



DEPARTMENT OF ELECTRONICS ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY
(INDIAN SCHOOL OF MINES), DHANBAD

SPARK | e-NEWSLETTER

JANUARY 2026
VOLUME-2, ISSUE-1



INSIDE THIS ISSUE

- | OUTREACH
- | PUBLICATION
- | PATENT GRANT
- | MEDIA CORNER
- | OPPORTUNITY

HOD'S ADDRESS

Dear Readers,

We are excited to update you on the overall progress and highlight a few milestones that the Department of Electronics Engineering reached in January 2026.

The Department of Electronics Engineering, IIT (ISM) Dhanbad, proudly showcased its indigenous drone technologies at NIDAR 2026 (National Innovation Challenge for Drone Application and Research), held at Gautam Buddha University (GBU), Greater Noida. In addition, Prof. Shalu Rani contributed to the department's research excellence through the publication of scholarly papers.

Furthermore, the Department is extremely delighted to share its recent achievement in the form of a Patent Grant, developed by the inventors Prof. Prashant Kumar Varshney and his research scholar, Ms. Rachna Prabha.

A promising and academically rewarding opportunity is available for bright and motivated individuals to pursue a PhD programme, with monthly interviews ensuring continuous and merit-driven selection.

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



OUTREACH



Department of Electronics Engineering, IIT (ISM) Dhanbad, showcased its indigenous drone technologies at NIDAR 2026 (National Innovation Challenge for Drone Application & Research) held at Gautam Buddha University (GBU), Greater Noida, from January 10–16, 2026. The national-level drone technology event was organized in collaboration with the Drone Federation of India and the Ministry of Electronics & Information Technology (MeitY), Government of India.

The event witnessed participation from over 1,500 students and 150+ teams from across the country, focusing on practical drone applications in disaster management and precision agriculture.

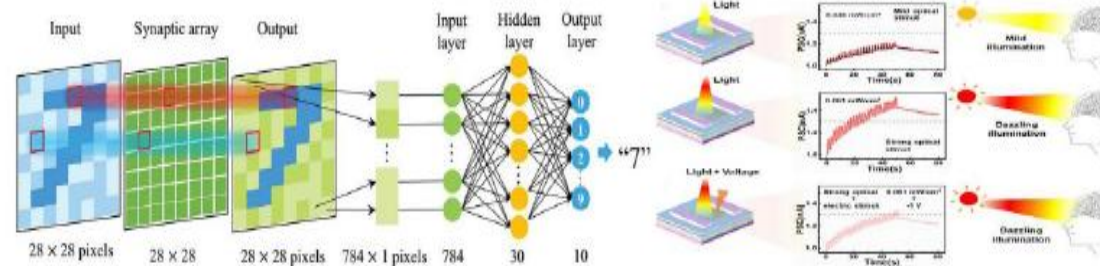
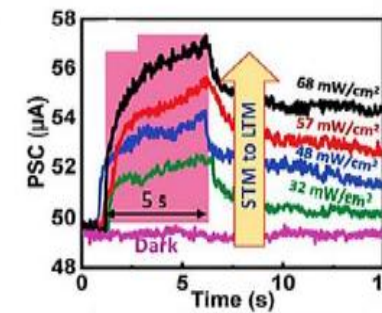
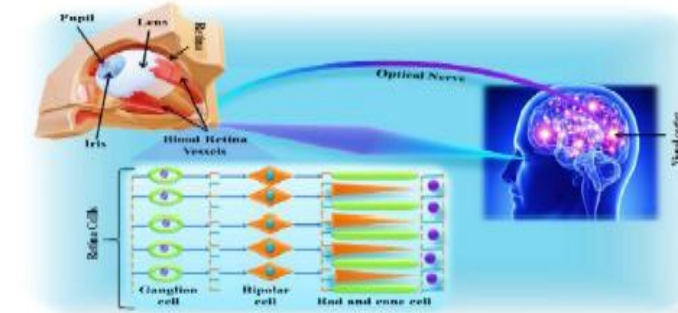
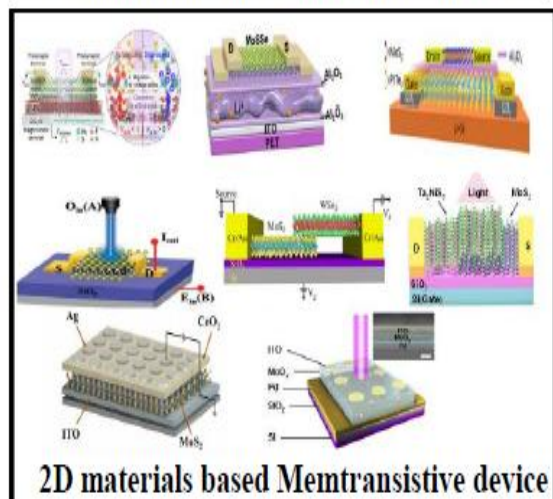
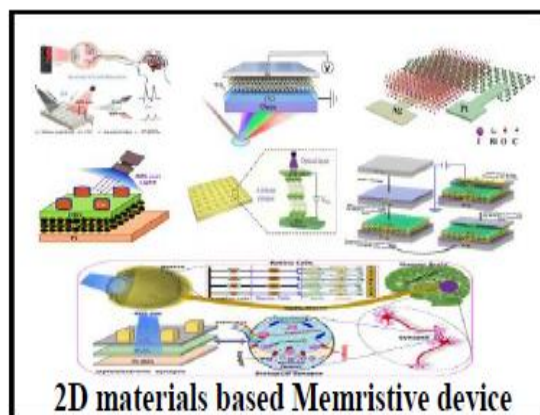
IIT (ISM) Dhanbad was part of the exhibition segment, where the Drone lab team presented lab-developed drones and in-house designed communication antennas. The exhibition highlighted the department's ongoing research and development in drone electronics, embedded systems, communication systems, and indigenous UAV technologies.

