SPARK e-NEWSLETTER

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DEPARTMENT OF ELECTRONICS ENGINEERING

INDIAN INSTITUTE OF TECHNOLOGY

(INDIAN SCHOOL OF MINES), DHANBAD

INSIDE THIS ISSUE

- EXCHANGING IDEAS AND INNOVATIONS
- PUBLICATION
- PATENT GRANT
- 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 March 2026.

An engaging and insightful interaction session with distinguished scientists from the Defence Research and Development Organisation (DRDO) was successfully organized at the Department of Electronics Engineering, IIT (ISM) Dhanbad. This session was conducted as part of the ERIPR project review, fostering meaningful collaborative discussions, knowledge exchange and exploration of future research opportunities between academia and defence research experts.

In addition, several distinguished faculty members—Prof. R. K. Gangwar, Prof. R. K. Ranjan, Prof. M. Sahoo, Prof. S. K. Raghuwanshi, Prof. P. K. Varshney, Prof. A. Sikri, and Prof. S. Mukhopadhyay—collectively strengthened the department's academic and research excellence through their valuable scholarly publications, reflecting a sustained commitment to innovation and impactful research. Furthermore, the Department is extremely delighted to share its recent achievement in the form of a Patent Grant, developed by the inventors Prof. Ravi Kumar Gangwar and his research scholars, Mr. Amit Kr Pandey and Dr. Kundan Kr Suman.

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

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

An interaction session with distinguished scientists from Defence Research and Development Organisation (DRDO) was successfully conducted at Department of Electronics Engineering, IIT (ISM) Dhanbad, as part of the ERIPR project review and collaborative discussions. The visiting scientists, **Dr. Meena D**, Scientist-G from the Electronics and Radar Development Establishment (LRDE), and **Smt. Anuya Venkatesh**, Scientist associated with the Defence Bioengineering and Electromedical Laboratory, actively engaged with faculty members, researchers and students during the session.

The interaction provided a valuable platform for in-depth discussions on ongoing research initiatives, emerging technological advancements and potential avenues for collaboration between DRDO laboratories and the institute. Key areas of focus included advancements in radar systems, electronics, bioengineering applications and interdisciplinary research aligned with national defence needs. The visiting scientists shared insights into current DRDO projects, expectations from academic collaborations and opportunities under the ERIPR framework.

The session fostered a spirit of collaboration and knowledge exchange, encouraging participants to explore innovative research directions and strengthen academia-industry partnerships. Overall, the visit proved to be highly productive, paving the way for future joint research endeavours and contributing to the advancement of cutting-edge technologies in strategic domains.

PUBLICATIONS

Kapil Gangwar, Kundan Kumar Suman, Som Pal Gangwar and **Ravi Kumar Gangwar**, "*A Novel compact printed inverted-F antenna integrated into biker helmets for consumer internet of vehicles*," published in **IEEE Transactions on Consumer Electronics.**

DOI: 10.1109/TCE.2026.3674922

Research Overview:

This work introduces a novel Planar Inverted-F Antenna (PIFA) design optimized for biker's helmets, aimed at enhancing rider safety by facilitating effective communication systems. Road traffic injuries, a significant global health concern, disproportionately affect motorcycle riders, with mobile phone usage while riding increasing this risk. A helmet model, developed in CST software, serves as a testbed for evaluating antenna characteristics. The presented PIFA design, covering a frequency range from 2.36-2.6 GHz, offers a 9.8% impedance bandwidth around the 2.45 GHz ISM band and maintains high efficiency and stability despite variations in helmet materials and placements. Detailed specific absorption rate (SAR) analysis is done to ensure compliance with safety protocols. A link budget analysis examines the communication feasibility between helmet-mounted and mobile phone antennas, as well as between different helmet users. This study contributes significantly to the field of antenna-integrated helmet technology, offering a viable solution to enhance rider safety through improved communication capabilities.

Three standout features of this study include:

1)Robust Performance Against Detuning: The antenna maintains stable bandwidth and high efficiency despite variations in helmet materials and antenna placement, which is crucial for reliable performance in real-world conditions.

2)High Efficiency: The proposed design achieves an impressive 88% efficiency, ensuring longer battery life and superior performance in energy-constrained environments, making it highly suitable for wearable applications like smart helmets.

3) Comprehensive Safety and Performance Analysis: The paper thoroughly examines the impact of the antenna's placement on bandwidth, efficiency, gain, link margin, and SAR, ensuring that it operates safely and effectively within the intended frequency range, even in the presence of a human head model.

