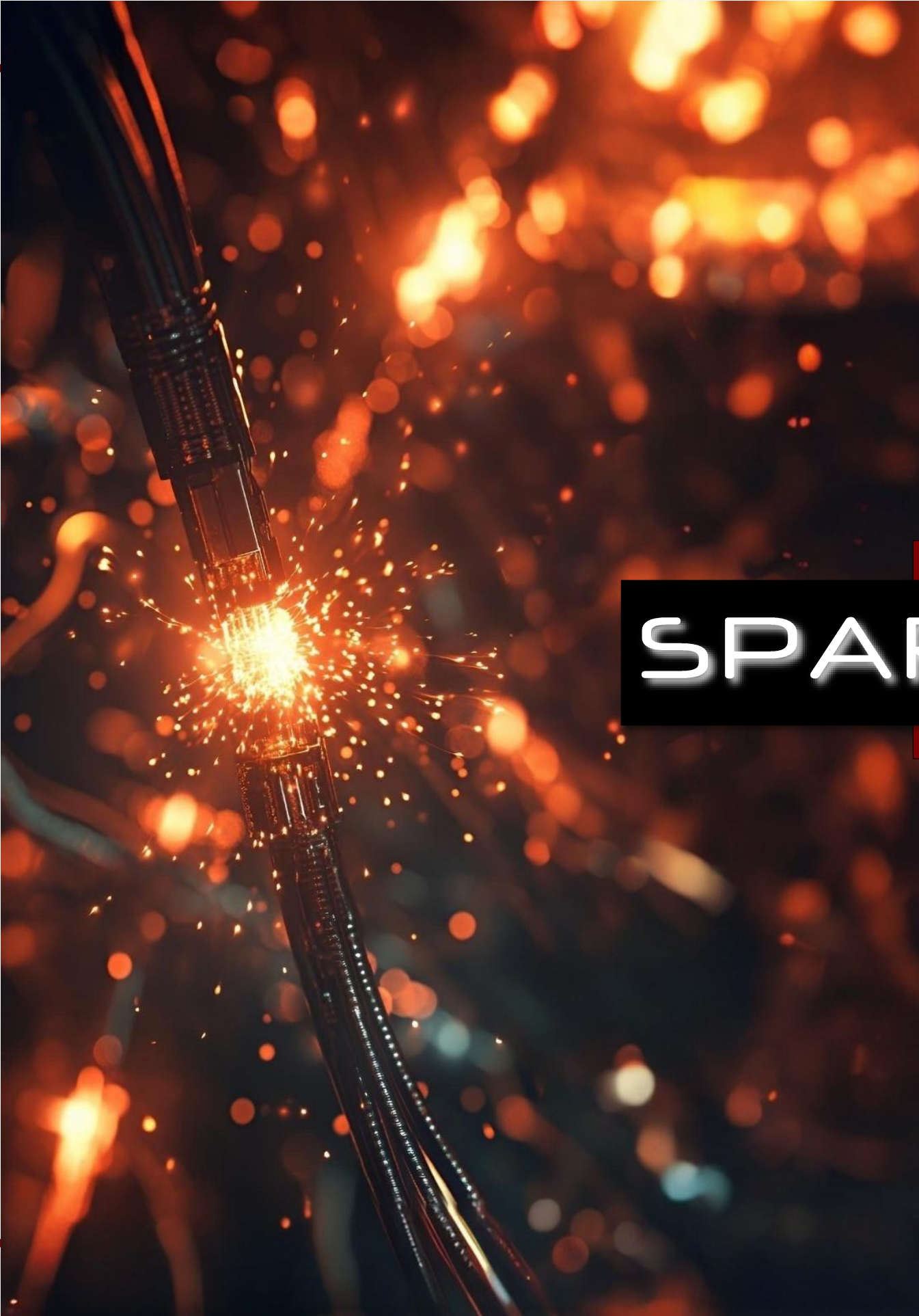




DEPARTMENT OF ELECTRONICS ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY
(INDIAN SCHOOL OF MINES), DHANBAD

SPARK | e-NEWSLETTER

FEBRUARY 2026
VOLUME-2, ISSUE-2



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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 February 2026.

