DEPARTMENT OF ELECTRONICS ENGINEERING

INDIAN INSTITUTE OF TECHNOLOGY (INDIAN SCHOOL OF MINES) DHANBAD

SPARK

MONTHLY e-NEWSLETTER

INSIDE THIS ISSUE

AUGUST 2025
8th EDITION

FROM THE HOD'S DESK

Dear Readers,

We are here to update you about the overall progress and a few milestones achieved by the Department of Electronics Engineering in August 2025.

In this month, Prof. Rajeev Kumar Ranjan delivered a distinguished lecture during the Faculty Development Program on "Advances in Analog and Mixed Signal Design (AAMSD-2025)," jointly organized by NIT Patna and Delhi Technological University (DTU), New Delhi. The event was conducted in online mode.

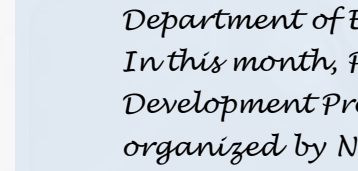
Prof. Ravi Kumar Gangwar delivered three invited talks, addressing both industry professionals and academicians, at MNIT Jaipur and MNNIT Allahabad. Additionally, Dr. Ravi Kumar Gangwar and Dr. Preeti Priya have recently published a couple of research papers in reputed international journals.

Prof. Sanjeev Kumar Raghuwanshi, along with his research team, visited the CSIR-National Metallurgical Laboratory (NML) in Jamshedpur. The visit provided a valuable opportunity to explore cutting-edge research facilities, including high-temperature cascaded optical fiber Bragg grating sensors for industrial applications, and Asia's second-largest material creep testing laboratory. I'm also pleased to announce an opportunity for bright and intelligent individuals to pursue a PhD program, with interviews being conducted monthly.

Lastly, I am pleased to share that a Global Initiative of Academic Networks (GIAN) program is scheduled to be held in November 2025. We look forward to active and enthusiastic participation in this significant academic event.

Please find the Newsletter for detailed updates and give your valuable feedback to fertilise us to be bigger and better.

Wish you all the best!



Prof. Ravi Kumar Gangwar
HoD, Department of
Electronics Engineering,
IIT (ISM) Dhanbad

FACULTY DEVELOPMENT PROGRAM ON ADVANCES IN ANALOG AND MIXED SIGNAL DESIGN (AAMSD-2025)

The Faculty Development Program *"Advances in Analog and Mixed Signal Design (AAMSD-2025)"* was jointly organized by **NIT Patna** and **Delhi Technological University (DTU), New Delhi** in **August 2025** in online mode.

During the program, Prof. Rajeev Kumar Ranjan delivered a distinguished talk on **"The Memristor Revolution: From Concept to Circuit Realization."**

In his session, Dr. Ranjan elaborated on the journey of memristors from their conceptual foundation to their practical realization in modern circuits. He discussed their potential applications in memory devices, neuromorphic computing, and analog design innovations. The talk offered participants valuable insights into how memristors are shaping the future of analog and mixed-signal design.

His engaging presentation received enthusiastic participation from faculty members, researchers, and industry professionals across the country, and set a strong tone for the rest of the FDP.

EXCHANGING **IDEAS** AND **INNOVATIONS**

Prof. Ravi Kumar Gangwar Delivered an invited talk for the people of Industry and academics on "*Dielectric Resonator Antenna: A Potential Radiator for Modern Communication Applications,*" at the Faculty Development Program on " Recent Trends in Antenna Design for 5G & 6G Applications, " Malaviya National Institute of Technology, Jaipur in August 2025.

Prof. Ravi Kumar Gangwar Delivered an invited talk for the people of Industry and academics on "*Substrate Integrated Waveguide-based Antenna: A Potential Radiator for IoT applications,*" at the Faculty Development Program on "Innovative Antenna Design for Next-Generation Wireless Systems: From Concept to Application", Motilal Nehru National Institute of Technology, Allahabad in August 2025.