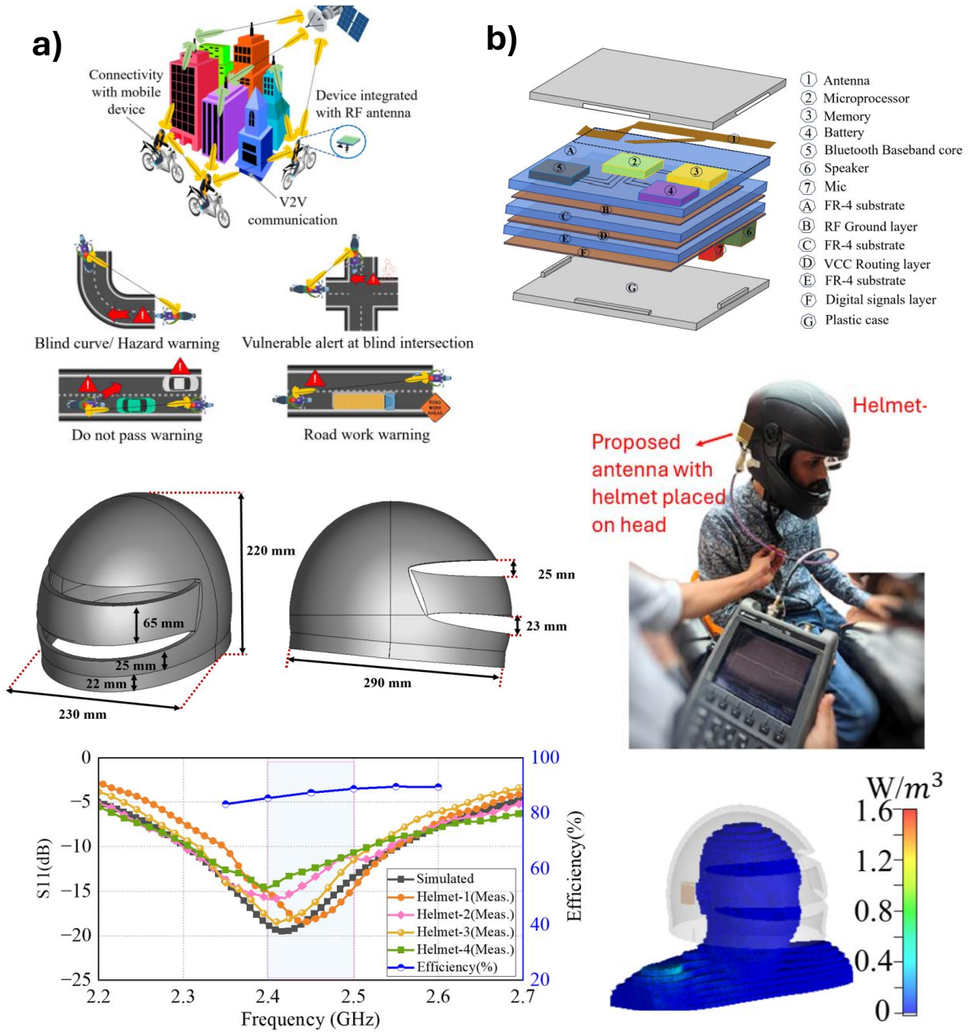


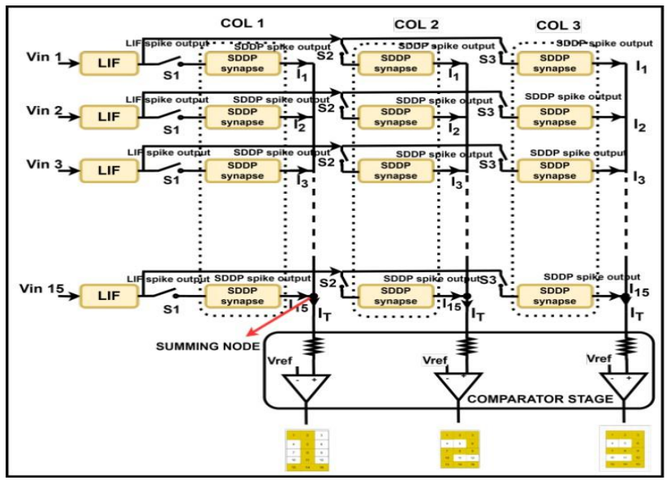
Fig. (a) Illustration of the biker's helmet intelligently connected for various vehicular safety communication, (b) architecture of the handheld system with proposed antenna, (c) modelled helmet, (d) measurement setup, (e) Measured results and (f) SAR analysis on the human voxel head model

PUBLICATIONS

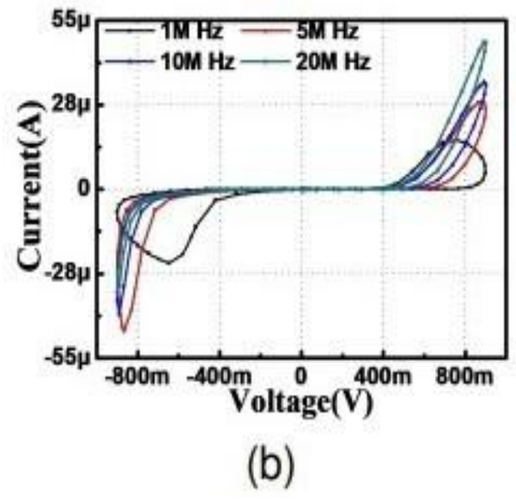
- S. Bediga, T. K. Sharma, A. Kalakola, V. Upadhyay, R. K. Ranjan, and S.-M. Kang, "*Compact Memristor Emulator with SDDP for Integrated Neuromorphic Temporal Learning,*" IEEE Transactions on Circuits and Systems for Artificial Intelligence, pp. 1–13, 2026. DOI: https://doi.org/10.1109/TCASAI.2026.3676004.

Brief Description:

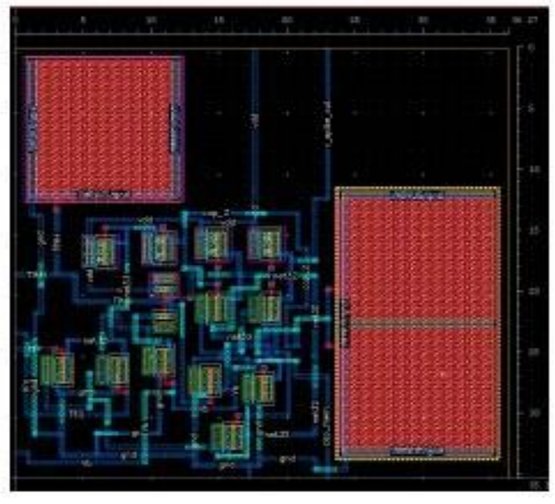
This work presents a compact memristor emulator architecture enabling efficient temporal learning for neuromorphic systems. The proposed design reduces hardware complexity while maintaining high accuracy and energy efficiency. Experimental validation demonstrates robustness under noise and process variations.



Architecture for pattern recognitionincluding comparators.



PHL at different frequencies.