This month began with the III-2026 Exhibition on Defense Theme, organized by the Department of Electronics Engineering, which showcased advanced innovations and technologies related to modern defense systems.

In addition, Prof. Sanjeev K. Raghuwanshi, and Prof. Ravi Kr Gangwar have recently authored several research papers that have been published in reputed international journals.

Furthermore, Prof. Ravi Kumar Gangwar delivered a keynote address to industry professionals and academic participants titled "Design and Development of SIW-Based Self-Diplexing Antennas for IoT-Enabled Smart Infrastructure through Wireless Connectivity."

The talk was presented at the International Conference on Green Technologies and Sustainable Solutions (GTSS-2026) organized by Madan Mohan Malaviya University of Technology, Gorakhpur.

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,
JIT (ISM) Dhanbad



III-2026 EXHIBITION

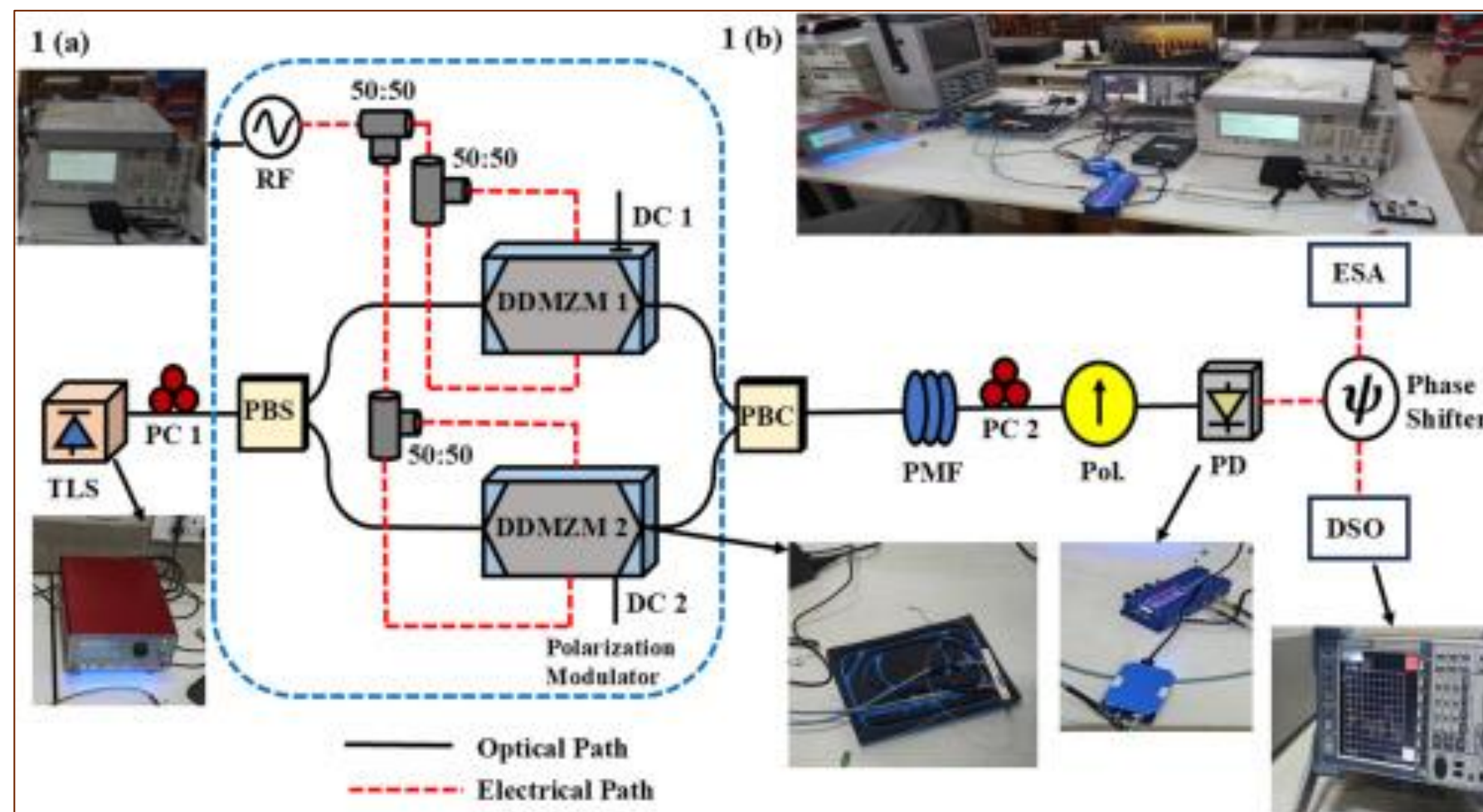


The III-2026 Exhibition on Defense Theme, organized by the Department of Electronics Engineering, showcased cutting-edge innovations and technologies relevant to modern defense systems. As the leader of this initiative, the department brought together students, faculty, industry experts and defense professionals to explore advancements in electronics, robotics, communication systems and embedded solutions tailored for defense applications. The exhibition highlighted project demonstrations, interactive displays, aimed at fostering innovation, strategic thinking and practical problem-solving skills. Under strong academic leadership, the event reinforced the department's commitment to bridging academic research with real-world defense challenges, inspiring the next generation of engineers and contributing to national technological progress.

PUBLICATIONS

Prashant Kumar, Sanjeev Kumar Raghuwanshi," Analytical modeling and generation of versatile optical waveforms using polarization-based modulation", Applied Optics 65 (7), 2122-2132, February 2026.