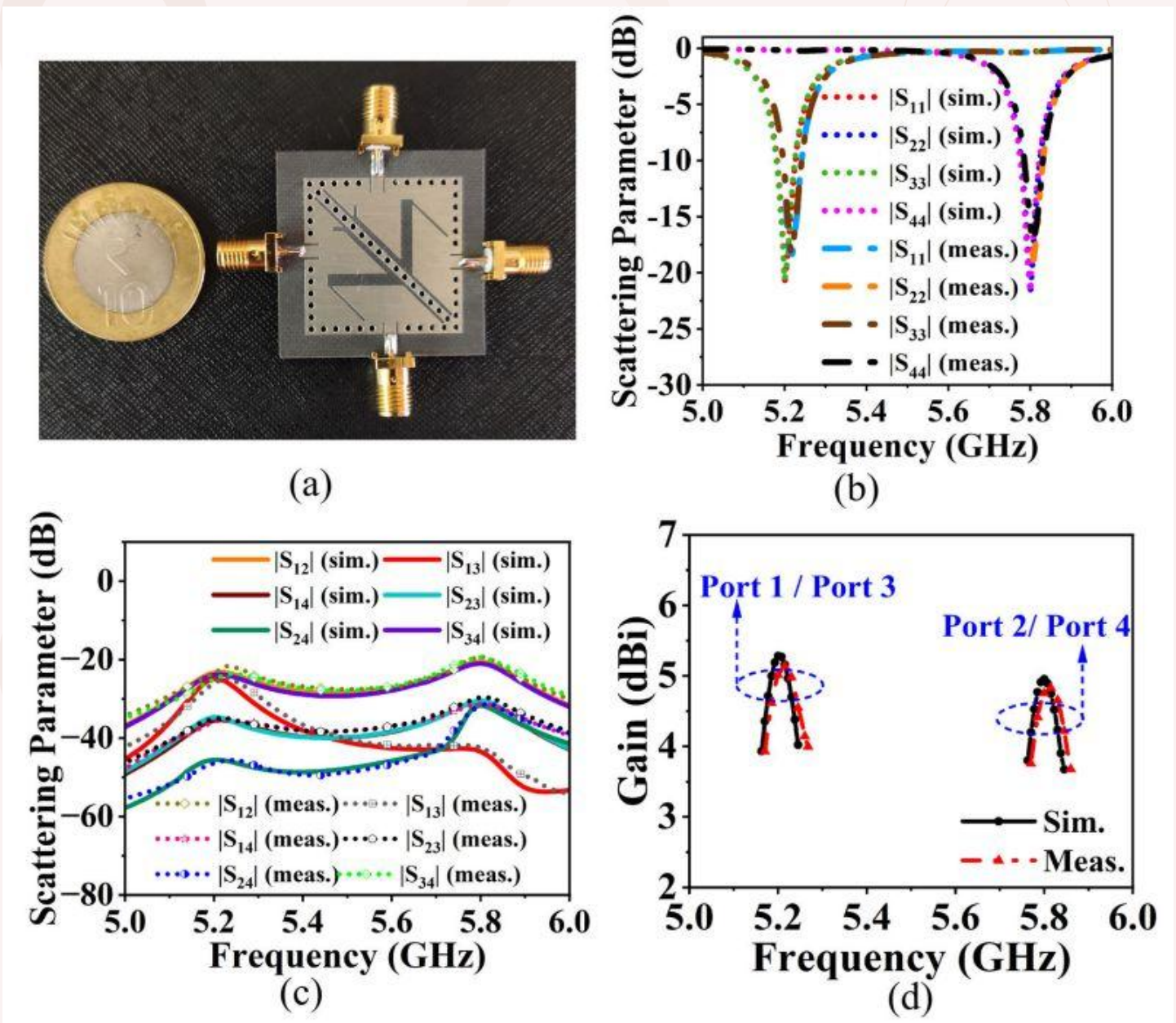
Prof. Ravi Kumar Gangwar

Prof. Ravi Kumar Gangwar Delivered an invited talk for the people of Industry and academics on "*Dielectric Resonator Antenna: A Potential Radiator for Modern Communication Applications,*" at the Faculty Development Program on "Innovative Antenna Design for Next-Generation Wireless Systems: From Concept to Application," Motilal Nehru National Institute of Technology, Allahabad in August 2025.

