extensively tested under different electric grid operating conditions to examine the response with the RES, the interaction with the battery storage, and the smooth operation of the power conversion and to enhance the controllability of PES based interfaces.

Development of text to speech systems in Indian languages
Anil Kumar Sao

The objective of this work is to develop a Text to speech Synthesis System (TTS) for Rajasthani language. Rajasthani language comprises of five primary dialects - Marwari, Mewari, Dhundhari, Mewati and Harauti. Our focus will be to build TTS system for Marwari, which is most widely spoken dialects in Rajasthan. In this work we are exploring to build TTS system using the platforms like: Unit Selection based Speech synthesis system (USS) and HTS based speech synthesis.

Work done: We would like to build system and integrate with OCR also which can read contents from website. In order to build system we need a huge corpus of speech in Rajasthani language. Till now we have built Rajasthani USS based TTS for 3.5 hours of female data which obtained a MOS (Mean opinion score) of 3.51(DMOS) and a word error rate of 28.68%. MOS was obtained after subjective evaluation by 20 subjects. We have also built USS based TTS for Indian-English for 1.5 hours of data. This system can read the English text also. We have also built HTS based speech synthesis system using 3 hours of female data. We observed that synthesized speech using HTS based approach is not natural and the speaker characteristics are not preserved. But HTS based speech synthesis take small amount of memory and can be installed in mobile also. On the other hand we need a lot of memory (relatively) and hence cannot be install in memory. Currently, we are exploring compressive sensing concept to reduce the size of memory of USS based speech synthesis. Compressive sensing is an approach which helps us to sample a signal in less than Nyquist criterion provided it satisfies some predefined conditions. In all these approaches selection of suitable dictionaries play very important role. We are exploring to derive dictionaries which are inspired by speech production mechanism. In addition, we are also exploring approaches which will help in modifying the prosody of synthesised speech. All the above mentioned approaches will be validated with more amount of data, which will be recorded in another six months.

IU-ATC
Arti Kashyap, TA Gonsalves, Nitu Kumari, Samar, Sarita Azad, Tricha Anjali Manoj Thakur

This is a collaborative project in which a number of IIT Mandi faculty members are collaborating with their colleagues at other IITs as well as in UK. A small part of the project is to deploy a Farmers Advisory System. RTBI, IIT Madras developed a system to provide personalized agricultural advisories through mobile phones to farmers. We at IIT Mandi are replicating it by adapting it to the need of Himachal Pradesh where IIT Mandi is located. In the initial phase, the following locations in Himachal Pradesh are considered:

i. Locations:

Mandi:-Mandi district is located in the heart of Himachal Pradesh, India, on the bank of byas river. The district has total geographical area of 3950 sq.kms with wheat, maize, tomato and apple as major crops. Among these crops wheat and tomato have been selected for the phase I of the project.

Kangra:- Kangra district is situated on the southern escarpment of the *Himalayas.* The district has total geographical area of 5739 sq.kms with wheat, maize, tea and potato as major crops. Among these crops tea and potato have been selected for the phase I of the project.

Kullu:- Kullu district is situated along the river byas. The district has total geographical area of 5503 sq.kms with wheat, maize, potato, apple and cherry as major crops. Among these crops apple and cherry have been selected for the phase I of the project.

ii. Baseline Survey

In order to run the pilot, we have started conducting detailed baseline survey for Apple and Cherry crop in Kullu district. We aim to conduct the pilot by engaging 20 farmers for both the mentioned crops.

iii. *Selecting Farmers for participation:* There are different categories of farmers belonging to marginal, small, medium and large based on landholdings. From the data collected through baseline survey questionnaire, a total of 20 farmers from Kullu are to be selected. The farmer's selection criteria include having a mobile phone, cultivating the crop chosen and willingness to take part in this project. Apple and Cherry are chosen as focus crops for field pilot testing in Kullu district. These crops are chosen because majority of farmers are predominantly growing them in this district.

iv. *Support of Himachal Pradesh Agriculture University, Palampur*

We have signed MoU with Agriculture University, Himachal Pradesh under which we will are able to formally partner with KVK Kullu to handle our pilot run.

Building on some of our previous work we are developing a two-pronged approach to characterize the capacity of general relay channel ... a fundamental problem in information theory that is open for more than forty years. First, we are striving to come up with better achievability schemes. Second, we are trying to generalize some of the recent results obtained for highly specialized networks (namely, symmetric diamond networks) for tighter upper bound computations to more general relay networks.

Another part of the project is to set up cloud at IIT Mandi and the work is in progress.

Centre for Innovative Technologies for the Himalayan Region (CITHR)
Arti Kashyap, Timothy A. Gonsalves

The mission of the Centre at IIT Mandi is to study, understand and provide solutions to the otherwise ill-equipped rural society in terms of knowledge, technology and awareness. Available technologies will be adapted to the requirements of the Himalayan region. We will use existing technologies but if required we will also put effort in tuning the products for the region specific

requirements. The Centre works on deploying the existing technologies to assist various sections of the rural society in Himalayan region ranging from education sector to agriculture and socio-economic activities.

Himachal presents a unique opportunity to avoid the ills of urbanization by rapidly improving the attraction of rural life through appropriate science and technology, on the other hand it is a challenge in itself to understand the societal dynamics of the other two hilly states. This Centre could become a hub of innovation for the rural areas of the entire Himalayan region. IIT Mandi with its vision of a sustainable society for India and its thrust areas is well-suited to take advantage of this opportunity through the Centre.

Aakash Education Proposal
Arti Kashyap

To create the educational ecosystem with high quality educational content and software tools to deliver the content and manage the learning process, a team from 5 IITs, led by TCOE, IIT Madras is being formed. This team is focusing on the available software tools and the required tools for Indian rural students and teachers. TCOE IIT Madras is the lead member of this team. IIT Mandi is one of the other four IITs working to create android applications towards this ecosystem as per the identified tools and content required.

Aakash Application Development Lab (AADL) at IIT Mandi started in August 1, 2012. Few students who had interest in Android application development formed the team and came forward to work on Aakash. Subsequently few project staff were hired and the activity was formalized.

As a first step, the self-motivated group of few students gave "Beginners workshop" to around 40 students for getting started with Android application development. After that competition about the ideas for developing applications for Aakash was floated. Good ideas were selected and students started working on the applications.

After receiving more tablets we organized workshop for the Government Engineering College in the neighborhood, called Jawahar Lal Nehru Govt Engineering College. Lots of hands on practice were given to the students to give them a good feel of the android application development as well as use of Aakash tablet.

To reach out to students in nearby private engineering colleges, few interns from Shoolini University, Solan (HP) were taken. Just to mention, Shoolini University at Solan had received Aakash tablets from IIT Bombay and students had undergone the training about how to use the tablet. We trained these interns and workshop on application development on Aakash has been planned at Shoolini University in the month of August where their own student trained with us will help us in parting the training.

Recently, few students from NITs who had interest in android application development also have got involved with AADL, IIT Mandi and working for applications on Aakash.

Applications under Development

1. *Data Structure Simulation*-This app will ease the understanding of the data structure and various algorithms.
2. *Interactive e-Book*- Developing interactive eBook for various engineering subjects to help

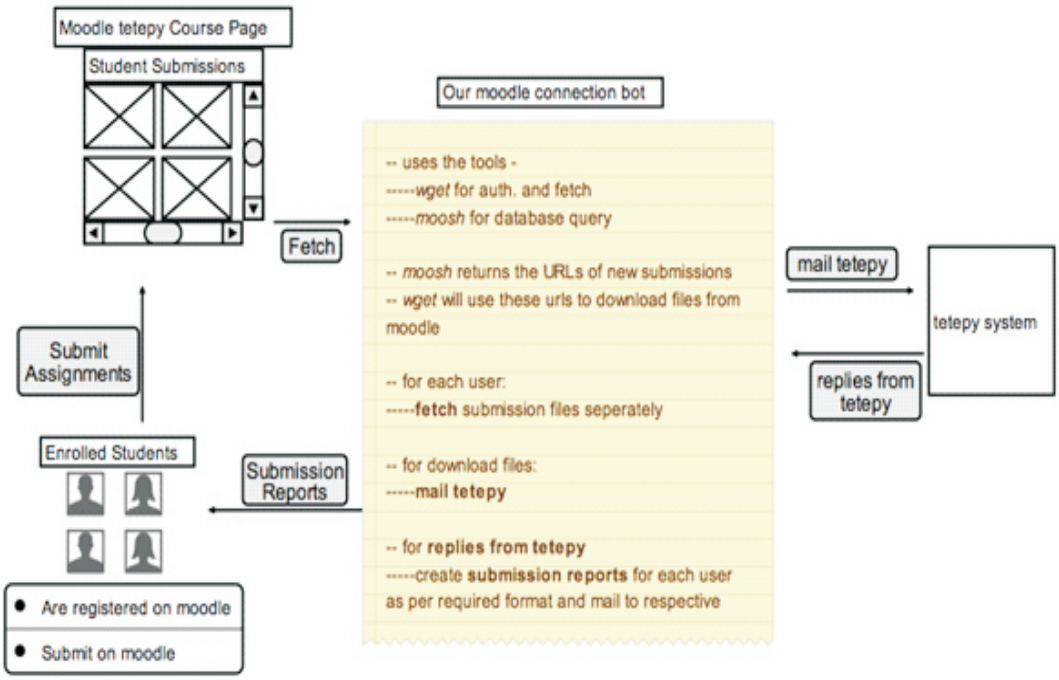
students in their studies because larger numbers of graduate students are more favorably leaning to e-books.

3. *Doubt Buster*- It's a teacher student interaction application to solve doubts regarding any stream anytime.
4. *E-Blackboard*- This application provides interface for free hand writing to take notes. It also contains toolbar of different elements such as: pencil, color, shapes etc.
5. *Easy Engineering*- This application is to perform a role of a handy pocket reference guide for students stepping into engineering colleges who need guidance on different aspects of engineering courses.
6. *Note Mania*- This app is intended especially for the students to make study easier i.e. taking notes, remembering the important things, setting up the reminders to get alerts about projects/assignments etc.

Aakash Ayurveda- It is simple but useful Educational App that makes students aware about various Ayurvedic plants of Himachal region. The information that app contains mainly include plant name, plant common name and medicinal properties. It also provide offline as well as online quiz mode.

Structured Programming through E- Learning, TeTepy
Arti Kashyap, Anil Prabhakar, Hansfangohr

This is a collaborative project between IIT Mandi, IIT Madras and University of Southampton. We have deploying the e-Learning System on the web server to be used by both UK and Indian partner Institutes. Both India and UK partner institutions have one or more functional deployments of the system and their students are able to use the system. At IIT, the deployment is usable by students



at IIT Mandi & IIT Madras. At Southampton, it is used by students from Southampton and University of Southampton Malaysia Campus. Southampton also has a testing/development deployment live. Further aim of the project was to generating a repository of high quality interesting problems from various areas of Science and Engineering.

Southampton already had a repository of quality problems covering programming concepts and some applications such as numerical modelling. Problems identified jointly by IIT Mandi & IIT Madras have enriched the existing repository. The following figures depicts the working of e-learning system

Computational Nano- Engineering of Patterned Nanostructures

Arti Kashyap

Computational nano-engineering is an emerging field of research aimed at developing nanoscale modeling and simulation methods to enable and accelerate the design and development of functional nanometer-scale devices and systems. Just as microfabrication has led to microelectronics revolution in the 20th century, nano-precision engineering will be a key to the success of the nanotechnology revolution of the 21st century. The driving force for developments in nanotechnology results from the increasing demand related to key technologies like microelectronics and nano magnetic devices. One example is the high density magnetic random access memory (MRAM) technology which has grown over the past decade due to its potential to store more data, access that data faster and also to use less power than current memory technologies. Over the past several decades, amorphous and more recently nano-crystalline materials have been investigated for applications in magnetic devices. Scientifically also, they offer the opportunity to study magnetism in between the atomic and bulk limits. Further nanoconstrictions, multilayered structures of nano-thick films, nanotubes and other nano-geometries are presently the focus of deep interest in this era of new class of materials coming up rapidly.

The objective of the project was to develop multiscale modeling and simulation methods for understanding the nanopatterning of meta-materials and their properties. Phase-vise progress as proposed has been achieved as is evident from the List of Publications. New Observations achieved in this project are: Magneto electric effect in thin films, not proposed in the project initially, was studied. We used first-principle calculations to study the influence of external electric effect on the magnetic properties of L10-ordered CoPd films. Our calculations show that an electric field yield substantial change in surface magnetization and anisotropy, due to change in the surface electric density at the Fermi level.

PAPER PUBLISHED IN NATIONAL & INTERNATIONAL JOURNALS

1. R. Singh, S. A. Lakshman and B. S. Rajpurohit "Performance Analysis of Grid Connected SPV System with Different MPPT Algorithms", International Journal on Energy Conversion, vol.1 no.1, pp. 203-212, July 2013.
2. S. A. Lakshman, A. Jain and B. S. Rajpurohit "Modelling and Analysis of 3-Phase Inverter for Grid Connected Solar PV system with Harmonic Compensation", The Journal of CPRI, Vol. 10, No. 1,pp. 203-2012, March 2014.
3. G. G. Grewal and B. S. Rajpurohit "An adaptive NFC based dynamic analysis of integrated offshore wind farm with HVDC Link," International Journal on Energy Conversion (IRECON), Vol. 2, No. 2, pp 56-65, March 2014.
4. G. G. Grewal, K. Steela and B. S. Rajpurohit "Strategies for Smart Power Engineers", IEEE International Conference on MOOC, Innovation and Technology in Education (MITE), pp-96-99, Dec. 20-22, 2013, Jaipur, India.
5. S. A. Lakshmanan, B. S. Rajpurohit and A. Jain "Modeling and Analysis of 3-phase VSI using SPWM Technique for grid connected solar PV system", 2nd IEEE International Students' Conference for Electrical, Electronics and Computer Science, pp 1-6 March 01-02, 2014, Bhopal, India.
6. C. L. Chan, S. Jaggi, V. Saligrama and S. Agnihotri"Non-adaptive group testing: Explicit bounds and novel algorithms", IEEE Transactions on Information Theory, vol. 60(5) pp-3019-3035, 2014.
7. C.Gonzalez, N.Ben-Asher, J. M. Martin and V. Dutt"A Cognitive Model of Dynamic Cooperation with Varied Interdependency Information"*Cognitive Science*, vol. 38(7),PP 1–39. (2014). doi: 10.1111/cogs.12170
8. S.Debnath, S. S.Baishya, R.Triebel, V.Dutt and D.Cremers"Environment-Adaptive Learning: How Clustering Helps to Obtain Good Training Data" Lecture Notes in Computer Science, 8736, pp 68-79. (2014). doi: 10.1007/2F978-3-319-11206-0_8
9. *A.Kumar, J.Prakash and V. Dutt "Understanding Human Driving Behavior through Computational Cognitive Modeling" Lecture Notes in Computer Science, 8662, pp 56-65.* (2014). *doi: 10.1007/978-3-319-11167-4_6.*
10. V.Dutt and A. Kaur "Cyber Security: Testing the Effects of Attack Strategy, Similarity, and Experience on Cyber Attack Detection"*International Journal of Trust Management in Computing and Communications*, vol.*1* (3/4), pp 261-273. (2013). doi: 10.1504/IJTMCC.2013.056428.
11. V.Dutt, A.Young-Suk and C.Gonzalez"Cyber Situation Awareness: Modeling the Detection of Cyber Attacks with Instance-based Learning Theory"*Human Factors*, vol. *55*(3), pp -605-618. (2013).doi: 10.1177/0018720812464045.
12. R.W.Proctor, M.Yamaguchi, V.Dutt and C. Gonzalez "Dissociation of S-R Compatibility and Simon Effects with Mixed Tasks and Mappings"*Journal of Experimental Psychology:*

Human Perception and Performance, vol. *39*(2), pp. 593-609. (2013). doi: 10.1037/a0029923.

13. V.Dutt and C. Gonzalez "Enabling eco-friendly choices by relying on the proportional-thinking heuristic" Sustainability, vol. 5(1), pp. 357-371. (2013).doi: 10.3390/su5010357

BOOK / BOOK CHAPTERS PUBLISHED

1. R. K. Chauhan, B. S. Rajpurohit, S. N. Singh and F. Gonzalez-Longatt "DC Grid Interconnection for Conversion Losses and Cost Optimization" in a book entitled "Renewable Energy Integration: Challenges and Solutions" Berlin: Springer-Verlag, pp. 327-345, Ed. Dr. Jahangir Hossain and Dr. Apel Mahmud, 2014.
2. Ranjit Singh and B. S. Rajpurohit, "Performance Evaluation of grid-connected Solar photovoltaic (SPV) system with different MPPTs controllers" in a book entitled "Renewable Energy Integration: Challenges and Solutions" Berlin: Springer-Verlag, pp. 97-124, Ed. Dr. Jahangir Hossain and Dr. Apel Mahmud, 2014.
3. N.Sharma and V.Dutt, Decisions from Information Search: Could Models of Aggregate Choice Explain Individual Choices? In M. Khosrow-Pour (Ed.), *Encyclopedia of Information Science and Technology,* Third Edition(pp. 4641-4652) (2014). Hershey, PA: IGI Global.
4. V.Dutt andC. Gonzalez, Climate Risk Communication: Effects of cost, timing, and probability of climate consequences in decisions from description and experience. In C. L. Fung (Ed.), *Psychology of Policy Making* (pp. 23-48) (2013). Hauppauge, New York: Nova Science Publishers.
5. V.Dutt, Why Do We Defer Actions on Climate Change? A Cognitive Perspective. In M. Carpenter & E. J. Shelton (Eds.), *Carbon Dioxide Emissions: New Research,* pp. 1-14 (2013). Hauppauge, New York: Nova Science Publishers.
6. V.Dutt andC.Gonzalez, Responding linearly in nonlinear problems: Application to earth's climate. In M. Carpenter & E. J. Shelton (Eds.), *Carbon Dioxide Emissions: New Research,* pp. 15-30 (2013). Hauppauge, New York: Nova Science Publishers.

CONFERENCES ATTENDED AND PAPER PRESENTED

1. Vinayak Abrol, Pulkit Sharma and Anil Kumar Sao. "Speech Enhancement using Compressed Sensing." In 14th Annual Conference of the International Speech Communication Association (INTERSPEECH), vol.5 pp.3273-3772 August, 2013.
2. S. Mandal and Anil Kumar Sao. "Edge preserving single image super resolution in sparse environment." In 20th IEEE International Conference on Image Processing (ICIP'13), pp. 967-971, September, 2013.
3. Shejin T and Anil Kumar Sao. "Analysis of WD Face Dictionary for Sparse Coding Based Face Recognition." In proceedings of the 17thInternational Conference on Image Analysis and Processing (ICIAP 2013), pp. 221-230, September 9-13, 2013.
4. G. G. Grewal, K. Steela and B. S. Rajpurohit, "Strategies for Smart Power Engineers", IEEE International Conference on MOOC, Innovation and Technology in Education (MITE), pp-96-99, Dec. 20-22, 2013, Jaipur, India.

5. S. A. Lakshmanan, B. S. Rajpurohit and A. Jain, “Modeling and Analysis of 3-phase VSI using SPWM Technique for grid connected solar PV system”, 2nd IEEE International Students' Conference for Electrical, Electronics and Computer Science, pp 1-6 March 01-02, 2014, Bhopal, India.
6. N.Sharma andV. Dutt “Decisions from Experience: Could Models of Aggregate Choice Explain Individual Choices from Information Search?:InPaper presented at the 23rd Annual Conference on Behavior Representation in Modeling & Simulation (BRiMS 2014),Washington, DC: USA ,pp. 18-25, year 2014.
7. N.Sharma andV. Dutt “Decisions from Experience: How Models of Aggregate Choices Explain Individual Choices?”In Paper presented at the 4th IEEE International Advance Computing Conference. Gurgaon, India, pp. 1221-1226, 21-22 Feb. 2014.
8. A.Arora andV. Dutt “Cyber Security: Evaluating the Effects of Attack Strategy and Base Rate through Instance-Based Learning.”In Paper presented at the 12th International Conference on Cognitive Modeling. Ottawa, Canada, pp-336-341,year. 2013.
9. A.Kaur and V. Dutt “Cyber Situation Awareness: Modeling the Effects of Similarity and Scenarios on Cyber Attack Detection.” In Paper presented at the 12th International Conference on Cognitive Modeling. Ottawa, Canada, pp. 324-329, year. 2013.
10. B.Kanaparthi, R.Reddy and V. Dutt “Cyber Situation Awareness: Rational Methods versus Instance-Based Learning Theory for Cyber Threat Detection.” In Paper presented at the 12th International Conference on Cognitive Modeling. Ottawa, Canada, pp. 330-335, year.2013.
11. N.Ben-Asher, V.Dutt and C.Gonzalez “Accounting for the integration of descriptive and experiential information in a repeated prisoner's dilemma using an instance-based learning model.” In Paper presented at the 22nd Behavior Representation in Modeling & Simulation (BRIMS) Conference. San Antonio, Texas, USA, pp-130-138, year. 2013.
12. A.Kaur, V.Dutt andC. Gonzalez “Modelling the Security Analyst's Role: Effects of Similarity and Past Experience on Cyber Attack Detection.” In Paper presented at the 22nd Behavior Representation in Modeling & Simulation (BRIMS) Conference. San Antonio, Texas, USA, pp. 122-129, year.2013.
13. R.Reddy, B. R.Kanaparthi andV. Dutt “Testing the Effects of Recency and Inertia on Cyber Threat Detection through Instance-Based Learning.” In Paper presented at the 3rd IEEE International Advance Computing Conference (IACC-2013). Ghaziabad, India, pp. 1369-1374, year. 2013

LIST OF THE INITIATIVES/EVENTS ORGANIZED BY
SCHOOL OF COMPUTING AND ELECTRICAL ENGINEERING, IIT MANDI

S.No.	Name of Faculty Organizer & Speaker	Date	Event Name	Event Types
1	Dr. Bharat Singh Rajpurohit & Dr. Samar Agnihotri	June 27-29, 2013	Strategic Research Vision to Build a Smarter Grid	National Workshop

WORKSHOPS AND CONFERENCES ORGANIZED BY SCHOOL OF COMPUTING AND ELECTRICAL ENGINEERING, IIT MANDI

A report on mini workshop conducted by Women Center Committee IIT Mandi on 15th March 2014

Women Center Committee IIT Mandi organized its first (Mini) workshop on Saturday, the 15th of March 2014. The program was initiated under the leadership of Dr. Arti Kashyap, Chairperson-Women Center Committee, IIT Mandi, with a motive of bringing about sensitization on gender ethics at workplace. The event comprised two sections: first 'an invited talk by guest speaker' and second 'a panel discussion' spaced by 'Director's Speech on the occasion'.