DOI: <https://doi.org/10.1364/AO.584539>



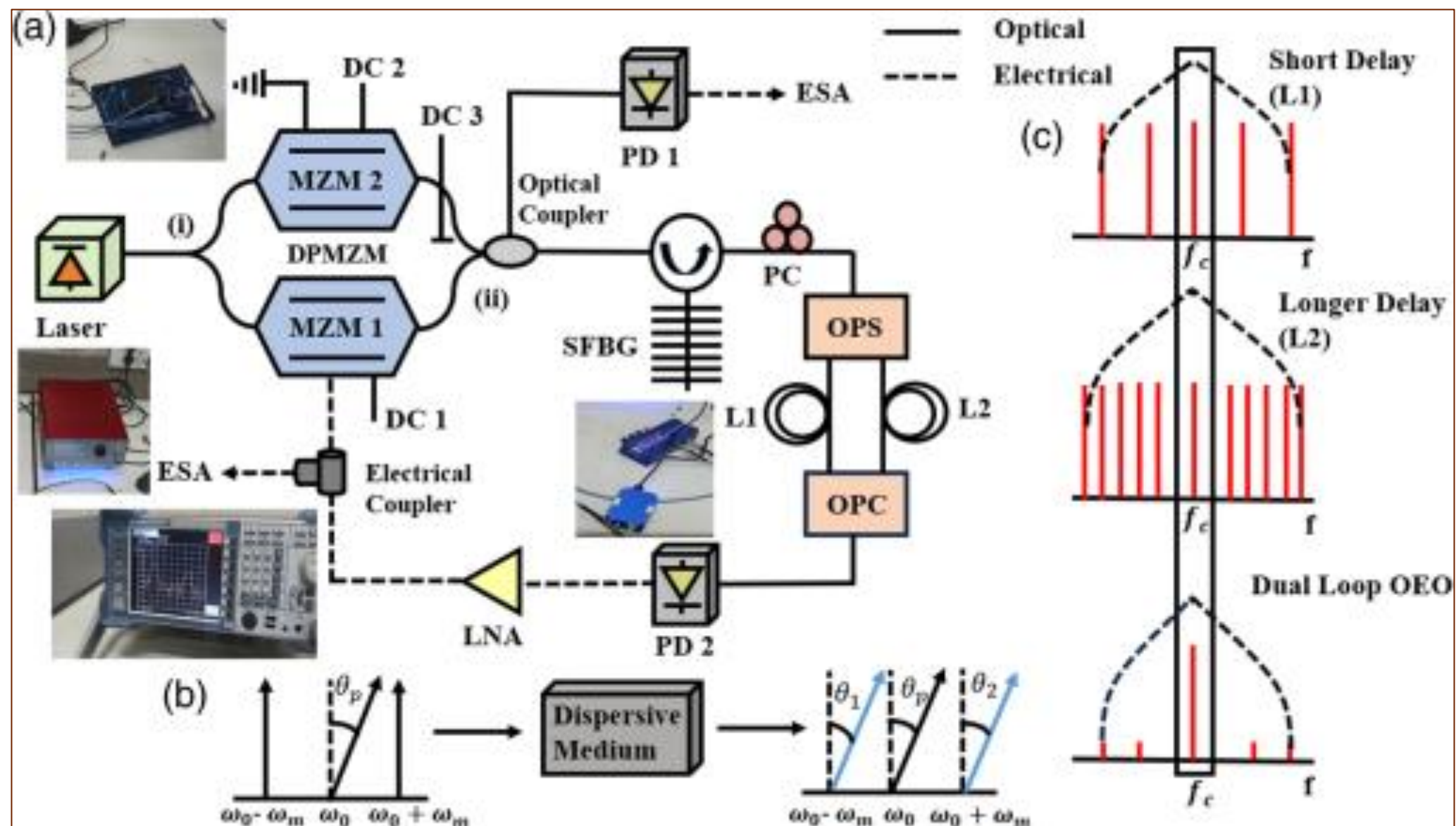
Experimental validation of polarization-based optical waveform generation.

1(a) Schematic diagram of the proposed system showing the polarization-modulation architecture and key instrumentation.

1(b) Photograph of the corresponding laboratory experimental setup used for time- and frequency-domain measurements. Abbreviations: TLS, tunable laser source; PC, polarization controller; PBS, polarizing beam splitter; DDMZM, dual-drive Mach-Zehnder modulator (operated as a phase modulator); DC, direct-current bias; PMF, polarization-maintaining fiber; PBC, polarization beam combiner; Pol, polarizer; PD, photodetector; , RF phase shifter; ESA, electrical spectrum analyzer; DSO, digital storage oscilloscope.

PUBLICATIONS

Sanjeev Kumar Raghuwanshi,” *Phase controlled frequency switchable optoelectronic oscillator based on a tunable microwave photonic filter for RADAR system*” Optical Engineering, Vol. 65, Issue 2, 024103 (February 2026)

DOI. <https://doi.org/10.1117/1.OE.65.2.024103>

(a) Proposed frequency switchable as well as tunable OEO and its operation principle. (b) Pictorial representation of phase relationship between optical carrier and their side bands. (c) Selection of one fine mode by using Vernier effect of short delay loop and longer delay loop. SFBG: specialized FBG, OPS: optical power splitter, OPC: optical power combiner, LNA: low noise amplifier, PC: polarization controller, PD: photodetector, OC: optical coupler, EC: electrical coupler, EDFA: Erbium-doped fiber amplifier, ESA: Electrical spectrum analyzer.