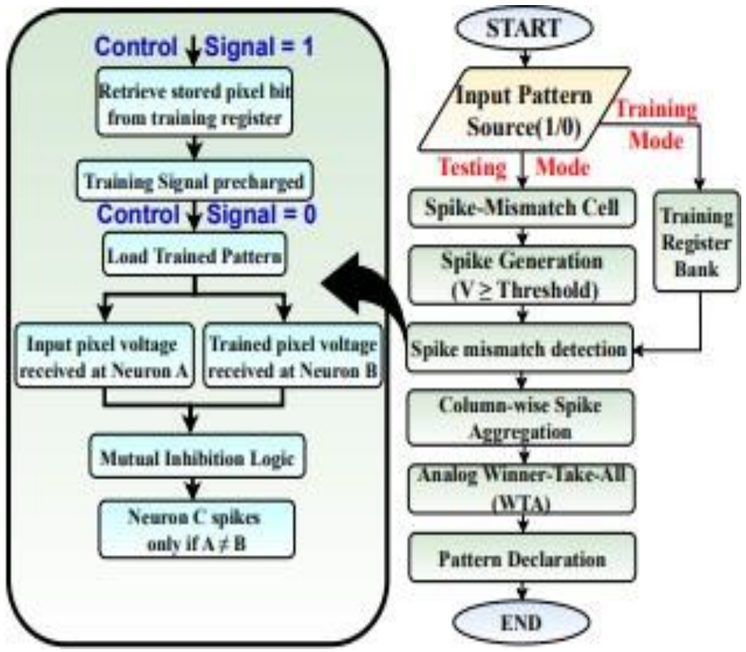
Layout of the Leaky Integrate and Fire (LIF) circuit

PUBLICATIONS

V. Upadhyay, N. Singhal, B. S. Makhdoomi, V. Saxena, **R. K. Ranjan**, and S.-M. Kang, "*Design of a 65-nm CMOS Neuromorphic Circuit for Sequential Alphanumeric Pattern Detection With Experimental Verification*," **IEEE Transactions on Very Large Scale Integration (VLSI) Systems**, pp. 1–12, 2026.
DOI: https://doi.org/10.1109/TVLSI.2026.3674147.

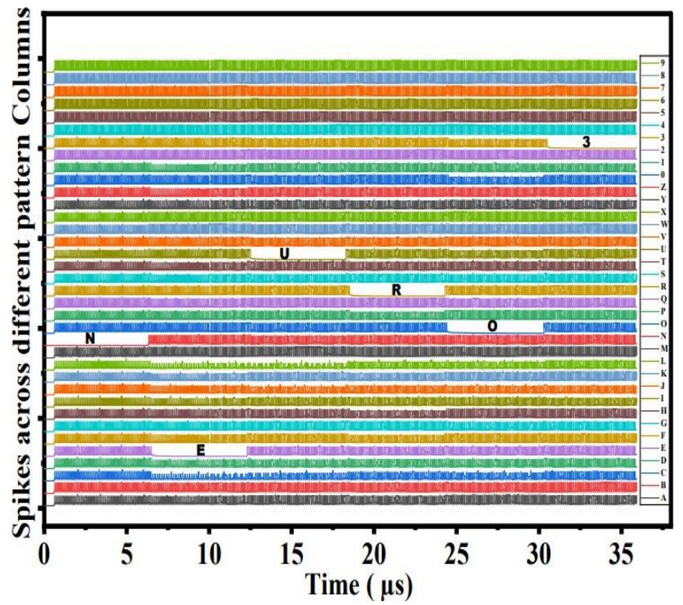
Brief Description:

This work presents a low-power spiking mismatch detection architecture validated through circuit-level simulations. The design enables pixelwise mismatch detection in the spike domain while capturing positional and density variations of input patterns. A 64- bit implementation using sequential EMNIST-derived 8 × 8 inputs demonstrates correct spike transitions for the test word NEURO3. Hardware emulation using discrete ICs (SN7404, CD4007) and capacitors further confirms accurate spike generation, inhibition behaviour, and mismatch detection consistent with simulation results.



Flowchart for the working of the proposed architecture

EMNIST-derived 8 × 8 alphanu- meric patterns dataset for train-ing



Spikes across columns in real time for pulse-driven input

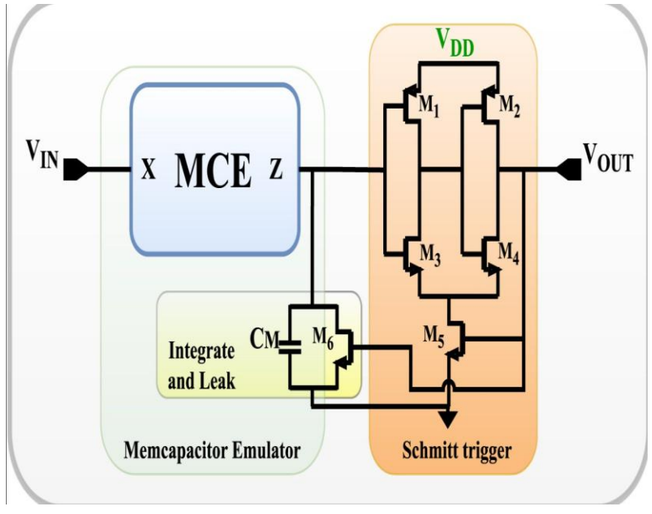
PUBLICATIONS

- R. Jaiswal, B. S. Makhdoomi, V. Upadhyay, and **R. K. Ranjan**, "*An event-driven bioinspired associative learning circuit using CCTA-controlled memcapacitive emulator with spike generation*," **Integration**, vol. 109, p. 102717, Mar. 2026.

