

Event Report

- 1) **Name of Event:** Techfest IIT Bombay
- 2) **Nature of the Event:** Competition
- 3) **Date:** 22 December 2025
- 4) **Time:** 9:00AM to 7:30PM
- 5) **Venue:** IIT Bombay
- 6) **Mode of Event:** Offline
- 7) **Organized by:** Techfest IIT Bombay 2025
- 8) **Objective of the Event:**
 - To promote technical creativity and innovation among students.
 - To provide exposure to cutting-edge technologies such as AI, Robotics, IoT, and Sustainable Tech.
 - To encourage students to develop problem-solving skills through real-world challenges.
 - To build a network of aspiring engineers, researchers, and innovators.
- 9) **Number of Participants:** 23, Annexure – 1
Google Sheet of the Total 7 Teams and each of the Participants:
[GSFC University Teams Wildcard Category IIT Bombay \(3\)](#)

10) Brief of Event :

Techfest IIT Bombay was conducted from **22nd December to 24th December**. During the event, we participated in two wildcard competitions, which provided an excellent opportunity to apply our technical knowledge and problem-solving abilities in a highly competitive and innovative environment. The event brought together participants from various institutes, fostering a culture of learning and healthy competition. The details of these two competitions are as follows:

The first event, **Meshmerize**, required teams to design and develop an autonomous robot capable of navigating a maze composed of 90-degree white vinyl paths. The robot initially performed a dry run to analyze the

arena and determine the optimal route. This was followed by an actual run, during which the robot was required to execute the shortest and most efficient learned path. The competition emphasized key concepts such as autonomous sensing, path planning, algorithm optimization, and precise control mechanisms.

The second event, **Cozmo Clench**, focused on the design and operation of a manually controlled gripper robot. Participants were tasked with navigating a complex arena filled with various obstacles while successfully picking up and placing shaped objects at designated locations. The arena included challenges such as sand pits, inclined ramps, tunnels, slack bridges, which tested the robot's mechanical design, durability, and the operator's control and adaptability. Collectively, both competitions offered valuable exposure to autonomous systems and manual robotics engineering, enhancing practical understanding and technical proficiency.

Many other events at IITB also featured Robotics Exhibition as well as Defense Expo, Guest Lectures and Insightful events.

The visit to SINE Incubation Centre of IITB gained us exposure to how the startups are working there.

Evaluation Process done for both of the competitions:

Meshmerize

Teams were evaluated based on:

- Checkpoint completion (25 points each)
 - Dry Run completion (30 points)
 - Shortest-path execution in Actual Run (30 points)
 - LED indicator activation (5 points)
 - Time-based scoring for Dry Run and Actual Run
 - Penalties for violations
- Final scoring: $\text{Total} = A + B + C + S + L + T - \text{Penalties}$

Cozmo Clench

Evaluation involved:

- Task completion points for each obstacle



- Time bonus for finishing under 5 minutes
- Penalties for arena exit, falls, misuse of pauses
- Single-run scoring method
- Tiebreakers based on tasks completed, time, high-difficulty completion, and penalties

About the Competition:

Annexure - 2: Attached are the Official Rules and Regulations for each competition.

Meshmerize - [Official Meshmerize Rules](#)

Cozmo Clench - [Official Cozmo Clench Rules](#)

Impact Created

- Encouraged strong innovation in **robotic design, sensor integration, control algorithms, and mechanical engineering.**
- Provided a national-level platform to benchmark our technical skills. Build confidence in designing competition-ready robots under real constraints.
- Strengthened our understanding of structured evaluation, scoring, and competitive engineering environments.
- Enhanced teamwork, problem solving, and decision-making skills.

Outcomes Achieved

- Autonomous navigation (Meshmerize)
- Bot mechanics, gripping systems, and manual maneuvering (Cozmo Clench)
- Enhanced ability to diagnose issues under pressure, optimize design, and refine algorithms or controls.
- Gained hands-on experience in advanced obstacle negotiations, precision tasks, and time-based competitive strategies.



Alignment with Sustainable Development Goals (SDGs)

SDG 4 – Quality Education

Both events promoted experiential learning in robotics, programming, electronics, and mechanical systems.

SDG 8 – Decent Work & Economic Growth

Prepared participants with industry-relevant skills such as automation, mechatronics, and system design.

SDG 9 – Industry, Innovation & Infrastructure

Encouraged innovation in robot engineering, embedded systems, and intelligent machine design.

SDG 17 – Partnerships for the Goals

Collaboration between IITs, Techfest organizers, and participating institutions fostered knowledge-sharing and technical growth.

Learning Outcomes for Students

Technical Skills:

- Autonomous sensing, PID tuning, path optimization (Meshmerize)
- Mechanical design, power systems, torque management, obstacle traversal (Cozmo Clench)

Programming & Control:

- Microcontroller coding, calibration, debugging
- Manual control precision and grip engineering

Strategic & Analytical Skills:

- Time optimization, rule-based scoring strategies
- Decision-making under constraints

Professional Skills:

- Team collaboration
- Communication with judges and technical mentors
- Exposure to real engineering problem-solving environments

Experience Sharing and Team Wise Learnings (7 Teams)

Both events offered a rich learning environment.

