Indian Institute of Technology Mandi

Tidings

A biannual newsletter published by the School of Engineering

January 2021

Chief Patron

Prof. Ajit Kumar Chaturvedi
(Director, IIT Mandi)

Editorial Team

Dr Rajeev Kumar
Dr Jaspreert Kaur Randhawa
Dr Himanshu Pathak
Dr Subhamoy Sen
Dr Sayantan Sarkar
Mr Diwakar Singh

Contact

Chairperson
School of Engineering,
IIT Mandi, Kamand
H.P. – 15005, India
Phone: 01905-267138
Fax: 01905-267138
Web: se.iitmandi.ac.in,
E-mail:
chairse@iitmandi.ac.in

SE Faculty Strength

Regular Faculty: 31
Visiting Professor: 1
Visiting Asst. Professor: 1
Adjunct Professor: 1
Distinguished Visit. Prof: 3
Emeritus Professor: 1
Mentor Professors: 2

Present Student Strength

B.Tech.:
(Civil & Mechanical): 124 & 152
M.Tech.:
(Civil & Mechanical): 42 & 70
Ph.D. & M.S.: 90 & 26
Female Students:
PG/UG: 33/49

Publications (as per Scopus)

Till date: 808
Since January 2020: 82

School Chairperson's Message…

For most of us, getting back to Covid free normal life is the much needed wish for 2021. There are several predictions about 2021 with varied possibilities of good and bad. Past experiences with optimistic views suggest that things will be normal again, sooner. After any major setback, things improve for the better; innovation, more jobs and economic growth are inevitable and people rejoicing with happiness is not too far. We don't know what exactly will happen in 2021, but we can only prepare ourselves for the best and worst. While we continue to make our goals high and realistic, it is high time to achieve them in small steps via daily tasks with patience. It was amazing to witness how the students on campus and online, the faculty colleagues and the staff members adapted to the new normal and carried forward anything and everything possible to run the academic and research activities smoothly at IIT Mandi. We, the School of Engineering, made our mark by doing our part in the domains of teaching, research, projects and also Covid-19 related prototype development. Probably, the lockdown and social distancing have given some personal time for students, researchers and faculty members to self-reflect and develop ideas that are quite unique and useful. Perhaps, it is a matter of time to execute such ideas to achieve excellence and make a difference in our own ways. I wish you a happy and intellectually stimulating new year.

Dr. Viswanath Balakrishnan

Recently Commenced Projects

- Coal-Based Economies in Developing Countries: An Environmental, Health and Cost Evaluation Around Mega Thermal Power Plants
  PI: Dr. Joyanto Routh (Linkoping University), Co-PI: Dr. Sayantan Sarkar, Dr. A. Bossios (Karolinska Institute), Dr. Shyamasree Dasgupta, Dr. Raja Dhar (Fortis Hospital), Dr. Mohammed Shoeb (University of Dhaka), Agency: Swedish Research Council, Budget: Rs 3,93,00,000, Duration: 3 years
- A Low-Cost MEMS-Based and Video-Based Monitoring and Early Warning System for Rainfall-Induced Landslides
  PI: Dr. K.V. Uday, Co-PI: Varun Dutt, Arnav Bhavsar
  Agency: NRDMS - DST,
  Budget: Rs 40,00,000, Duration: 3 years
- Spring Rejuvenation for Water Security in Himalaya
  PI: Dr. Jaspreet Kaur, Agency: NMHS,
  Budget: Rs 33,71,280, Duration: 3 years
- Photocatalytic Active Transparent Glass Ceramics for Waste Water Treatment
  PI: Dr. Vishal S Chauhan , Agency: CSIR
  Budget: Rs 21,16,000, Duration: 3 years
- Jal Abhyaranya IHR State: Himachal Pradesh Aspirational District: Chamba
  PI: Dr. Jaspreet Kaur, Agency: NMHS
  Budget: Rs 20,84,210, Duration: 6 months
- Report on Landslide Susceptibility Mapping for Parts of Himachal Pradesh
  PI: Dr. Dericks P Shukla , Agency: UNDP
  Budget: Rs 76,700, Duration: 10 days
- Vetting of Acoustic Design for Installation of Full Mission Simulator at Thanjavur
  PI: Dr. Arpan Gupta, Agency: Envirotech Systems
  Budget: Rs 61,360, Duration: 1 month