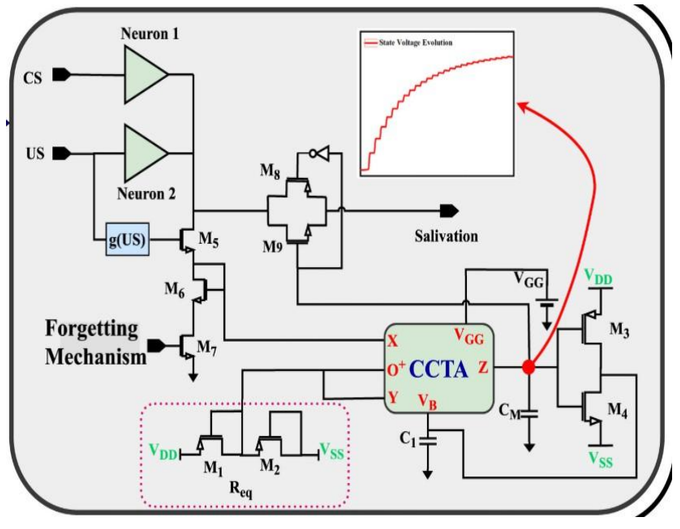
  DOI: https://doi.org/10.1016/j.vlsi.2026.102717.

Brief Description:

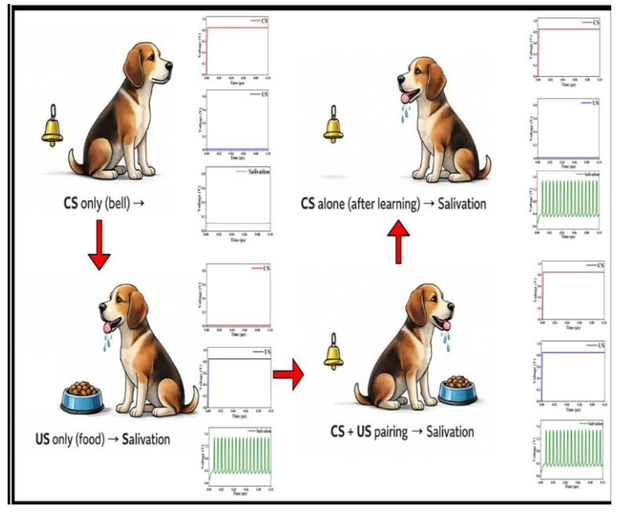
A compact charge-controlled memcapacitor emulator is proposed using a single CCTA, one CMOS inverter, and two capacitors in 90 nm CMOS technology. The design analytically models pinched $q-V$ hysteresis with clearly separable dynamic (memory) and static capacitance components. Robustness is validated through circuit simulations, PVT and Monte Carlo analyses, and hardware experiments using AD844, CA3080, and CD4007 devices. The memcapacitor is further integrated into a LIF neuron and associative learning architecture, enabling low-power bioinspired Pavlovian conditioning.



MIF neuron circuit.



Implementation of associative learning in the proposed neuro- morphic system.



Four cases representing the stages of Pavlovian associative learning in dog behavior.

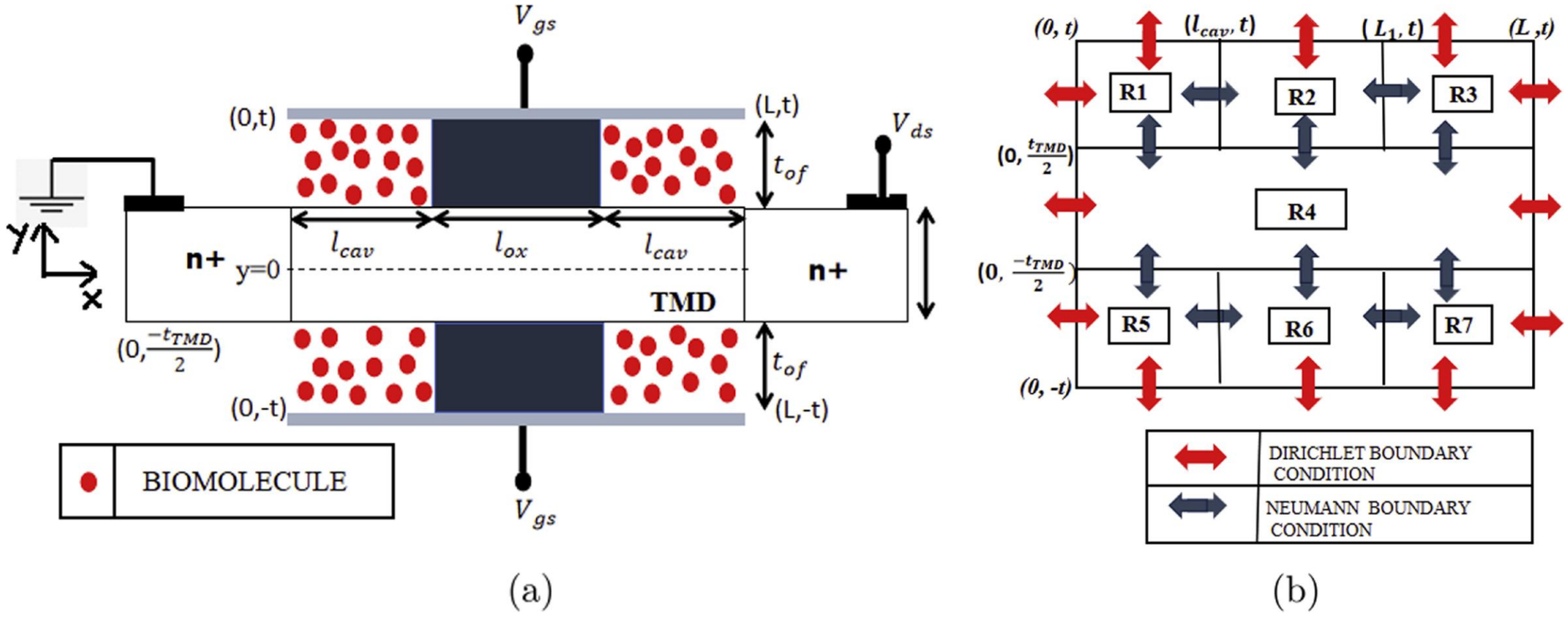
PUBLICATIONS

K. Jain, M. Chauhan, **M. Sahoo**, "*An Accurate Analytical Modeling of Dielectric Modulated 2-D Material FET-Based Biosensors Using Green's Function Approach*", **Physica Scripta**, IOP Publishers, March 2026,

DOI: https://doi.org/10.1088/1402-4896/ae49bf.