In **Meshmerize**, navigating the maze during the dry run taught us the importance of precise sensor readings and stable calibration. The actual run reinforced optimized algorithm design and efficient short-path execution.

In **Cozmo Clench**, we experienced a wide range of physical challenges—from gravel pits to slack bridges and rotating obstacles. Each segment required strategic control and adaptability. The precision deposit tasks pushed us to refine our mechanical accuracy and operator coordination.

Together, these events helped us grow as engineering students, exposing us to both robotics theory and challenging practical execution.

1. Team OnlyPath

- **Performance:** Completed runs in **107s** (within limit), but missed finals as top teams averaged 60-70s. Struggled with T-junction logic during development.
- **Key Learnings:** Top competitors use **display panels** for dynamic algorithm switching. Realized that winning bots require long-term iterative design.
- **Future Plan:** Prioritize "True Shortest Path" algorithms to maximize scoring and focus on logic optimization.

2. Team Techno Clench

- **Performance:** Performance was significantly hindered by **excessive weight**, which reduced speed and agility.
- **Key Learnings:** Weight management and mechanical efficiency are critical. Learned the trade-off between strength and agility.
- **Future Plan:** Develop a **compact chassis** and a lighter, stronger gripper mechanism for better speed-to-weight ratio.

3. Team TraceX

- **Performance:** Strong Dry Run (1m 45s), but failed the Final Run due to **false junction detection** caused by algorithm bugs.
- **Key Learnings:** Lacked initial research. Successful teams prioritize

structural design before component selection to ensure balance.

- **Future Plan:** Adopt a "Structure First" approach, use custom components instead of ready-made ones, and debug path-optimization code.

4. Team GraspX

- **Performance:** Strong start on flat tracks, but failed during the **ascent/descent segment** due to battery exhaustion and an unsuccessful jump.
- **Key Learnings:** Gained hands-on exposure to engineering constraints. Reinforced the importance of **rapid diagnosis** under pressure and effective team coordination.
- **Future Plan:** Improve traction by redistributing weight near the drive axis, adjust **gear ratios** for higher torque on inclines, and practice specifically on slopes.

5. Line jackers

- **Performance:** The bot performed well in the trial run but Performance dropped in the main run due to **maze material** differences and **the solving algorithm**.
- **Key Learnings:** I gained an understanding of maze-solving algorithms and learned how to effectively **integrate hardware and software** to collaboratively solve real-world problems.
- **Future Plan:** I would firstly improve the **algo and the main sensor**. Make the overall **build smaller** and compact in size improve the motor speed and use lipo instead of liion

6. Team Kanha

- **Performance:** Performance was good. **The wheels** were problematic but the issue is resolved now.
- **Key Learning:** Good **Networking**, Learned about IoT and Robotics.
- **Future Plan:** Focus more on testing and **build quality**.

7. ByteBots

- **Performance:** Everything was fine, but after **three obstacles**, **Bluetooth connectivity** was lost.
- **Key Learning:** Bluetooth is unreliable in competitive scenarios; we need to use a stable connection like **nrf radio**.



- **Future Plan:** Gaining a clearer understanding of the map to design more effectively and prioritising **weight management**.