The event provided a valuable platform for showcasing the institute's technical capabilities and fostering interactions with academia, industry experts, and student innovators in the rapidly advancing field of Unmanned Aerial Systems (UAS)

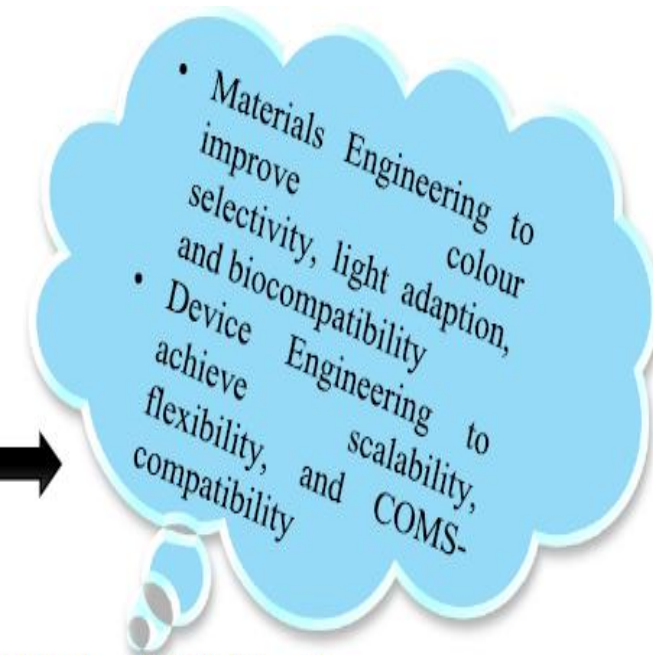
PUBLICATIONS

A. Dahiya, P. Pal, S. Rani, M. K. Gautam, R. S. Babu, I. Zeimpekis, D. G Georgiadou, and S. Kumar, "Two-dimensional layered materials-based energy-efficient optoelectronic memories: A leap towards bionic vision, Materials Science and Engineering: R: Reports, vol. 168, pp. 101146, 2026.