Brief Description:

Field-Effect Transistor (FET)-based biosensors offer a significant advancement in the detection of biomolecules due to their ability to convert biological events into measurable electrical signals without the need for labeling. The sensor architecture is defined by a dual-gate FET with dual-sided cavities filled with biomolecules to amplify the electrostatic modulation. According to the author's knowledge, there has been no reports on the analytical modeling of biosensors for accurately modeling 2-D potential distribution inside the channel utilizing Green's function approach.By dividing the device into multiple dielectric regions, the 2-D Poisson's equation is solved accurately using a multi-zone Green's function approach under mixed boundary conditions. This analytical framework enables precise evaluation of 2-D potential distribution and I-V characteristics in the subthreshold regime, which are critical for quantifying biomolecular interactions. The proposed analytical model is validated against Silvaco TCAD for both the surface potential and I-V characteristics in the subthreshold regime for different channel materials and lengths and strong correlation is achieved between the analytical and TCAD data. The analytical model is utilized for evaluating the interaction of FET-based biosensors to different biomolecules and higher drain current sensitivity is achieved with increasing dielectric constant of biomolecules.



(a) Schematic of 2-D material-based Dielectric Modulated FET-based Biosensor. Here, we have considered the channel consisting of multi-layer 2-D TMD material.
(b) The segmented structure of the proposed device architecture with defined boundary conditions.

PUBLICATIONS

Aman Sikri, Samrat Mukhopadhyay, Bassant Selim, and Georges Kaddoum," *Accurate Statistical Characterization for Cooperative Multi RIS-Aided Wireless System*". **IEEE Communications Letters.**

DOI: https://doi.org/10.1109/LCOMM.2026.3677601

Brief Description:

Reconfigurable intelligent surfaces (RIS) constitute a promising technology for beyond- Generation (B5G)/ Generation (6G) wireless systems. In this letter, using recursion approach, the second and fourth moment for the cooperative RIS-aided end-to-end channel are derived. Based on the moment matching (MM) approach, these moments are utilized to approximate the distribution for the cooperative RIS-assisted channel. It is shown that the outage probability (OP) and ergodic capacity (EC) performance of the considered system improves with the increase in when the number of reflecting elements (REs) per RIS is large.

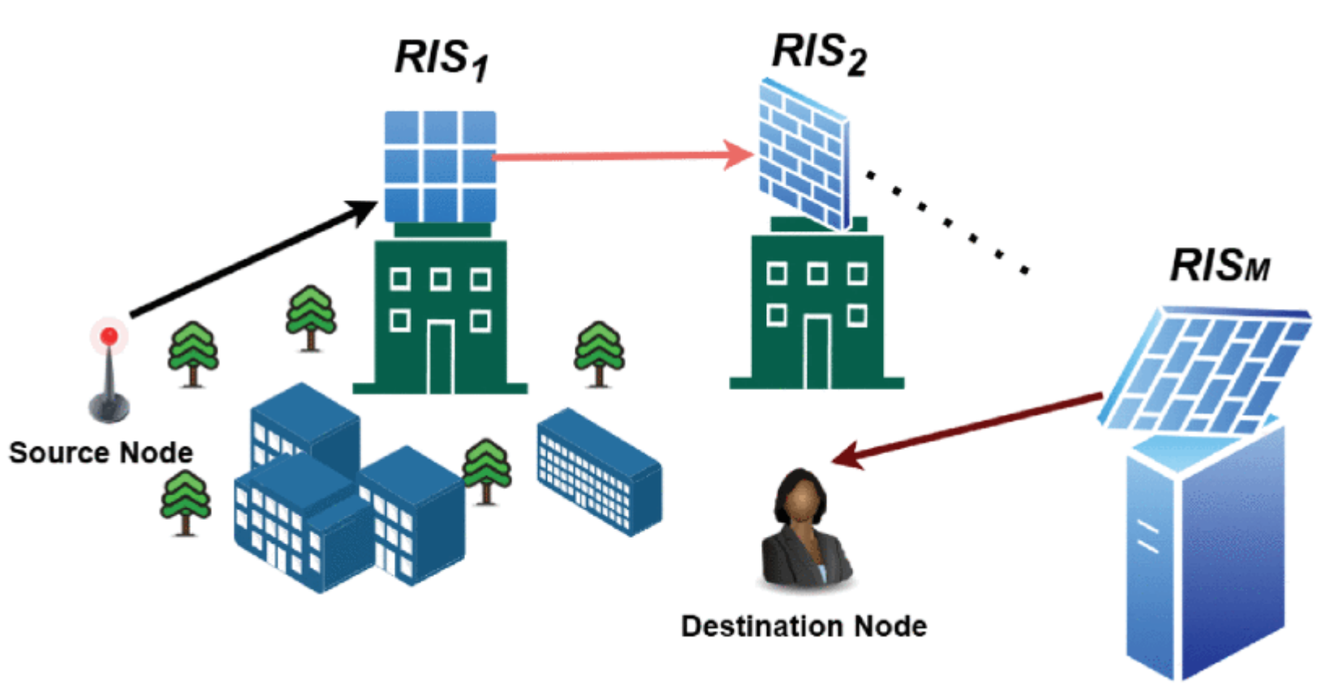


Fig Cooperative RISs-aided communication system.

