



# **BMS INSTITUTE OF TECHNOLOGY & MANAGEMENT**

Autonomous Institute Under VTU, Accredited by NBA and NAAC

Yelahanka, Bengaluru-560119.

## **Name of the Society:**

IEEE Signal Processing Society (SPS) BMSIT&M Student Branch

**Date of Formation:** March 2020

## **Coordinator:**

Dr. Pallavi Singh

## **Objective:**

To promote awareness and practical understanding of signal processing among students through technical activities, workshops, and hands-on projects. The society aims to bridge theoretical concepts with real-world applications while encouraging innovation, research, and collaborative learning.

## **Frequency of Meetings:**

Once in a month and more during events.

## **Social media link:**

**LinkedIn:** <https://www.linkedin.com/company/ieeespsbmsitm/>

**Instagram:** [https://www.instagram.com/sps\\_bmsit?igsh=MTRsMzQ4dGU5angxYg==](https://www.instagram.com/sps_bmsit?igsh=MTRsMzQ4dGU5angxYg==)

## **Roles and Responsibilities:**

The Signal Processing Society (SPS) is responsible for organizing technical events such as workshops, seminars, hackathons, and expert talks related to signal processing and allied domains. The society facilitates hands-on learning by encouraging project-based activities, research discussions, and interdisciplinary collaboration. SPS also supports student skill development by providing platforms for knowledge sharing, mentorship, and participation in technical competitions, while maintaining coordination with other technical societies and faculty advisors to ensure smooth execution of activities.

# Activities Conducted

|                      |  |
|----------------------|--|
| <b>Event Name:</b>   | IEEE BMSIT Open Day 2025 - Signal Processing Society Stall |
| <b>Date:</b>         | 22nd March 2025  |
| <b>Location:</b>     | BMSIT Campus, Yelahanka, Bengaluru                         |
| <b>Participants:</b> | Students, Faculty, and Visitors                            |
| <b>Prize Pool:</b>   | Goodies and Giveaways (Stickers, Pens, Bookmarks)          |

## Description

The IEEE Open Day 2025 at BMS Institute of Technology and Management (BMSIT) was a grand showcase of innovation, creativity, and community engagement, with each IEEE society putting its best foot forward. Among the standout stalls was the Signal Processing Society (SPS), which drew a large crowd with its mix of interactive games, live demonstrations, future-tech project ideas, and informative sessions on the benefits of joining SPS.

Our stall aimed to bridge the gap between complex signal processing concepts and real-world understanding through playful learning, hands-on demos, and meaningful conversations. From first-year students to final-year tech enthusiasts, visitors of all backgrounds found something exciting and educational at the SPS booth.

## Interactive Learning Games

- 1. Fourier Signal Game:** This game offered visitors a chance to build a complex waveform by adjusting the amplitudes and phases of sine and cosine components, visually demonstrating how Fourier series work. Players aimed to match a target waveform with their custom one in real time. Features included real-time waveform visualization, interactive harmonic sliders, and a scoring system based on waveform accuracy.
- 2. Waveformed:** A crowd-favorite, this game challenged users to replicate displayed waveforms using their voice. Participants spoke or sang into a microphone, and the system gave real-time feedback, comparing their vocal waveform with the target. It featured real-time audio-to-waveform conversion and enhanced auditory and visual coordination.
- 3. HearMeOut:** This interactive game encouraged users to listen carefully to audio clips and then choose the correct waveform representation from four options. It honed auditory skills and connected sound with its visual representation through multiple audio clips and waveform choices.
- 4. Circuits:** We also featured an educational platform to learn microcontroller basics and circuit design. With beginner-friendly tutorials and project examples, Circuits was perfect for those curious about embedded systems and electronics.

## SPS Website Showcase

One of the highlights was the live demonstration of our fully functional, interactive SPS website, developed and maintained by the members of the Signal Processing Society at BMSIT. The website served as a central information hub featuring flagship events like DecodeX (which received \$3500 in IEEE funding), team and society members information, current projects and research initiatives including Audio Experience Room, 3D Hologram Projection Systems, Spectrum Labs, and Supercomputing Simulations.