SPECIAL ACHIEVEMENT

IIT Mandi faculty nominated as Vice Chair of Conference/Workshop Committee of IEEE Computer Society Chapter India Council

Dr. Varun Dutt, Assistant Professor, SCEE, SHSS, IIT Mandi, has recently been nominated as the Vice-Chair of the IEEE Computer Society Chapter India Council (Conference/Workshop Committee).

Best poster prize at ICONSAT, March 2014

The poster entitled "Novel Non-Chemical Amplified (n-CARs) Resists for Next Generation Lithography (NGL) Applications" by **Vikram Singh, V. S. V. Satyanarayana, Vishwanath Kalyani, Satinder K. Sharma, Subrata Ghosh, Chullikkattil P. Pradeep and Kenneth E. Gonsalves. S**ponsored by the Royal Society of Chemistry (RSC), Cambridge, U.K, the poster session took place at the International Conference on Nano Science and Technology, (ICONSAT), INST, 2014, Chandigarh, March 3-5, 2014. This award consists of a citation, token cash prize and a rare publication of Prof. C.N. Rao research collection.

Fund for Improvement of S&T infrastructure in universities & higher educational institutions (FIST)

School of Computing and Electrical Engineering (SCEE) at IIT Mandi has received recommendation on a five-year project from Department of Science & Technology, Fund for Improvement of S&T, (DST-FIST) to strengthen the teaching and research facilities in the School.
The recommended research facility with maximum allowed budget are Real-time digital simulator (200 Lacs) and Wind turbine with HIL Simulator (35 Lacs). IIT Mandi envisions to set-up a Real Time Simulation lab facility that is easily scalable, affordable and easy to maintain by local teams and that keeps pace with the evolution of computer technologies. IIT Mandi is interested in establishing an experimental set-up for widely installed configuration of wind turbines i.e. Doubly-fed Induction Generator (DFIG) with bi-directional power electronics converters and real-time controller.

School of Engineering

School of Engineering is working towards the Vision of the Institute. School is committed for high standards of engineering education through outstanding teaching, innovative curricula and excellent research environment. School offers number of courses which are common for all the branches like Design practicum, Reverse engineering, Graphics for design, Materials science, Manufacturing processes and Engineering thermodynamics along with core courses of Mechanical stream.

Presently, school of engineering has 15 faculty members including 2 Mentor Professors, 10 Assistant Professors, 1 Distinguished Visiting Professor, 1 Professor on Deputation and 1 Teaching Fellow. This year 4 new faculty members have joined our School. There are currently 2 postdocs, 13 Ph.Ds and 16 MS students in the school. The main areas of research are broadly classified as Materials and design, Thermo-fluids engineering, Energy efficient buildings and Infrared signatures. In Materials and design, the work is directed towards the development and analysis of materials for the sensor, actuator, energy harvesting applications and analysis of the smart structures and systems. In thermo-fluids engineering, faculty members are investigating radiative heat transfer, nano-scale heat transfer, flow analysis and heat transfer analysis of IC engines. Additionally, molten metals/alloys are also being explored in our school. Energy efficient systems cover climate change studies, applications of phase change materials towards energy efficient buildings, use of non-conventional energy sources at IIT Mandi to enhance energy efficiency and development of an energy park. The school has successfully installed various equipment in Solid Mechanics and Materials laboratories.

Faculty

Dr. Rahul Vaish
Chairperson
Assistant PRofessor
Specialization: Glasses & Glass-ceramics
Ph. D (Engg.), Indian Institute of Science Bangalore, 2010
Home Town: Badaun, Uttar Pradesh
Phone: 01905-237921
e-mail: rahul

Dr. Jaspreet Kaur Randhawa
Assistant Professor
Specialisation: Nanomaterials.
Ph. D. from: Gorakhpur University in 2000.
Home Town: Mohali, Chandigarh
EMail: jaspreet

Dr. Atul Dhar
Assistant Professor
Specialisation: IC Engines, Alternative Fuels, Emission Control
PhD from IITKanpur, in year 2013.
Home Town: Sultanpur, Uttar Pradesh
Phone: 01905-237993
EMail: atul

Dr. Mohammad Talha
Assistant Professor
Specialisation: Solid mechanics, Composite structures, Functionally graded materials, Structural mechanics, Uncertainty quantification and Imperfection sensitivity in composites. PhD from IITKharagpur in year 2012. Home Town: Patna, Bihar
Phone: 01905-237929
EMail: talha

Dr. Om Prakash Singh
Assistant Professor
Specialization: Heat and mass transfer, Double diffusive convection, IC engine
PhD from Indian Institute of Science, Bangalore, 2006. Home Town: Arrah, Bihar
Phone: 01905-237992
e-mail: om

Dr. Prasun Jana
Teaching Fellow
Specialisation: Solid Mechanics, Vibration Damping, Composites, Finite Element Analysis, Plate buckling
PhD from IIT Kharagpur, 2013 (thesis submitted).
Home Town: Dantan (West Midnapur district), West Bengal
Phone: +91-9805432812
EMail: pjana

Dr. Sudhir Kumar Pandey
Visiting Assistant Professor
Specialization: Condensed Matter Physics and Material Sciences.
Ph. D. from UGC-DAE Consortium for Scientific Research, Indore in 2007.
Home Town: Garhwa, Jharkhand
Phone: 01905-237992
e-mail: sudhir

Dr. Vishal Singh Chauhan
Associate Dean (Faculty)
Assistant Professor
Specialization: Design Engg.,Electromagnetic Radiation during Deformation of metals and alloys, Solid Mechanics, FEM
PhD from BIT Mesra, Ranchi in 2009.
Home Town: Sanawad, MP
Phone: 01905-237920
e-mail: vsc

Dr. P. Anil Kishan
Assistant Professor
Specialization: Computational Fluid Dynamics
PhD from IIT Kharagpur in 2009.
Home Town: Tirupati, Andhra Pradesh
Phone: 01905-237922
e-mail: kishan

Dr. Rajeev Kumar
Assistant Professor
Specialization : Solid Mechanics, Vibration, FEM, Optimization
PhD from IIT Roorkee in 2008.
Home Town: Jaspur, Uttarakhand
Phone: 01905-237920
e-mail: Rajeev

Prof. Shripad P. Mahulikar
Professor (on deputation from IIT-Bombay)
Specialization: Heat Transfer, Thermodynamics, Aerospace
PhD from NTU-Singapore in 1999.
Phone: 01905-237127
e-mail: shripad

Dr. Subrata Ray

Distinguished Visiting Professor
Specialization: Physical metallurgy, Composites and Tribology
Ph.D. from IITKanpur in 1976.
Phone: +91-1332-285606
e-mail: sray

Dr. Viswanath Balakrishnan
Assistant Professor
Specialisation: Growth of functional materials/thin films, electron microscopy & in situ exploration of structure-property relationships
PhD (Materials Science) from IISc, Bangalore in 2008.
Home Town: Chidambaram, Tamil Nadu
Phone: 01905-237929
EMail: viswa

Mentor Professors

Prof. B. K. Mishra
Professor, Department of Mechanical and Industrial Engineering, IIT Roorkee
Specialization: Composite materials, Fracture mechanics, Wave propagation
PhD from IT-BHU in 1989.
Phone: +91-1332-285679
e-mail: bkmishra

Dr. Sunil R. Kale
Professor, Department of Mechanical Engineering, IIT Delhi
Specialization: Heat Transfer, Fluid Mechanics, Particle-laden flows, Combustion and Energy Conversion
Home Town: Pune, Maharashtra
Phone: +91-11-2659 1127, 1709
e-mail: srk

Post Doctoral Fellows

Dr. Reshma Sao
Specialization: Cellular and Molecular Biology, Biomaterial Science.
Ph.D. from Jawaharlal Nehru University (JNU) New Delhi, India.
E-mail: reshma.sao

Dr. Sonu Sharma
Specialization: Material Science (DFT Calculations)
Ph.D. from Jiwaji University, Gwalior (M.P.)
e-mail: sonu8sharma[at]gmail.com

Research Projects

S.No	Project	Sponsoring agency	Investigators	Project cost (in Lacs)
1.	Glass and glass-ceramics for electrical energy storage devices Date of sanction: 01.04.2012 Date of completion: 31.03.2017	DST	Rahul Vaish	35.0
2.	Electromagnetic Radiation response of metals and alloys during deformation at low temperature conditions Date of sanction: 22.05.2013	DST	Dr. Vishal Singh Chauhan	18.40

Progress of the Research Projects

Active control of vibration using fuzzy logic controller for smart structure and itsexperimental validation

Rajeev Kumar

An active vibration control experimental setup has been fabricated to analyze the transient behavior of different smart structures and structural vibration control subjected to different loading and boundary conditions. The experiments have been performed for active vibration control of smart structures over wide temperature range ranging from -70 °C to 70 °C. The effect of variation in temperature on piezoelectric ceramics (used as both sensor

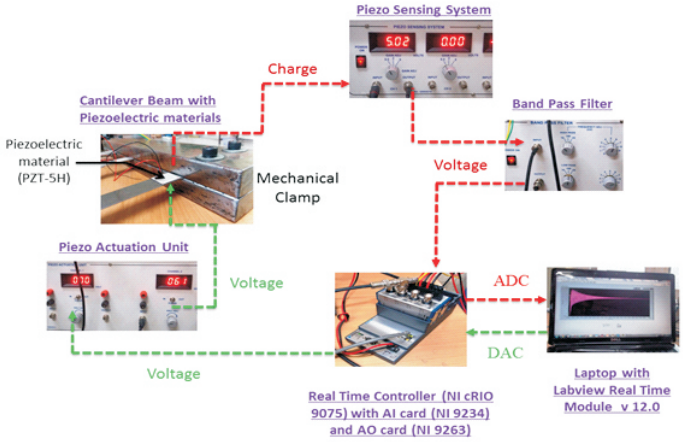


Figure: Schematic diagram for active vibration control of smart structure.

and actuator) has been studied in the context of sensing capability and active vibration control. Figure mentioned below illustrates the Schematic diagram for active vibration control of smart structure. The experimental results are obtained both in time and frequency domain.

Glass based materials for energy storage applications

Rahul Vaish

Glasses have very high electric breakdown strength and careful selection and addition of glasses in ferroelectric ceramics could enhance their energy storage properties. This technique is especially effective if glasses reside in grain boundaries. Grain boundaries in a bulk ceramic are physical discontinuities and act as stress concentration points owing to the high defect concentration existing on the surface of the grains. Mostly, dielectric failure in ferroelectric materials is an indirect consequence of defect concentration on grain boundaries. If the added glass can successfully be applied to fill the grain boundary discontinuity, then they play active role to enhance electric breakdown strength. However, glass addition can also drastically affect shape, size and growth rate of grains in the ceramics which are responsible for controlling various physical properties. Present progress deals with energy density enhancement using glass addition in ferroelectric compositions.

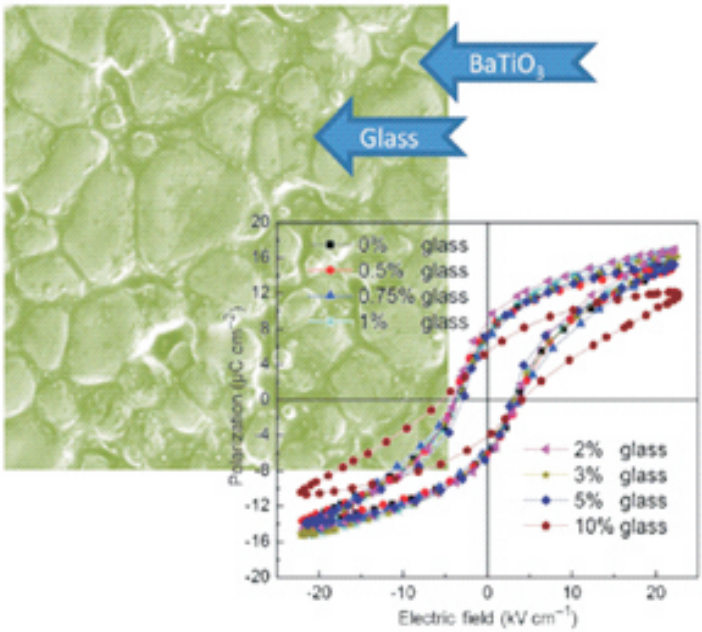


Fig : Enhanced energy storage capacity of ceramics using appropriate microstructure design

$3BaO–3TiO_2–B_2O_3$ glass was added in controlled amounts to study its effect on the ferroelectric response andstorage characteristics of vanadium-doped $BaTiO_3$samples. Byadding the glass, the breakdownstrength as well the ferroelectric properties could be also improved. The energy density for the composites was calculated usinghysteresis loops. It was observed that a significant improvement in the energy storage density can be obtained by addition of 1% (weight) glass.This addition thus proves to be a possibletechnological boost for electricalenergy storage using ceramic capacitors without the need of altering thechemistry of the material.

Phase Change Materials (PCM) based energy efficient buildings

P. Anil Kishan

For thermal energy storage, space heating and cooling and low temperature solar thermal applications organic and inorganic PCMs are available. Many modeling techniques have been proposed for simulating phase change of a PCM or PCM based structure. Most of the investigators have considered 1–D, 2-D and 3-D transient conjugate heat transfer (convection and conduction)

simulations for PCM based walls and room domain besides wall domain have not been taken into consideration. The main problem involved in suchmodeling is considering the transient behavior of the phase change materials. An important phenomenon occurs during the solidification of the PCM, when during the extraction of the stored energy, the liquid freezes close to the heat transfer surface and a moving boundary layer of solid material continuously grows as it releases its heat of fusion. During the melting process, the opposite happens. Besides, properties vary with composition of the salt. Proper optimum configuration of different layers depends on the ambient temperature variation and the desired room temperature limits and room size, besides ventilation and occupancy.

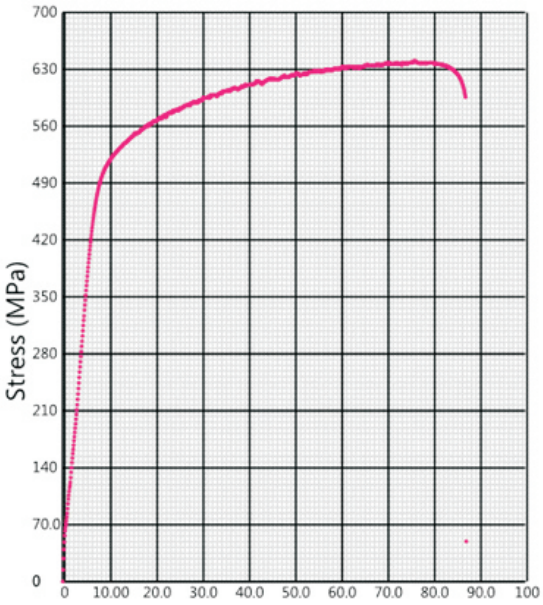
We aim to study energy efficient buildings using PCM. In this context, temperature measuring devices were purchased which are needed for measuring and storing the temperatures. These devices measure the ambient temperature at the specified intervals of time ranging from 1 minute to 1 hour. This device can store huge amount of data without any laptop/computer. The temperature of environment is under measurement which is the main requirement for the current study. For the simulation of the current problem, one needs to solve 3 – D equations in unsteady manner. These equations need to be solved numerically to find the exact temperature distribution within the room, walls, and environments. In general, the PCMs have to be encapsulated to avoid the liquid leakage. Due to this encapsulation, there will be some resistance to the heat flow. This parameter is being considered for the current study.

Experiments are planned to decide the effect of resistance heating in closed environment. Experiments will be conducted in the winter due to the requirement of the cold conditions. Before working with the experimental setup, one needs to study the effect of cold environment on the heat transfer through the walls without the PCMs. For this, experiments are planned and fabrication has been started. Actual experiments will be conducted after the simulations are done. Software identification and purchase process has been initiated. This software is needed to simulate the real conditions before performing proper experiments. The simulations involve solving of partial differential equations with appropriate initial and boundary conditions. This involves discretizing the domain into large number of small volumes and solves the equations for each and every cell. Once the equations are solved for the given conditions, results will be validated with the available results.

Electromagnetic radiation response of metals and alloys during deformation at low temperature conditions

Vishal Singh Chauhan

Installation of UTM completed and the Environmental Chamber completed. Preliminary experiments are being carried out to study the effect of sub-zero temperature on the mechanical behaviour of the materials. After preliminary experiments the electromagnetic radiation response of the materials at sub zero temperatures will be studied. Fig. appended below shows a sample stress strain curve for a brass specimen. Fig. shows the specimen placed in the grips inside the environmental chamber.



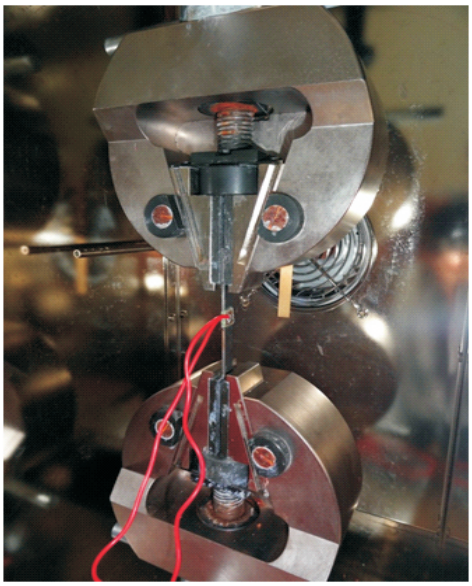


Fig. stress-strain plot for a sample understudy and its setup

Few major instruments in the School of Engineering are:

Paper published in International Journal Publications

1. Aditya Chauhan and Rahul Vaish. “Material selection decision making with incomplete. Information” Adv. Sci. Focus 1 340 (2013)
2. NK Sharma, SN Pandit, R Vaish, V Srivastava. “Effective Young's modulus of Ni–Al2O3 composites with particulate and interpenetrating phase structures: A multiscale analysis using object oriented finite element method. Comp. Mater.Sci , 82 320 (2014)
3. Aditya Chauhan and Rahul Vaish.“Fluid selection of organic rankine cycle using decision making approach.” J. Comput. Engg.(2013) Article ID 105825
4. Aditya Chauhan and Rahul Vaish. “An assessment of bulk metallic glasses for microelectromechanical system devices.Int. J. Appl. Glass Sci. 4(3) 231 (2013).
5. Gaurav Vats andRahul Vaish. “Piezoelectric material selection for ultrasonic transducers under fuzzy environment.” J. Adv. Ceram , 2 141 (2013)
6. Aditya Chauhan and Rahul Vaish. “Pareto-optimal microwave dielectric materials.” Advanced Science, Engineering and Medicine 5 149 (2013)
7. Aditya Chauhan and Rahul Vaish. “Material selection for piezoelectric devices.” Advanced Science, Engineering and Medicine 5 715 (2013)
8. Aditya Chauhan and Rahul Vaish. “Hard coating material selection using multi- criteria decision making.” Materials and Design 44 240 (2013)
9. Rahul Vaish. “Piezoelectric and pyroelectric materials selection.”Int. J. Appl. Ceram. Tech. 10 682 (2013)
10. K. R. S. Preethi Meher, Rahul Vaish, J. Hou, D. Krsmanovic, K. B. R. Varma and R. V. Kumar. “Ferroelectric relaxor behavior of Ca0.180Sr0.226Ba0.594Nb2O6 ceramics.” Int. J. Mater. Res.. 104 168 (2013)
11. S. Sharma and S. K. Pandey. “Investigation of thermoelectric properties of half-metallic Co2MnGe by using first principles calculations.” J. Phys.: Condens. Matter 26, 215501 (2014)
12. S. Sharma and S. K. Pandey. “A first principle study of electronic band structures and effective mass tensors of thermoelectric materials: PbTe, Mg2Si, FeGa3 and CoSb3.” Comput. Mater. Sci. 85, 340 (2014)
13. Anshul Sharma, Rajeev Kumar, Rahul Vaish and Vishal Singh Chauhan. “Lead-free piezoelectric materials' performance in structural active vibration control.” Journal of Intelligent Material Systems and Structures. Vol. 24(16):1969-1984, (2013).
14. Anshul Sharma, Rajeev Kumar, Vishal Singh Chauhan. “Fuzzy Logic based active vibration controller.” Applied Mechanics and Materials, Vol. 367 Page: 357-362, (2013)

School of Basic Sciences

The school of Basic Sciences at IIT Mandi is a cluster of disciplines of Mathematics, Physics, Chemistry and Life Sciences. The core of the school consists of 29 faculties having expertise in contemporary fields of research .The school started its Ph.D. program in 2011 and presently 66 research students have enrolled to pursue research in various disciplines. The school aims to create an ambience for the smooth pursuit of scholarly activities in research and education to make an international impact. The school has also initiated Post-Doctoral research program and currently four Post-Doctoral fellows are working in this school. The School of Basic Sciences have also plan to start M.Sc. program in Chemistry with specialization in various areas such as Organic Chemistry, Inorganic Chemistry, Physical Chemistry & Nanosciences fromAugust, 2014. The faculty members of the school are closely working with the engineering colleagues on different research projects.The school has also procured state-of-art equipments to pursue advanced research.