New Faculty

Prof. Sumant Nigam (Visiting Distinguished Professor) is serving as chair at Atmospheric and Oceanic Science, the University of Maryland. His research interests include atmospheric general circulation, climate variability mechanisms, tropical ocean-atmosphere interaction, characterization of secular change in regional hydroclimates. He obtained his Ph.D. in geophysical fluid dynamics from Princeton University in 1984, and postdoctoral training at MIT.

Dr. Prateek Saxena (Visiting Assistant Professor) holds a Ph.D. from Technical University of Denmark. His research domain includes sustainable manufacturing, tooling and tooling process chains, paper-packaging, additive manufacturing, and tribology of polymer-matrix composites.

Dr.Ashutosh Kumar (Assistant Professor) holds a Ph.D. from IIT Bombay. His research encompasses soil-structure interaction, engineering behaviour of unsaturated soils, geotechnical earthquake engineering and seismic performance of heritage structures.

Dr. Sayantan Sarkar (Assistant Professor) holds a Ph.D. from Jawaharlal Nehru University and has research expertise in the domain of characterization of aerosol climate forcing agents, coupling aerosol chemical speciation with receptor model-based source apportionment and, reconstruction of historical atmospheric pollutant deposition using lake sediments as archives.

Distinguished Visitors

- Dr. S.K. Pandey, Scientist and Head of Structure Panel, ARDB, DRDO visited on 15 Feb, 2020
- Dr. S.N. Jaiswal, Scientist DRDO visited on 15 Feb, 2020

Placements'20

- Codenation, and Wunderman Thompson
- Axxela Advisory Services
- Perceptive Analytics
- Decision Point Pvt Ltd.
- Halliburton Development Centre
- Wipro, C-DAC, and Razorpay
- Swiggy, and Addverb Technologies Pvt. Limited
- Impact Guru Technology Ventures Pvt. Ltd.
- L & T Engineering Construction and Contracts
- Beehyv Software Solutions Private Limited
- Cashfree, Newzera, and Wizikey
- ArcelorMittal Nippon Steel India Ltd
- Suzlon, and Cognizant
- LafargeHolcim, CGI, and Commvault
- L&T Technology Services
- National Solar Energy Federation of India

Recent Patent

- Sunny Zafar, Manoj Kumar Singh, and Nishant Verma (2020). Method for Manufacturing Thermoplastic Composite from Microwave-Assisted Compression Moulding.
- Sumit Sinha Ray, Sheshang Singh Chandel, Prakash Giri, and Ashish Kakoria (2020). Nanofibers from Plastic Bottles.
- K V Uday, Naman C, Shishir A, Amudhan M, and Nidhika Kadela (2020). Solar-Powered on-Field Vehicle Detection and Alarming System for Roads.
- Jaspreet Kaur and A.Tiwari (2020). Single-Step Synthesis of Multimodal Magneto-Fluorescent Core-Shell Superparamagnetic Iron Oxide Nanoparticles.

Art without Engineering is dreaming. Engineering without Art is calculating (Steven Roberts)

New Courses

- Fundamentals of Multiphase Flow
- Impact Mechanics
- Mesh Independent Computational Techniques
- Advanced Soil Mechanics
- Advanced Foundation Engineering
- Air Pollution and its Mitigation
- Soil Dynamics

Conference/Workshop

National workshop on Advanced Composites for Aerospace (11-15 February, 2020)

Organizers: Dr. Shubhomoy Sen, Dr. Himanshu Pathak and Dr. Sunny Zafar.

