



# SCEE NEWSLETTER

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# ELECTRON WAVE

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## 1. MESSAGE from the Editor:

It gives me immense pleasure to introduce Vol. 2 No. 2 of the SCEE newsletter "Electron Wave". Our school has also grown quite a bit over the past few months and has a current faculty strength of 36 members. Dr. Bharat Singh Rajpurohit has kindly taken over as



Chairperson of SCEE. The contributions of the previous Chairperson Dr. Anil Kumar Sao are highly appreciated and placed on records. In this newsletter we are having the interview of Prof. Enakshi Bhattacharya who is on deputation from IIT Madras.

## 2. What's INSIDE

	Page No.
1) Message from the Editor .....	2
3) Recent Research Achievements .....	3
4) Recent Projects .....	4
5) Face to Face with Prof. Enakshi Bhattacharya .....	5
6) Publications .....	7
7) Awards and Recognitions .....	7
8) Recent Seminars and Workshops .....	8
9) Recent Distinguished Lectures .....	10
10) Upcoming Workshop .....	11

### 3. Recent Research Achievements:

➤ Project on machine-learning for healthcare with RxDataScience, USA:

The Applied Cognitive Laboratory, SCEE, IIT Mandi has started a research collaboration with RxDataScience, USA, on a project titled, “Applications for Mining Rare Diseases and Analyzing and Predicting Patient Journeys.” As AI and machine learning capabilities increase exponentially, there is high potential value for the technology’s implementation in the healthcare and pharmaceutical industries. The goal of RxDataScience and IIT Mandi’s current partnership is twofold: design and develop AI applications for rare disease treatments and use machine learning prediction models for different measures of interest to improve upon patient journeys. This international project is worth USD \$21,667. For more details, please see: [https://www.rxdatascience.com/news/iit\\_venture](https://www.rxdatascience.com/news/iit_venture)

➤ Project on low-cost landslide monitoring and warning:

The Applied Cognitive Laboratory, SCEE, IIT Mandi in collaboration with the Construction Material laboratory, SE, IIT Mandi has recently developed a low-cost microelectromechanical system (MEMS) landslide monitoring and warning system. This system makes use of low-cost microelectromechanical systems (MEMS) - based sensors for local site-specific monitoring of landslides at every 10 to 15 minute intervals. A prototypical low-cost system is currently installed on a hill on the Kamand - Kataula road (near IIT Mandi campus). This technology may be replicated in other landslide-prone areas in India and world in the long term. This project is funded by the State Council for Science, Technology, and Environment, HP Government and DTRL, DRDO.



## 4. Recent Projects:

- Project Sanctioned:
  - **Title:** Rare disease patient finder and their patient journeys  
**PI:** Dr. Varun Dutt  
**Funding Authority:** Rx Data Science  
**Amount sanctioned:** USD 21667
  
- Project Approved:
  - **Title:** Development and Evolution of low-cost Landslide early warning solution  
**PI:** Dr. Varun Dutt  
**Funding Authority:** Defense Terrain Research Laboratory (DTRL), Defense Research and Development Organization (DRDO)  
**Amount Sanctioned:** INR 10 lakhs
  
  - **Title:** Development and Evaluation of Low-Cost Landslide Monitoring Solutions  
**PI:** Dr. Varun Dutt  
**Funding Authority:** National Disaster Management Authority (NDMA), Ministry of Home Affairs  
**Amount Sanctioned:** INR 28 lakhs
  
  - **Title:** High-Throughput & Energy-Efficient Flexible-Turbo/LDPC Decoder for the Next-Generation Wireless-Communication Systems  
**PI:** Dr. Rahul Shreshta  
**Funding Authority:** Dept. of Science & Technology, Govt. of India  
**Amount Sanctioned:** INR 70 lakhs
  
  - **Title:** Study and Design of Broadband frequency selective surface for various RF and Microwave applications  
**PI:** Dr. Gopi Shrikanth Reddy  
**Funding Authority:** Science and Engineering Research Board (SERB)- Govt. of India  
**Amount Sanctioned:** INR 51.97 lakhs
  
  - **Title:** Design of IoT transceiver integrated with compact MIMO Diversity antenna scheme  
**PI:** Dr. Gopi Shrikanth Reddy  
**Funding Authority:** DST- Interdisciplinary cyber physical system division  
**Amount Sanctioned:** INR 61.5 lakhs

## 5. FACE TO FACE WITH Prof. Enakshi Bhattacharya

Prof. Enakshi Bhattacharya has been doing quality research in the field of MEMS and Biosensors for a major part of her professional career. She holds A patent and numerous publication. She is a professor at Microelectronics and MEMS Laboratory, Department of Electrical Engineering and Centre for NEMS and Nanophotonics, Indian Institute of Technology, Madras.