Faculty

Dr. Subrata Ghosh
Chairperson
Assistant Professor
Specialisation : Organic Chemistry PhD from IIT Guwahati in 2006
Home Town : Bolpur-Santiniketan, West Bengal
Phone : 01905-267065
EMail :subrata

Dr. A. Chakraborty
Assistant Professor
Specialisation: Theoretical Chemistry
PhD from IISc Bangalore in 2005.
Home Town: Kolkata, West Bengal
Phone: 01905-237930
EMail: achakraborty

Dr. Abhimanew Dhir
Assistant professor (DST-INSPIRE)
Specialisation: Supramolecular Chemistry
PhD from Department of Chemistry, Guru Nanak Dev University, Amritsar, Punjab
Home Town: Jalandhar, Punjab
Phone: 01905-237912
EMail: abhimanew

Dr. Arti Kashyap
Associate Professor (Joint Appointment)
Specialisation: Magnetism and magnetic materials
PhD from IIT Roorkee.
Home Town: Mandi, Himachal Pradesh
Phone: 01905-300042
EMail: arti

Dr. Aditi Halder
Assistant Professor
Specialization: Design and development of new functional nanomaterials for the application of renewable energy, nano-electronics and sensor
PhD (Materials Science) from IISc, Bangalore in 2009.
Home Town: Kolkata,West Bengal
Phone: 1905-237933
EMail: aditi

Dr. Ajay Soni
Assistant Professor
Specialisation:Nanomaterials and Experimental Condense Matter Physics
PhD from UGC-DAE Consortium for Scientific Research, Indore (2009).
Phone: 01905-237926
EMail: ajay

Dr. Bindu Radhamany
Associate Dean (Research)
Assistant Professor
Specialization: X-ray spectroscopy
Ph.D. from UGC-DAE, consortium for scientific research, Indore (2005)
Home Town: Kollam, Kerala
Phone: 01905-300060
EMail: bindu

Dr. Chayan K. Nandi
Assistant Professor
Specialisation: Physical Chemistry
PhD from IIT Kanpur in 2006.
Home Town: Sarangapur, Bankura, West Bengal
Phone: 01905-237917
EMail: Chayan

Dr. Hari Varma
Assistant Professor
Specialisation: Atomic and Molecular physics
PhD from IIT Madras in 2008.
Home Town: Kochi, Kerala
Phone: 01905-300066
EMail: hari

Prof. Kenneth Gonsalves
Visiting Distinguished Professor
Specialisation: Materials Synthesis
PhD from University of Massachusetts at Amherst.
Home Town: Charlotte, NC, USA
Phone: 01905-237976
EMail: Kenneth

Dr. Manoj Thakur
Assistant Professor
Specialisation: Optimization, Soft Computing, Machine Learning & its Application to Computational Finance
PhD from IIT Roorkee in 2007.
Home Town: Roorkee, Uttarakhand
Phone: 01905-237927
EMail: manoj

Dr. P. C. Ravikumar
Associate Dean (Planning)
Assistant Professor
Specialisation: Organic Chemistry
PhD from IISc Bangalore in 2006.
Home Town: Chennai
Phone: 01905-300044
EMail: ravi

Dr. C. S. Yadav
Assistant Professor
Specialisation: Low Temperature Physics
PhD from Jawaharlal Nehru University, New Delhi in 2008
Phone: 01905-237999
EMail: Shekhar

Dr. Kaustav Mukherjee
Assistant Professor
Specialisation: Experimental Condensed Matter Physics
Ph.D. from UGC-DAE Consortium for Scientific Research, Indore (2008).
Home Town: Kolkata, West Bengal
Phone: 01905-237923
EMail: kaustav

Prof. Lalit Malhotra

Dean SRIC, Finance & Accounts
Visiting Professor
Specialisation: Thin Film Physics and Technology
PhD from IIT Delhi in 1971.
Home Town: Mandi, Himachal Pradesh
Phone: 01905-237916
Email: lalitmlhtr

Dr. Nitu Kumari
Assistant Professor
Specialisation: Differential Equations, Dynamical Systems, Nonlinear Dynamics
PhD from ISM Dhanbad in 2009.
Home Town: Dhanbad, Jharkhand
Phone: 01905-237926
EMail: nitu

Dr. Prasanth P. Jose
Assistant Professor
Specialization: soft condensed matter physics
PhD from Indian Institute of Science Bangalore in 2005.
Home Town: Palakkad, Kerala
Phone: 01905-300064
EMail: prasanth

Dr. Pradyumna Kumar Pathak
Assistant Professor
Specialisation: Quantum Optics,Quantum Information and Nanophotonics
PhD from Physical Research Laboratory, Ahmedabad, India.
Home Town: Mathura, Uttar-Pradesh
Phone: 01905-300033
Email: ppathak

Dr. Prem Felix Siril
Associate Dean (SRIC)
Assistant Professor
Specialisation: Chemistry of Nanomaterials
PhD from DDU Gorakhpur University in 2003.
Home Town: Thiruvananthpuram, Kerala
Phone: 01905-300040
EMail: prem

Dr. R.C.Sawhney
Adjunct Professor
Specialisation: Endocrinology & Metabolism, High Altitude Physiology, Herbal Medicines
Ph.D from Postgraduate Institute of Medical Education and Research, Chandigarh in 1977
Home Town: Shimla
Phone: 01905-237943
EMail: sawhneyrc

Dr. Syed Abbas
Assistant Professor
Specialisation: Differential Equations and Ecological modelling
PhD from IIT Kanpur in 2009.
Home Town: Gonda, Uttar Pradesh
Phone: 01905-237933
EMail: abbas

Dr. Suman Kalyan Pal
Assistant Professor
Specialisation: Fast and Ultrafast Laser Spectroscopy
PhD from IACS, Jadavpur in 2006
Home Town: Katwa, West Bengal
Phone: 01905-237933
EMail: suman

Dr. Prasanth P. Jose
Assistant Professor
Specialization: soft condensed matter physics
PhD from Indian Institute of Science Bangalore in 2005.
Home Town: Palakkad, Kerala
Phone: 01905-300064
EMail: prasanth

Dr. Pradeep Parameswaran
Associate Dean (Courses)
Assistant Professor
Specialisation: Inorganic/Materials/Nano-Chemistry
PhD from University of Hyderabad in 2006.
Home Town: Varavoor, Thrissur District, Kerala
Phone: 01905-237931/300045
EMail: Pradeep

Dr. Rajendra K. Ray
Assistant Professor
Specialisation : Computational Fluid Dynamics, Numerical Methods for PDEs
PhD from IIT Guwahati in 2009.
Home Town: Sainthia, West Bengal
Phone: 01905-237932
Email: rajendra

Dr. Sarita Azad
Assistant Professor
Specialization: Statistical Time Series Analysis
Ph.D in Applied Mathematics (2008) Delhi University and Indian Institute of Science, Bangalore.
Home Town: New Delhi
Phone: 01905-237928
EMail: sarita

Dr. Tulika Prakash Srivastava
Assistant Professor (Ramalingaswamy Fellow, DBT)
Specialisation: Bioinformatics, Systems Biology, Metagenomics, Comparative Genomics, Protein Function and Structural analysis
Phd from IGIB, CSIR, Delhi, India in 2005
Home Town: Delhi
Phone: 01905-237922
EMail: tulika

Dr. Venkata Krishnan
Assistant Professor
Specialisation: Materials Chemistry, X-ray Science
PhD from University of Stuttgart, Germany in 2006.
Home Town: Coimbatore, Tamil Nadu
Phone: 01905-237930
EMail: vkn

Post-Doctoral Fellows

Dr. Charu Dwivedi
Post Doctoral Fellow (PDF) in School of Basic Sciences
Specialisation: Separation Science and Radiation Chemistry
Ph.D. from Bhabha Atomic Research Centre, Mumbai, India
EMail: charu

Dr. Rajesh Chebolu
Post Doctoral Fellow (PDF) in School of Basic Sciences
Specialisation: Organic Synthesis
Ph.D.: Doctorate in Medicinal Chemistry, NIPER, SAS Nagar, Mohali
EMail: rajeshchebolu

Dr. Ganesh Adhikary
Post Doctoral Fellow (PDF) in School of Basic Sciences
Specialisation: Photoelectron Spectroscopy
Ph.D. from Tata Institute of Fundamental Research, India
EMail: ganesh

Dr. Rik Rani Koner
Post Doctoral Fellow (PDF) in School of Basic Sciences
Specialisation: Bioinorganic chemistry
PhD from Indian Institute of Technology Guwahati
Home Town: Bolpur Phone: 01905237994
EMail: rik

Research Projects

S. No	Project Title	Sponsoring Agency	Principal Investigator & Co-ordinator(s)	Amount Sanctioned (in Lacs)	Duration of Project
1	Development of a class of Higher Order Compact (HOC) Finite Difference schemes and its application to Linear Shear Flows	DST	Dr. Rajendra K Ray	13.32	3years
2	Collision Processes in Atomic and Molecular Physics	DST	PI:- [Dr. Hari R. Varma] CO:PI-[Dr.P.C. Deshmukh] Dr. Yugal Khajuria	10.62	3years

3	Towards Novel Barbiturates as Matrix Metalloprotenase (MMP) Inhibitors: Design, Synthesis, Characterization and Biological Evaluation	DST	Dr. Subrata Ghosh	22.85	3years
4	DNA aptamer conjugated gold nanoparticle for targeting cancer cells	DST	Dr. Chayan Kanti Nandi	22.80	3years
5	Nanophotonic Systems for quantum information processing & coherent central	DST	Dr. P. K. Pathak	13.44	3years
6	Molecular Chaperone's mediated protein folding using time resolved single molecule Forster resonance energy transfer	DBT	Dr. Chayan Kanti Nandi	69.58	3years
7	Super molecular High Energy Compounds synthesis, Characterization and theoretical Studies	DRDO	Dr. Subrata Ghosh Dr. Prem F. Siril Dr. Aniruddha Chakraborthy	36.04	3years
8	Development of Polyoxometalates organic Hybrids having through- bond Electronic interactions between cluster and organic units for materials And catalytic applications	DST	Dr. Pradeep C. Parameswaran	26.90	3years
9	Resists Concepts for EUVL at the 16 nm Node and Beyond	INTEL	Prof. Kenneth Gonsalves Dr. Pradeep C. Parameswaran Dr. Subrata Ghosh Dr. Satinder Sharma	US $3.51 (Initial year July 2012 to June 2013) (July 2013 to June 2014 US $11.70)	3years
10	A Short Formal Asymmetric Synthetic Approach to Huperzine-A	SERB	Dr. P. C. Ravikumar	27.00	3years
11	Controlled Fabrication of Realistic Nano-circuits using Robust Artificial Peptides	DST	Dr. Venkata Krishnan	35.00	5 years

12	Engineering Molecular Organic Frameworks Crystal Structure and Photo Physical properties	DST	Dr. Abhimanew Dhir	35.00	5 years
13	Exploring the Human Microbiome: A Hunt for the candidates for Pre- and Pro-biotics	Ramalingaswa mi Re-entry Fellowship DBT	Dr. Tulika Srivastava	35.00	5 years
14	Novel Routes for Crystallization Of Energetic Compounds	LDSKI, ARMREB ,DRDO	Dr. Prem Felix Siril Dr. Prasanth P. Jose	68.48	3 Years
15	Periodicity & a Almost Periodicity in Ecological Modeling	NHBM, DAE	Dr. Syed Abbas	8.57	3 Years
16	Modeling of contaminated sediment transport in lake/ river	BRNS	Dr. Rajendra K Ray& Dr. O. P. Singh	21.07	3 Years
17	Swollen liquid crystal 'soft' templates for structured nanomaterial synthesis	DST, New Delhi	Dr. Prem Felix Siril	19.25	4 years

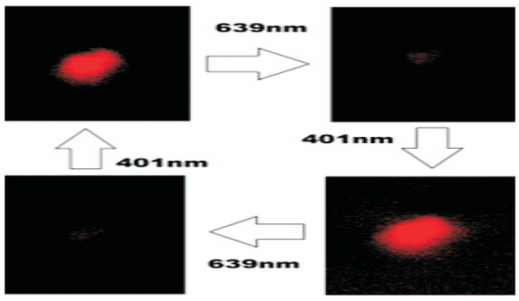
Progress of the Research projects

Dr. Chayan K. Nandi

Molecular Chaperone mediated protein folding using time resolved single molecule Forster Resonance Energy Transfer (smFRET)

We are trying to build advance single molecule techniques such as single molecule Forster resonance energy transfer (smFRET) and fluorescence correlation spectroscopy (FCS). Both of these techniques have paid lot of attention in recent days as they provide quantitatively more precise informations on biological events that were not possible in ensemble experiments. On the other hand, we are also building the super resolution nanoscopy (Nobel Prize in chemistry 2014). It has the unique capability to cross the diffraction limit in optics and provide the dynamics of biomolecules down to nanometer scale. This development is expected to revolutionize, especially in biology and medicine, by the quantitative dynamic description of the cellular components that defines the phenotypes of all life forms.

Few results on both single molecule transients and photoswitching are shown here.



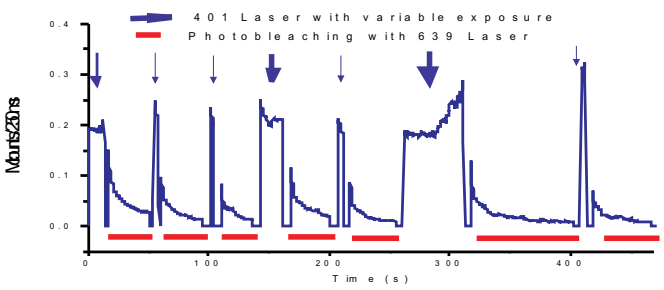
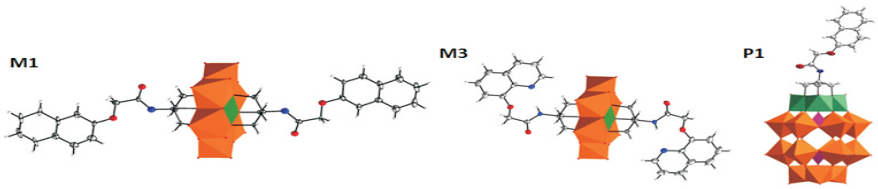


Figure: Photoswitching of carbon dots (left): The on-off switching observed by using 401 nm and 639 nm laser. (right): Photon counts in a hybrid photomultiplier detector show photo-decay and subsequent gain in intensity (photoswitch) using 401 laser. The 4^{th} and 6^{th} cycle, with a slightly higher exposure time of blue light, results a better recovery of fluorescence.

Dr. Pradeep Parameswaran

Development of polyoxometalates-organic hybrids having 'through-bond' electronic interactions between cluster and organic units for materials and catalytic applications.

As part of this project, new photoactive mono- and bis-TRIS (TRIS = tris(hydroxymethyl) aminomethane) based organic precursors have been designed and developed and were used to constructa series of polyoxometalates (POMs) based inorganic-organic hybrids. These new POM-based hybrids were characterized by IR, NMR, ESI-MS and some of them by using single crystal XRD analyses as well, see Figure.Thesenew POM based hybrids were tested for their photocatalytic properties using dye decomposition reaction. Some of these POM hybrids were found to be useful for the catalytic degradation of organic dye pollutants (such as methyl orange) on visible light irradiation.



Some selected POM hybrids were tested for their cytotoxicity properties as well. In vitro cytotoxicity of hybrid **P1** against Colo320DM cell lines was determined by using MTT assay. **P1** produced a dose dependent inhibition on growth of the cells. Results of MTT assay revealed that different concentrations of compound **P1** could be able to reduce cell viability of Colo320DM. Percentage of viability of cells at concentrations ranging from 0.0000001 mg/mL to 0.1 mg/mL is 93.98 to 37.23. The LD_{50} value of the compound **P1** was found to be 0.055 mg/mL.Increased numbers of apoptotic cells as a function of concentration of **P1**determined by AO/EB staining method is shown below. Nuclear condensation and change in colour of the fragmented nuclear membranes from green to reddish orange represents the induction of apoptosis of treated cells compared to control.

Dr. Suman Kalyan Pal

Photoinduced electron transfer in organic molecule-inorganic nanomaterial hybrid systems

Zinc oxide (ZnO) nanocrystals (NCs) of size 3.5 nm were synthesized and characterized by various spectroscopic and microscopic techniques. Interaction of ZnO NCs with Rhodamine B (RhB) molecule in the presence of light was investigated by steady state and time-resolved emission measurements. The visible emission of ZnO NCs was quenched as a result of fluorescence resonance energy transfer from NCs to RhB molecules. This study reveals that at least three decoupled defect transitions which are associated with the visible emission of ZnO NCs interact individually with the dye molecule resulting in wavelength dependent energy transfer and hence uneven quenching of the NC fluorescence. The fluorescence quenching is not only due to energy

transfer to dye molecules but also the result of nonrediative recombination in the trap staes present in the NCs. These NCs form ground state charge transfer complex with a newly synthesized coumarin dye. The detail study is underway. The following two publications come out of this project and few are in the pipeline:

Dr. Hari Varma

Collision processes in atomic and molecular physics

In this project we study the atomic photoabsorption processes in free and confined atomic systems, including ions. These studies have significant applications in stellar spectroscopy, material science, UV lithographyetc. The works involve many-body theories and efforts are in progress toimprove the existing approximation techniques. Apart from some workbased on earlier model potentials for confinements, the project alsoinclude developing more realistic potentials to include the dynamicalcoupling between fullerene and atomic electrons to study the ionizationprocesses.

Dr. Venkata Krishnan

Controlled fabrication of realistic nano-circuits using robust artificial peptides

The research project deals with the physico-chemical understanding, design and fabrication of bio-inspired materials. The main goal of the research work will be to explore the use of molecules, methods and concepts of biology to design and create novel materials with new functions and properties. In particular, the project is aimed at fabricating nanomaterials in desired structures by controlling the assembly of nanoparticles based on the approaches adopted by nature, particularly biomolecule-directed-assembly, wherein achieving nanoscale structural control will enable the preparation of ordered hierarchical nanostructures in one, two and three dimensions, which could be used for a molecular electronics applications.

Dr. Rajendra K. Ray

Higher Order Compact (HOC) finite difference scheme for elliptic equations with discontinuous coefficients and singular source terms.

We have developed a new methodology for solving two-dimensional immersed interface problems in polar coordinates with circular interfaces. We then extended this idea for two-dimensional general immersed interface problems. Now, we are working on the extension of this scheme for any irregular geometry.

Development of a class of Higher Order Compact (HOC) finite difference schemes and its application to linear shear flows.

We have started the project. Equipment purchasing and hiring of JRF staff are under process. In the meantime, we are working on the development of higher order compact (HOC) scheme for shear flow past a square cylinder in Cartesian coordinate and we already have got some success on this.

Dr. Syed Abbas

Periodicity and almost periodicity in ecological modelling

Our aim is to find the periodicity, almost periodicity and qualitative behavior of dynamical systems like prey-predator systems using difference equations and ordinary differential equations and

dynamics equation on Time Scale.The area of discrete time models is very vast and has many applications in many fields. The analysis of discrete time model is more appropriate then the continuous models. We constructed a discrete model and have found the all fixed points and their feasibility of that model. We have also derived the relation among the parameters of model for stability analysis. We have constructed two models on time scale which have continuous and discrete version when time scale is real number and integer respectively. We are still working theoretically and numerically on our models. The aim for future is to complete these papers with nice results.