PUBLICATION

A. K. Pandey, R. K. Gangwar, and R. K. Chaudhary present a compact, low-profile, dual-band shielded half-mode substrate integrated waveguide (SD-HMSIW)-based self-diplexed multiple-input multiple-output (MIMO) antenna (SDMA) designed for wireless local area network (WLAN) applications. DOI

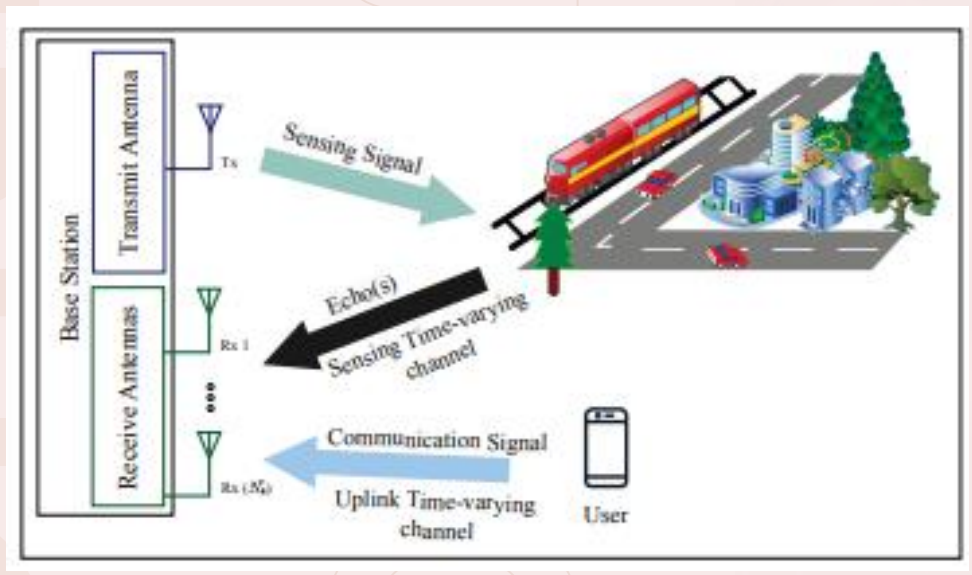
This communication presents a compact, low-profile, dual-band shielded half-mode substrate integrated waveguide (SD-HMSIW)-based self-diplexed multiple-input multiple-output (MIMO) antenna (SDMA) designed for wireless local area network (WLAN) applications. The MIMO configuration comprises two orthogonally positioned, identical self-diplexing antenna (SDA) elements, forming a slot configuration resembling the anatomy of a frog. Each SDA element features two uniquely shaped modified slots on the top conducting surface of the SD-HMSIW cavity. These SDAs are driven by separate 50-Ω microstrip feed lines, facilitating radiation at 5.2 and 5.8 GHz with good isolation between the ports. The proposed SDA design method offers exceptional versatility, enabling independent operation at two distinct frequency bands. The overall MIMO configuration of the SDA element enables a compact antenna size of 0.40 λg 2, with isolation greater than 21 dB between ports and gains of 5.26 and 4.94 dBi at ports resonating at two identical frequencies. The outcomes of MIMO antenna features involving envelope correlation coefficient (ECC), effective diversity gain (EDG), and multiplexing efficiency (MUX) have been evaluated and found to be satisfactory for the proposed SD-HMSIW-based SDMA.



