



## BMS INSTITUTE OF TECHNOLOGY & MANAGEMENT

Autonomous Institute Under VTU, Accredited by NBA and NAAC

Yelahanka, Bengaluru-560119.

### **Name of the Society:**

IEEE Photonics Society BMSIT Student Branch

### **Date of Formation:**

11th November 2024

### **Coordinator:**

Dr. Asha G Hagargund, ECE

### **Objective:**

To advance communications, networking, and photonics technologies for the betterment of humanity through innovation, research, and knowledge sharing.

### **Frequency of Meetings:**

Two team meetings per month, and an Annual General Meeting with all photonics members.

### **Social media link:**

#### **LinkedIn:**

**Instagram:** [https://www.instagram.com/ieee.photonics\\_bmsit?igsh=OTlrOHU0M3A1cGJh](https://www.instagram.com/ieee.photonics_bmsit?igsh=OTlrOHU0M3A1cGJh)

### **Roles and Responsibilities:**

The IEEE Photonics Society is a global professional community dedicated to advancing photonics and light-based technologies. It fosters exploration, knowledge sharing, and collaboration through technical talks, workshops, conferences, and research activities in areas such as optical communications, networking, signal processing, integrated photonics, and emerging technologies. Members actively organize events, disseminate cutting-edge research through publications, and collaborate with academia and industry, thereby strengthening global connectivity and contributing to technological progress for the benefit of humanity.

### **Activities conducted:**

#### **MIT workshop**

The **IEEE Photonics Society**, which focuses on advancing light-based technologies such as optical communications and photonics systems, supports and inspires workshops and collaborative technical events worldwide. At **Manipal Institute of Technology (MIT) Bengaluru**, for example, activities aligned with photonics research include the establishment of an IEEE Photonics Student Chapter in September 2024, aimed at fostering learning, research, and collaboration among students, researchers, and industry professionals in the science of generating and manipulating light. This chapter serves as a platform for organizing expert talks, seminars, and guest lectures on emerging trends in photonics, quantum optics, and integrated photonics, connecting academic study with real-world innovation. In addition, MIT Bengaluru hosts technical workshops such as the *Antenna and Photonics Workshop* scheduled for October.

13–17, 2025, which provides hands-on exposure to photonics concepts and practical training for engineering students. Through these workshops and the student chapter's initiatives, participants gain exposure to cutting-edge photonics research and applications in communications, imaging, and sensing technology.



### Spark Trail 2025 (online)

Spark Trail 2025 was a flagship hybrid event organized to promote awareness and engagement in photonics, in alignment with the educational and outreach objectives of the IEEE Photonics Society, which emphasizes innovative learning, student involvement, and dissemination of light-based technologies for societal benefit. The event was conducted in two stages: an Online Round on April 4, 2025,

The **online round** witnessed enthusiastic participation from **250+ students**, who competed in a fast-paced, photonics-themed scavenger hunt designed to test logical thinking, curiosity, and basic understanding of light and optical principles through interactive clues and challenges. Based on speed and accuracy, the **top 25 participants** were shortlisted and grouped into teams of four for the next stage. The **on-campus round** transformed the BMSIT&M campus into an engaging puzzle trail, where teams navigated multiple checkpoints featuring clues inspired by fundamental photonics concepts such as reflection, refraction, optical communication, and light behavior. The event concluded with the **top three teams** being declared winners and awarded cash prizes, receiving strong appreciation for the creativity, energy, and educational value of the event.



## Spark Trail 2025 (Offline) on Campus

The offline round of **Spark Trail 2025**, held on April 8, 2025, was a high-energy, hands-on learning experience conducted across the BMSIT&M campus, designed in alignment with the student engagement and outreach vision of the IEEE Photonics Society. Shortlisted teams from the online round were assigned starting checkpoints and guided through a structured trail of challenges distributed across academic blocks and common campus locations.

Each checkpoint featured scenario-based puzzles, logical clues, and mini-tasks rooted in fundamental photonics principles, including reflection, refraction, wavelength behavior, optical communication, and real-life applications of light-based technologies. Participants were required not only to solve the clues but also to apply teamwork, time management, and analytical thinking to progress through the trail. Faculty members and student volunteers acted as evaluators at each checkpoint, ensuring fair assessment, smooth coordination, and rule compliance.