Q. Who are you and what do you do?

Ans. I am Enakshi Bhattacharya and I am a professor in Electrical Engineering at IIT Madras and visiting professor at IIT Mandi in SCEE for the semester July-Dec, 2017.

Q. You have been trained in basic sciences(physics) and now teaching in Electrical Engineering department, How comfortable was this move?

Ans. Earlier my research area in physics was semiconductor devices which is common to Physics and Electrical Engineering. But problems that I have worked on has changed. For example, earlier I was more interested in density of states in semiconductor materials and how that affects the behaviour of devices, but after joining Electrical Engineering, I am more interested in making actual devices and their optimization.

Q. In India, most of the jobs for Electrical Engineers are on the circuit design sides and a very large number of students pick up jobs in the software industries. How do you think we can motivate more students to come for device fabrications?

Ans. A good knowledge of devices and fabrication would help people who design circuits. There are jobs in fabrication too. A lot of our MS and PhD Students go to fabrication companies abroad. Few IITs and IISc already have clean rooms. IIT Mandi is also in the process of building clean room. So, it should be possible to do fabrication at these places. There are lots of demands for such students who have hands on experience in fabrication.

Q. How do you see the future of India with respect to chip design and fabrication?

Ans. Design is already good, large design houses have opened up in Bangalore and other places but, fabrication is still a big question. Presently, India has very few fabrication units. There has been talk of a commercial fab starting in India for years but I have to see it to believe it.

Q. Given that IIT Mandi is far off from the electronics hub of the country at Bangalore, how do you think we can attract a large number of domain industries to come and get engaged with the institute at various levels, through placement, research and collaboration etc.?

Ans. Location of IIT, Mandi could be considered as a problem in all fields, but still there are good number of placements happening. So, it is not only about the location. The faculty and students have to engage more with companies from different fields. IIT, Mandi has good interaction with Semiconductor Complex Limited, which is one of the oldest fabrication unit in India so, that is an advantage.

Q. What are your views regarding the falling motivation level of students across the years?

Ans. I won't call it falling motivation or lack of interest, I think it's just about change. Their attitudes have changed but it is not necessarily for the worst. I think students now are much smarter than the students from our days. So, we the teachers only need to reorient ourselves.

Q. You have taught at IIT Kanpur, IIT Madras, and now teaching for a semester at IIT Mandi. What is your opinion regarding the academics and research at the three IITs?

Ans. IIT Madras having a larger student community and being located at Chennai city, there are lots of things to do outside the campus hence interaction with students is less. At IIT Kanpur however, student interaction was more when I was there and I think it was because Kanpur as a city, doesn't have much to offer. IIT Mandi being a fledgling institute and the student's community being much smaller, interaction with students here is much better and I find that very refreshing.

Q. Please give a word of advice for the students of IIT Mandi.

Ans. It doesn't matter which IIT you are in, you must remember that you are getting a degree from an IIT. Do well in your field and be at par with the reputation that an IIT student has.

Q. What made you choose research rather than going into an industry?

Ans. I used to like maths a lot from my college days but, the types of maths I used to like was more relevant to physics. Towards the end of my Masters, a professor from IIT Bombay suggested that I join him for PhD, and that got me thinking thought I finally joined TIFR for PhD, So, it was like a natural progression for me but, finally I am very happy that I choose academics because I think it's really a great profession.

Q. What would you suggest to a someone who is doing a B.Tech or in a master degree? Whether they should go abroad for better opportunities or better research environment or, are our IITs also at par with foreign institutions.

Ans. It depends on the university and the field of research and I think students nowadays are smart enough to find out the opportunities available to them. In many ways staying in India can be better than going abroad because, factors like familiarity and teacher student interaction are better when staying in India whereas, going to foreign countries requires more independence so, it suits some people but not everyone.

Q. Kindly describe your present research area.

Ans. I worked on semiconductor devices and microelectronics to begin with. My PhD. Was on solar photovoltaic materials (amorphous silicon) I continued working on that during postdoc. and even for few years after postdoc, after joining IIT Madras I switched to MEMS because funding was not good in photovoltaic materials. I also worked on biosensors in collaboration with a colleague in bio-technology department. Currently I am continuing on MEMS and Bio-Sensors.