PUBLICATIONS

Nibash Kumar Sahu, and Ravi Kumar Gangwar “*Zeroth-Mode Metasurface-Based Miniaturized Antenna with Tri-Band and Tri-Polarization Characteristics for WBAN Applications*” published in IEEE Transactions on Consumer Electronic

DOI: <https://doi.org/10.1109/TCE.2026.3667336>

Research Overview: This paper investigates a novel miniaturized antenna with tri-band and tri-polarization characteristics for wireless body area network (WBAN) applications. The antenna covers the 2.4–2.485 GHz band, the 3.4–3.6 GHz band and the 5.725–5.875 GHz band with linear polarization, left-hand circular polarization and right-hand circular polarization, respectively. In the first band, it produces omnidirectional radiations for establishing device-to-device (DTD) communications on the same human body. In the other two bands, the antenna produces directional radiation for establishing DTD communication between two different bodies.

Key Highlights:

The main contributions of the proposed work are as follows:

- Investigations of Oth-mode using a pin-free unit cell for achieving miniaturization.
- Achievement of higher-order modes in the targeted frequencies by controlling the dispersion characteristic.
- Use of an unbalanced coplanar-waveguide ground (UCPWG)-based feed line as an individual radiator.
- Generation of LHCP using a UCPWG-based printed patch.