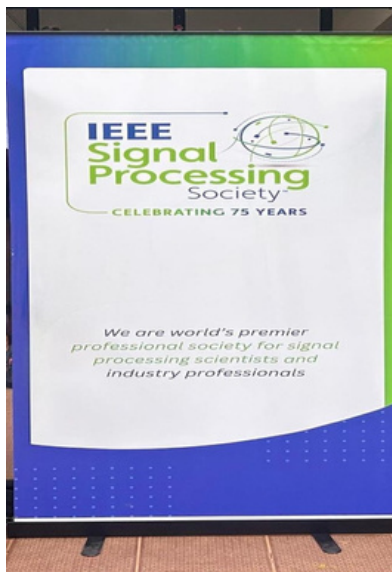
## Outreach and Member Engagement

Throughout the day, the SPS team actively engaged with students and faculty, explaining the advantages of being a part of IEEE SPS, including: Scholarships and Research Grants, Travel Grants for Conferences (ICASSP, ICIP, etc.), Student Branch Growth Awards, T4G Project Funding, YP (Young Professionals) STEP Proposals, Speaker and Event Funding, and Chapter Social Gatherings Support.

### Goodies and Giveaways

To leave a lasting impression and promote SPS branding, we distributed customized SPS-themed goodies including stickers, pens, and bookmarks. These tokens were a big hit, especially among first-year students, many of whom expressed keen interest in joining SPS.

### Photographs



# Activities Conducted

|               |  |
|---------------|--|
| Event Name:   | SPS UNBOX - "Decode   Design   Dominate" |
| Date:         | 26th May 2025                            |
| Location:     | Seminar Hall-2, Academic Block, BMSIT    |
| Participants: | IEEE SPS Members and Students            |
| Prize Pool:   | INR 5,000 (split across rounds)          |

## Description

On the 26th of May 2025, the IEEE Signal Processing Society (SPS) at BMSIT hosted a thrilling and multi-faceted technical event titled "SPS UNBOX". But this was more than just a fun competition - it was the official launchpad for DecodeX, the flagship event of the IEEE SPS chapter.

Through a blend of puzzle-solving, sound remixing, and design innovation, "SPS UNBOX" gave participants a glimpse into the creativity, critical thinking, and futuristic spirit that would define the upcoming DecodeX. It was a teaser, a testing ground, and a celebration of everything SPS stands for - logic, innovation, and breaking boundaries.

## Purpose of the Event

The event was designed to serve as the official "Unbox" event for DecodeX, generate buzz and anticipation, give participants a hands-on experience of what DecodeX would involve (puzzles, AI tools, creativity, and applied signal processing), and kickstart the DecodeX campaign with high-energy, cross-domain challenges.

## Event Format and Flow

| Time               | Activity  |
|--------------------|---|
| 11:00 AM - 1:00 PM | Round 1 - NoiZeCTRL (Audio Remix)                   |
| 1:00 PM - 1:45 PM  | Lunch Break   |
| 1:45 PM - 2:30 PM  | Round 2 - Thread404 (Merch Design)                  |
| 2:30 PM - 3:45 PM  | Round 3 - Trace//0 (Puzzle Round)                   |
| 3:45 PM - 4:15 PM  | UNBOX Segment - Prize Distribution + DecodeX Reveal |

## Round Descriptions

**Round 1 - NoiZeCTRL (Audio Remix Challenge):** Teams were given a base audio file and challenged to creatively remix it using rhythm, layering, and minimalistic sound design. Remix duration was minimum 40 seconds, with allowed additions including drums, sound effects, and monotone external tunes. Tools like Audacity, GarageBand, and Groovepad were encouraged.

**Round 2 - Thread404 (Merch Design Challenge):** Participants created wearable designs (T-shirt or hoodie) combining tech aesthetics, SPS branding, and creative symbolism. Designs had to include the phrase "Project X" and IEEE SPS name/logo, with styles like glitch art, circuit patterns, and puzzle themes.