Dr. Abhimanew Dhir

Cytochrome C encapsulated metal organic framework as bio- material for sulfate ion recognition

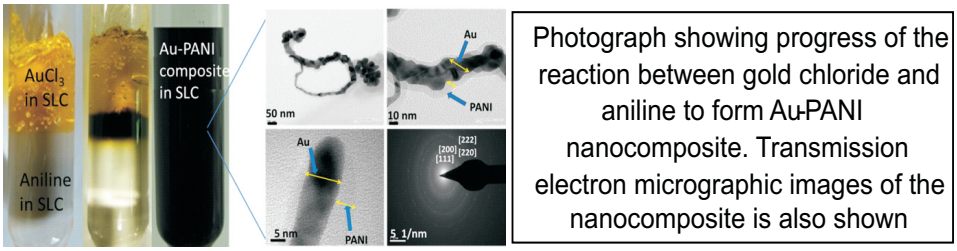
In this context, we aimed at preparation of MOF based biomaterial in which protein cytochrome c (cyt c) is encapsulated in pores of MOF. Cyt c is an essential component of the electron transport chain and is capable of undergoing oxidation and reduction. These properties of cyt c encapsulated MOF make it a suitable candidate for anion sensing applications.Therefore, we evaluated material for its anion sensing application. Among all the ions tested, the cyt c encapsulated MOF biomaterial selectively sensed sulfate (SO_4^{2-}) ions in 100 % aqueous solution and in solid phase with practical application.

In addition to it, we were interested to work in field of fluorescent chemosensors and evaluate their applications for molecular recognition. Both our previous work and the work on fluorogenic sensors lie in the broad research area of supramolecular chemistry.

Dr. Prem Felix Siril

Exploration of swollen liquid crystal templates for structured nanomaterial synthesis- IIT Mandi

The main objective of these projecthas been to prepare and characterize nanostructures using swollen liquid crystals (SLCs) as soft templates. We have achieved significant progress in this project by developing a novel and general method for achieved controlled morphology of zero and one dimensional nanostructures of conducting polymer nanostructures and their nanocomposites with metals. Nanocomposites of polyaniline (PANI) with Pd, Pt, Au and Iron oxide were prepared and charcterised. These materials were found to have interesting applications as catalysts in Suzuki-Miyaura coupling reactions, reduction of organic pollutants and for surface enhanced Raman Scattering (SERS).



Photograph showing progress of the reaction between gold chloride and aniline to form Au-PANI nanocomposite. Transmission electron micrographic images of the nanocomposite is also shown

Novel routes for nanocrystallisation of energetic compounds-DRDO

We have developed a novel evaporation assisted solvent anti-solvent interaction method and optimisedthe preparation ofnano-RDX and nano-HMX using the same method. The plan is to use the solvent-antisolvent interaction principles in microfluidics to prepare mono-dispersed nanoparticles. The microfluidics chips and other parts have been purchased and preliminary results are quite encouraging.

Dr. Aniruddha Chakraborty

Dynamical analysis of highly excited molecular spectra

Understanding dynamics of highly excited vibrational motion of small molecules is one of the most important challenges in Molecular Spectroscopy. The aim of this research is to extract new understanding about dynamics from information present in the experimental spectra and to apply this knowledge to understand internal molecular energy flow and reaction dynamics.

In highly excited vibrational states of molecules, strong coupling between different modes and an-harmonicity give rise to complicated classical dynamics, making the simple normal mode analysis unsatisfactory.

Traditional methods for analysing the spectrum are based on assignment of eigenstate in terms of quantum numbers (zero order), such as number of quanta in each normal mode, which can be physically meaningful only at low energy, near harmonic regime. In highly excited vibrational spectra these zero order quantum numbers are destroyed by the strongly coupled dynamics, which means the spectra become un-assignable in ordinary terms.

Effective spectroscopic Hamiltonians are very useful to analyse and extract information from experimental and simulated spectra. We are using our methods to interpret experiments that probe molecules via the high resolution frequency-domain spectra. We planto construct ageneralized effective spectroscopic Hamiltonian by fitting the spectrum of real an-harmonic systems using simulated data.

The standard approach for building an effective spectroscopic Hamiltonian is well understood for systems below the dissociation energy of any bond. We plan to extend our method to energies above the dissociation energy of any bond. This is non-trivial because one has to incorporate the effect of energy continuum into the energy levels, which is one of the key challenges in this area.

We now have preliminary results using a model system of coupled Morse Oscillators and our result will be communicated soon to one of the reputed international journal.

Dr. Subrata Ghosh

Towards novel barbiturates as Matrix Metalloprotenase (MMP) inhibitors: design, synthesis, characterization and biological evaluation

Non destructive visualization of metal ions in cell is a challenging task as signaling processes in biological systems are awfully complex and the major challenge is the direct watching of molecular interaction in real time inside the organism. Metal-ion-induced fluorescence enhancement of small molecules has been used as a potential tool for the last few decades to obtain additional insight into various biological events including the distribution and concentration of metal ions in living cells in vitro and invivo. Though zinc is the second most abundant metal ion and key in monitoring various

biological events in human body, it's over accumulation inside cells is not advisable and may cause severe damage to human health. The role of chelated zinc in biological systems is well investigated and documented in the literature, but the biological functions of labile/free zinc pool in living system still remain unclear. In this regard, small molecule based fluorescence imaging are expected to provide us valuable information on various important biological events. Our systematic studies lead to the development of three molecular markers for labeling Zn^{2+} inside living systems (in vitro and in vivo) based on easily synthesizable small molecules with higher wavelength emission profile. In addition, we also developed an approach which may help in knowing the in vivo imaging potential of a newly developed probe using a plant model before applying it to the expensive animal model.

Dr.R.C. Sawhney
Ethnobotanical garden

IIT Mandi Campus at Kamand and surrounding areas up to Prashar lake is a unique repository of plants growing at different altitudes having significant health promoting bioactivity. With the establishment of the Institute Campus in which about 8000 residents are expected to reside, the existing rich biodiversity may be disturbed. Therefore, the present study was taken up to map the complete area for the presence of different plant species and carry out identification and taxonomical classification and set up a Herbarium for preservation of voucher specimens. This Herbarium would function as a repository of plants growing in this region and will serve as a referral point for authentication of the plant species. In addition, as the local population has been using herbal remedies against different diseases an ethnobotanical survey of this region will be useful in understanding medical potential of the plants growing in this area. Identification of these medicinal plants in natural habitat with ethnobotanical knowledge can serve as a powerful search engine for the drug discovery process. The synergy of natural product research and biotechnology in the near future can drive development of molecular drugs, nutraceuticals and functional foods which in turn can improve economy of the local inhabitants.

A plant medicine lab with the facilities for collection, identification and preservation of flora has been established. A Project Associate has been recruited to start the project activities. He was trained at IHBT Palampur and Forest Research and Training Institute Sundernagar. 54 voucher specimens of different plants have been collected, photographed and preserved for confirmation of the nomenclature. Topo sheets to divide the complete area into different grits have been collected. A preliminary survey was done in Navlai village and Uhl river valley for existence of source of rare medicinal plants. Work on leaf analysis as a modality for identification of plants was started. Seabuckthorn and rhodiola growing in the higher altitude of Himachal Pradesh have been identified as anti-aging plants to be investigated in details. Liaison has been established with the Himachal Pradesh Forest Dept. to carry out a limited cultivation trial of these plants for research purposes in Prashar Lake area.

PAPERS PUBLISHED IN NATIONAL AND INTERNATIONAL JOURNALS

1. Barrierless electronic relaxation in solution: An analytically solvable model**.** A. Chakraborty. *J. chem. Phys*., Vol. 139, page 094101, year 2013.
2. Quantum mechanical and spectroscopic (FT-IR, ^{13}C, ^{1}H NMR and UV) investigations of 2-(5-(4-Chlorophenyl)-3-(pyridin-2-yl)-4, 5-dihydropyrazol-1-yl) benzo[d]thiazole by DFT method. Diwaker. *SpectrochimiciaActa.* Part A., Vol. 128, page 819, year 2014.
3. Quantum Chemical and Spectroscopic Investigations of (Ethyl 4 hydroxy-3-((E)-(pyren-1-ylimino) methyl) benzoate) by DFT Method. Diwaker and A. K. Gupta. *International Journal of Spectroscopy*, Vol. 2014, Article ID 841593, year (2014).
4. Functional Molecular Lumino-Materials to Probe Serum Albumins: Solid Phase Selective Staining Through Non-Covalent Fluorescent Labeling. GourabDey, Abhishek Gupta, Trinetra Mukherjee, Pankaj Gaur, Abhishek Chaudhary, SubhraKantiMukhopadhyay, ChayanKanti Nandi, Subrata Ghosh. *ACS Applied Materials & Interfaces,* Vol*. 6*, Pages 10231–10237, 2014.
5. Engineering Fused Coumarin Dyes: Molecular Level Understanding of Aggregation Quenching and Tuning Electroluminescence via Alkyl Chain Substitution. Sunil Kumar, Punita Singh, Ritu Srivastava, Rik Rani Koner, AvijitPramanik, Jomon Mathew, Sougata Sinha, MadhuRawat, Raghubir Singh Anand, Subrata Ghosh. *Journal of Materials Chemistry,* Vol. 2, Pages 6637-6647, 2014.
6. Triazole-based Zn^{2+} specific molecular marker for fluorescence bioimaging. S. Sinha, T. Mukherjee, J. Mathew, S. K. Mukhopadhyay, S. Ghosh. *AnalyticaChimicaActa, Vol.822*, Pages *60-68, 2014.*
7. Radiation Sensitive Novel Polymeric Resist Materials: Iterative Synthesis and Their EUV Fragmentation Studies.V. S. V. Satyanarayana, F. Kessler, V. Singh, F. R Scheffer, D. E Weibel, S. Ghosh, K. E Gonsalves. *ACS Applied Materials and Interfaces*, Vol.6, Pages 4223–4232, 2014.
8. Towards novel non-chemically amplified (n-CARS) negative resists for electron beam lithography applications.V. Singh, V.S.V. Satayanarayana, S. Sharma, S. Ghosh, K. E. Gonsalves. *Journal of Material Chemistry C*, Vol.2, Page 2118, 2014.
9. Green-emissive molecular marker with a TRIS-scaffold for fluorescence imaging of Zn2+ in biological systems. S. Sinha, T. Mukherjee, J. Mathew, S. K. Mukhopadhyay, S. Ghosh. *Journal of Photochemistry and Photobiology A: Chemistry,* Vol.277, Pages75-81, 2014.
10. Effect of N-a Substitution on the Electropolymerization of N-Substituted Pyrroles: Structure–Reactivity Relationship Studies.S. Kumar, S. Krishnakanth, J. Mathew, Z. Pomerantz, J. P. Lellouche, S. Ghosh. Journal of Physical Chemistry *C,* Vol.118, Pages 2570-2579, 2014.
11. Cysteamine-based cell permeable Zn2+-specific molecular bioimaging materials: from animal to plant cells. S. Sinha, G. Dey, S. Kumar, J. Mathew, T. Mukherjee, S. K. Mukhopadhyay, S. Ghosh. *ACS Applied Materials and Interfaces*, Vol.5, Pages

11730–11740, 2013.

12. Structurally tuned benzo[h]chromene derivative as Pb2+ selective 'turn-on' fluorescence sensor for living cell imaging. S. Sinha, R. R. Koner, S. Kumar, J. Mathew, A. Roy, S. K. Mukhopadhyay, C. K. Nandi, S. Ghosh. *Journal of Luminescence*, Vol.143, Pages 355-360, 2013.
13. N-Substituted carbazoleheterocycles and derivatives as multipurpose chemical species: at the interface of chemical engineering, polymer and materials science. J. P. Lellouche, R. R. Koner, S. Ghosh. *Reviews in Chemical Engineering*, Vol. 29, Pages 413-437, 2013.
14. Interfacing water soluble nanomaterials with fluorescence chemosensing: Graphene quantum dot to detect Hg2+ in 100% aqueous solution. HimadriChakraborti, Sougata Sinha, Subrata Ghosh, SumanKalyan Pal. *Materials Letters,* Vol.97*,* Pages 78–80, 2013.
15. Carboxylated 'locking unit' directed ratiometric probe design, synthesis and application in selective recognition of Fe3+/Cu2+. Sougata Sinha, Sunil Kumar, Rik Rani Koner, Jomon Mathew, Chayan K. Nandi, Subrata Ghosh. *RSC Advances,* Vol.3, Pages 6271-6277, 2013.
16. Weighted pseudo almost automorphic solutions of fractional functional differential equations. Abbas,S. *Cubo*, Vol.16 ,no. 1, Pages 21–35, 2014.
17. Asymptotic almost automorphic solution of impulsive neural network with almost automorphic coefficients. Abbas, S., Mahto, L., Hafayed, M., Alimi, A.A. *Neurocomputing*, Vol.142, Pages 326–334, 2014.
18. On near-optimal necessary and sufficient conditions for forward-backward stochastic systems with jumps, with applications to finance. Hafayed, M.; Veverka, P.; Abbas, S. *Appl. Math., Vol.* 59, no. 4, Pages 407–440, 2014.
19. Local and global stability analysis of two prey one predator model with help.Tripathi, J.P., Abbas, S., Thakur, M., Comm*. Nonl. Sci. Numer. Sim*., Vol.19 (9), Pages 3284-3297, 2014.
20. Dynamical analysis of the Irving-Mullineux oscillator equation of fractional order. Abbas, S., Erturk, V.S., Momani, S. *Signal Processing*, Vol.102, Pages 171-176, 2014.
21. Stepanov weighted pseudo almost automorphic sequences and their application. Abbas, S., Chang, Y.K., Hafayed, M. *Nonlinear Studies,* Vol.21 (1), Pages 99-111, 2014.
22. A comparative study of deterministic and stochastic dynamics for a non-autonomous allelopathic phytoplankton model. Mandal, P.S., Abbas, S., Banerjee, M., *Applied Mathematics and Computation*, Vol.238, Pages 300-318, 2014.
23. On near-optimal mean-field stochastic singular controls: necessary and sufficient conditions for near-optimality. Hafayed, M., Abbas, S. *Journal of Optimization theory and Appl.*, Vol.160 (3), Pages 778-808, 2014.
24. Stochastic near-optimal singular controls for jump diffusions: necessary and sufficient conditions. Hafayed, M.; Abbas, S. *J. Dyn. Control Syst.*, Vol 19, no. 4, Pages 503–517, 2013.

25. On necessary and sufficient conditions for near-optimal singular stochastic controls. Hafayed, M.; Abbas, S.; Veverka, P. *Optim. Lett.*, Vol. 7,no. 5, Pages 949–966, 2013 .

26. Analysis of Caputo impulsive fractional order differential equations with applications. Mahto, L., Abbas, S., Favini, A. *Int. J. Differential Equations*, Vol. 2013, Pages 1-11, 2013.

27. Existence and attractivity of k-almost automorphic sequence solution of a model of cellular neural networks with delay. Abbas, S., Xia, Y. *Acta Mathematica Scientia*, Vol. 33 (1), Pages 290-302, 2013.

28. Approximate controllability and optimal control of impulsive fractional functional differential equations. Mahto, L., Abbas, S. *Jour. Abstr, Differ. Equ. Appl*., Vol. 4, no. 2, Pages 44-59, 2013.

29. Emerging Trends of Malaria-Dengue Geographical Coupling in the South-East Asia Region. Sarita Azad and PietroLio. '*Journal of vector borne diseases, Vol.* 51(3), Pages 165–171, 2014.

30. Selection of India's Energy Resources using Fuzzy Vikor Method. Sharma, Deepak; Azad, Sarita. *OIDA International Journal of Sustainable Development, Vol.06* (01), Pages 19-36, 2014.

31. Malaria Incidence Forecasting and its Implication to Intervention Strategies in South East Asia Region. Ankit Bansal, Sarita Azad and PietroLio. '*Springer Proceedings in Complexity*, Pages 919-926, 2013.

32. Ranking Indian States Based on Socio-Economic Factors. Shashank Mathur, Aditya Chuhan, and Sarita Azad. *Advanced Science Focus, Vol.*1, Pages 322-332, 2013.

33. Uncovering the Economic Coherence among the Asian Giants and the Western World. Azad, Sarita; Gupta, Arvind. *Advanced Science, Engineering, and Medicine*, Vol.5, Pages 330-334, 2013.

34. Evaluating India's Strategic Partnership using Analytical Hierarchy Process. Sarita Azad, ShashankMathur, and Arvind Gupta. *Advanced Science Focus*, Vol. 1, Pages 96-101, 2013.

35. Assessment of Amine Functionalized Graphene Nanoflakes for Anode Materials in Li-Ion Batteries: an ab initio Study. Chakraborti, H.; Pal, Suman Kalyan. *Chemical Physics Letter*, Volume:600, Pages:118-122,2014.

36. Role of decoupled defect transitions of ZnO nanocrystals in energy transfer. Kumar, Pushpendra; Pal, Suman Kalyan. Journal of Photochemistry and Photobiology A-chemistry, Volume: 278 Pages:46-52,2014.

37. Excited state electron transfer from aminopyrene to graphene: a combined experimental and theoretical study. Chakraborti, H ; Bramhaiah, K ; John, NS ; Pal, SK. Physical chemistry chemical physics ,Volume: 15, Issue: 45, Pages: 19932-19938,2013.

38. Global sampling of the photochemical reaction paths of bromoform by ultrafast deep-UV through near-IR transient absorption and ab initio multiconfigurational calculations. Pal, S. K.; Mereshchenko, A. S.; Butaeva, E. V.; El-Khoury, P. Z.; Tarnovsky, Journal of Chemical

Physics, Volume:138, Pages:124501, 2013.

39. Preparation of Nano-RDX by Evaporation Assisted Solvent-Antisolvent Interaction. Kumar, Raj; Siril, Prem Felix; Soni, Pramod. Propellants explosives pyrotechnics, Volume: 39, Pages: 383-389, 2014.
40. Ultrafine carbamazepine nanoparticles with enhanced solubility and rate of dissolution. Kumar, Raj; Siril, Prem Felix.RSC Advances, Volume: 4, Pages: 48101-48108, 2014.
41. A novel approach for the synthesis of polyaniline nanostructures using swollen liquid crystal templates. Dutt, Sunil; Siril, Prem Felix. Materials letters, Volume: 124 Pages: 50-53, 2014.
42. Morphology controlled synthesis of polyaniline nanostructures using swollen liquid crystal templates. Dutt, Sunil; Siril, Prem Felix.Journal of Applied Polymer Science, Volume: 131 (18), Pages: 15-23, 2014.
43. Bi-metallic nanocomposites of Mn with very high catalytic activity for burning rate enhancement of composite solid propellants. Dubey, Reena; Chawla, Mohit; Siril, Prem Felix; Singh, Gurdip. ThermochimicaActa, Volume: 572 Pages: 30-38, 2013.
44. Exact Controllability of an Integro-differential equation with deviated argument.M. Muslim, R.P. Agarwal. Functional Differential Equation, Vol. 21, no.1-2, Pages31-45, 2014.
45. A New Liquid Droplet Laser Desorption Source Combined with Supersonic Jet Expansion: Application to Phenol and its Water Clusters. Nandi, Chayan Kanti; Barth, Hans-Dieter; Brutschy, Bernhard. Zeitschrift fur physikalische chemie-international journal of research in physical chemistry & chemical physics,Volume: 228 Pages: 449-457, 2014.
46. Gold Nanoparticle Chitosan Composite Hydrogel Beads Shows Efficient Removal of Methyl Parathion from Waste Water. Dwivedi, Charu; Gupta, Abhishek; Chaudhary, Abhishek; Nandi, Chayan Kanti.RSC Advance, Volume: 75 Pages: 39830, 2014.
47. Orientational Switching of Protein Conformation as a Function of Nanoparticle Curvature and Their Geometrical Fitting. Khan, Syamantak; Gupta, Abhishek; Chaudhary,Abhishek; Nandi,Chayan Kanti. Journal of chemical physics, Volume: 141 Pages: 048707-1, 2014.
48. Morphological effect of gold nanoparticles on the adsorption of bovine serum albumin. Chaudhary, Abhishek; Gupta, Abhishek; Khan, Syamantak; Nandi, Chayan Kanti. Phys. Chem. Chem. Phys,Volume: 38 Pages: 20471, 2014.
49. Optimizing the underlying parameters for protein-nanoparticle interaction: advancement in theoretical simulation.Khan, Syamantak; Nandi, Chayan Kanti Nanotechnology Reviews, Volume: 3 Pages: 347-359, 2014.
50. Controlling the Fate of Protein Corona by Tuning Surface Properties of Nanoparticles.Khan, Syamantak; Gupta, Abhishek; Nandi, Chayan Kanti. J. Phys. Chem. Lett.Volume: 4 Pages: 3747-3752, 2013.
51. Hypervalent iodine mediated direct one pot transformation of aldehydes to ketones. Sagara, Prateep Singh; Chebolu, Rajesh; Bahuguna, Ashish; Ravikumar, P. C. RSC AdvancesVolume: 4, Pages: 15011-15013, 2014.