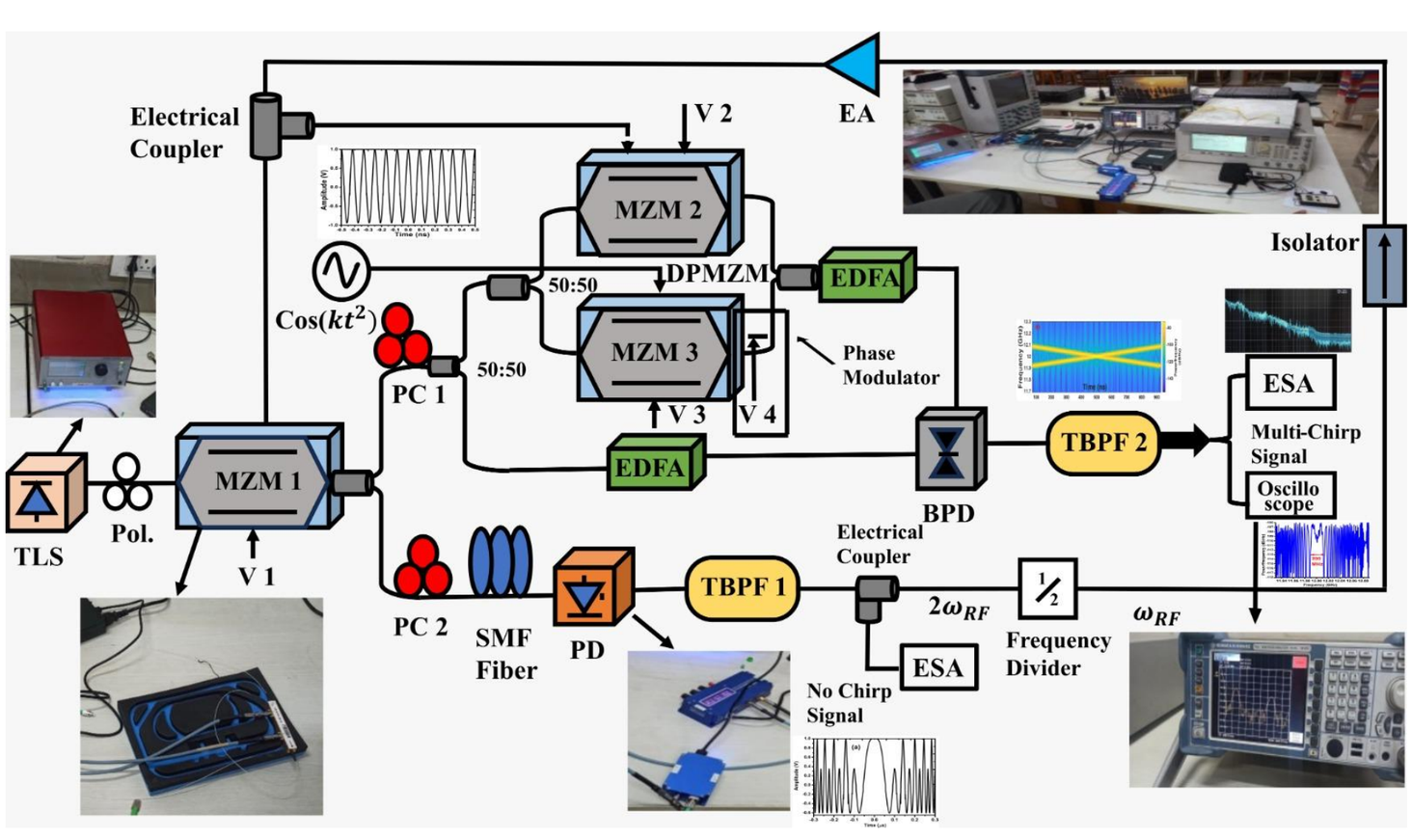
PUBLICATIONS

Sanjeev Kumar Raghuwanshi "*Simultaneous Optical Generation of Un-chirp and Multiple Chirp Rate Microwave Waveform with Frequency Multiplying Capacity Based on a Tunable Optoelectronic Oscillator*", **IEEE Journal of Quantum Electronics**,

DOI: 10.1109/JQE.2026.3679643

Brief Description:

A photonic approach to generating multiple chirp rates microwave signal with frequency multiplying capability is reported based on a tunable optoelectronic oscillator (OEO). There is an option to select a single chirp signal of a particular chirp rate and center frequency out of multiple chirp rate signals without any modification in the experimental setup. In the proposed scheme, one balanced photodetector (BPD) is used for the detection of multiple chirp rate signals with multiple center frequencies and one PIN photodetector (PD) is used for the detection of frequency doubled un-chirp signal. A single dual linear chirp signal of the fixed tunable central frequency can be generated by the same experimental setup by adjusting the bias voltage of the phase modulator. In the proposed scheme, one Mach-Zehnder Modulator (MZM) and one Dual-Parallel Mach-Zehnder Modulator (DPMZM) are cascaded and operate at MITP (minimum transmission point) in push-pull mode to achieve the carrier suppression frequency modulated optical signal at the output end. The lower MZM is properly biased to serve as an intensity modulator and further constructs the closed-loop OEO to generate a microwave signal. When the OEO loop gain is slightly more than the total loss of the loop, an oscillating frequency centered at the frequency decided by the microwave photonic filter (MPF) can stably occur.



PUBLICATIONS

Saptarshi Mukherjee, Rachna Prabha, and **Prashant Kumar Varshney**, "*Spatially arranged unevenly coupled CSRRs loaded highly sensitive microwave sensor for bio-fluids,*" **Microwave and Optical Technology Letters**, vol. 68, no. 3, e70579, 2026.

DOI: 10.1002/mop.70579

Brief Description:

This study presents a sophisticated sensor based on microwave resonators employing complementary split ring resonators (CSRRs), engineered with uneven coupling and a unique spatial configuration to attain high sensitivity in the detection and characterization of bio-fluids. The suggested sensor focuses on medical diagnostic applications, such as blood glucose monitoring and evaluation of electrolyte balance. The core, unevenly coupled CSRR-loaded resonator sensor is developed using CST Microwave Studio (CST-MWS), with its principal parameters refined to improve sensitivity at the target frequency of X-band, roughly 9.51 GHz. Thereafter, the proposed sensor is constructed on a commercially available FR-4 substrate, and its scattering parameters are assessed using a network analyzer to ascertain the resonance frequency and insertion loss of the unloaded structure. It exhibits a remarkable sensitivity of 409 MHz/ r across a permittivity range of 2–10 while requiring only a minimal sample volume for testing. Experimental validation confirms the sensor's efficacy in detecting permittivity fluctuations in response to frequency shifts. The results validate that the sensor is very appropriate for glucose monitoring, dehydration detection, and identifying electrolyte imbalances in clinical and point-of-care applications. The proposed sensor attains a sensitivity of 4.405%, surpassing numerous previously reported designs.