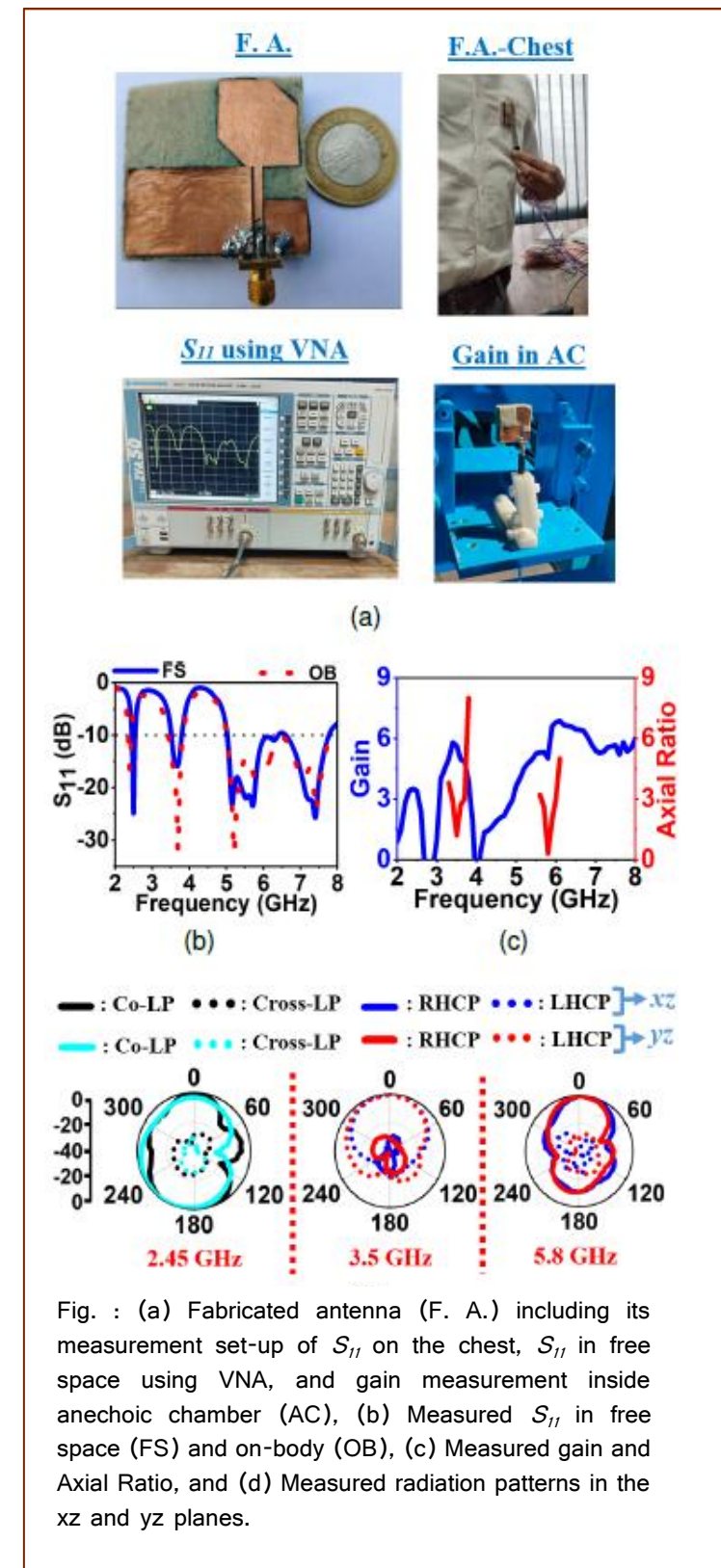


Fig. : (a) Fabricated antenna (F. A.) including its measurement set-up of S_{11} on the chest, S_{11} in free space using VNA, and gain measurement inside anechoic chamber (AC), (b) Measured S_{11} in free space (FS) and on-body (OB), (c) Measured gain and Axial Ratio, and (d) Measured radiation patterns in the xz and yz planes.

PUBLICATIONS

Divyanshi Srivastava, and Ravi Kumar Gangwar titled “*Design of Flexible Triple-Band GPS Antenna using PLA-Based Conformal Mold for Vehicle Positioning Applications*” published in IEEE Transactions on Dielectrics and Electrical Insulation.

DOI: <https://doi.org/10.1109/TDEI.2026.3667648>

Research Overview: The work presents a flexible triple-band Global Positioning System (GPS) antenna has been developed for vehicle positioning applications operating in the L1, L2, and L5 frequency bands. The antenna is designed using a polylactic acid (PLA) - based conformal mold, enabling flexible integration with curved vehicle surfaces. The proposed antenna structure consists of two substrates separated by a Rohacell foam layer ($\epsilon_r \approx 1$), with a modified square patch excited through a 50- Ω microstrip feed line. To achieve triple-band operation, L-shaped and diagonally oriented square slots are introduced in the patch structure, while circular polarization is generated by chamfering opposite corners and incorporating semicircular slots. The antenna prototype was fabricated using a Taconic RF-35 substrate ($\epsilon_r = 3.5$) and experimentally validated under conformal configurations. The measured results demonstrate stable impedance bandwidths across the three GPS bands, along with strong right-hand circular polarization (RHCP) performance in the L1 and L2 bands.

Key Highlights:

- Operates in L1 (1.575 GHz), L2 (1.22 GHz), and L5 (1.17 GHz) GPS bands.
- Demonstrates -10 dB impedance bandwidths of 70 MHz (L1), 30 MHz (L2), and 25 MHz (L5).
- Achieves 3-dB axial ratio bandwidths of 20 MHz (L1) and 35 MHz (L2).