DOI: <https://doi.org/10.1016/j.mser.2025.101146>



Advancement in two-dimensional layered materials-based memristor and Memtransistive devices for bionic vision applications

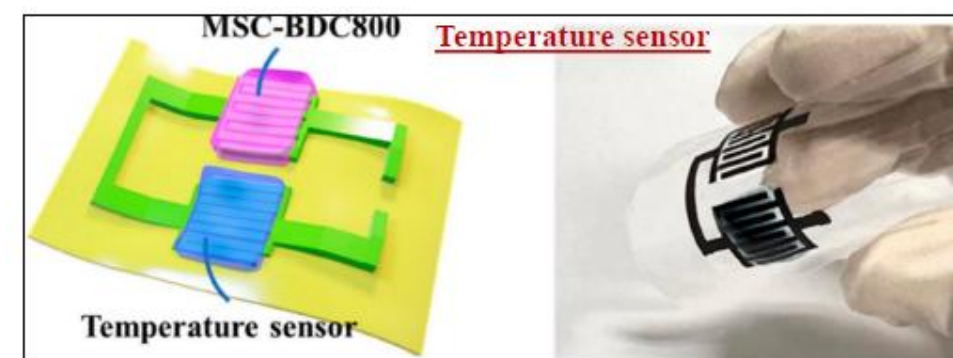
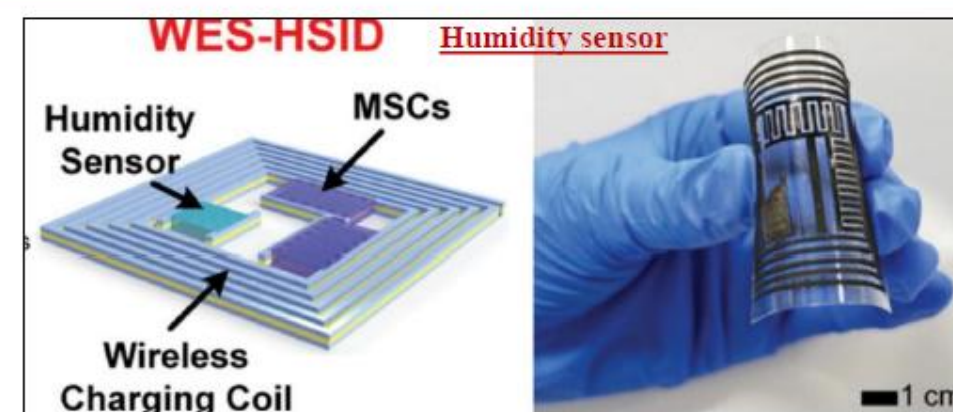
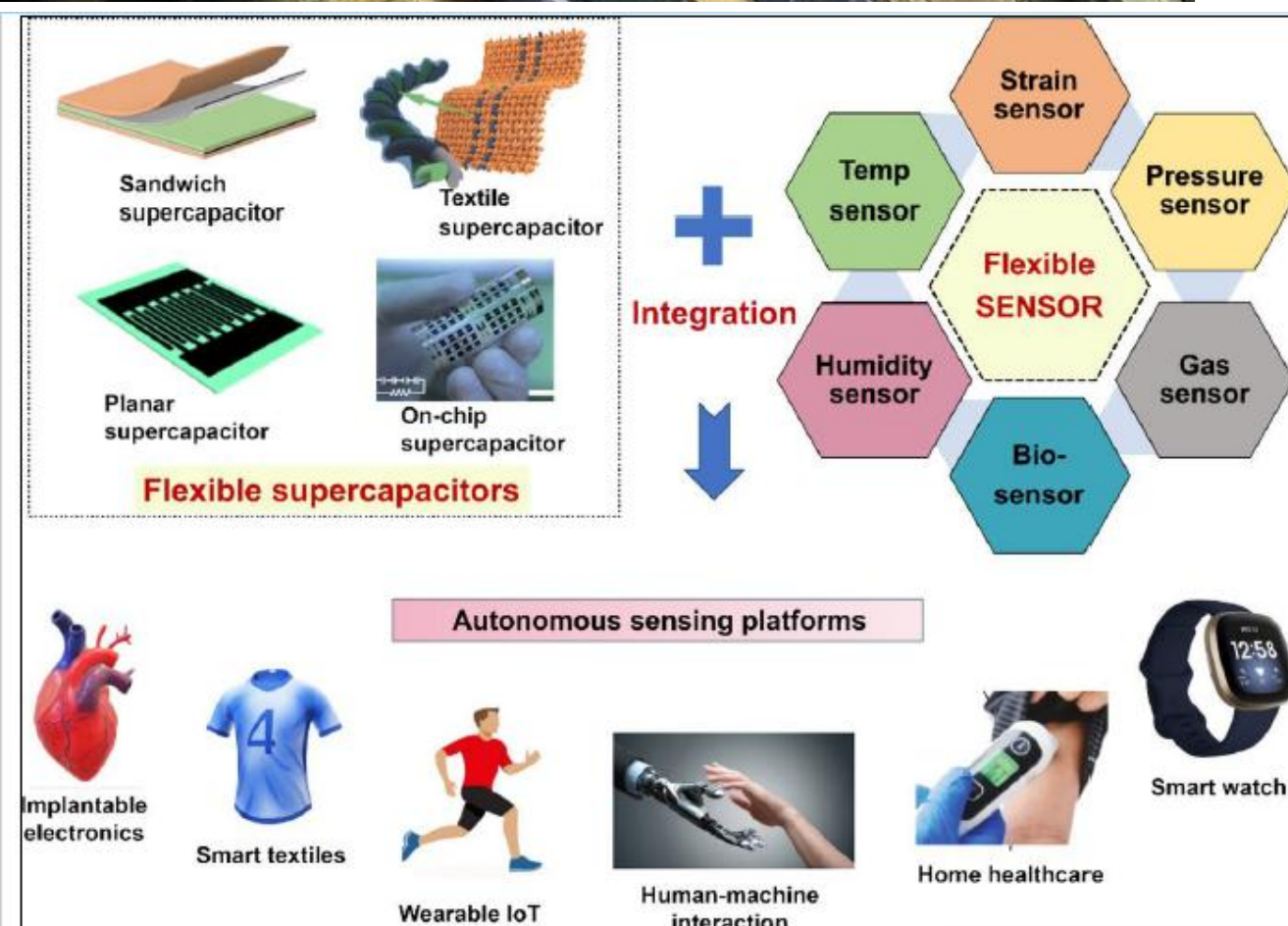