52. A Projection Method-based model with the exact C-property for shallow-water flows over dry and irregular bottom using unstructured finite-volume technique.Shi Yu-e, Ray Rajendra K, Nguyen Kim Dan.Computers and Fluids, Vol. 76, PP. 178—195, 2013.

53. A Transform Free Higher Order Compact Finite Difference Scheme for Simulating the Flow behind a Rotationally Oscillating CircularCylinder at Reynolds number 500. Mittal HariVansh R, Ray Rajendra K. Applied Mechanics and Materials, Vol. 367, PP. 126-131, 2013.

54. Conformation induced discrimination between picric acid and nitro derivatives/anions with a Cu-pyrene array: the first decision making photonic device. Pandey, R (Pandey, Richa) ; Reddy, L (Reddy, Lingeshwar) ; Ishihara, S (Ishihara, Shinsuke); Dhir, A (Dhir, Abhimanew); Krishnan, V(Krishnan, Venkata) .RSC ADVANCES,Volume: 3, Issue: 44, Pages: 21365-21368, 2013.

55. Pronounced effects of interchannel coupling in high-energy photoionization. W. Drube,T. Grehk, S. Thiess, G. B. Pradhan, H. R. Varma, P. C. Deshmukh and S. Manson, J.Phys. B: At. Mol. & Opt. Phys. ,Vol.46, Article Number: 245006, 2013.

56. Au microparticles mediated construction of a logic based dual channel molecular keypad lock. M. Devi, A. Dhir, C. P. Pradeep. Dalton Trans., Vol. 42, Pages 7514-7518, 2013.

57. A fluorescence 'turn-on' chemodosimeter for selective detection of Nb^{5+}ions in mixed aqueous media. A. K. Gupta, A. Dhir, C. P. Pradeep. Dalton Trans., Vol. 42, Pages 12819-12823, 2013.

58. ESIPT induced AIEE active material for recognition of 2-thiobarbituric acid.S. Sharma, C. P. Pradeep, A. Dhir.Sens. &Act., Vol.191 Pages 445-449, 2014.

59. Nano dispersion of 3D Cd(II) coordination polymer: synthetic blood plasma anticoagulant, D. Rambabu, C. P. Pradeep, A. Dhir.Inorg. Chem. Front., Vol.1, Pages163-166, 2014.

60. Cytochrome c encapsulated metal organic framework as biomaterial for sulfate ion recognition.D. Rambabu, D. Pooja, C. P. Pradeep, A. Dhir. *J. Mater.Chem. A,* Vol.2, Pages 8628-8631, 2014.

61. New triangular steroid-based $A(LS)_3$ type gelators for selective fluoride sensing application M. Devi, A. Dhir, D. Pooja, C. P. Pradeep. RSC Adv., Vol.4, Pages 27098-27105, 2014.

62. Conformation induced discrimination between picric acid and nitro derivatives/anions with a Cu-pyrene array: the first decision making photonic device.R. Pandey, L. Reddy, S. Ishihara, A. Dhir, V. Krishnan. RSC Adv., Vol.3, Pages 21365-21368, 2013.

63. Cyanide induced self assembly and copper recognition in human blood serum by a new carbazole AIEE active material.S. Sharma, C. P. Pradeep, A. Dhir. Materials Science and Engineering C, Vol.43, Pages 418-423, 2014.

64. A modified real coded genetic algorithm for constrained optimization. Manoj Thakur, Suraj S. Meghwani, and Hemant Jalota. Applied Mathematics and Computation .Vol.235, pp. 292-317, 2014. (Impact Factor 1.600)

65. A New Genetic Algorithm for global optimization of multimodal continuous functions. Manoj Thakur. Journal of Computational Science (Elsevier), Journal of Computational Science .Vol.5(2), Pages 298-311, 2014. (Impact Factor 1.567).

66. Stereo camera calibration using particle swarm optimization. Kusum Deep, Madhuri Arya, Manoj Thakur & Raman Balasubramanian. Applied Artificial Intelligence, Vol.27 (7), Pages. 618-634, 2013. (Impact Factor 0.475)

67. Inspired by nature: investigating tetrataenite for permanent magnet applications, L. H. Lewis, A. Mubarok, E. Poirier, N. Bordeaux (NW Univ) and P. Manchanda, A. Kashyap, (IIT Mandi) and R. Skomski (UNL) and J. Goldstein, F. E. Pinkerton, R. K. Mishra, R. C. Kubic Jr., K. Barmak (Iowa State Univ, Ames) ", Journal of Physics: Condensed Matter vol. 26 (6), 064213 (2014)

68. Magnetoelectric effect in Fe linear chains on Pt (001), P. Manchanda, R. Skomski, A. Prabhakar, A. Kashyap, Journal of Applied Physics 115 (17), 17C733 (2014)

69. Transition-metal and metalloid substitutions in L10-ordered FeNi, P. Manchanda, R. Skomski, N. Bordeaux, L. H. Lewis, A. Kashyap, Journal of Applied Physics 115 (17), 17A710 (2014).

70. Effective Mass and Band Gap in strained Graphene, Pankaj Kumar, Ralph Skomski, P. Manchanda, A. Kashyap and P.A. Dowben, Current Applied Physics, 14, S136 (2014).

71. Ab initio study of anisotropy and nonuniaxial anisotropy coefficients in Pd nanochains, Pankaj Kumar, Ralph Skomski, Priyanka Manchanda, and A. Kashyap, Chemical Physics Letters, 583. pp. 109-113, (2013).

72. Magnetoelectric effect in organometallic Vanadium-Benzene wires, P. Manchanda, P. K. Sahota, R. Skomski, and A. Kashyap, Chemical Physics Letters 568, 121 (2013).

73. Ab-initio study of free standing TiO2 clusters: Stability and magnetism, T. H. Rana, P. K. Sahota, A. K. Solanki, R. Skomski, and A. Kashyap, Journal of Applied Physics 113, 17B526 (2013).

74. HfCo7-based Rare-Earth-free Permanent-Magnet Alloys, B. Das, B. Balamurugan, P. K. Sahota, R. Skomski, V. R. Shah, J. E. Shield,A. Kashyap and D. J. Sellmyer , IEEE Transaction on magnetics vol .49 (7), 3330 (2013).

75. Predicting the future of permanent magnetism (Invited), R. Skomski, P. Manchanda, P. K. Sahota, B. Balasubramanian, A. Kashyap, And D. J. Sellmyer, IEEE Transaction on magnetics, vol. 49 (7), 3315 (2013).

76. Magnetic properties of Fe-doped MnAl. Manchanda, P.;Kashyap, A; Shield, J. E.; Lewis, L. H.; Skomski, R. Journal of magnetism and magnetic materials, Volume: 365 Pages: 88-92 (2014)

77. Size-Induced Chemical and Magnetic Ordering in Individual Fe-Au Nanoparticles

    Mukherjee, Pinaki;Manchanda, Priyanka; Kumar, Pankaj; Zhou, Lin; Kramer, Matthew J.; Kashyap, Arti; Skomski, Ralph; Sellmyer, DavidShield, Jeffrey E. ACS NANO, Volume: 8

Pages: 8113-8120 (2014)

78. Magnetoelectric effect in Fe linear chains on Pt(001) Manchanda, P.; Skomski, R.; Prabhakar, A.; Kashyap, A. Journal of applied physics,Volume: 115 Article Number: 17C733 (2014)

79. Transition-metal and metalloid substitutions in L1(0)-ordered FeNi Manchanda, Priyanka; Skomski, Ralph; Bordeaux, N.; Lewis, L. H.; Kashyap, Arti. Journal of applied physics, Volume: 115 Article Number: 17A710 (2014)

80. Permanent magnetism of intermetallic compounds between light and heavy transition-metal elements Kumar, P.; Kashyap, A.; Balamurugan, B.; Shield, J. E.; Sellmyer, D. J.; Skomski, R.Journal of physics-condensed matter, Volume: 26 Article Number: 064209 (2014).

81. Ab-initio study of anisotropy and nonuniaxial anisotropy coefficients in Pd nanochains Kumar, P (Kumar, Pankaj) ; Skomski,R (Skomski,Ralph) ; Manchanda, P (Manchanda, Priyanka) ; Kashyap, A (Kashyap, Arti) Chemical physics letters, Volume: 58, Pages: 109-113 (2013)

82. Turn-on trivalent cation selective chemodosimetric probe to image native cellular iron pools. M. Venakaswaralu, T. Mukherjee, S. Mukherjee, R. R. Koner. Dalton Trans, Vol.43 (14), Pages 5269-73, 2014.

83. Quencher displacement strategy for recognition of trivalent cations through 'turn-on' fluorescence signaling of an amino acid hybrid. M. Venkateswarulu, S. Sinha, J. Mathew, R. R. Koner. Tetrahedron Letters, Vol.54(35), Pages 4683-88, 2013.

84. Imine containing benzophenone scaffold as an efficient chemical device to detect selectively Al^{3+}. S. Sinha, R. R. Koner, S. Kumar, J. Mathew, P. V. Monisha, I. Kazi, S. Ghosh, RSC Advances, Vol.3,Pages 345-351, 2013.

Conference proceedings

1. V. Singh; V. S. V. Satyanarayana; S. K. Sharma; S. Ghosh; K. E. Gonsalves. Novel non-chemically amplified (n-CARs) negative resists for EUVL. *Proc. SPIE* 9051, Advances in Patterning Materials and Processes XXXI, 905106 (March 27, 2014); doi:10.1117/12.2041183.

2. V. S. V. Satyanarayana; V. Singh; S. Ghosh; S. K. Sharma; K. E. Gonsalves. Design and synthesis of novel resist materials for EUVL. *Proc. SPIE* 9048, Extreme Ultraviolet (EUV) Lithography V, 90481W (April 17, 2014); doi:10.1117/12.2045736.

3. V. Singh ; V. S. V. Satyanarayana ; F. Kessler ; F. R. Scheffer ; D. E. Weibel ; S. K. Sharma ; S. Ghosh, K. E. Gonsalves. Optimization of processing parameters and metrology for novel NCA negative resists for NGL. *Proc. SPIE* 9048, Extreme Ultraviolet (EUV) Lithography V, 90481Y (April 17, 2014); doi:10.1117/12.2045882.

4. V. Singh ; V. Kalyani ; V. S. V. Satyanarayana ; C. P. Pradeep ; S. Ghosh ; S. Sharma ; K. E. Gonsalves. Organic-inorganic hybrid resists for EUVL. *Proc. SPIE* 9051, Advances in Patterning Materials and Processes XXXI, 90511W (March 27, 2014);

doi:10.1117/12.2041907.

5. *Abbas, S.,* Almost automorphic sequences and their application to a model of cellular neural network, Springer proceedings, ICDEA, May 26-30, 2013, Muscat, Oman.
6. Abbas, S.,Mahto, L. Existence of almost periodic solutions of a model of phytoplankton allelopathy with delay, In ICNAAM-2012, 19-25 September 2012, Kos, Greece, AIP Conference Proceedings, Vol.1479, Pages: 900-904, 2012.
7. *Mahto, L., Abbas, S. Existence and uniqueness of the solutions of Caputo fractional differential equations, In ICNAAM-2012, 19-25 September 2012, Kos, Greece, AIP Conference Proceedings, Vol.1479, Pages: 896-899, 2012.*
8. *Tripathi, J. P., Abbas, S., Thakur, M. Stability analysis of two prey one predator model, In ICNAAM-2012, 19-25 September 2012, Kos, Greece, AIP Conference Proceedings, Vol.1479, Pages:905-909, 2012.*
9. An Evaporation Assisted Precipitation Method for the Preparation of Nano High Energetic Materials. Kumar, Raj;Siril, Prem Felix;Soni, Pramod. HEMCE-2014, February 13-15, 2014, VSSC, Thiruanathapuram.
10. Synthesis and characterisation of green explosives: nitrate ester derivatives of triazole.Gaur,Pankaj;Ghosh, Subrata;Siril, Prem Felix.HEMCE-2014, February 13-15, 2014, VSSC, Thiruanathapuram.
11. An efficient higher order accurate finite difference scheme for solving two dimensional ellipticequations with discontinuities. Mittal HariVansh R, Ray Rajendra K. International Congress of Mathematicians (ICM), 2014, Seoul, South Korea.
12. Numerical study of transition flows over a rotationally oscillating circular cylinderRay Rajendra K, Mittal HariVansh R. International Congress of Mathematicians (ICM), 2014, Seoul, South Korea.
13. A comparative study of iterative solvers for image de-noising using Crank-Nicolson scheme.Jain Subit K, Ray Rajendra K, Bhavsar A. International Congress of Mathematicians (ICM), 2014, Seoul, South Korea.
14. An efficient higher order accurate scheme for two-dimensional Immersed Interface problems.Ray Rajendra K, KalitaJitenC. Third International Conference on MetaComputing (ICoMeC), 2012; Bhubaneswer, India.
15. New findings on Alpha-Beta Phenomena for Unsteady Flow Past an Impulsively Started Circular Cylinder.Ray Rajendra K. IUTAM Symposium on Bluff Body Flows (Blubof), 2011, IIT Kanpur, India.
16. Effect of Confinement and interchannel coupling on High-Z atoms Ashish Kumar, Hari R. Varma, P. C. Deshmukh and S. T. Manson Journal of Physics: Conference Series 488, 022042 (2014) doi:10.1088/1742-6596/488/2/022042
17. Effect of Interchannel Coupling and Confinement on the Photoionization of Kr. J. George , Hari R. Varma , P. C. Deshmukh , S. T. Manson. J. Phys: Conf. Series, Vol.388, Page 022009, 2012. doi:10.1088/1742-6596/388/2/022009

18. Dipole and Quadrupole Photoionization of Intermediate Subshells of Atomic Mercury.T Banerjee , Hari R Varma , P C Deshmukh , S T Manson. J. Phys: Conf. Series, Vol.388, Page 22076, 2012. doi:10.1088/1742-6596/388/2/022076
19. Effect of confinement and interchannel coupling on high-Z atoms .Ashish Kumar, H R Varma, P C Deshmukh and S T Manson .J. Phys: Conf. Series, Vol.488, Page 022042, 2012, doi:10.1088/1742-6596/488/2/022042
20. Jai Prakash Tripathi, Syed Abbas, and Manoj Thakur: "Stability analysis of two prey one predator model", In the proceedings of International Conference of Numerical Analysis and Applied Mathematics, AIP Conference Proceedings,Vol.1479, Pages : 905-909, 2012.
21. Manoj Thakur, Kusum Deep, "Design Optimization of Three Wheeled MotorVehicle: A GA Approach", In the Proceedings of the International Conferenceon Soft Computing for Problem Solving (SocProS 2011) December 20-22, 2011,*Advances in Intelligent and Soft Computing Volume, Springer*, Vol.130, Pages: 677-688, 2012.

Conferences attended and papers presented

1. Evidence of nanoscale phase separation in a large bandwidth e- doped manganite. NSAM, 28th May 2014. (Dr. Bindu Radhamany)
2. Nandi CK. Smart Surface Chemistry for Protein Nanoparticle Interaction: Challenges and Opportunities on Biological Activities. (NSNB 2013)" on December 9-11th at Indian Institute of technology Mandi
3. Indian Association for the cultivation of Science at Kolkata and delivered a lecture on nanotechnology and its application.
4. Nandi CK. Smart Surface Chemistry for Protein Nanoparticle Interaction: Challenges and Opportunities on Biological Activities. National Conference on Photosciences (NCP-2013) 12-14th Dec 2013.
5. Dr. Muslim Malik visited the South Asian University, Delhi on 3rd November 2014 to deliver a lecture on Controllability of Evolution Problems with Deviated Argument.
6. Dr. Chayan Kanti Nandi, lecture on Super-resolution Microscopy: A New Vision of Nano World**on**November 11, 2014.
7. Dr. Chayan Kanti Nandihas delivered alecture on nanotechnology and its application at Kolkata, Indian Association for the cultivation of Science.
8. Dr. Chayan Kanti Nandi, Visited Jadavpur University in a golden Jubilee conference in Photochemistry and delivered an invited lecture on protein corona study.
9. Ray Rajendra K, Mittal HariVansh R. An Efficient HOC Scheme for solving 2D Elliptic Equations with Discontinuities along circular interfaces.National Conference on Mathematical and Computational Modeling (MCM).Agra, India, May 24-26, 2013.
10. Dr. Prem Felix Siril attended National conference on Current Trends in Chemical Sciences, "*Swollen liquid crystals – versatile 'soft' templates for thepreparation of*

nanostructures" 15-16 October 2014, St. Andrew College, Gorakhpur.

11. Dr. Prem Felix Siril attended International conference on Electron Microscopy, "*Controlling the Morphology of Polyaniline Nanostructures and its Nanocomposites Using 'Soft' Templates*" 9-11, July 2014, Delhi University, India.

Outreach Programmes

1. Dr.Venkata Krishnan participated as a mentor, interacted with students and presented a lecture at DST INSPIRE Internship Camp for 11th class students at Palampur, India on Oct. 24, 2013 and Nov. 14, 2013.
2. Dr.Venkata Krishnan, lecture "Integrated Watershed Management" at Irrigation and Public Health Department, Mandi, Nov. 08, 2013.

Conferences/Workshops organized

1. ANUSANDHAN '14, Intra-institute research event. This event gave an opportunity to the research scholars to present their ideas live in front of an interested audience of students and faculty.
2. 2nd National symposium on Nanobiotechnology (NSNB 2013)" on December 9-11th at Indian Institute of technology Mandi.
3. Pankaj Narula, Arjun Arjun Bhardwaj,SaritaAzad, and Ankit Bansal (2013), "Data Assimilation Methods in Parameter Estimation: An Application to Tuberculosis Transmission in India", International Conference of Mathematical Techniques in Engineering" Dehradun, October
4. Deepak Sharma and SaritaAzad (2013), "Selection of India's Energy Resources using Fuzzy VIKOR Method", International Conference on Sustainable Development, Canada, August.

Office Bearers of Professional Societies

1. Nandi CK. Secretary"Society for Nanobiotechnology".
2. Thakur M. Member, Elected IEEE Delhi Section PES/IAS Chapter for 2013-14.

School of Humanities and Social Sciences

The role and function of the humanist disciplines in the undergraduate engineering curriculum of the IITs has been universally recognized as an indispensable component. In assisting the potential technologist to attain the twin goals of individual excellence and happy harmony with society, the humanist disciplines need to be configured to meet immediate, practical, professional requirements without losing sight of the overriding claims of all-round liberal education. The School implemented for the first time in the B. Tech first semester the new curriculum comprising thirteen credits spread over five streams, viz., the a) Creative Stream b) International Language Competence c) Communicative Competence d) Social Competence and e) Managerial Competence. The Creative Stream was introduced in the fall semester where students had the option of choosing from three 1-credit courses, namely a) Art and Architecture b) Dance and Drama and c) Music. For this the School invited young and talented instructors from various parts of the country. An end of the year music production provided the capstone to the Creative Stream experience. At the higher semesters, HSS introduced new courses such as Technology in Pre-Modern India, International Business Management, Tribal India & Indigenous Latin America, Consumer Behavior, Organizational Behavior, and Introduction to World History, Modern Literature and the Constitution of India.

Faculty

Dr. Ashok Kumar M
Chairperson
Assistant Professor
Specialisation: Sociology of Religion, Caste and Christianity in India
PhD from IIT Bombay.
Home Town: Tenali, Andhra Pradesh
Phone: 01905-237928
EMail: ashok

Dr. Bhavender Paul
Adjunct Professor
Specialisation: Management Strategy, Managerial Finance, Biotechnology & Pharmaceutical Technology
Ph.D. Biochem. E. Rutgers U., New Brunswick NJ '77; MBA, Syracuse U., Syracuse NY '85
Home Town: San Mateo, CA USA (originally from Patiala, Punjab)
Phone: 01905-237998
EMail: bp

Prof. Balasundaram Subramanian
Visiting Professor
Specialisation: German Studies and Political Philosophy
Ph.D in German Studies in 1981
Home Town: Velachery, Chennai
Phone: 01905-237996
EMail: bs

Dr. Manu V. Devadevan
Assistant Professor
Specialisation: Literary practices in South Asia, Political and economic processes in premodern South Asia & South Asian Epigraphy
PhD from: Mangalore University, Mangalagangothri, Mangalore.
Phone: 01905-237908
EMail: manu

Dr. Ramna Devi Thakur
Visiting Assistant Professor
Specialisation: Development Economics
PhD from HPU Shimla
Home Town: Mandi
Phone: 01905-237918
EMail: ramna

Dr. Shail Shankar
Assistant Professor
Specialisation: Identity and group dynamics, Health and Well Being
PhD from University of Allahabad.
Home Town: Deoria
Phone: 01905-237912
EMail: shail

Dr. Varun Dutt
Assistant Professor (Joint Appointment)
Specialisation: Judgment and Decision Making, Environmental Decision Making, Artificial Intelligence, Human-Computer Interaction
Ph.D. From Carnegie Mellon University (USA) in year 2011
Home Town: Lucknow, Uttar Pradesh
Phone: 01905-237932
EMail: varun

Dr. Rajeshwari Dutt
Assistant Professor
Specialisation: Indigenous culture and politics in 19th Century Yucatan, Mexico
Ph.D. From Carnegie Mellon University (USA) in year 2012
Home Town: Kolkata, West Bengal
Phone: 01905-237919
EMail: rdutt

Dr. Suman
Assistant Professor
Specialisation: Colonialism, Postcolonialism, Imperialism and Romance Literature
PhD from IIT Delhi.
Home Town: Faridabad
Phone: 01905-237994
EMail: suman.sigroha

Research Projects

Sr.No.	Project Title	Investigators	Project cost (in lac)
1	Impact Assessment of Mahatma Gandhi National Rural Employment Guarantee Scheme in the Rural Area of Mandi District of Himachal Pradesh, funded by Department of Rural Development, Government of Himachal Pradesh, India	Dr. Ramna Thakur Dr. RajeshwariDutt	1.49 (Completed)

List of Publications

1. Suman, Death and Despair in the Poetry of Toru Dutt. CELT- Journal of Culture, English Language Teaching and Literature, 14:2, 148 - 158, (2014).
2. Suman, Delhi: The City Besieged, MahmoodFarooqui's Besieged: Voices from Delhi 1857. Millennial Asia. 5: 247-251, (2014).
3. Suman,Breaking Stereotypes: An Analysis of New Age Marketing Mantra. Marketing-Concepts to Applications, edited by Ahujaet. al. Bloomsbury India, 2014.