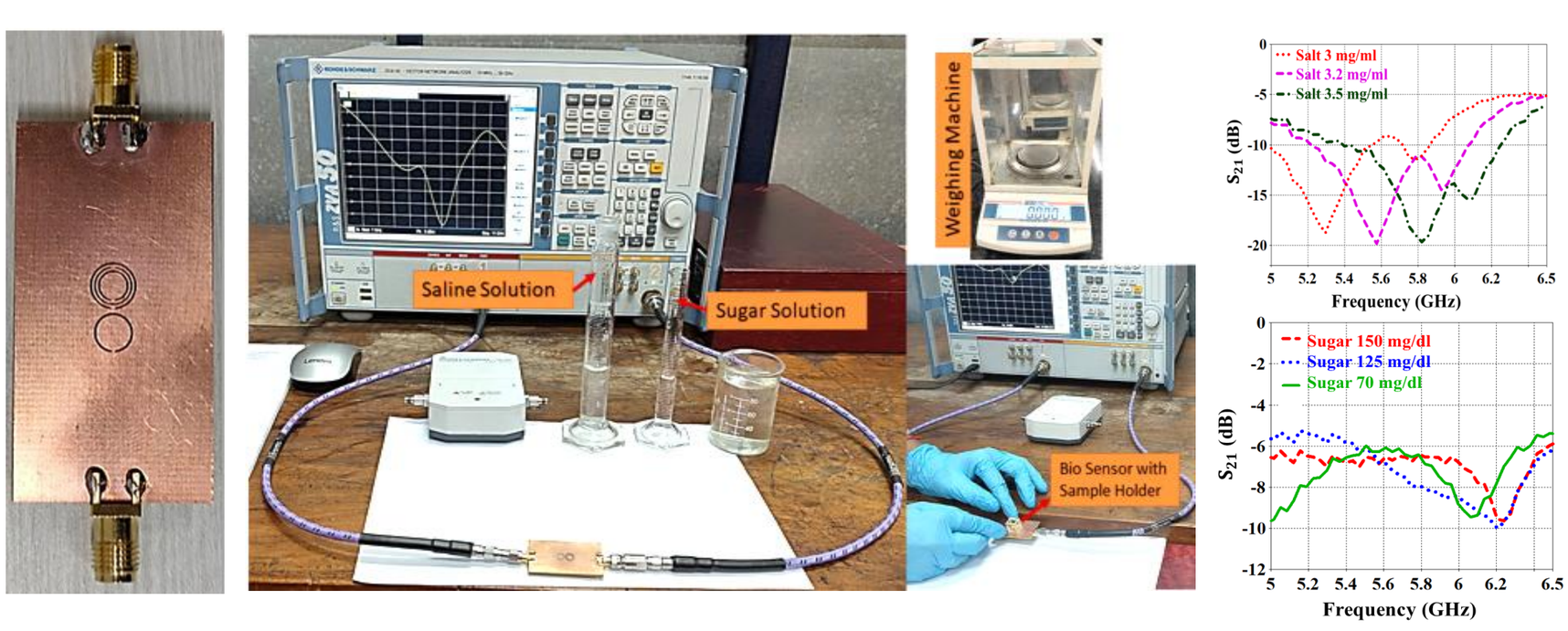


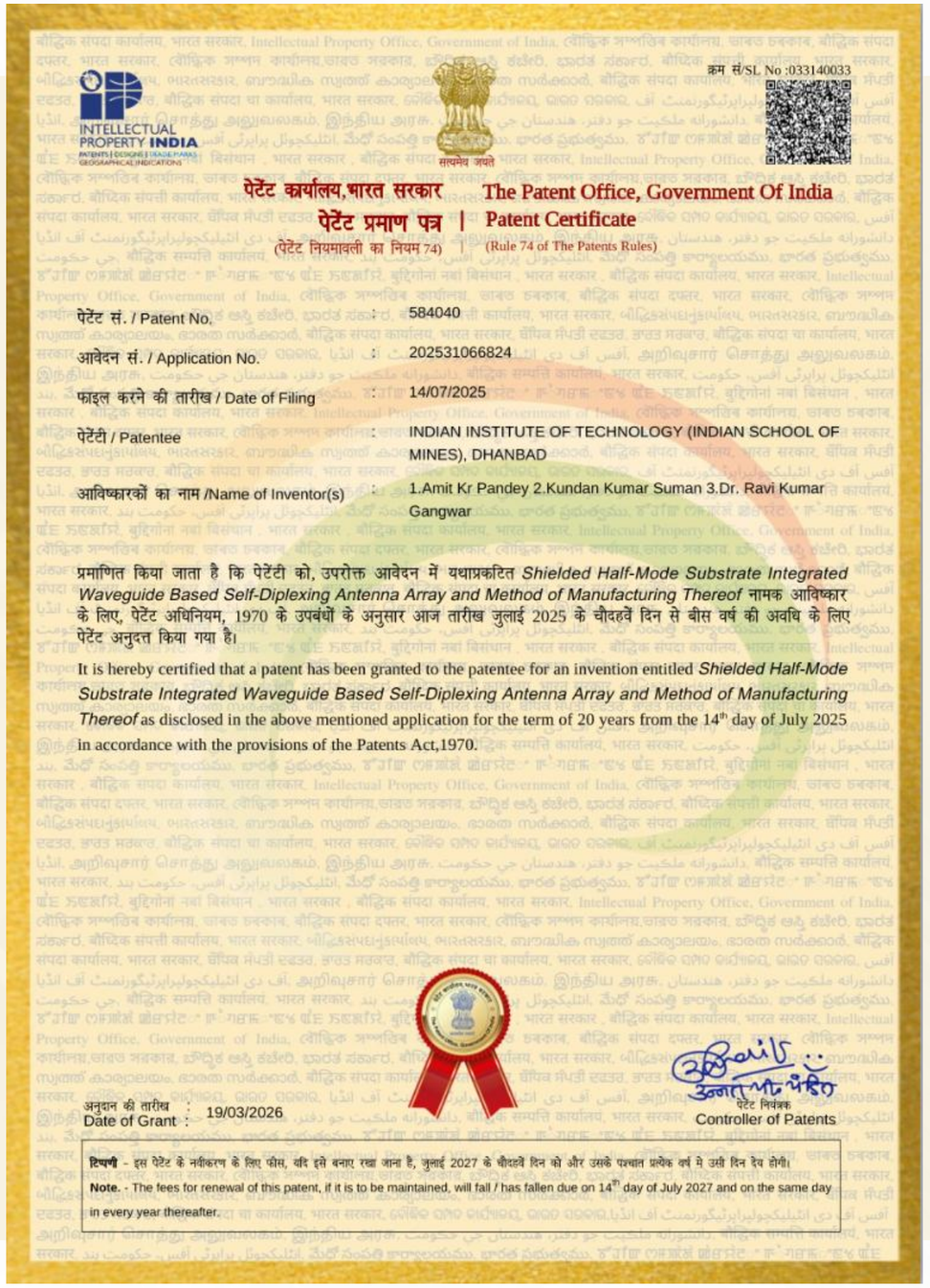
Fig. Measurement setup displaying exploration of the UC-CSRR-based sensor for detecting concentrations of sugar and saline in aqueous solution.The measured responses showing distinct resonance shifts for aqueous samples with varying saline and sugar concentrations.