Proposed Strategies to improve the performance of 2D based memristive and Memtransistive devices for bionic vision applications

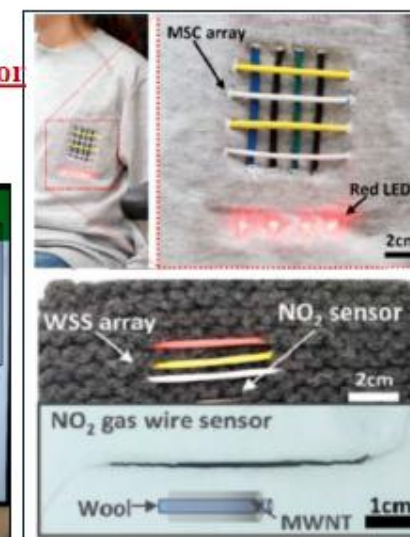
PUBLICATIONS

Shalu Rani, Purushottam Kumar, Abhinav Tandon, Sanjay Kumar, and Themis Prodromakis, "Recent advancements in supercapacitor-integrated self-powered sensors", Chemical Engineering Journal, vol. 530, no. 173558, pp. 1-40, 2026,

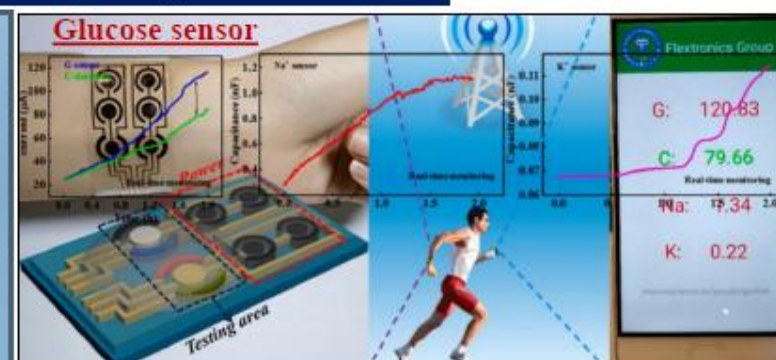
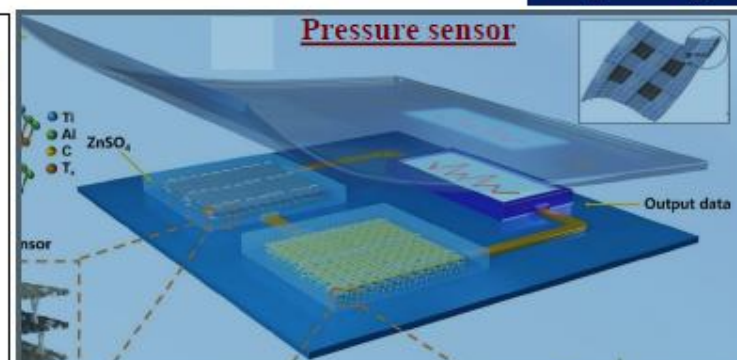
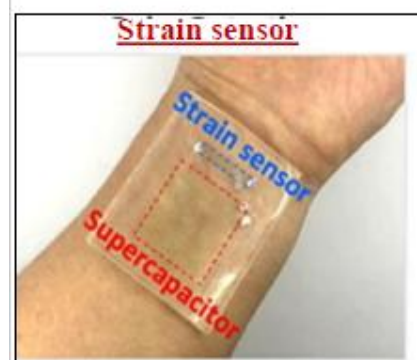
DOI: <https://doi.org/10.1016/j.cej.2026.173558>



NO₂ gas sensor



Supercapacitor-integrated sensors



NEW INNOVATON

Department of Electronics Engineering is extremely delighted to share its recent achievement in the form of a "Patent Grant" titled "Folded Substrate Integrated Waveguide Derived Specially Designed Microwave Rotary Sensor" with grant no. 579630 effective from June 2025, developed by the inventors, Prof. Prashant Kumar Varshney and his research scholar Ms. Rachna Prabha.

About the Innovation:

"Angular movement of mechanical components is one of the key operations among most of the modern day machines utilized in various sectors including automation, transportation, domestic, and industry. For this purpose, the present invention introduces a microwave technology motivated rugged, more sustainable and better performance delivering rotary sensor for precise measurements of angular movements. The proposed sensor utilizes the combination of two components – stator and rotor. The stator is basically substrate integrated waveguide derived entity while rotor is a resonating element. This novel folded SIW derived microwave rotary sensor is able to sense high dynamic range of angles for 140° , providing better linearity and on the top, best sensitivity of around $7.97 \text{ MHz}/^\circ$ compared to most of the available literature till date."

INTELLECTUAL PROPERTY INDIA
PATENTS, TRADE MARKS, DESIGN, GEOGRAPHICAL INDICATIONS

कम सं/SL No :033139723

पेटेंट कार्यालय, भारत सरकार | The Patent Office, Government Of India
पेटेंट प्रमाण पत्र | Patent Certificate
(पेटेंट नियमावली का नियम 74) | (Rule 74 of The Patents Rules)

पेटेंट सं. / Patent No. : 579630
आवेदन सं. / Application No. : 202531059906
फाइल करने की तारीख / Date of Filing : 23/06/2025
पेटेंटी / Patentee : INDIAN INSTITUTE OF TECHNOLOGY (INDIAN SCHOOL OF MINES), DHANBAD
आविष्कारकों का नाम / Name of Inventor(s) : 1.Prashant Kumar Varshney 2.Rachna Prabha