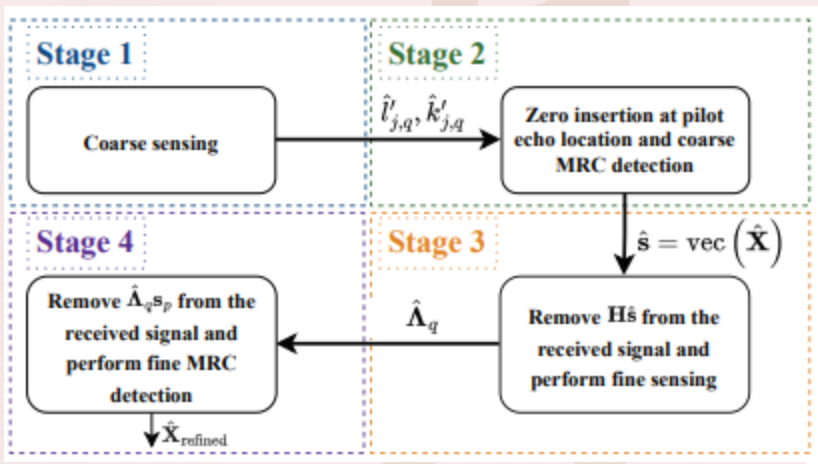
PUBLICATION

N. V. Kalpage, Y. Hong and P. Priya, "Performance Analysis and Joint Receiver Design for an OTFS-Based ISAC System in Time-Varying Channels," in *IEEE Transactions on Vehicular Technology*, DOI

This work presents a joint receiver for Integrated Sensing and Communication (ISAC) using OTFS modulation, designed for time-varying wireless channels. ISAC is an important technology for 6G networks, with potential applications in autonomous vehicles, smart transportation, and advanced radar systems. The designed receiver simultaneously processes uplink communication signals from users and echo signals reflected from surrounding targets, ensuring reliable sensing and communication. A four-stage method is employed, where the first two stages perform coarse sensing and detection, and the last two stages refine the results through pilot-aided channel estimation and a low-complexity detection scheme.



System Model



l, k→delay-Doppler

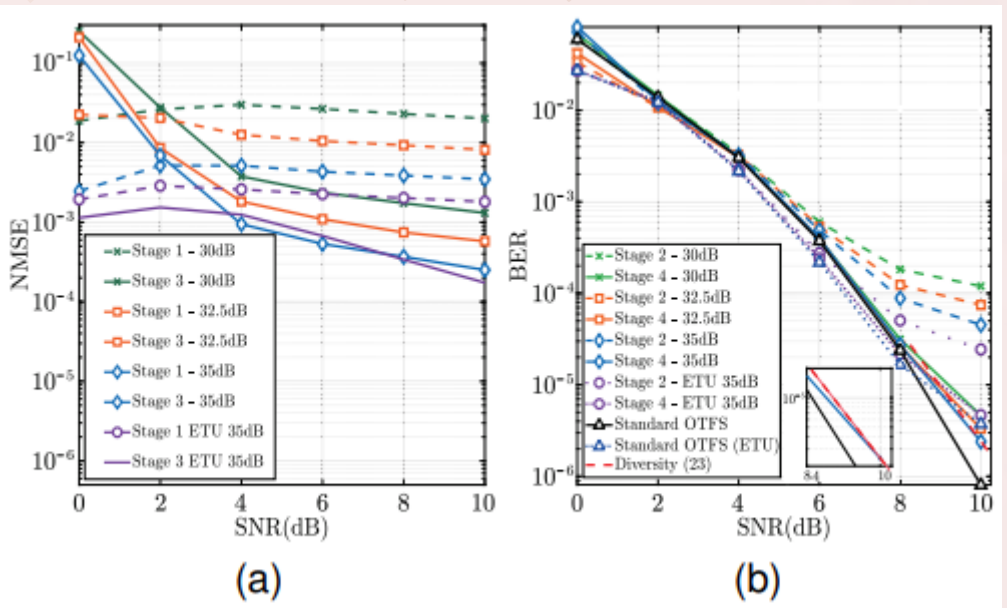
$\boldsymbol{s}$→ OTFS signal

$\boldsymbol{X}$—Data

$\boldsymbol{H}$→Comm. Channel

$\boldsymbol{\Lambda}$→ Sensing channel

Proposed joint sensing and detection method



Comparison between coarse sensing/detection and fine sensing/detection stages in terms of (a) NMSEs and (b) BER.