4. Suman, From Strips to the Graphic Novels: (Un)told tales. TISCELL, New Delhi, India, 2014.

5. Suman, Role of Memory in Shaping Characters' Identity in Mahesh Dattani's Final Solutions. CELT- Journal of Culture, English Language Teaching and Literature, 13: 2, 227-238, (2013).

6. Dutt, Rajeshwari, (2014). Crossing Over: Caciques, Indigenous Politics and the Vecino World in Caste War Yucatán. Ethnohistory, Duke University Press, 61(4).

7. Subramanian B. Die Verwandlung der Dinge. ZurTechnikkritikRilkes. In: "Transdisziplinär", "Interdisziplinär". Technikphilosophienach der akademischenKleinstaaterei.Festschriftfür Bernhard Irrgang. Ed. Michael Funk. Königshausen&Neumann. Wiesbaden 2014.

8. Subramanian B.PädagogischeProvinzIndien. BeispielHesse, Beispiel Zweig. In: DiskursezwischenÄsthetik, Ethik und Politik. Ed. D. Haberland& G. Horvath. Vienna (Praesens) 2013.

9. Ashok Kumar M. 2014. 'Caste Identity and Combating Marginality: A Village Lutheran Church in Coastal Andhra, South India', in Joseph P Dayam (Ed). Mission at and from the Margins: Patterns, Protagonists and Perspectives. Oxford: Regnum Books,Pp. 82-96.

10. Ashok Kumar M. 2014. 'Interlocking Caste with Congregation: A Political Necessity for Dalit Christians in Andhra, South India', in Chad Bauman & Richard F Young (Ed). Constructing Indian Christianities: Conversion, Culture and Caste. New Delhi: Routledge Publication, Pp. 45-57.

11. Ashok Kumar M.& Rowena Robinson. 2013. 'NaralokaPrarthana: Prayer in the Language of Protest', in Giuseppe Giordan& Linda Woodhead (Ed). Annual Review of the Sociology of Religion: Prayer in Religion and Spirituality. London: Brill Publication, Pp. 123-140.

12. S. Shankar, C. Stevenson, K. Pandey, S. Tewari, N. Hopkins and S. Reicher (2013). Calming Cacophony: Two studies on social meaning, social identity and the experience of noise at the MaghMela in Allahabad. Journal of Environmental Psychology, 36 (87-95).

13. S. Shankar. Hopkins, N., Stevenson, C., Shankar, S., &Pandey, K. Cold comfort at the MaghMela: Social identity processes and physical hardship. British Journal of Social Psychology (Article first published online: 22 NOV 2013 DOI: 10.1111/bjso.12054). (in press). Being together at the PrayagMela: The social psychology of crowds and collectivity. In T. Gale, A. Maddrell& A. Terry (Eds.). Sacred mobilities. Farnham, Surrey: Ashgate.

14. Ramna, Extent of Absolute Poverty in Rural Sector of Himachal Pradesh: A Measure of Unemployment, International Journal in Commerce and Management, Vol. 3, No. 03. 2013, pp.1-4. http://ijrcm.org.in/

15. Ramna, Relative Poverty and Inequality – A Study of Himachal Pradesh, International Journal of Research in Computer Application and Management, Vol. 3, No. 03. 2013, pp. 1-7. http://ijrcm.org.in/

16. Manu V. Devadevan, 'Changes in Land Relations during the Decline of the Cera State, In KesavanVeluthat and Donald R. Davis Jr. (eds), Irreverent History: Essays for M.G.S. Narayanan, Primus Books, New Delhi, 2014.

Conferences

1. Ramna, Indian Agriculture and the Legacy of Surplus Labour, 55th Annual Conference of Indian Society of Labour Economics, Jawaharlal Nehru University, New Delhi, December, 2013.
2. Ramna, Changing Patterns of Agricultural Practices in the Tribal Areas of Himachal Pradesh: Policies and Prospects, 96th Annual Conference of Indian Economic Association, Meenakshi University, Kanchipuram, Chennai, Tamil Nadu, December, 2013.

Fellowship/Award

1. Ashok Kumar M. The M. Louise C Gloeckner Research Fellowship 2013, the Drexel University College of Medicine, Philadelphia, USA.

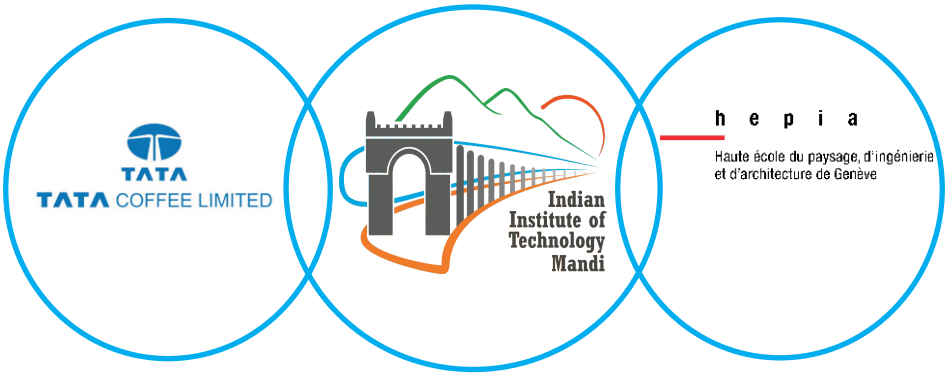
Lectures and Talk Organized

"Pierre Bourdieu's Theory of Habitus and the Indian Social Structure" Dr. GernotSaalmann**,** Sociologist at the Department of Sociology, AlbertLudwing University of Freiburg on 10th April, 2013.

"State formation in Premodern Himachal Pradesh" Prof. Chetan Singh, Director, IIAS Shimla on dated 17th April, 2014.

MEMORANDUM OF UNDERSTANDING

To promote academic research, cooperation and development of technical education the following MoUs have been signed during the year 2013-14.



1. Tata Consultancy Services (TCS), Chennai (Represented by Mr. K. Ananath Krishnan, Vice President and Chief Technology Officer, Tata Consultancy Services (TCS), Chennai) – MoU signed for in academic and research collaboration.

2. Framework Agreement between Hepia-University of Applied Science Western Switzerland Techonology Architecture and Landscape(Represented by Yves Leuzinger, Director, University of Hepia) and IIT Mandi – MoU signed for academic and research collaboration and exchange of students and faculty.

Advanced Materials Research Center (AMRC)

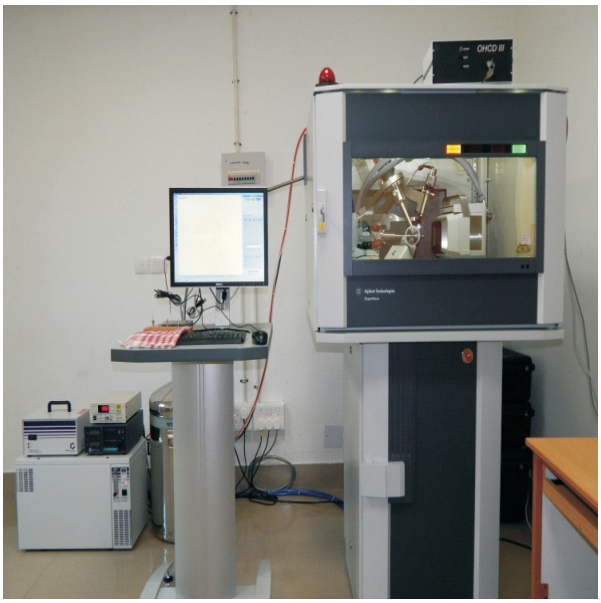
Development of advanced materials, particularly for engineering devices, is a critical area for competing at the international level. In this endeavor, IIT Mandi has started researching in the interdisciplinary area of novel materials for electrical, electronics, biological and other applications by setting up laboratories that house synthesis and characterization facilities. However, there is currently an urgent need for setting-up sophisticated analytical facilities. In order to serve research activities, fully functional synthesis and characterization labs are already established at IIT Mandi with a full range of basic instruments and facilities. In addition, an Advanced Materials Research Centre (AMRC), a centralized research facility has been established in a purpose-built building in the new campus. At AMRC, researchers investigate the basic structure of materials, and develop novel materials for electrical, electronics, biological, and other applications. AMRC caters to about 35 Ph.D. scholars and 10 postdoctoral researchers, who work in an inter-disciplinary team led by about 15 faculties. AMRC houses several state-of-the-art equipments for materials research including: (i) High Resolution Powder X-ray Diffractometer, (ii) Single Crystal X-ray Diffractometer, (iii) High Resolution Transmission Electron Microscope, (iv) Nuclear Magnetic Resonance Spectrometer, (v) Fluorescence Confocal Microscope, (vi) High Resolution Mass Spectrometer, (vii) Femtosecond Pump-Probe Set-Up, (viii) Scanning Electron Microscope and (ix) Atomic Force Microscope. Several other equipments such as SQUID Magnetometer, Physical Properties Measurement System (PPMS) and X-ray Photoemission Spectrometer will be installed in the near future.

The major equipment procured and commissioned are:

Field Emission Scanning Electron Microscopy

Atomic Force Microscopy

High Resolution Mass Spectrometry



Single Crystal X-ray Diffractometer

Gas Chromatograph

Gel Permeation Chromatography with High Performance Liquid Chromatography

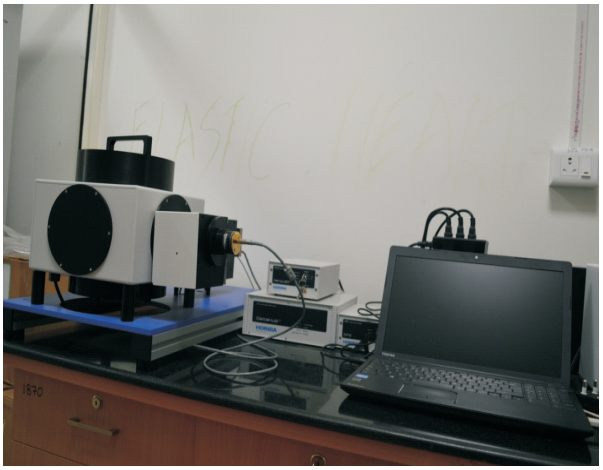
Biology lab instruments

Centrifuge (Bench top)

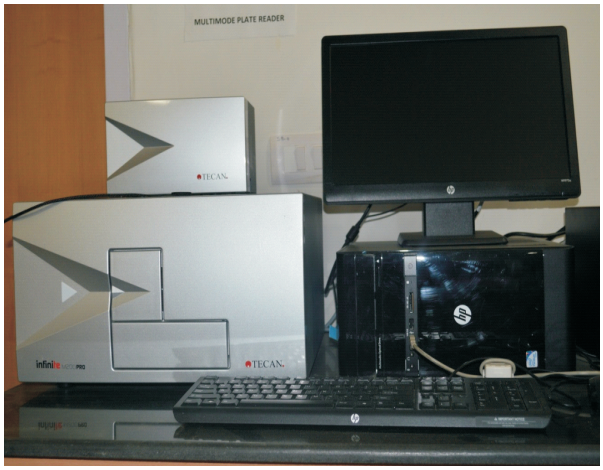
Centrifuge (Floor model)

Fluorescence spectrometer (Fluorolog)

Fast Protein liquid chromatography



TCSPC Lifetime



Multimode plate reader

Sonicator (Qr 500)

Real Time PCR system

Characterization and Synthesis Lab Equipment:

- Fume Hood
- Rotary Evaporator
- Double Stage Water Purification System
- Ultra Centrifuge with refrigeration
- Muffle Furnace
- Deep Freezer
- Vacuum Oven
- Flake Ice Making Machine
- Programmable Spin Coater
- Ozone Generator with Oxygen Concentrator.
- Magnetic susceptibility balance
- Spectrofluorometer
- Ozonator
- Polarimeter
- Photoreactor system
- Magnetic Susceptibility Balance
- Gel Permeation Chromatography
- Light Emitting Diode
- Rotary Evaporator (IKA)
- Glove box
- Chiller Circulator
- Horn Probe sonicator
- Heatng oven
- Mechanical stirrer
- Melting point apparatus
- Ultra Low Immersion-Cooler

Instruments to be installed in the near future are:

- SQUID Magnetometer
- Physical Properties Measurement System (PPMS)
- Raman Spectrometer system
- Thermo gravimetric analysis

Summer Internship Programme

IIT Mandi organized a 'Summer Internship Program' for Bachelors and Masters students from all over India during June – July 2013. Six interns were selected for this program from a large number of applications received. The participants included students from various Institutes and Universities including IIT Roorkee, IIT Kanpur, IIT (BHU), Kakatiya University (Warangal), Swami Ramanand Teerth Marathwada Univerisity (Maharashtra), Dr. B.R.Ambedkar NIT Jalandhar, etc. Each student's skill set was matched with an appropriate project from the Institute. Students were admitted in the following disciplines:- Chemistry, Mathematics, Physics, Electrical and Mechanical Engineering, Computer Science, etc.This internship program was for a period of 8 weeks and the internship included a stipend and housing assistance as well.

CENTRAL LIBRARY

Central Library plays a vital role in furthering the academic and research mission of IIT Mandi and facilitates creation and dissemination of knowledge. Library provides essential support by offering current library services which are integrated with teaching, learning and research activities. The Library facilitates excellence in teaching, creates an appropriate learning and research environment, anticipates and responds to student learning and research needs, and provides the information infrastructure essential in today's changed environment.

Central library at IIT Mandi is rapidly developing its collection of books, reference books, reports, periodicals, and electronic resources. The Text Book Collection in the Library provides vital supports for on-going undergraduate teaching programs. The books are on various disciplines ranging from Computer Science Engineering, Mechanical Engineering, Electrical Engineering, Mathematics, Physics, Chemistry, Economics, Philosophy, Psychology & English literature. The collection for Post Graduate programs is also being developed simultaneously.

Central Library provides access to the various e-journals databases. This includes access to hundreds of journal titles on subjects such as Mathematics, Chemistry, Physics, Computer Science, Electrical Engineering, Mechanical and Astronomy. Central Library is completely automated by using open source library management software ***KOHA***. All documents are bar-coded and by retro conversion all collections acquired prior to automation are also included in the Central Library books database. Transaction of books is also automated. Library has introduced various innovative services including CAS/SDI, On-line status of ILL, On-line reservation of books etc. By using Web OPAC, users can check their borrowing details online. Two workstations have been set up for users to access library holdings.

Softwares Used in Library:

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

1. Collection Development and Management

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

1.1 Print Documents added during the year 2013-14

During the period of 2013-14, Central Library acquired 1242 books including 10 reference books. It also added few periodicals/magazines, besides reprints, technical reports and annual reports of other universities/institutions.

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

1.2 New electronic resources subscribed during the year 2013-14

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

1.2.1 Full-text e-journals: Access to 10000 + full-text journals from the following databases: ACM Digital Library, ACS, APS, ASME, Elsevier's Science Direct, IEEE Electronic Library, JSTOR, SIAM, Springer Link, Taylor & Francis (S&T complete Collection), Nature, Annual Reviews etc.

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

1.2.3 E-Books: Central Library provides access to a collection of more than 8000 e-Books in various disciplines. The e-book collection contains the titles which are a rigorous recommendation by the subject experts of the institute and cater to the needs of the users. The publishers of e-books collection include Science-Direct (Elsevier), McGraw Hill, Pearson, T&F, IEEE, CUP, ASME, World Scientific and John Wiley. The e-books collection also includes the Lecture Notes Series on Mathematics (LNM), Physics (LNP) & Computer Science (LNCS) of Springer publisher.

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

2. Circulation

Circulation activities are now automated. Library users can check their borrowing details by using WebOPAC. We serve the users consisting of the faculty, research scholars, students and staff. Circulation desk is kept open for 50 hours a week. On an average, the monthly circulation transactions are about 1600.

3. Digital Library

Central Library has its own homepage (http://www.iitmandei.ac.in/academics/lib/), which provides

web-based access to its resources, procures over 10,000 electronic journals and databases. An institutional repository of publications has recently launched which provides access to the intellectual output of the IIT Mandi community. The library is a part of the institute-wise network and has adequate computing infrastructure to cater to the needs of the users.

4. OPAC (On-line Public Access Catalogue)

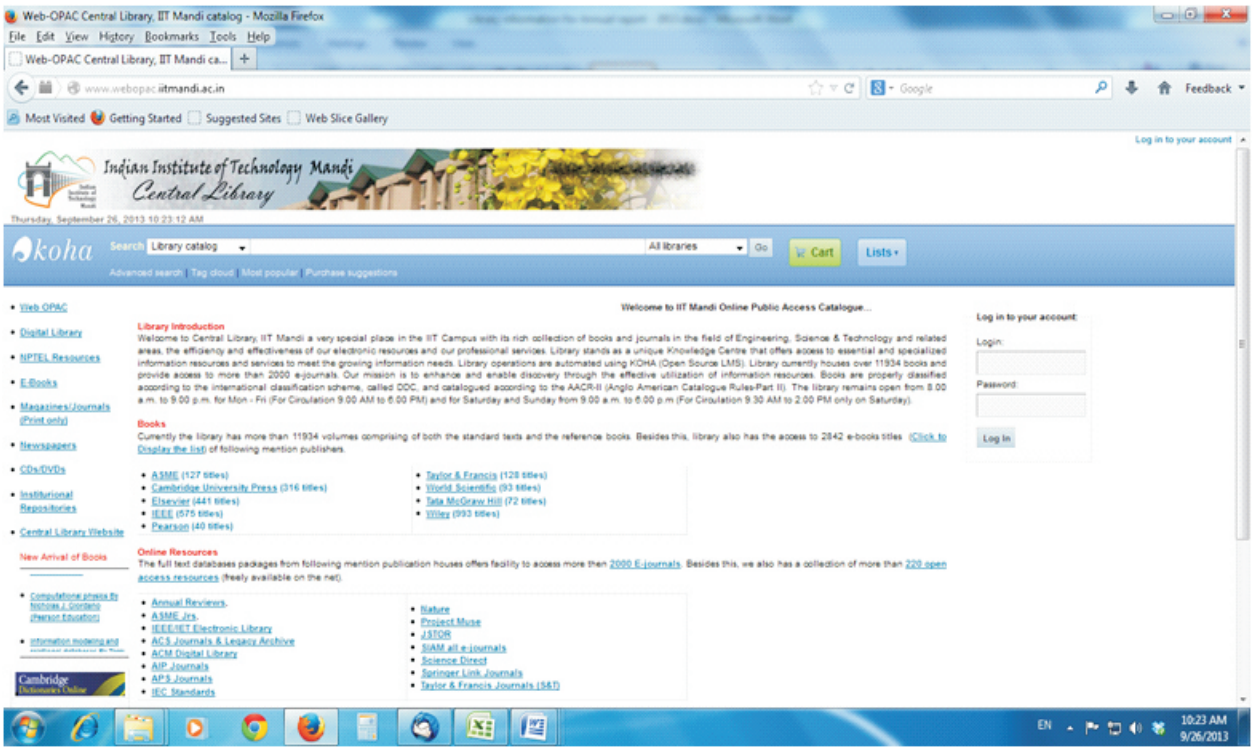
The OPAC is one of the most heavily used databases of the library and is accessible 24*7 via library web page (http//www.webopac.iitmandi.ac.in/). Besides listing all the documents available in the library, it allows on-line renewal and reservation, circulation and tells the current status of each &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

5. Services Offered

- Fully automated Circulation
- Online book reservation, Information search, Patron's library book loan status check
- Web OPAC (Web based Online Public Access catalogue)
- Reserve collection development for student's in-house reading
- New Arrival Book Section
- Reference Service
- Inter-Library Loan
- Document Delivery Service
- Information Alert Services
- Selected e-resources subscription for Central Library
- Digital library services
- User education program

6. Future Plans:

- Implementation of RFID Tags.
- Installations of CCTVs
- Database for Table of Contents of Library Books.
- Database for Institutional Repository.
- Database of different softwares available with CDs/DVDs available in the Library



WEB OPAC

Library Web Page

STUDENT AMENITIES AND ACTIVITIES

Sports Facilities and Activities

Gymkhana sports IIT Mandi consists of Dean students, Sports Advisor, Co-advisor,PTI and coaches. Also, there is a post of General Secretary,which is elected from the students. Besides this, there are game representatives, one for each game.