**Round 3 - Trace//0 (Puzzle Solving Challenge):** Teams faced two puzzle sets with hidden clues, codes, or logic patterns. AI tools like ChatGPT were allowed and encouraged. Puzzles varied in style: cryptography, lateral thinking, number patterns, and visual riddles.

### The UNBOX Reveal

The final segment featured a dramatic unveiling of DecodeX - the biggest SPS initiative of the year. A teaser video revealed the theme and concept, the core team shared plans and sub-events, round winners were awarded and celebrated, and certificates were provided to all participants who completed all rounds.

### Conclusion

"SPS UNBOX" wasn't just a competition - it was a statement. A bold, creative, and innovative prelude to DecodeX. It successfully engaged students from multiple departments and created buzz, anticipation, and inspiration across campus. As SPS moved toward organizing DecodeX, this event proved that the society is ready to lead the way in merging creativity, tech, and intelligence like never before.

### Photographs



# Activities Conducted

|                      |   |
|----------------------|---|
| <b>Event Name:</b>   | DecodeX 2025 - National Level Puzzle Competition                |
| <b>Date:</b>         | 20th - 21st September 2025                                      |
| <b>Location:</b>     | APJ Abdul Kalam Lab, BMS Institute of Technology and Management |
| <b>Participants:</b> | 120 Students + Organizing Team (from 20+ institutions)          |
| <b>Prize Pool:</b>   | INR 50,000 + Consolations                                       |

## Description

DecodeX 2025 was a 24-hour national-level puzzle-based competition organized by the IEEE Signal Processing Society, BMSITM, designed to test participants' decoding, analytical, and signal processing skills. The event simulated a classified mission called "The Manhattan Directive" where teams decoded data patterns, interpreted complex signals, and worked collaboratively under tight time constraints.

It attracted participants from across India, offering a unique blend of technical rigor and fun, supported by an enthusiastic team of IEEE. The event was conducted in collaboration with IEEE SPS Bangalore Branch, IEEE Bangalore Section, IEEE Student Branch BMSITM, and Institute Innovation Council (IIC).

## Event Format

**Round 1 - Online Qualifier (Unstop):** Analytical puzzles and decoding-based problems. Top 30 teams qualified to Round 2.

**Round 2 - The Manhattan Directive (On-Campus):** 24-hour decoding marathon involving time-bound problem-solving, teamwork, and mental endurance.

## Technical Description

With an overall 20 puzzles for 24 hours, DecodeX featured a diverse array of puzzles that brought together the worlds of signal processing, embedded systems, cybersecurity, and AI into one cohesive decoding marathon. Some challenges were hosted through interactive web-based CTF platforms, demanding logic, precision, and a deep understanding of data interpretation.

Signal processing tasks included: filtering damped human voices in the 2-5 kHz range masked by 12 kHz noise, implementing modulation and demodulation techniques like QAM and FSK, and performing audio steganography where participants extracted every 1337th audio sample and analyzed its least significant bits to reveal hidden flags.

The embedded domain featured hands-on challenges such as an ESP32-based Whack-a-Mole system and a Raspberry Pi-powered vault, where participants combined hardware knowledge with problem-solving and timing precision. Other challenges integrated machine learning and image processing, geo-location-based puzzles, and Wireshark packet analysis challenges.

## Event Timeline

| Date & Time              | Event Description                                 |
|--------------------------|---|
| Sept 2 - 11 AM           | Event Goes Live on Unstop platform                |
| Sept 13 - 12 PM to 11 PM | Qualifier Round (Online) - Top 30 teams qualified |

|                             |  |
|-----------------------------|--|
| Sept 20 - 10 AM             | Opening Ceremony - Keynote by SPS experts                |
| Sept 20-21 - 11 AM to 11 AM | Final Round: The Manhattan Directive (24-hour challenge) |
| Sept 21 - 12 PM             | Closing Ceremony and Prize Distribution                  |