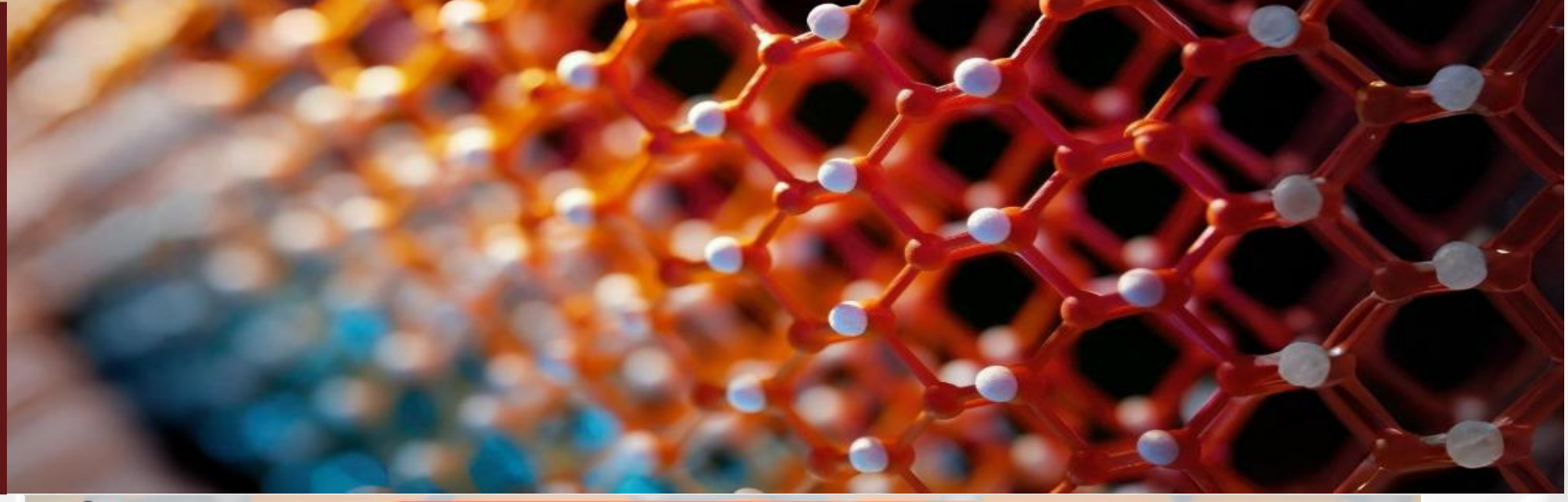
OUTREACH

In August 2025, Prof. Sanjeev Kumar Raghuwanshi, along with PhD scholars Tirbhuwan Narayan Yadav and Md. Tauseef Iqbal Ansari, visited the CSIR-National Metallurgical Laboratory (NML) in Jamshedpur.

The visit offered a valuable opportunity to explore state-of-the-art research facilities, including high-temperature cascaded optical fiber Bragg grating sensors designed for industrial applications and Asia's second-largest material creep testing laboratory.

The team engaged in enriching interactions with esteemed CSIR-NML scientists Dr. S. Sivaprasad, Dr. Tarun Kumar Das, and Dr. Vinod Belwanshi.

The visit concluded with productive discussions on potential future research collaborations between IIT (ISM) Dhanbad and CSIR-NML, paving the way for innovative advancements in the field.



5-Day GIAN COURSE ON

2D Materials for Emerging Electronics

GIAN GLOBAL INITIATIVE OF ACADEMIC NETWORKS

शिक्षा मंत्रालय MINISTRY OF EDUCATION सत्यमेव जयते

This course offers a comprehensive introduction to 2D materials like graphene, TMDs, h-BN, and phosphorene, covering their fundamentals, growth techniques, device fabrication, and key challenges. Participants will gain hands-on experience in simulations and 2D material exfoliation. The course also discusses different material/device characterization techniques and highlights applications of 2D materials in advanced and emerging electronics.