प्रमाणित किया जाता है कि पेटेंटी को, उपरोक्त आवेदन में बयां प्रकटित *Folded Substrate Integrated Waveguide Derived Specially Designed Microwave Rotary Sensor* नामक आविष्कार के लिए, पेटेंट अधिनियम, 1970 के उपबंधों के अनुसार आज तारीख जून 2025 के तेइसवें दिन से बीस वर्ष की अवधि के लिए पेटेंट अनुदत्त किया गया है।

It is hereby certified that a patent has been granted to the patentee for an invention entitled *Folded Substrate Integrated Waveguide Derived Specially Designed Microwave Rotary Sensor* as disclosed in the above mentioned application for the term of 20 years from the 23rd day of June 2025 in accordance with the provisions of the Patents Act, 1970.

अनुदान की तारीख : 30/01/2026
Date of Grant : 30/01/2026

विशेषी - इस पेटेंट के नवीकरण के लिए फीस, यदि इसे बनाए रखा जाना है, जून 2027 के तेइसवें दिन की और उसके परचात प्रत्येक वर्ष में उसी दिन देय होगी।
Note. - The fees for renewal of this patent, if it is to be maintained, will fall / has fallen due on 23rd day of June 2027 and on the same day in every year thereafter.

अज्ञात पी. प्रिंटर
पेटेंट नियंत्रक
Controller of Patents

जागरण धनबाद, 30 जनवरी, 2026

कैंपस जागरण

सेमीकंडक्टर चिप निर्माण की ओर बढ़ा आइएसएम

टीम 65 नैनोमीटर तकनीक पर आधारित आरआइएससी-वी माइक्रो प्रोसेसर सिस्टम आन चिप डिजाइन करेगी

में एक को
शिविर
समूह धनबाद
निश्चुलक मिंगी
तयोजन किया
सर्वशरी
नगर में
एवं
स्वनिर्मित
पीरोग से
न की
विवार
से पूर्व
प्रो 31
त होना
भोजन
(जास)

ल
तना
लया
म

जागरण संवाददाता, धनबाद: सेमीकंडक्टर तकनीकी दुनिया की रोड़ हैं। मोबाइल फोन, आटोमोबाइल, 5जी नेटवर्क, स्वास्थ्य उपकरण और इलेक्ट्रॉनिक सेना उपकरणों में सेमीकंडक्टर से बने चिप्स का उपयोग हर जगह हो रहा है। सेमीकंडक्टर के क्षेत्र में आइआईटी आइएसएम के छात्रों की टीम को देशभर की शीर्ष 37 टीमों में स्थान मिला है। यह संस्थान के इलेक्ट्रॉनिक्स इंजीनियरिंग विभाग के लिए गर्व का अवसर है कि आइआईटी आइएसएम का चयन वीएलएसआई सोसायटी आफ इंडिया (वीएसआई) के प्रतिष्ठित एक टेप आउट प्रति छात्र कार्यक्रम में हुआ है। इसका उद्देश्य भारत में इंडस्ट्री-रेडी चिप डिजाइन टैलेंट तैयार करना है। इसके अतिरिक्त, संस्थान ने वीएसआई के सीईओ डा. सत्य गुप्ता और उनकी टीम को वन टीओपीएस पहल के माध्यम से भारत में मजबूत सेमीकंडक्टर इकोसिस्टम बनाने के लिए धन्यवाद



आइआईटी आइएसएम के चयनित छात्रों की टीम • जागरण

इस कार्यक्रम के तहत वीएसआई छात्रों को एमपीवी चिप टेप-आउट के लिए पांच लाख तक की फंडिंग प्रदान करेगी, जिससे वे अपना पूरा सिलिकॉन प्रोटोटाइप तैयार कर सकें। आइआईटी आइएसएम की टीम 65 नैनोमीटर तकनीक पर आधारित आरआइएससी-वी माइक्रो प्रोसेसर सिस्टम-ऑन-चिप