IIT Mandi gymkhana sports has developed facilities for many sports such as Athletics, Badminton, Basketball, Cricket, Football, Hockey, Lawn tennis, Table-Tennis and Volleyball. Volleyball and Basketball grounds are equipped with floodlights. Various indoor facilities are also available in the hostels. Skilled and experienced coaches are available for all sports. Students are motivated for sports activities through NSO.

The Gymkhana sports monitors the sports domain of the institute. It is responsible for maintaining the sports grounds of different sports, conducting Inter Branch (RANN), Inter Year(AAGAZ), Annual Athletic meet, Intra class sports competition and participation of IIT Mandi in InterIIT Sports Meet (Annual sports event of all the IITs). Apart from this, Gymkhana sports is also responsible for conducting Rann-neeti, the Invitation tournament of IIT Mandi.

Inter Year Sports Tournament-AAGAZ 2013

Gymkhana sports of IIT Mandi organized AAGAZ-2013 (Inter Year sports tournament) on 6th and 7th April 2013.The events were Football, Cricket, Volleyball, Basketball (Men & Women), Table Tennis (Men &Women), Badminton (Men &Women), Hockey and Chess. Batch of 2011 became the overall champion.

Intra Year Sports Tournament-LAKSHAY 2013 Gymkhana sports of IIT Mandi organized

LAKSHAY-2013 (Intra Year sports tournament for fresher's) in the month of April 2013. The events were Football, Volleyball, Basketball, Table Tennis (Men &Women), Badminton (Men &Women) and Chess.

Invitation Tournament Rann-neeti-2013

Like everything else at IIT Mandi, Rann-neeti 2013 first ever Invitation tournament of IIT Mandi kicked off with a bang. The event then commenced with men's Volley Ball match. Watching the students participating from various NIT'S, engineering colleges and Universities from Northern India with such enthusiasm and vigor reminded one and all is just as passionate about sports as he or she is about academics.

Winning the Cricket (Men), Football (Men) and T.T. (Women) events made the overall competition even. The rain did play killjoy on a number of occasions, but this did not dampen the spirit of the participants. What was important to take home was the sportsmanship attitude that the participants exhibited all through the event.

The closing ceremony was graced by the presence of chief guest D.C. Mandi, guest of honor, former Ranji player, Rajeev Nayyer, Dean students, Sports Advisor and many esteemed professors of the institute. Medals and certificates were handed out to the winners of each individual event. All in all it was a well-organized and contested event which turned out to be a huge success and a stress buster for most of the students. We now wait with baited breath for Rann-neeti 2014.

Annual Athletic Meet of IIT Mandi-2013

Gymkhana sports of IIT Mandi organized Annual Athletic Meet-2013 on 2nd October 2013.The events were 100 m (Men & Women), 200m (Men & Women) ,400m (Men&Women), 800m (Men), 1500m (Men), 4*100m ((Men&Women), 4*400m (Men), Long Jump (Men & Women), Shot Put (Men & Women), Discuss Throw (Men & Women), Javelin Throw (Men & Women). In annual athletic meet, students showing off their skills and prowess in every event.

The trophy for the best athlete of the annual athletic meet was handed over to Sachin Saini from the fourth year for his incredible performance bagging highest number of medals in various track & field events. The annual athletic meet trophy was then handed over to the second year students by honorable Director, IIT Mandi in the presence of a huge uproar.

Inter IIT Sports Meet (Annual sports event of all the IITs)-2013

IIT Mandi participated in Inter IIT Student Sports meet 2013 held at IIT Guwahati from 16th-23rd December, 2013.There were total contingent of 90 students including 13 girls and 77 boys. IIT Mandi T.T. (women) and Cricket (men) teams have reached quarter finals.

Faculty and staff team consisting of 25 members also participated in Inter IIT Staff Sports Meet from 25th-29th December2013. It was also held in IIT Guwahati. Winning first ever gold medal by IIT Mandi Staff Cricket team in Inter IIT Staff Sports Meet made the history for IIT Mandi.

National Service Scheme (NSS):

The NSS unit at IIT Mandi encourages students to understand the immediate society and to search the meaning of life through the spirit of social services. It provides students different opportunities to take part in several voluntary initiatives.

- Some of the activities coordinated by NSS IIT Mandi were,
- Blood Donation camps.
- Visit to Divya Manav Jyothi Anathalaya, Dehar, Mandi
- Teaching Program for Govt school children at Mandi
- Cleanliness drive on 28th September 2013
- Talk on alcoholism
- NSS youth conferenace in BITS, Rajasthan
- NSS Language Club
- Career guidance to Orphan students

Students and staff donating blood

Teachingstudents of Government Girls Sen. Sec. School and guidance programme to 10 +1 10+2 students

Group photo of NSS team with all children at D.M.J.A. Dehar, Mandi

Volunteers and staff members with collected waste material

Hiking and Trekking

For an IIT in the lap of Himalayas, a full-fledged Hiking and Trekking clubcaters to the spirit of adventure that resides in the students of IIT Mandi.Himachal Pradesh is one of the most beautiful places on earth. Places liPrashar, Rewalsar, Kamand, Manikaran etc. are ideal for hiking. Nature trulysignifies its beauty in these set of mountains where our institute issituated. With the Director himself having keen interest in hiking, the clubarranges trips on regular basis for its members to various places. Hikingand Tracking club of IIT Mandi is the single largest club at IIT Mandi.

Students, Staffs and Faculties are the members of this club. More than 234members registered in this club during 2013-2014. During the period of 2013to 2014 the club had carried out one 5 days and many full-day or half-daylong hiking and trekking activities. The members trekked to Great HimalayanNational Park, Prashar lake, Naina Devi Temple, Shikari Devi Temple BijliMahadev and to the hill tops adjoining to the South campus.

Guidance & Counselling Service (GCS)

1. Orientation 2013

A 6-day orientation program was organized by the Guidance and Counselling Service from 1st – 6th of August 2013 for the new batch of B.Tech students. Various events were organized to introduce the fresher to their new environment and life at IIT Mandi. These events included indoor and outdoor sessions. During the class room session, the students were given overview of various engineering disciplines, their curriculum, various services available at their disposal at IIT Mandi, as well as the surrounding flora and fauna. The students were taken for walking tours and hiking trips to familiarize them with the campus and surrounding as well as caution them against dangers in the mountains.

2. **Mentoring Program**

The GCS was able to implement the peer mentoring program for B.Tech. students with success for the second consecutive year. GCS volunteers were assigned as mentors to the freshmen students. These mentors were the contact persons before the freshmen reached Mandi and remained their guide throughout the first year.

Cultural Society

1. **Aakarshan**

Continuing the tradition, the cultural society gave a blistering introduction to the freshers as Aakarshan, the inaugural event of the academic year went on to be a roaring success. Making its debut on the event was Arts and Geeks joined by the usual stalwarts Music club, Dance club, Drama club and the behind the scenes deliverer, guardians of the D Day, the Programme Management Club.

The evening kicked off with screening of small movie clips having the alumni of IIT Mandi recounting their experiences of working in the Cultural Society. Cultural Society presented a stunning show. The art geeks took care of the aesthetics, designing huge flexes and posters with intricate designs. The evening became a rad show it was due to the enthusiastic bunch the crowd was, a fact to which all the performers took a bow to.

2. Exuberance

Exuberance is the platform for the freshers to showcase their talent. The evening was orchestrated with a dynamic mix of dance, drama and musical performances.The first to step in was the Music club with the band The Tapered Screw and other performers delivering a dynamic mix of love ballads, alternative rock, heavy metal, punk rock and classical performances. The dance club entranced the audience with two feet tapping numbers of their own and the Drama club topped it all off with a little sitcom.

3. Exodia 2014

Exodia'14 was the third edition of the annual technical-cultural festival Exodia organized by the students of IIT Mandi. The 3 day event took place with an aim of promoting technical and cultural talent and providing an incubation nest for the same.

Through its humble existence of 3 years Exodia received tremendous participation and support, hiking heights which we never thought we would be able to.

The list of major activities and events are mentioned below:

1. **Workshops**: Android development, Ethical Hacking and Robotics have been conducted and have successfully managed to impart technical education and learning to its participants.
2. **Guest Lecture**: Lecture by 'Gautam Mahajan', Founder Customer Value Foundation (CWF) and inventor of PET bottles and noise control kits. Like its previous editions, Exodia'14 saw huge participation coming from Himachal Pradesh and beyond. This has encouraged technical communication and collaboration between the various colleges and we hope to build a strong network within the state in future.
3. **Technical Events**: Junkyard Wars (A competition to build machine out of scrap), Dementia (Coding Marathon) which saw international online participation come in, Nitro Blaze (Remote controlled car), designing competition – ArCAD, robotics events like Line Follower and Sumo Wars and many others were also held to promote technical activities in a fun and engaging way. Detailed descriptions of events are available at http://exodia.in/events.
4. **Cultural Events**: Exodia also played host to may cultural events like Band Slam, Synchronies (A group dance competition), Fashion Show, Femina Miss Diva, Instrumania, Groove Fanatics (Solo Dance) and Exodia Idol (Solo Singing). These events provided its participants a stage to showcase their talents. These events also brought to the fore front a flavour of HimachaliCulture with various groups choosing to compete through their native genre. Detailed descriptions of events are available at http://exodia.in/events.
5 **Social Awareness Campaign 'A Brighter Tomorrow'**: This edition of Exodia saw it picking up a Social mettle as well when we ran a social campaign targeted at bringing about awareness about pursuing Higher education. There is a vast world beyond school

education which can help students realize their dreams. IIT Mandi has always tried to help students whether through guidance, counselling or coaching. This Exodia students continued this effort and held talks and presentations in various schools of Mandi to spread this awareness. 250 students from Mandi schools visited IIT Mandi during Exodia as part of this initiative.

For a college festival that too of an IIT, IIT Bombay's Mood-I is the benchmark along with the fests of other major IIT's. The events included in 2014 edition of Exodia reflected the major events are at other IIT's. Fashion show and Femina Miss Diva are major crowd gatherers and contributors to large footfall, the latter being introduced in the college fest from 2014 onwards. The winner of FeminaMiss Diva, Exodia auditions also happened to reach in top 10 at the Mumbai finals taking our name to national level competition organized by Femina and Times group.

IIT Mandi's 5th Foundation Day Celebrations, 24th Feb

IIT Mandi celebrated its 5th Foundation Day on February 24, 2014, at its permanent campus at Kamand, a township located 18 kilometres from the main Mandi town. On the occasion, the Director, IIT Mandi, Prof. Timothy A. Gonsalves welcomed the Chief Guest, Prof. Dr.-Ing. Wolfram Ressel, Rector, Technical University (TU), Stuttgart, Germany; the Guest of Honour, Shri. Dinesh Kumar Jain, Former-Ambassador, Government of India; and., Dr. Wolfgang Holtkamp, Senior Advisor, International Affairs, TU, Stuttgart, Germany..

Five years ago, IIT Mandi's foundation stone was laid on the same very day to mark the beginning of this Institute as a single destination for excellence, innovation, and learning in the Himalayas. The day was commemorated with various sports events, cultural activities, and an award ceremony for

students, faculty, and staff of IIT Mandi. The sports events included games like the volleyball and tug-of-war between teams consisting of faculty and staff, and students. The volleyball game was won by a team of 3rd year and 4th year B. Tech. students. The tug-of-war for men was won by 1st and 2nd year B. Tech. students. Also, the tug-of-war for women was won by the girl's student team.

Technical Society

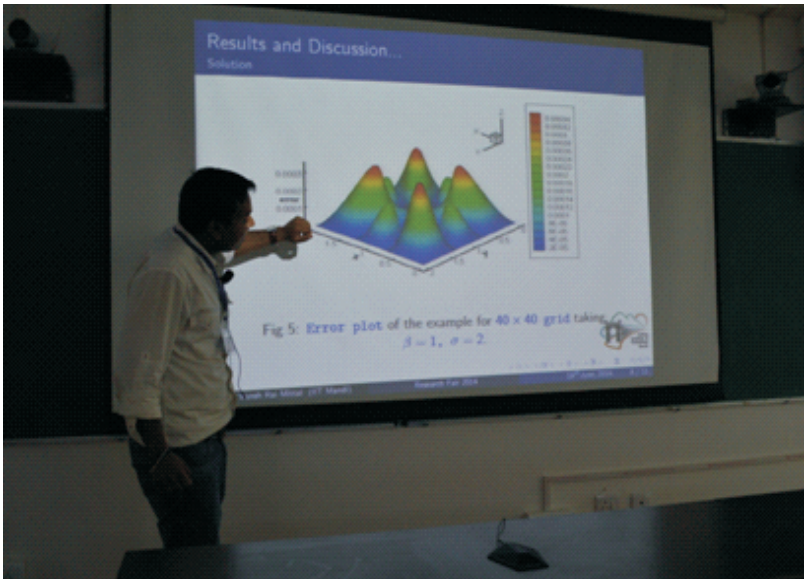
Aavishkar 2014

Institute witnessed the second edition of Aavishkar, Intra-college technical festival. Events were scheduled throughout the day starting with the Aavishkar Open-House, which was held in the newly inaugurated Lounge in Kamand. In the Open-House, all the clubs under Science & Technology Council (SNTC) displayed their projects. The clubs that displayed projects were Electronics Club, Astronomy Club, Robotics Section, Mobile Application De-velopment (MAD) Club, Energy Club and Programming Club.

Research Affairs Society

Research Fair Anusandhan 2014

Institute witnessed the second Research Fair ANUSANDHAN '14, Intra-institute research event. This event gave an opportunity to the research scholars to present their ideas live in front of an interested audience of students and faculty. Events were scheduled throughout the day starting with a welcome speech by Dean (Academics), which was held in the NKN room of A-1 building.



In this event, all the students were divided into four groups: Physics, Chemistry, Mathematics and Engineering. The first session was kept as a common oral session where one student from each of the four groups made presentations. The talks were based on research topics that have applications in light emitting diodes, marine and coating industries, automobile and aerospace industries. Later, four parallel oral sessions were conducted in which

twenty students presented in front of judges and other attendees.

The evening session that attracted a wider technical audience was the poster session. It started after the lunch break in the mess hall. Few of the posters that were highly appreci-ated by the judges were related to Formalism of Access Control for Sharing Digital Objects, Multi-channel scattering problems and Ferroelectric memories. Students' hard work was truly reflected in their presentations. Twelve students were conferred best oral and best poster presentation awards. This marked the end of Anusandhan'14.

The tireless efforts of Hari Vansh Rai Mittal, Research Secretary and his team of volunteer research students in organizing Anusandhan '14 was appreciated by the Dean (Academics). Scholars are soon going to inaugurate the IIT Mandi Research Club (IITMRC) by bringing out its magazine 'Khoj' highlighting their research areas and experiences.

Next year there are plans to invite research scholars from nearby regional colleges and universities also to send in their research papers. The aim is for this research fair to grow until it becomes a premier research conference for the research students of HP and J&K to come together and present their research work and establish contacts etc.

Our upcoming campus at Kamand

The Indian Institute of Technology Mandi is privileged to be the first IIT in the Himalayas. The main campus of IIT Mandi is located at Kamand which is about 15 kms from Mandi City. It lies along the river Uhl, a tributary of the river Beas. The total area is 538 acres of which about 200 acres is flat land while the rest is mountainous.

The youngest of all IITs, IIT Mandi, is also the first IIT to have residential and academic facilities on the main campus. On September 23, 2012, 108 B.Tech 2nd year students shifted to the main campus. About 20 faculty members, staff and their families, besides a few research scholars,

accompanied them to the Kamand Campus. Since then with more batches moving to Kamand along with several more faculty and staff, students now enjoy the real feeling of being part of a thriving campus community.

Academic facilities on the main campus:

Students' hostels, Administration office, Engineering office, field hostel for supporting staff, the Director's residence and renovated faculty/staff quarters, are supported by the mechanical engineering workshop, computer lab, conference room, class rooms, a provision store are functioning at the Kamand campus. IIT buses ply regularly between Kamand and Mandi campuses. Sports facilities: Volleyball, badminton, table tennis, cycling and so on are some of the sports facilities being used by students on the main campus.

Medical facility: IIT Mandi has a medical unit consisting of male and female doctors, staff nurses and a pharmacist serving both the main campus and the transit campus. The medical unit is also equipped with an Ambulance to take care of emergency medical problems. Modern healthcare facilities are available in Mandi town with a number of Government and private hospitals. A 500-bed Govt. Hospital cum College is also coming up at a distance of 25 km from Kamand.

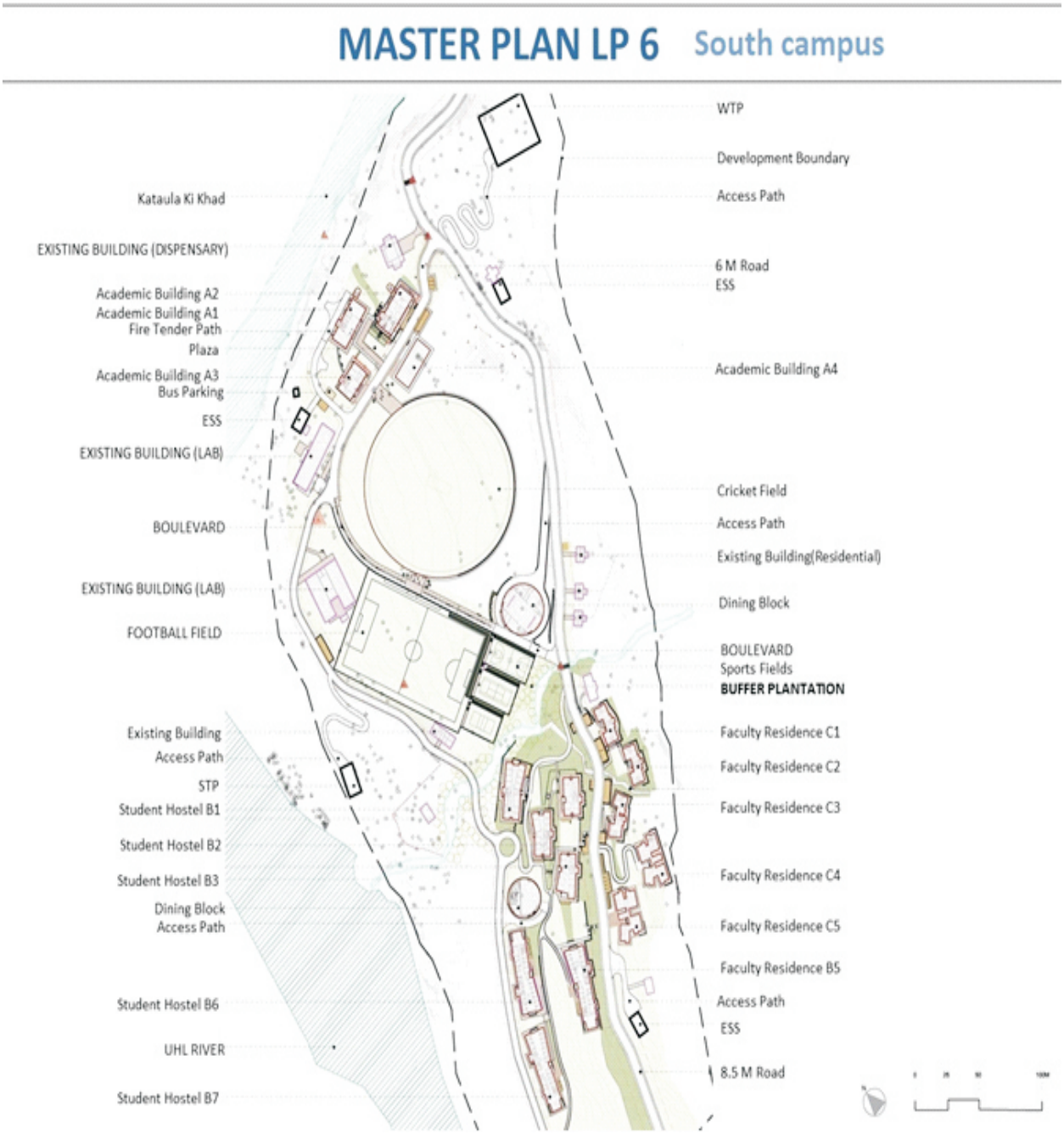
Master plan for complete campus development: The master plan for the complete development of the campus is ready. This caters to 6000 students, 600 faculty and associated staff.