03-07 NOVEMBER 2025

No. of Participants: 50 (First Come, First Serve)

Venue:
Department of Electronics Engineering
IIT (ISM) Dhanbad
Jharkhand – 826007
India

Enroll Now !!

https://forms.gle/sfvG6rgnQ14h1RrA6

OBJECTIVES:

- Exposing participants to the fundamentals of 2D material, its potential and limitations.
- Providing knowledge of atomic-level investigation methods and tools.
- Discussing the fundamentals of material synthesis and thin film growth.
- Hands-on experience on 2D material exfoliation and flake identification.
- Overview on extracting device properties and exploring applications of 2D materials.

COURSE FEE

- Students (BTech/MTech/M.Sc.) – ₹ 590*
- Research Scholars / Post-Doctoral Fellows – ₹ 1180*
- Faculty (Academic Institutions) – ₹ 2950*
- Industry / Research Organizations – ₹ 3540*
- Foreign Students – $350*

*Including GST

ACCOMMODATION

- IIT Dhanbad Guest House (A/C, Twin-sharing) – ₹ 672/- per day
- Hostel (Non A/C, Twin-sharing) – ₹ 236/- per day

Prof. Ariel Ismach
Dept. of Materials Science and Engineering,
Tel Aviv University, Israel

Click here

Prof. Jeevesh Kumar
Dept. of Electronics Engineering,
Indian Institute of Technology (ISM) Dhanbad, India

Click here

Course Coordinator:
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Phone: +91 8884742131
Email: jeevesh@iitism.ac.in

Mode : Offline
Register by: 22 October 2025

OPPORTUNITY

In the Department of Electronics Engineering at IIT (ISM) Dhanbad, applications are being accepted for both full-time and part-time Ph.D. programs.

Application form, Guidelines, Terms & Conditions for full-time are available at IIT(ISM) Dhanbad website.

https://admissions.iitism.ac.in/phd/index.php/admission/add_phd/home

FACULTY PROFILE

Dr. Aman Sikri
Assistant Professor
Research Interest:
Reconfigurable Intelligent Surfaces (RISs), Non Orthogonal Multiple Access (NOMA), Free

Dr. Amitesh Kumar
Associate Professor
Research Interest: Photonic Integrated Circuits, Fiber Optic Sensors, Microwave Photonics, and Radio-over Fiber Technologies for 5G and Beyond.

Dr. Debjani Mitra
Professor
Research Interest: Wireless Communication- 5 G technologies, Communication Networks, Machine Learning and Statistical Signal processing

Dr. Devendra Chack
Associate Professor
Research Interest: Photonic Integrated Circuits, Advance Optical Communications, Radio-over-Fiber System For 5G/6G

Dr. Govind Murmu
Assistant Professor
Research Interest: Signal Processing and Communication Algorithms, Adaptive Filters, Adaptive Beamforming for 4G/5G, Blind Source Separation (BSS) Algorithms, , Adaptive Control

Dr. Himanshu Bhusan Mishra
Associate Professor
Research Interest: Development of Physical Layer Signal Processing for 5G/6G Wireless Technologies (OFDM, Massive MIMO, OTFS, RIS, ISAC etc.), Implementation of Physical layer algorithms on Software Defined Radio (SDR) based point-to-point wireless setup.

Dr. Jaisingh Thangaraj
Associate Professor
Research Interest: ptical Networks, Wireless Sensor Networks, VANET, Software Defined Networks, Optical

Dr. Jeevesh Kumar
Assistant Professor
Research Interest: 2D Materials, Emerging Electronic Devices, Atomistic Simulation, Device Fabrication, material & Device characterizations.

Dr. Jitendra Kumar
Professor
Research Interest:
Nano-optoelectronics, Nanoelectronics

Dr. Kaushik Mazumdar
Associate Professor
Research Interest: VLSI Design, Electronic Low Dimensional Systems, Analysis and Design of MOSFET & Nano-Devices.

Dr. Manodipan Sahoo
Associate Professor
Research Interest: Emerging Materials-based Devices, VLSI Circuits

Dr. Manoj Kumar
Assistant Professor
Research Interest: Graph machine learning, graph dimensionality reduction, optimization algorithms, federated learning, large language models (LLMs), and their real-world applications.