डिजाइन (सुरक्षा संचालन केंद्र) और टेप-आउट करेगी। यह सुरक्षा संचालन केंद्र विशेष रूप से रोबोटिक्स और ड्रोन एप्लिकेशन को ध्यान में रखकर बनाया जा रहा है। इसमें ल्यूनेक्स सपोर्ट वाला आरआइएससी-वी कोर और कस्टम एआई एक्सेलेरेटर होगा, जो कन्वोल्यूशनल न्यूरल नेटवर्क (सीएनएन) जैसे रियल-टाइम

कंप्यूटर विज्ञान टास्क को संभाल सकेगा। यह प्रोजेक्ट ओपन-सोर्स आरआइएससी-वी आर्किटेक्चर और स्वदेशी बड़े पैमाने पर एकीकरण डिजाइन कार्य प्रवाह पर आधारित है, जो भारत सेमीकंडक्टर मिशन और आत्मनिर्भर भारत के विजन को पूरा करेगा।

टीम का अकादमिक मार्गदर्शन प्रो. राजीव कुमार रंजन करेंगे। वहीं, इंडस्ट्री मेंटर के रूप में सीनियर मैनेजर डिजाइन वेरिफिकेशन इंजीनियरिंग और एनालाग डिवाइस से जुड़े सुमित कुमार हैं। प्रो. रंजन ने बताया कि भारत अब आत्मनिर्भरता की दिशा में तेजी से कदम बढ़ा रहा है। आइआईटी आइएसएम में सेमीकंडक्टर चिप्स पर काफी काम हो रहा है और यह क्षेत्र में उत्कृष्ट प्रदर्शन करेगा। टीम के सदस्य महारिषि सोनवानी, सौम्यजीत सामंता, नितिन सिंघल, अमरकांत, आदित्य रंजन, धनंजय झा, कृष्ण सुरलाकर और प्रद्युम्न अग्रवाल हैं।

आइएसएम के शोधार्थी डा. शिवशंकर को मिला सम्मान

जागरण संवाददाता, धनबाद: आइआईटी आइएसएम के कैमिकल इंजीनियरिंग के शोधार्थी डा. शिवशंकर प्रसाद को गांधीअन यंग टेक्नोलॉजिकल इनोवेशन एप्रिसिएशन अवार्ड 2024 से सम्मानित किया गया है। यह सम्मान भारत सरकार के प्रिंसिपल साइंटिफिक एडवाइजर प्रो. अजय कुमार सुंद ने प्रदान किया। डा. प्रसाद को यह पुरस्कार उनके पयुरान डाइकाबॉक्सिलिक एसिड के प्रोडक्शन से संबंधित इनोवेटिव रिसर्च के लिए मिला है। एफडीसीए एक महत्वपूर्ण बायोफार्मास्यूटिकल है, जो इको-फ्रेंडली और सस्टेनेबल मटेरियल बनाने में सहायक हो सकता है। डा. प्रसाद ने यह कार्य प्रो. एजाज अहमद और प्रो. सुमन दाता के मार्गदर्शन में किया। जनवरी 2026 में उनकी टीम को 1.51 करोड़ की प्रोजेक्ट फंडिंग मिली है।

The Department of Electronics Engineering at IIT (ISM) Dhanbad has taken a significant step toward semiconductor chip development by advancing work on indigenous processor design. A dedicated team of students and researchers is working on a 65-nanometer technology-based RISC-V microprocessor System-on-Chip (SoC), marking an important milestone in the institute's contribution to India's semiconductor ecosystem. The initiative highlights the department's strong focus on innovation, research excellence, and self-reliance in advanced electronics and chip design.

Dr. Aman Sikri

Assistant Professor

Research Interest: Reconfigurable Intelligent Surfaces (RISs), Non Orthogonal Multiple Access (NOMA), Free Space Optical (FSO) Communications, Rate Splitting Multiple Access (RSMA).



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. Debjani Mitra

Professor

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

Dr. Samrat Mukhopadhyay

Assistant Professor

Research Interest: Online Machine Learning, Compressed Sensing, Nonconvex and Stochastic Optimization, Sparse Adaptive Filtering.