The offline round successfully converted the campus into an interactive learning environment, where students learned photonics concepts through exploration and problem-solving rather than conventional classroom methods. The event concluded with the top three teams being declared winners and awarded cash prizes, followed by positive feedback from participants and observers. Overall, the offline round significantly enhanced student interest in photonics, strengthened interdisciplinary participation, and reinforced the IEEE Photonics Society's reputation for hosting innovative, experiential, and high-impact technical events.



## IEEE Open Day

**COMPSIF 2025**, held on **March 21st and 22nd, 2025** at the **BMSIT Campus**, served as a major platform for technical exchange and innovation, attracting students, faculty, and visitors from all departments. The **IEEE Photonics Society** actively participated in this two-day technical fest with the objective of showcasing real-world applications of photonics, promoting cross-disciplinary interest, and providing its members with an opportunity to present innovative ideas to a wider audience.

During the event, the society organized an **interactive exhibition** featuring working models, simulations, and gamified demonstrations that highlighted how light-based technologies influence modern engineering and future innovations. The exhibition witnessed strong footfall from multiple departments, effectively demonstrating the relevance of photonics across domains such as communication, agriculture, sensing, and sustainability.

One of the key highlights was the **IoT-Based LiDAR Drone – Seed Quad NaviDropper**, a smart agriculture solution integrating LiDAR for terrain mapping, real-time navigation, and a custom seed-dropping mechanism. This project showcased the fusion of **photonics, IoT, and sustainable technology**, emphasizing how light-based sensing can support precision agriculture. Another major attraction was the **2D Crystal Waveguide Simulation**, developed using **Finite-Difference Time-Domain (FDTD)** techniques, which visually demonstrated light propagation through photonic crystal structures, helping visitors understand core concepts of waveguiding and optical communication.

The exhibition also featured **Sonic Beams – Laser Audio Transmission**, a Li-Fi-inspired concept where audio signals were transmitted using laser diodes and received via a solar panel, illustrating secure and interference-free light-based wireless communication. To make learning engaging and accessible, the society introduced interactive games such as **Light Pong**, where Light Dependent Resistors (LDRs) controlled paddle movement through hand gestures, and **Dino Jump**, a photonics-inspired version of the Chrome Dino game using light variation for jump detection. These games effectively demonstrated **photonic sensing principles** in a fun and intuitive manner.

Overall, COMPSIF 2025 proved to be a significant success for the IEEE Photonics Society. The stall **engaged over 200+ visitors across two days**, sparked strong cross-domain curiosity, and enhanced the visibility and credibility of the newly formed society. Additionally, it provided



## **Mentor sessions - Winter of Projects 2024**

**Winter of Projects (WOP)** was conducted on **December 20th and 21st** at the **BMSIT Campus** and marked the **first flagship technical event** organized by the **IEEE Photonics Society** at BMSIT&M. The event was designed to introduce students—especially beginners—to **project-based learning** through hands-on challenges in photonics and electronics, encouraging teamwork, creativity, and the practical application of theoretical concepts.

The event followed a **unique bidding-based project selection format**, where registered participants reviewed proposed problem statements and bid for the projects that aligned with their interests. This approach promoted ownership, motivation, and active decision-making among students. Two core project themes were offered. The first, **Optical Communication**, required participants to establish data transfer between two Arduino boards using an optical channel and a custom communication protocol. Through this project, students learned fundamental concepts such as light-based data transmission, encoding and decoding of signals, synchronization, and error handling in optical links.

The second theme, **Self-Driving LiDAR Car**, focused on building a prototype autonomous vehicle using LiDAR sensors. Teams worked on real-time distance sensing, data processing, and navigation logic to enable safe self-driven movement and obstacle avoidance. This project provided exposure to photonic sensing, embedded systems, and control algorithms, helping students understand how light-based sensing is used in modern autonomous systems.

Throughout the two days, participants worked collaboratively under the guidance of mentors and volunteers, building, testing, and refining their prototypes. The event concluded with a **project showcase**, where teams demonstrated their working models and explained the underlying concepts to peers and faculty.