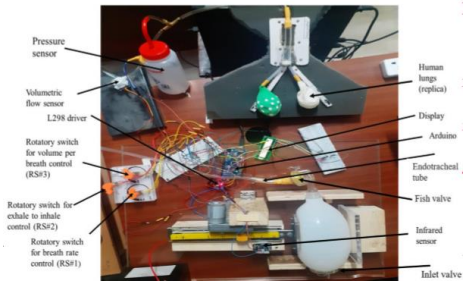
Speakers from IIT Mandi: Viswanath Balakrishnan, Rajneesh Kumar, Rajeev Kumar, Vishal Singh Chauhan.

High Impact Papers

- Verma N., Zafar S., and Pathak H. Investigations on Thermal Damage and Surface Roughness of Laser Beam Machined Nano-Hydroxyapatite UHMWPE Composites. Manufacturing Letters, 25, (2020) 81-87.
- Chauhan S., and Kumar P. Approach and Breakup of Taylor Bubble and Taylor Drop in a Hele-Shaw Cell. Physics of Fluids, 32, (2020) 082104
- Chauhan A., Sharma S., Kumar S., Thirumalai S., Kumar R. V., and Vaish R. TiO2@C Core@Shell Nanocomposites: A Single Precursor Synthesis of Photocatalyst for Efficient Solar Water Treatment. Journal of Hazardous Materials,381, (2020) 120883

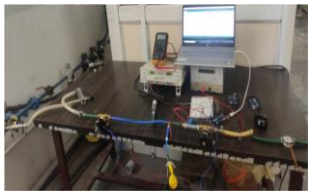
Developed Prototype for COVID-19

Disinfection Tunnel



Mechanical Ventilator-1

Mechanical Ventilator-2



Mechanical Ventilator-3

Face Mask for Capturing 0.6 µm Particles

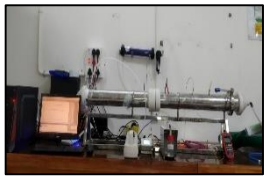
Recently Developed Facilities

Gas Chromatograph

Francis Turbine

Distillation Assembly

Plastic Extruder



Air Filtration Test Setup

Thermocouple Wire Welder

Students Achievements

- *Dr Sumeet Kumar Sharma* who completed PhD under the supervision of Dr. Vishal Singh Chauhan, was selected as Assistant Professor (Ad Hoc) in NIT Hamirpur.
- *Dr Sharad Kumar Gupta* who completed PhD under the supervision of Dr. Dericks P Shukla, was awarded with AGU travel grant and also got selected as Scientist C in Punjab Remote Sensing Centre, Ludhiana.
- *Dr Mohammad Amir* who completed PhD under the guidance of Dr. Mohammad Talha received Post Doctoral position at the School of , Engineering at Hankyong National University, South Korea.
- *Harsimranjit Kaur*, PhD student under the supervision of Dr. Dericks P Shukla, got ISPRS travel grant.
- *Ashish Kakoria*, PhD student under the supervision of Dr. Sumit Sinha Ray, was awarded with travel grant to attend International Workshop on Advanced Materials 2020, Dubai.
- *Yati Aggarwal*, PhD student under the supervision of Dr. Sandip Kumar Saha, was awarded with grant-in-aid of 100,000 JPY to attend 17th World Conference in Earthquake Engineering, Sendai, Japan.
- *Dharani Raj SV* who is pursuing M. Tech. project under the supervision of Dr. Mousumi Mukherjee, was awarded with DAAD Fellowship to pursue part of his M.Tech. project work at TU Munich, Germany.