## 6. Publications:

- Journals: 6
- Conferences: 16
- Books and Book Chapters: 1

## 7. Awards and Recognitions:

- Dr. Shubhajit Roy Chowdhury Received IAAM Scientist Medal in the European Sensors and Actuators Summit 2017 at Stockholm, Sweden
- Dr. Gopi Shrikanth Reddy received the award of best paper in technical session- IEEE i-AIM 2017 , Bangalore for his paper titled “Elliptical UWB antenna loaded with Rectangular Split ring resonator and Semi elliptical slot for multi-band rejection”
- Dr. Rajeev Kumar Chouhan a PhD scholar of 2017 batch, SCEE, got the best PhD thesis award for the thesis titled ‘*Design and Analysis of Multi-Terminal DC Microgrid*’ in the IEEE UPCON 2017 held during Oct. 26-28th, 2017.

## 8. Recent Seminars and Workshops

- **Event:** National Conference on Computer Vision, Pattern Recognition, Image Processing and Graphics (NCVPRIPG 2017) was organized at IIT Mandi from Dec. 16 - 19, 2017.

**Organized By:** Multimedia and Analytics Lab. IIT Mandi.

**Supported By:** IIT Mandi, IUPRAI, MathWorks, KOVID LABS, vehant, Punjab National Bank.



- **Event:** Mini Mathematics Training and Talent Search Program (Mini MTTs - 2017), was organized at IIT Mandi from Dec. 4-9, 2017.

**Funded By:** NBHM (Govt. of India)





- **Event:** One-day workshop on Rainfall Induced Landslides: Mapping, Mitigations and Monitoring has been organized at IIT Mandi on 11th October, 2017.

**Supported By:** SDMA-HP (Himachal Pradesh State Disaster Management Authority)



- **Event:** Talk on “From pattern recognition to discovering binomial coefficients” by Dr. K. Ramasubramanian on 13th November, 2017.

**Organizers:** IIT Mandi Colloquium.



- **Event:** Workshop on “Current Trends in Analog Circuit Designing” during 25<sup>th</sup> – 26<sup>th</sup> September, 2017

**Organizers:** Dr. Hitesh Shrimali of IIT Mandi and Prof. Friedel Gerfers of TU-Berlin.



- **Event:** Formal Methods Update Meeting, an annual event of Indian Association for Research in Computer Science (IARCS) was held from 17<sup>th</sup>-18<sup>th</sup> July 2017.  
**Organizers:** Dr. Astrid Kiehn and Dr. Samar Agnihotri.  
**Supported By:** TCS and SCEE.



## 9. Recent Distinguished lectures

- **Topic:** An IEEE Technical Talk on “Introduction to High Voltage Engineering” was organized at IIT Mandi.  
**Date:** Dec. 8, 2017.  
**Speaker:** Prof. Ravindra Arora.
- **Topic:** A Talk on “The Indian Stack and Financial Inclusion – What is in there for research?” was organized at IIT Mandi.  
**Date:** Nov. 15, 2017.  
**Speaker:** Prof. Yvonne Dittrich.
- **Topic:** A Talk on “Evolving ideas of teaching and research in engineering institutions during my journey in academics over five decades” was organized at IIT Mandi.  
**Date:** Oct. 24, 2017.  
**Speaker:** Prof. B. Yegnanarayana.
- **Topic:** A Lecture on “Modern Health Monitoring Tools from Ayurveda” was organized at IIT Mandi.  
**Date:** Sep. 26, 2017.  
**Speaker:** Prof. M. Manivannan.

## 10. Upcoming Workshop

- **Topic:** A National Workshop on Reliability and Economic Performance of Multi-Functional Microgrids for Indian Scenario

**Date:** Dec. 21-23, 2017.

**Speaker:** Prof. Mahesh Kumar(IIT Madras), Dr. S. Srinivas(IIT Madras), Dr. Tushar Jain(IIT Mandi), Dr. Rik(IIT Mandi), Mr. Mahesh.M(Sr. Er. PGCIL), Dr. Bhakti Joshi(IIT Mandi), Dr. Vijaya Bhaskar. Devara(IIT Dhanbad), Dr. Subashish Dutta(IIT Mandi), Mr. Samir M. Alhejaj(Loughborough University, UK Visitor Senior Ph.D. Researcher), Mr. Gagan Deep Puri(Opal-RT Technologies India).

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