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. 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. 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. 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. Nirupama Mandal

Associate Professor

Research Interest: Transducer Design, Controller Design, Instrumentation System Design, Smart Sensing System and Smart Instrumentation.



Dr. Mrinal Sen

Associate Professor

Research Interest: Photonic Integrated Circuits, Embedded Systems.

FACULTY PROFILE

Dr. Sushrut Das

Professor

Research Interest: Microwave Passive Networks, Antennas, Wireless Energy Transfer and Energy Harvesting Microwave Filters.**Dr. Ravi Kumar Gangwar**

Professor

Research Interest: Dielectric Resonator Antennas, MIMO Antennas, Bio-electromagnetics And Microwave Measurements.**Dr. Santanu Dwari**

Professor

Research Interest: RF & Microwave Engineering, Antenna.**Dr. Prashant Kumar Varshney**

Assistant Professor

Research Interest: SIW Based Microwave Planar Sensors, Metamaterial Inspired Microwave Sensors for Various Applications.**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.**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. Jaisingh Thangaraj**

Associate Professor

Research Interest: Optical Networks, Wireless Sensor Networks, VANET, Software Defined Networks, Optical Instrumentation.**Dr. Devendra Chack**

Associate Professor

Research Interest: Photonic Integrated Circuits, Advance Optical Communications, Radio-over-Fiber System For 5G/6G.**Dr. Jitendra Kumar**

Professor

Research Interest: Nano-optoelectronics, Nanoelectronics.**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 Modules for Photonic QKD Network Development of Quantum Fiber Optic Network.

FACULTY PROFILE

FACULTY PROFILE

Dr. Naresh Sharma

Assistant Professor

Research Interest: Integrated Photonics, Programmable Photonics, Free Space Optics, Photonic Crystals Applications.



Dr. Sanjeev Kumar Raghuwanshi

Professor

Research Interest: Numerical Method of Optical Waveguides, Optical Sensor, Microwave Photonics, Optical Fiber Communication.



Dr. Swati Rajput

Assistant Professor

Research Interest: Silicon Photonics for Next Generation Optical Communication, Nano photonics, Semiconductor Optoelectronics.



Dr. Jeevesh Kumar

Assistant Professor

Research Interest: 2D Materials, Emerging Electronic Devices, Atomistic Simulation, Device Fabrication, material & Device characterizations.



Dr. Shalu Rani

Assistant Professor

Research Interest: Energy Storage Devices for Wearable Electronics Including Advanced Flexible Supercapacitors/Micro-supercapacitors.



Dr. Subindu Kumar

Professor

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

Dr. Rajeev Kumar Ranjan

Associate Professor

Research Interest: VLSI Design, Mem-element (Memristor, Memcapacitor, And Meminductor) Design.



Dr. Manodipan Sahoo

Associate Professor

Research Interest: 2D Materials-based Devices and Circuits, Nanomaterials based Sensors, Heterogeneous 3D ICs, Neuromorphic Circuits.

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. Kaushik Mazumdar

Associate Professor

Research Interest: VLSI Design, Electronic Low Dimensional Systems, Analysis and Design of MOSFET & Nano-Devices.



Nanoelectronics and VLSI



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

ENGINEERING PROFESSIONALS APPLY

The Department of Electronics Engineering at IIT (ISM) Dhanbad is seeking highly motivated research personnel for multiple ongoing projects in cutting-edge domains such as 6G Communication, VLSI Design, MEMS, and Signal Processing. Applications are invited for various positions, including Junior Research Fellows (JRF) and Project Associates

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

<https://people.iitism.ac.in/~research/Projectopening.php>



Working at the Department of Electronics Engineering offers access to state-of-the-art laboratory facilities, a collaborative research environment, and the opportunity to enroll in a Ph.D. program (subject to departmental norms and performance).

EDITORIAL TEAM

Dr. Jeevesh Kumar, Mr. Bappa Ghosh, Mr. Vaibhav ♥

[LinkedIn](#) [Website](#)

Spark 2026.01