Faculty Achievements/Outreach

- *Dr. Mohammad Talha* delivered a lecture on Nonpolynomial Based Higher-order Structural Kinematics for Functionally Graded Material Plates at India-UK SPARC webinar organized jointly by IIT Patna, IIT Hyderabad and University of Manchester, United Kingdom Ion Beam Center, University of Surrey, United Kingdom on 17 September 2020.
- *Dr. Ashutosh Kumar* received "ASCE 2019 Outstanding reviewer recognition" by International Journal of Geomechanics, published by American Society of Civil Engineers. He delivered several online talks in FDP and STTP on wide spectrum of Soil-Structure interaction, Engineering Behaviour of Unsaturated Soils, Geotechnical and Earthquake Engineering at KIT Warangal (24-28 July 2020), NIT Andhra Pradesh (23-28 Nov.2020), SVNIT Surat (22-26 Sept. 2020), and IIT Madras (4 Sept, 2020) respectively.
- *Dr. Sunny Zafar* was invited to deliver expert talk on Microwave Processing of Green Composites at JIET, Jodhpur on 7 January 2020.
- *Dr. Kaustav Sarkar* has delivered three online expert lectures. 1. Understanding the Severity and Pattern of Rainfall Manifestation in India for the Durable Design of Concrete Structures organized by GEC Bharatpur under the aegis of TEQIP-III during 7-12 Sept.2020. 2. New Era in Civil Engineering at Shiv Nadar University (15th Sept 2020). 3. Atmospheric Corrosivity Map for the Management of Steel Infrastructure at SVNIT Surat (21-25 Dec. 2020)
- *Dr. Arpan Gupta* was invited as a speaker for Industrial Noise and Vibration Control (26-28 November 2020), IIT Indore and also for Noise and Vibration of Mechanical Systems (29-31 Oct 2020), IIT Indore.
- *Dr. Vishal Singh Chauhan* chaired a online technical session in the International Conference on Evolution in Manufacturing held during 10-12 December, 2020, organized by Malaviya National Institute of Technology Jaipur in association with the NIT Uttarakhand and NIT Warangal.
- *Dr. Sumit Sinha Ray* delivered three online expert talks. 1. Porous Polymer Fiber Membrane at lecture series of technical textile organized by The Technological Institute of Textile & Sciences. 2. My Experiments at Zero Gravity: A Rendezvous of Thermal Science and Fun organized by Bhiwani with NISTI, Former Students Association of Physics in collaboration with Department of Physics, Scottish Church College as a part of 16th Prof. J. M.Dassarma Memorial Lecture. 3. Solution Blown Nanofibers at Department of Textile and Fiber Engineering, IIT Delhi
- *Dr. Parmod Kumar* delivered lectures in workshop (ASTESTC-2020) and STTP (ACMME-2020) at Mechanical Engineering, NIT Hamirpur. He delivered a talk in workshop at SBS, IIT Mandi. He has also delivered webinar at DVR & Dr. HS MIC College of Technology, Kanchikacherla, AP and at Maharana Prataap College of Engineering, Mandhana, Uttar Pradesh.
- *Dr. K.V. Uday* received the 2020 Gold SKOCH Award in the "Safety and Security" category for the landslide monitoring and warning system implemented in Mandi district.
- *Dr. Himanshu Pathak* delivered invited lecture in STTP at Govt Engineering College, Sitamarhi and at ABES Engineering College, Ghaziabad. He also delivered invited talk in STTP at Pune University and NIT Hamirpur.
- *Dr. Jaspreet Kaur* delivered talks at UCL, CEA Paris 7 University, Moons University Belgium.
- *Dr. Sandip Kumar Saha* delivered an expert lecture in FDP at BIET Jhansi, and an expert lecture in FDP at Department of Civil Engineering, G. B. Pant Institute of Engineering and Technology, Pauri, Uttarakhand, India.
- *Dr. Rajeev Kumar* attended online as one of the interview panel members for Ph.D. admission 2020-21 in Mechanical Engg at Dr. A.P.J. Abdul Kalam Technical University Lucknow on 14th October, 2020.
- *Dr. Swati Sharma* has been selected as a council member of the Indian Carbon Society which serves as a platform to facilitate collaborative research between institutes/ national labs and industry.