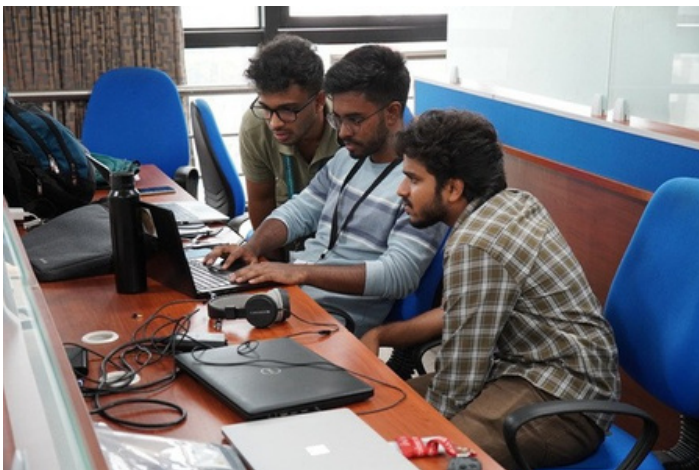
### Participant Feedback Summary

DecodeX 2025 received overwhelmingly positive feedback from participants representing over 20 institutions, with many calling it their most memorable event. 106 participants rated the overall conduction as Excellent, 118 rated the hospitality as Excellent, and 95% said they are very likely to participate again. The event stood out for its smooth organization, creative puzzles, enthusiastic volunteers, and the midnight energy that made the experience unforgettable.

### Outcomes

The success of DecodeX 2025 brought numerous benefits: Enhanced Visibility for IEEE SPS on a global scale, Skill Development for participants in both software and hardware-oriented signal processing tasks, Community Building that strengthened relationships between IEEE SPS BMSIT, IEEE SPS Bangalore Section, and the global IEEE SPS community, and demonstrated the chapter's ability to handle large-scale events effectively.

### Photographs





# Activities Conducted

|               |  |
|---------------|--|
| Event Name:   | Winter of Projects 2025 (WoP)              |
| Date:         | 29th October - 5th December 2025           |
| Location:     | BMS Institute of Technology and Management |
| Participants: | Students across multiple departments       |
| Prize Pool:   | INR 30,000 (Stark Expo)                    |

## Description

Winter of Projects (WoP) 2025, organized under the IEEE Signal Processing Society (SPS), aimed to foster innovation, technical creativity, and hands-on learning among students. Inspired by real-world engineering challenges, SPS curated impactful problem statements that pushed participants to explore the applications of signal processing, embedded systems, AI, and IoT.

## Problem Statements Proposed by SPS

- Energy-Efficient AI Inference on Edge Devices
- Crescendo - AI-Powered Music Composition Engine
- Low-Cost Respiratory Monitoring Using Sound Signals
- Fatigue Detection Using Steering & Visual Signals
- Vibration Signal Analysis for Vehicle Fault Detection

## Event Timeline

| Phase                       | Duration/Date              |
|-----------------------------|----------------------------|
| Registrations               | 29th Oct - 5th Nov         |
| PPT Submission Round        | Initial concept evaluation |
| Project Building Phase      | 18th Nov - 4th Dec         |
| Review Session              | 29th Nov                   |
| Stark Expo (Final Showcase) | 5th December               |

## Event Flow

WoP 2025 opened with enthusiastic participation from multiple domains. Teams submitted their initial concepts and solutions for evaluation during the PPT Submission Round. During the Project Building Phase, teams worked on designing and building their prototypes with guidance from SPS mentors from the 4th year - Vikas, Chinmay, Keerthi, and Smriti - who guided teams throughout development.

A mid-phase Review Session on November 29th ensured alignment and meaningful progress. The event culminated in the Stark Expo on December 5th, where teams showcased their final prototypes across Hardware, Software, and Open Innovation tracks.



## Highlights and Outcomes

**Hardware Track Winner - Team Forgeon:** Team Forgeon secured First Place for their outstanding execution and alignment with SPS initiatives.

Winter of Projects 2025 demonstrated the enthusiasm and technical capability of BMSIT&M students, strengthened by SPS mentorship culture and impactful problem statements. The event successfully bridged the gap between academic learning and practical application, inspiring students to innovate and create solutions for real-world challenges.

## Photographs