NEW **INNOVATON**

Department of Electronics Engineering is extremely delighted to share its recent achievement in the form of a “Patent Grant” titled “Shielded Half-Mode Substrate Integrated Waveguide-Based Self-Diplexing Antenna Array and Method of Manufacturing Thereof”, granted by the Intellectual Property Office, India (Patent No. IN584040 B1), effective from March 2026, developed by the inventors **Mr. Amit Kr Pandey, Dr. Kundan Kumar Suman, and Prof. Ravi Kumar Gangwar.**

About the Innovation:

With the rapid advancement of Intelligent Transportation Systems (ITS) and autonomous driving technologies, reliable long-range wireless communication for vehicular applications across multiple frequency bands has become essential. However, conventional systems requiring high gain at multiple frequencies use multiple antennas or additional circuitry for isolation, increasing complexity and cost. To address this, the present invention introduces a shielded half-mode substrate integrated waveguide-based self-diplexing antenna array, in which a microstrip-based power divider feeds two self-diplexing antenna elements, enabling dual-frequency operation within a unified structure with inherent isolation without the need for external diplexers. The design achieves gain higher than 8 dBi at both frequencies with good radiation efficiency and interport isolation exceeding 27 dB. Shielding vias reduce radiation leakage from the open edges of the HMSIW cavity, thereby improving overall performance, while the slot configuration enables independent resonance at the desired frequency bands. The antenna has been validated under realistic conditions, demonstrating stable performance for DSRC and public safety applications in vehicular connectivity.:



INTELLECTUAL PROPERTY INDIA
PATENTS | DESIGNS | TRADE MARKS | GEOGRAPHICAL INDICATIONS

सत्यमेव जयते

क्रम सं/SL No :033140033

पेटेंट कार्यालय,भारत सरकार
पेटेंट प्रमाण पत्र |
(पेटेंट नियमावली का नियम 74)

The Patent Office, Government Of India
Patent Certificate
(Rule 74 of The Patents Rules)

पेटेंट सं. / Patent No.	:	584040
आवेदन सं. / Application No.	:	202531066824
फाइल करने की तारीख / Date of Filing	:	14/07/2025
पेटेंटी / Patentee	:	INDIAN INSTITUTE OF TECHNOLOGY (INDIAN SCHOOL OF MINES), DHANBAD
आविष्कारकों का नाम /Name of Inventor(s)	:	1.Amit Kr Pandey 2.Kundan Kumar Suman 3.Dr. Ravi Kumar Gangwar

प्रमाणित किया जाता है कि पेटेंटी को, उपरोक्त आवेदन में यथाप्रकटित *Shielded Half-Mode Substrate Integrated Waveguide Based Self-Diplexing Antenna Array and Method of Manufacturing Thereof* नामक आविष्कार के लिए, पेटेंट अधिनियम, 1970 के उपबंधों के अनुसार आज तारीख जुलाई 2025 के चौदहवें 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 *Shielded Half-Mode Substrate Integrated Waveguide Based Self-Diplexing Antenna Array and Method of Manufacturing Thereof* as disclosed in the above mentioned application for the term of 20 years from the 14th day of July 2025 in accordance with the provisions of the Patents Act,1970.

अनुदान की तारीख : 19/03/2026
Date of Grant :

पेटेंट नियंत्रक
Controller of Patents

टिप्पणी - इस पेटेंट के नवीकरण के लिए फीस, यदि इसे बनाए रखा जाना है, जुलाई 2027 के चौदहवें दिन को और उसके पश्चात प्रत्येक वर्ष मे उसी दिन देय होगी।

Note. - The fees for renewal of this patent, if it is to be maintained, will fall / has fallen due on 14th day of July 2027 and on the same day in every year thereafter.

FACULTY PROFILE

Communication and Signal Processing Engineering

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.

Instrumentation & Control

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

RF and Microwave Engineering

Optical communication and Integrated Photonics

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

Nanoelectronics and VLSI

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

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

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

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

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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**

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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).

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