Engineering is not only study of 45 subjects but it is moral studies of intellectual life. (Prakhar Srivastav)

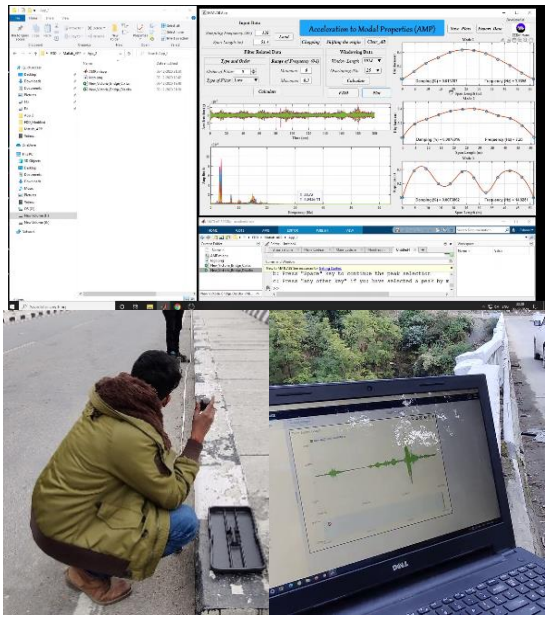
Doctors- for the bridges

i4S **Laboratory**-

Under the research theme "Structural Safety against Natural and Man-Made Hazards"

Every third kid from India carries the aspiration to be a doctor, well for the humans mostly. Like the humans, the infrastructures around them also need doctors. Unlike human, they can't even express their problems. Bigger problem ...We need a good doctor here!!

i4S laboratory is working in this field to train doctors (not engineers) for the bridges, to hear their heartbeats, analyse their pulses, and prescribe the remedies. We discussed how i4S approaches to the problem with one of the researcher from the lab, Mr. Eshwar Kuncham, who recently developed an in-house applet that analyses vibration responses of the bridges and decides if at all the bridge's health is okay or not. Mr. Kuncham says "The applet allows you to extract the modal properties like frequencies, mode shapes, damping, seamlessly from the recorded noisy measurements. We have uploaded a go through video in our laboratory website www.i4siitmandi.com for the interested".



Dr. Subhamoy Sen, the head of the team, details, that the laboratory is made under the research theme "Structural Safety against Natural and Man-Made Hazards".

This theme, jointly built with Dr. Sandip Saha and Dr. Maheshreddy Gade, oversees the research to ensure safety of the infrastructures. While Dr. Saha looks into the seismic vulnerability and related design aspects of the structures, and Dr. Gade looks in to the seismology aspects, the lab i4S tries to assess health of the already built structures. Dr. Sen further discloses that the lab is trying to benchmark health of all the bridges of Himachal Pradesh. Most of such old bridges have taken the test of time and developed deficiencies. He thinks it's the high time to be concerned for their health before an unfortunate event does something worse.

i4S is equipped with all major instruments required for this job and is handling four major projects funded by agencies like, DST, SERB and ARDB. There are four PhD students and two project fellows who are currently working in this lab. Last year the lab published eight journal articles in this field of structural health monitoring (SHM). This lab is having a strong collaboration with its parent lab, also named i4S, from Inria, France with joint PhD scholars and bilateral student exchanges.

Last year i4S laboratory organised a workshop to discuss cutting edge techniques for health monitoring. In which machine learning (ML) techniques for SHM were also discussed. Ms. Smriti Sharma, a PhD student from this lab, and a researcher of ML based SHM techniques, argues that "traditional approaches are too idealistic compared to the recent days ML-based approaches and that is why the use of such techniques are on the rise for SHM". i4S is therefore attempting to venture in the data-based approaches for SHM for which they have already seen good success with articles in reputed journals. With a collaborator, Dr. Amit Singha from SCEE, IIT Mandi, they are further trying to implement their algorithms in to chips to make a product.