On the second day, an additional highlight was the **Laser Maze**, set up in a dark room as an interactive photonics experience. Visiting school children were invited to navigate the maze by avoiding laser beams, making the activity both entertaining and educational. This initiative successfully introduced younger students to the concept of light, reflection, and beam propagation in an engaging way. Overall, **WOP** resulted in the successful completion of **two fully functional student-built prototypes**, strengthened participants' practical understanding of photonics applications, and positioned the IEEE Photonics Society as an active, hands-on technical community. The laser maze emerged as a major crowd-puller, reinforcing the society's commitment to making photonics learning **accessible, interactive, and impactful**.



### Laser maze

The Laser Maze is an interactive game designed using photonics principles. In this game, multiple laser beams are arranged across a dark room to form a maze-like path. The objective is simple yet challenging: participants must navigate from the start to the end without touching or breaking any laser beam.

As a game, it tests focus, coordination, patience, and strategic movement. At the same time, it serves as an educational experience by demonstrating key concepts such as straight-line propagation of light, reflection using mirrors, and laser alignment. Any interruption of a beam indicates a mistake, making the game both exciting and competitive.

The Laser Maze game was especially engaging for students and school children, successfully combining fun with learning and creating curiosity about lasers, optics, and photonics-based security systems.



## **Winter of Projects (WoP) 2025**

Winter of Projects (WOP) was held on December 5th, 2025 at BMS Institute of Technology (BMSIT) and served as a collaborative, project-driven learning initiative aimed at promoting hands-on engineering education among undergraduate students across all branches. Organized under the Student Branch of BMSIT&M, the event brought together multiple technical societies, each mentoring teams working on diverse, real-world problem statements. The core objective of WOP was to move beyond classroom-based theoretical learning and provide students with an opportunity to design, build, and present functional prototypes, while developing skills in teamwork, project planning, and technical communication.

The IEEE Photonics Society played an active and impactful role in WOP by curating three interdisciplinary problem statements centered around photonics, optical sensing, and biomedical instrumentation. These problem statements were carefully designed to expose students to practical applications of light-based technologies while remaining accessible to participants from varied engineering backgrounds. Multiple student teams were formed under each problem statement and were mentored by society members and technical guides throughout the project duration, ensuring continuous learning and structured progress.

One of the key problem statements was Smart Glasses for Assistive and Wearable Applications, where a team of four students worked on integrating multiple sensors such as a gyroscope, GPS module, and microphone to collect motion, location, and ambient data. This data was displayed on a transparent OLED heads-up display, demonstrating how photonics-based displays and sensor systems can be combined to create intuitive, real-world wearable solutions. The project emphasized usability, system integration, and design constraints, fostering interdisciplinary thinking and innovation.

Another major problem statement focused on the development of a Low-Cost Contactless Distance Sensor Using Laser-Spot Triangulation (10–50 cm range). Multiple teams explored optical sensing principles by using laser light and image-based detection to estimate distance without physical contact. The project introduced students to concepts such as optical alignment, calibration, triangulation geometry, and practical measurement challenges, highlighting the importance of photonics in automation, robotics, and sensing applications while maintaining a strong focus on affordability and simplicity.

The third problem statement, Photoplethysmograph (PPG) Based Vital Monitoring System, introduced participants to biomedical photonics. Student teams worked on non-invasive monitoring of physiological parameters such as heart rate and blood flow using optical techniques. Rather than focusing on optimization, the project emphasized understanding signal acquisition, basic data interpretation, and real-world usability, giving students valuable insight into how photonics is applied in healthcare and medical devices.

Through Winter of Projects, participants gained significant learning outcomes, including hands-on

exposure to photonics-based sensing systems, experience in team collaboration and project management, improved understanding of translating theory into practice, and increased confidence in presenting technical work and design decisions. The event also motivated students to pursue further projects, research initiatives, and hackathons.

Overall, WOP 2025 had a strong impact by encouraging cross-disciplinary participation, strengthening a practical and project-oriented culture within the IEEE Photonics Society, providing junior students with early exposure to research and prototyping, and positioning the society as a key contributor to hands-on technical initiatives on campus.