Dr. Mrinal Sen
Associate Professor
Research Interest: Photonic Integrated Circuits, Embedded Systems

Dr. Mukul Kumar Das
Professor
Research Interest: Modeling and Design of Semiconductor Devices for VLSI and Opto-electronic Applications, Growth of Semiconductor Interface and Band-gap Engineered Thin Film Transistor and Solar Cell by using PVD Technique, Design and Development of Integrated

Dr. Naresh Sharma
Assistant Professor
Research Interest: Integrated Photonics, Programmable Photonics, Free Space Optics, Photonic Crystals Applications

Dr. Nirupama Mandal
Associate Professor
Research Interest: Transducer Design, Controller Design, Instrumentation System Design, Smart Sensing System and Smart Instrumentation.

Dr. Prashant Kumar Varshney
Assistant Professor
Research Interest: SIW Based Microwave Planar Sensors, Metamaterial Inspired Microwave

Dr. Preety Priya
Assistant Professor
Research Interest: Integrated Communications and Sensing, High Mobility Communications, Leo Satellite Communications, OTFS, OFDM, Beamforming, MIMO, Sparse Signal Processing, Synchronization and Channel Estimation, Nonlinear Data Detection (Particle Filter).

Dr. Rahul Bhattacharya
Assistant Professor
Research Interest: Modelling Of Analog and Mixed-signal Circuits, Fault Modeling and Testing of VLSI Circuits, FPGA-based Design

Dr. Ravi Kumar Gangwar
Professor
Research Interest: Dielectric Resonator Antennas, MIMO Antennas, Bio-electromagnetics And Microwave Measurements

Dr. Rajeev Kumar Ranjan
Associate Professor
Research Interest: VLSI Design, Mem-element (Memristor, Memcapacitor, And Meminductor) Design

Dr. Santanu Dwari
Professor
Research Interest: RF & Microwave Engineering, Antenna.

Dr. Samrat Mukhopadhyay
Assistant Professor
Research Interest: Online Machine Learning, Compressed Sensing, Nonconvex and Stochastic Optimization, Sparse Adaptive Filtering.

Dr. Sanjeev Kumar Raghuwanshi
Professor
Research Interest: Numerical Method of Optical Waveguides, Optical Sensor, Microwave Photonics, Optical Fiber Communication.

Dr. Subindu Kumar
Professor
Research Interest: III-V Semiconductor Nano-structures, Nano-scaled MOS Devices and Circuits, On-Chip Interconnects

Dr. Shalu Rani
Assistant Professor
Research Interest: Energy Storage Devices for Wearable Electronics Including Advanced Flexible Supercapacitors/Micro-supercapacitors.

Dr. Sushrut Das
Professor
Research Interest: Microwave Passive Networks, Antennas, Wireless Energy Transfer and Energy Harvesting Microwave Filters

Dr. Swati Rajput
Assistant Professor
Research Interest: Silicon Photonics for Next Generation Optical Communication, Nano photonics, Semiconductor Optoelectronics

Dr. Ugrasen Singh
Assistant Professor
Research Interest: Design and analysis of wireless communication systems. I have been working on Space Modulation Techniques (SMTs), Reconfigurable Intelligent Surface (RIS), Non-Orthogonal Multiple Access (NOMA), Orthogonal Frequency Division Multiplexing (OFDM), Ultra-Reliable and Low-Latency Communication (URLLC), and Physical Layer Security.

Dr. Y. M. Asha Latha
Assistant Professor
Research Interest: RF Power Amplifier Design: Broadband, High Efficiency, Switched Mode PAs, Harmonic Manipulation, Harmonic Injection, Load Modulation, Doherty PA, Chip Design: GaN MMIC Based RF Power Amplifier Design

EDITOR'S NOTE

Hi everyone,
Our monthly electronics newsletter is a community effort, and your input is key to its success. We'd love to hear what you thought of this month's issue. Let us know what you enjoyed, and what you'd like to see in future issues, so we can make it a resource that benefits everyone.

Thanks for your time!

Editorial Team

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"Talk to yourself at least once in a day. Otherwise, you may miss a meeting with an EXCELLENT person in this world".

--Swami Vivekananda