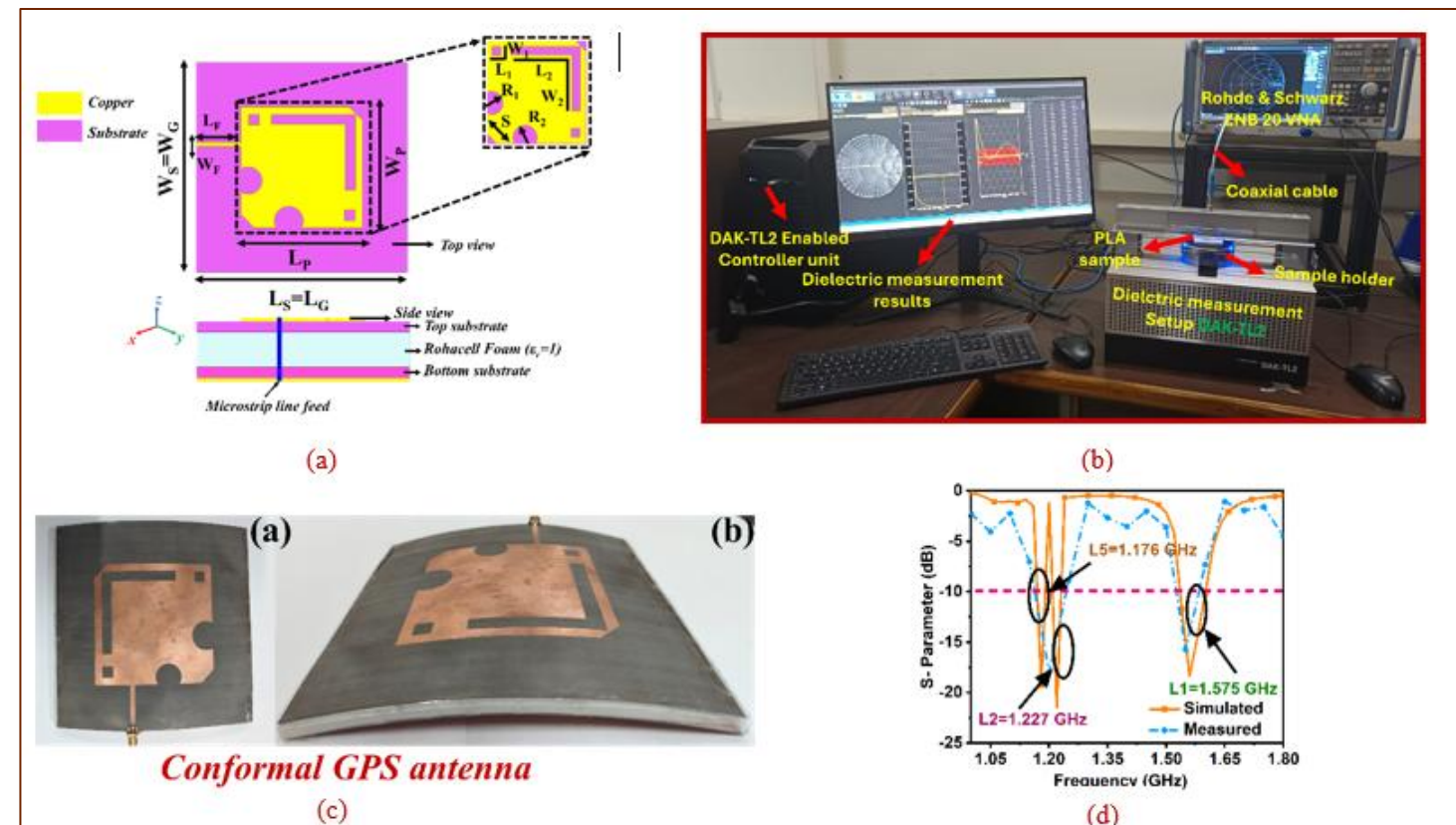


Fig. (a) Geometry configuration of a proposed GPS antenna, (b) Experimental setup for dielectric measurement of a PLA sample using a Speag DAK-TL2 system and Rohde & Schwarz VNA, (c) Prototype of the proposed conformal GPS antenna: (a) Top perspective of the conformal configuration, and (b) Side perspective of the conformal configuration, and (d) simulated and measured performance of the conformal GPS antenna: S-parameters.

EXCHANGING IDEAS AND INNOVATIONS



Prof. Ravi Kumar Gangwar delivered a distinguished keynote address to a diverse audience of industry professionals and academicians on the topic “**Design and Development of SIW-Based Self-Diplexing Antennas for IoT-Enabled Smart Infrastructure through Wireless Connectivity.**” This keynote lecture was presented at the International Conference on Green Technologies and Sustainable Solutions (GTSS-2026) organized by Madan Mohan Malaviya University of Technology, Gorakhpur, where it highlighted innovative advancements in wireless communication technologies supporting sustainable and smart infrastructure.

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 & Project staff (subject to departmental norms and performance).

EDITORIAL TEAM

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

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

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