Future development: Phase 1 South: All 11 buildings (10,000 sqm) complete by Jan 2013.

Phase 1 North: 1,15,000 sqm to start by Dec 2012, buildings to be ready in phases from May 2013-2014.

The campus also has a "Nala" going through it. There are plans to make a 2 MW SHP station to utilise the water resource of the nala

IIT Mandi is planning to shift to Kamand its whole campus by 2015. Work of Infrastructure works for phase-I South which includes road work, internal paths & play grounds (cricket, football, basketball, tennis court & volleyball court) is in progress and likely to be completed in 2015.



Board of Governors

Chairman

Shri M. Natarajan
Former Scientific Advisor to Raksha Mantri
& Secretary DRDO
Plot No.8, 12th South Street,
Sringeri Saradha Nagar,
Thyagaraja Colony,
Tirunelveli – 627011

Members

Prof. Timothy A Gonsalves Director,
IIT Mandi
Indian Institute of Technology Mandi
Mandi - 175001 (H.P.)
Chief Secretary/ Secretary (TE)
Government of Jammu & Kashmir
Srinagar - 190 001

Prof. (Mrs.) Basabi Bhaumik
Head
Dept. of Electrical Engineering
Indian Institute of Technology Delhi
Hauz Khas,
New Delhi-110 016

Prof. Subrata Ray
Distinguished visiting professor
Indian Institute of Technology Mandi
Mandi - 175001

Shri Raj Khilnani IPS
DG, Anti-Corruption Bureau
21-B, Sangam
Juhu Versova Link Road
Andheri West, Mumbai

Chief Secretary/ Secretary (TE)
Government of Himachal Pradesh
Shimla - 171 002

Prof. S.C. Sahasrabudhe
Director
Dhirubhai Ambani Institute of Information and
Communication Technology (DAIICT)
Near Indroda Circle
Gandinagar - 382 007

Prof. Sunil R. Kale
Professor
Dept. of Mechanical Engineering
Indian Institute of Technology Delhi
Hauz Khas,
New Delhi-110 016

Mr. Satish K. Kaura
CMD, Samtel Group
6th Floor, 7 TDI Centre
District Centre, Jasola
New Delhi - 110 025

Secretary
Dr. R. C. Sawhney
Registrar (Ex-officio)
Indian Institute of Technology Mandi
Kamand Campus, VPO Kamand
Distt. Mandi - 175005
Himachal Pradesh

**During this year meetings of the Board of Governor were held on 08*/10/2013 & 07/02/2014

Finance Committee

Chariman

Shri M. Natarajan
Former Scientific Advisor to Raksha Mantri
& Secretary DRDO
Plot No.8, 12th South Street,
Sringeri Saradha Nagar,
Thyagaraja Colony,
Tirunelveli – 627011

Members

Prof. Timothy A Gonsalves
Director, IIT Mandi
Indian Institute of Technology Mandi
Mandi - 175001 (H.P.)

Mr. Yogendra Tripathi
Finance Advisor
MHRD - AS & FA,
MHRD
Shastri Bhawan
New Delhi - 110001

Prof. S. R. Kale
Professor
Mechanical Engineering Department
Indian Institute of Technology Delhi
HauzKhas, New Delhi - 110 016

Ms. Amita Sharma
Bureau Head (Technical Education)
AS (HE, MHRD)
Shastri Bhawan
New Delhi - 1100016

Prof. V. G. Idichandy
Dept. of Ocean Engineering
Indian Institute of Technology Madras
Chennai - 600 036

Secretary
Dr. R. C. Sawhney
Registrar (Ex-officio)
Indian Institute of Technology Mandi
Kamand Campus, VPO Kamand
Distt. Mandi - 175005
Himachal Pradesh

**During this year meetings of the Finance Committee were held on 26/05/2012 & 17/11/2012*

Building & Works Committee

Chairman

Prof. Timothy A. Gonsalves
Director
Indian Institute of Technology Mandi
Kamand - 175004 (H.P.)

Member

Prof. R. L. Sharma
Director
Jawaharlal Nehru Government Engineering College, Sundar Nagar-175018
(H.P.)

Er. Udayan Ukhal
Dy. General Manager
H.P. Power Corporation Ltd.
BBMB Colony, Sunder Nagar - 174402

Prof. Sunil Kale
Professor
Department of Mechanical Engineering
Indian Institute of Technology Delhi
Hauz Khas, New Delhi - 110026

Prof. Anand Srivastava
Visiting Professor & Dean (I & S)
School of Engineering
Indian Institute of Technology Mandi
Mandi - 175 001

Member Secretary (ex officio)
Dr. R. C. Sawhney
Registrar (Ex-officio)
Indian Institute of Technology Mandi
Kamand Campus, VPO Kamand
Distt. Mandi - 175005 (H. P)

Mr. K. N. Rai
Former Chief Executive
Civil Works, DRDO
C-4, 4112, Vasant Kunj, New Delhi

Prof. K. C. Iyer
Professor
Department of Civil Engineering
Indian Institute of Technology Delhi
Hauz Khas, New Delhi - 110026

Prof. Lalit Malhotra
Visiting Professor & Dean (F & A)
School of Basic Sciences
Indian Institute of Technology Mandi
Mandi - 175001 (H.P.)

Er. Rajan Kapoor
Superintending Engineer
Indian Institute of Technology Mandi
Mandi - 175001 (H.P.)

Special Invitee
Er. A.K. Jain
Senior Consultant IIT Mandi,
Retd.Spl. D.G. CPWD

**During this year meetings of the B & W Committee were held on 08/10/2013,19/12/2013, 16/01/2011&25/03/2014*

SENATE

Chairman

Prof. T. A. Gonsalves, Director, IIT Mandi

Professors of the Institute

Prof. Lalit Malhotra, Visiting Professor, IIT Mandi
Prof. B. Subramanian, Visiting Professor, IIT Mandi
Prof. Subrata Ray, Distinguished Visiting Professor, IIT Mandi
Prof. Ramesh Oruganti, Visitng Professor, IIT Mandi
Prof. Kenneth E. Gonsalves, Distinguished Visiting Professor, IIT Mandi
Prof. Anand Srivastava, Visting Professor, IIT Mandi
Dr. Sukumar Bhattacharya, Associate Professor, IIT Mandi

Members of Academic Advisory Council

Prof. B. K. Mishra, IIT Roorkee
Prof. ArghyaTaraphder, Dept. of Physics, IIT Kharaghpur
Prof. D. K. Mehra, E&C, IIT Roorkee
Prof. Shormishtha Panja, English, DU, Delhi
Prof. Deepak Khemani, Dept. of CSE, IIT Madras IIT Madras
Prof. Sunil Kale, Dept. of ME ,IIT Delhi
Prof. N. S. Narayanswamy, CSE, IIT Madras
Prof. Anil Prabhakar, EE, IIT-Madras
Prof. Babu Viswanathan, ME, IIT Madras
Prof. Hema Murthy, CSE, IIT-Madras
Prof. S. B. Krupanidhi, MRC, IISc-Bangalore
Prof. Milind A. Sohoni, IIT-Bombay
Prof. S. N. Singh, EE, IIT-Kanpur

School of Computing and Electrical Engineering

Dr. Varun Dutt
Assistant Professor, IIT Mandi

School of Engineering

Dr. Vishal Singh Chauhan
Assistant Professor, IIT Mandi

School of Basic Sciences

Dr. Aniruddha Chakraborty Assistant Professor, IIT Mandi

School of Humanities and Social Sciences

Dr. Shail Shankar
Assistant Professor, IIT Mandi
Dr. Rajeev Kumar
AP, SE, IIT Mandi
Dr. Arti Kashyap
Associate Prof. SCEE & SBS, IIT Mandi
Dr. Pradeep Parameswaran
AP & Convener Execom (Courses), IIT Mandi
Dr. Bindu Radhamany
AP & Convener Execom (Research), IIT Mandi
Dr. Subrata Ghosh
AP & Convener Execom (Students), IIT Mandi

Student General Secretary

Mr. Sanchit Khattry

Student Academic Affairs Secretary

Mr. Deepak Sharma

Student Research Affairs Secretary

Mr. Hemant Jalota

Member Secretary

Dr. R. C. Sawhney
Registrar, IIT Mandi

*During this year meetings of the Senate were held on 20/05/2013&15/10/2013

ACADEMIC OFFICIALS AS ON 31.03.2014

Prof. Timothy A. Gonsalves
Director

Prof. Anand Srivastava
Dean Infrastructure and Services

Prof. Lalit Malhotra
Dean Finance & Accounts and Dean SRIC

Dr. P.C. Ravi Kumar
Associate Dean (Planning)

Dr. Bindu Radhamany
Associate Dean (Research)

Dr. Vishal Singh Chauhan
Associate Dean (Faculty)

Dr. Subrata Ghosh
Chairperson SBS

Dr. Rahul Vaish
Chairperson SE

Prof. Ramesh Oruganti
Dean Academics

Prof. B. Subramanian
Dean Students

Prof. B. K. Mishra
Dean, Planning

Dr. Pradeep Parameswaran
Associate Dean (Courses)

Dr. Prem Felix Siril
Associate Dean (SRIC)

Dr. Ashok Mocherla
Chairperson SHSS

Dr. Anil Sao
Chairperson SCEE

ADMINISTRATIVE OFFICIALS AS ON 31.03.2014

Dr. R. C. Sawhney
OSD & Registrar

Er. Sunil Kapoor
Superintending Engineer

Mr. J.R. Sharma
Finance & Accounts Officer

Mr. Suresh Kumar Rohilla
Assistant Registrar (Admn)

Mr. Amit Kumar Singh
Assistant Registrar (S&P)

Dr. K.C.Sharma
Medical Officer

Er. Anil Kumar Jain
Senior Consultant

Dr. A.K. Solanki
Dy. Registrar (Admin)

Mr. Naresh Singh Bhandari
Deputy Librarian

Mr. C.L. Sharma
Asstt. Registrar (Audits &Accounts)

Mr. Vivek Tiwari
Assistant Registrar (Academic)

Mr. D.R.Verma
Officer on Special Duty (Admin)

Dr. Jyoti Sharma
Medical Officer

LIST OF PERMANENT EMPLOYEES AS ON 31/03/2014

S.No.	Name	Designation
1	Ms. Monika Kashyap	P.S. to Director
2	Mr. Ramesh Kumar	Jr. Accountant
3	Mr. Vinod Kumar	Sr. Library Info. Asst.
4	Ms. Suchetna Shachi	Jr. Assistant
5	Ms. Sushma Kumari	Stenographer
6	Mr. Sunil	Jr.Assistant
7	Mr. Sushil Kumar Pal	Jr.Assistant
8	Mr. Amit Sharma	Jr Lab Assistant
9	Mr. Lalit Kumar	Jr Lab Assistant
10	Mr. Ashish Kumar Ahirwal	Sr. Library Info. Asst.
11	Mr. AbhishekAudichya	Staff Nurse
12	Mr. Brijesh Kumar	Pharmacist
13	Mr. NeerajChauhan	Junior Engineer (Elect)
14	Mr. Khushi Ram Bhagat	PTI
15	Mr. Amit Kumar Singh	AR(Store & Purchase)
16	Ms. Chandan Sharma	Junior Superintendent
17	Mr. AbhijeetTiwari	SLIA
18	Mr. Naresh Singh Bhandari	Deputy Librarian
19	Mr. Anuj Kumar Dubey	PA to Registrar
20	Mr. Suresh Kumar Rohilla	AR(Administration)
21	Mr. Vivek Tiwari	AR(Academics)
22	Mr. Pawan Kumar	Junior Accountant

LIST OF DEPUTATION EMPLOYEES AS ON 31/03/2014

Sr. No.	Name	Designation
1	Dr. Ashok Kumar Solanki	Deputy Registrar
2	Er. Sunil Kapoor	Superintending Engineer
3	Er. Hemant Kumar Behl	Assistant Engineer (Elect)
4	Er. Yashwant Singh Chandel	Assistant Engineer (Civil)

LIST OF CONTRACT EMPLOYEES (ON CONSOLIDATED EMOLUMENTS) AS ON 31/03/2014

Sr. No.	Name	Designation
1	Dr. Ramesh Chand Sawhney	OSD & Registrar
2	Er. Anil Kumar Jain	Sr. Consultant (part time)
3	Mr. J.R. Sharma	Finance & Accounts Officer
4	Mr. C.L. Sharma	Asstt. Registrar (Audit &Accounts)
5	Dr. K.C.Sharma	Medical Officer
6	Dr. Jyoti Sharma	Female Medical Officer
7	Dr. Ghanshyam Kapoor	GDMO
8	Sh. D.R.Verma	OSD (Admin)
9	Mr. R.S.Raghav	Technical Superintendent
10	Ms. Lishma Anand	Counsellor
11	Hony. Capt. Birbal Ram	DSO
12	Sh. Pavin Samuel	Dy. Administrator (Students)
13	Mr. Kaul Singh	PTI
14	Mr. Daulat Ram	Field Supervisor

STUDENT LEADERSHIP -2013-2014

Chamundeshwar Nadh	General Secretary
Akash Pathak	Cultural Secretary
Mohit Rawat	Sports Secretary
Vikhyat Korrapati & Anand Dhandania	Technical Secretary
Nidhi Makhijani	Literary Secretary
Sachin Bhatt	Academic Secretary
Harshvardhan Mittal	Research Secretary

PH.D SCHOLARS - 2013 BATCH

Sr. No	Roll No	Name	School
1	D13001	Sachin Kumar	SE
2	D13002	Rajan Kumar	SE
3	D13003	Neeraj Sankhyan	SHSS
4	D13004	Shubhanjali Pathak	SBS(Physics)
5	D13005	Somnath Acharya	SBS(Physics)
6	D13006	Pankaj Gaur	SBS(Chem)
7	D13007	Ashish Bahuguna	SBS(Chem)
8	D13008	Vinayak Abrol	SCEE
9	D13009	Vibha Gupta	SCEE
10	D13010	Ajay	SCEE
11	D13011	Robin Khosla	SCEE
12	D13012	Shivender Sangar	SHSS
13	D13013	Mohit Kumar Sharma	SBS(Physics)
14	D13014	Srimanta Mandal	SCEE
15	D13015	Medha Kumar	SCEE
16	D13016	Sanjay Rathee	SCEE
17	D13017	Ashwani Kumar	SBS (Chemisty)
18	D13018	Surender Lal	SBS (Physics)
19	D13019	Mandeep Kr. Hooda	SBS (Physics)
20	D13020	Pravin Kumar	SHSS
21	D13021	Shivam Mishra	SHSS
22	D13023	Mahesh Soni	SCEE

MS SCHOLARS

Sr. No	Roll No	Name	School
1	S13001	Tulika Agrawal	SCEE
2	S13002	Munender Kumar	SCEE
3	S13003	Vishal Goel	SCEE
4	S13004	Abhijeet Sachdev	SCEE
5	S13007	Manish Sharma	SE
6	S13009	Faria Rehman	SE
7	S13010	Tarun Arora	SCEE
8	S13011	Monisha Rastogi	SE
9	S13012	Priybrat Sharma	SE

B.TECH STUDENTS - 2013 BATCH

Computer Science and Engineering			
Sl.No.	**Roll No.**	**Student Name**	**Branch**
1	B13101	Abhay Singh	CSE
2	B13102	Abhimanyu Mittal	CSE
3	B13103	Abhishek Pandey	CSE
4	B13104	Ahmed Abdul Kareem Karanath	CSE
5	B13105	Ajay Kumar Meena	CSE
6	B13106	Aman Gupta	CSE
7	B13107	Amit Kumar	CSE
8	B13108	Ankur Sardar	CSE
9	B13109	Ankush Jindal	CSE
10	B13110	Arpit Krishna	CSE
11	B13111	Ayush Garg	CSE
12	B13112	Ayush Kumar Yadav	CSE
13	B13113	Banda Bharathkumar	CSE
14	B13114	Chandan Purbia	CSE
15	B13115	Chandra Jeet Nagar	CSE
16	B13116	Deepanshu Sapra	CSE
17	B13117	Deepanshu Gupta	CSE
18	B13118	Depinder Preet Singh	CSE
19	B13119	Farah Anjum	CSE
20	B13120	Ghanshyam Yadav	CSE
21	B13121	Gopal Krishan Aggarwal	CSE
22	B13122	Kumari Shubhangi	CSE
23	B13123	Kansul Mahrifa C Abdurahiman	CSE
24	B13124	Karavadi To yaz Sai Madhav	CSE
25	B13125	Karre Nitin	CSE
26	B13127	Mayank Kishore	CSE
27	B13129	Naman Gupta	CSE
28	B13130	Prateek Rajdev	CSE
29	B13131	Priyanka Mahawar	CSE
30	B13133	Ritesh Kumar	CSE
31	B13134	Rohit Bishnoi	CSE
32	B13135	Sagar Ghai	CSE
33	B13136	Samriddhi Jain	CSE
34	B13137	Shivansh Sapra	CSE
35	B13138	Shruti Garg	CSE
36	B13139	Tarani Hitesh Mahendra	CSE
37	B13140	Vemula Yaminee Jyothsna	CSE
38	B13141	Vinod Kumar	CSE
39	B13204	Ashish Kumar Bedi	CSE

40	B13218	Paawan Mukker	CSE
41	B13225	Samya Ranjan Patro	CSE
42	B13231	Shubham Chandel	CSE
43	B13234	Swapnil Sharma	CSE
44	B13235	Tushar Gupta	CSE
45	B13305	Aswinkumar A	CSE
46	B13312	Himanshu Singal	CSE
47	B13318	Mukarram Tailor	CSE

ELECTRICAL ENGINEERING

1	B13202	Akshat Gupta	EE
2	B13203	Ankur Gangwal	EE
3	B13205	Avanish Kumar Yadav	EE
4	B13206	Avnish Kumar	EE
5	B13208	Bandari Manoj Kumar	EE
6	B13209	Deepika Chaudhry	EE
7	B13210	G D S V V S S Sadwith	EE
8	B13211	Gadipalli Siddhartha	EE
9	B13212	Guntuku Vikas	EE
10	B13213	Katta Guru Srivenkat	EE
11	B13214	Kulendra Kumar Kaushal	EE
12	B13215	Md Tahseen Alam	EE
13	B13216	Munindar Kumar Meena	EE
14	B13217	Narendra Kumar Meena	EE
15	B13219	Pankaj Kumar	EE
16	B13220	Rajat Valecha	EE
17	B13221	Rishabh Gehlot	EE
18	B13222	Rishabh Trivedi	EE
19	B13223	S Thejas Babu	EE
20	B13224	Sachin Chaudhary	EE
21	B13226	Sanjeev Khare	EE
22	B13227	Saurabh Gangwar	EE
23	B13228	Shiva Verma	EE
24	B13229	Shivangi Kataria	EE
25	B13230	Shri Kisna Mahajan	EE
26	B13232	Siddharth Gangal	EE
27	B13233	Sunil Choudhary	EE
28	B13236	Tushar Jain	EE
29	B13237	Vasudev Meena	EE
30	B13238	Vipul Gupta	EE
31	B13239	Vivek Sharma	EE

32	B13126	Manish Kumar Meena	EE
33	B13132	Pushpendra Kumar Meena	EE
34	B13325	Raspreet Singh	EE
35	B13319	Nikhil Kaushik	EE
36	B13321	Onkar Singh	EE
37	B13328	S V Jyothir Aditya	EE

MECHANICAL ENGINEERING

1	B13301	Alpna Tyagi	ME
2	B13302	Ankit Kumar Meena	ME
3	B13303	Ankur Kumar Singh	ME
4	B13304	Anubhav Singh	ME
5	B13306	Bhishm Tahiliani	ME
6	B13307	D.Amar Simha Yadav	ME
7	B13308	Gajendra Prajapati	ME
8	B13309	Gaurav Kohali	ME
9	B13310	Gaurav Prajapati	ME
10	B13311	Harshit Kumar	ME
11	B13313	Lalit Shakywal	ME
12	B13314	M Shri Harikrishnan	ME
13	B13315	Mahajan Karan Suryakant	ME
14	B13316	Manas Kumar	ME
15	B13317	Mayank Tewatia	ME
16	B13320	Nikhil Sasi Rajan	ME
17	B13322	Pawan Kumar Meena	ME
18	B13323	Pramod Verma	ME
19	B13324	Prince Garg	ME
20	B13326	Ravi Sirohi	ME
21	B13329	Sagar Kumar Peddinti	ME
22	B13330	Saket Saurabh	ME
23	B13331	Shailendra Pal Meena	ME
24	B13332	Shaily Bansal	ME
25	B13333	Sivarapu Aditya Krishna	ME
26	B13335	Subhankar Das	ME
27	B13336	Sumit Chahal	ME
28	B13338	Vineet Yadav	ME
29	B13340	Yashu Madaan	ME

www.iitmandi.ac.in

INDIAN INSTITUTE OF TECHNOLOGY MANDI
KAMAND - 175005, HIMACHAL PRADESH, INDIA

Tel: +91 1905-267015
Fax: +91 01905-267009
Email: registrar@iitmandi.ac.in