Conclusion

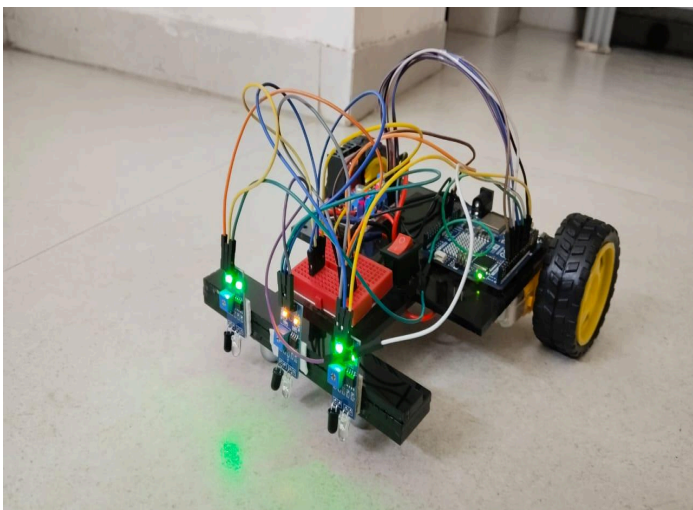
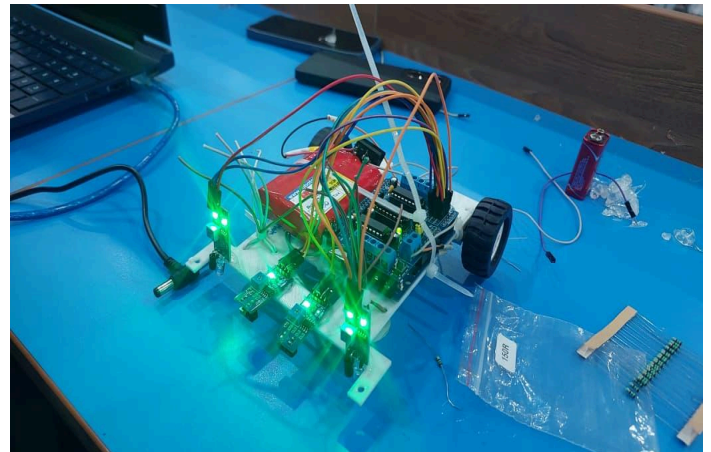
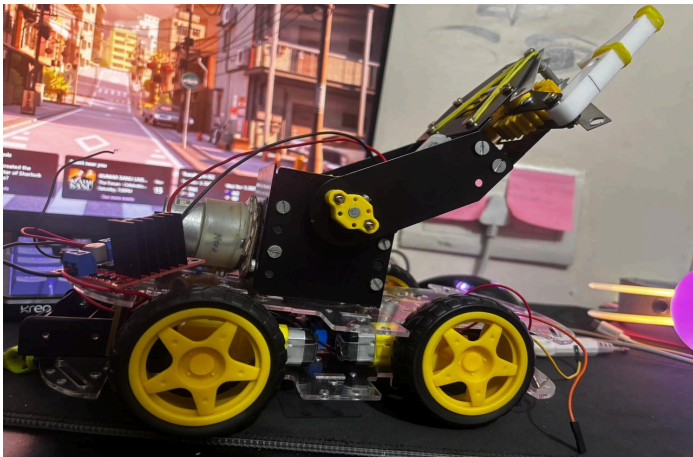
The participation of GSFC University students in the **Meshmerize** and **Cozmo Clench** challenges provided a rigorous platform for applying theoretical engineering concepts in a competitive environment. These events tested not only technical proficiency in autonomous navigation and mechanical control but also adaptive problem-solving skills under constraints. The experience went beyond mere participation, fostering a deeper understanding of system integration and engineering resilience that is essential for professional development.

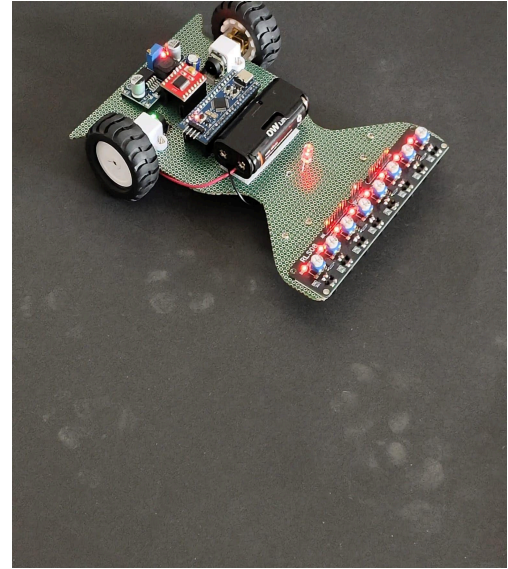
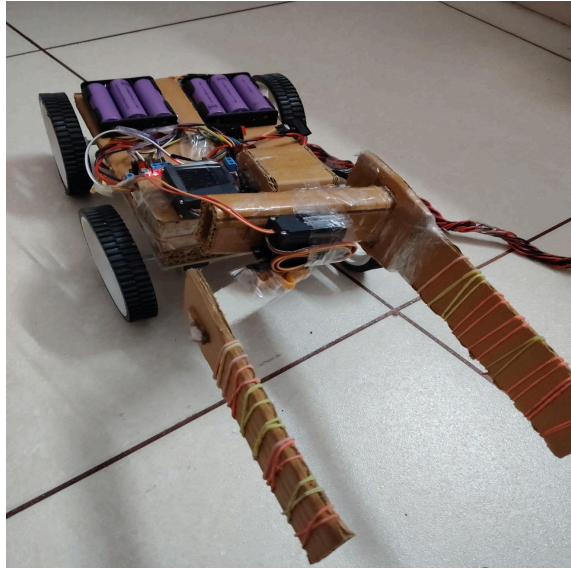
Complementing the competitive aspects, the **Robotics Exhibition and Defense EXPO** served as a critical educational interface. The demonstration of the Indian Armed Forces' **VTOL Drone** as well as many other things offered tangible evidence of how fundamental engineering principles are translated into high-stakes defense applications. Furthermore, the expert sessions delivered by industry leaders provided strategic insights into emerging technological trends and automation, offering students valuable mentorship.

The visit to the **SINE (Society for Innovation and Entrepreneurship) Incubation Centre** was particularly impactful in the context of institutional growth. The exposure to professional startup infrastructures, including specialized research labs and collaborative workspaces, has provided a benchmark for innovation ecosystems. These observations have yielded actionable insights that will be instrumental in refining and strengthening the startup and entrepreneurship culture at GSFC University.

In conclusion, this event successfully bridged the gap between academic curriculum and industrial application. By integrating intense technical competition with exposure to defense-grade technology and premier incubation frameworks, the initiative has significantly broadened the technical and strategic horizons of our students. The learnings derived from this collaboration will serve as a foundational catalyst for future innovation and technical excellence within the university.

11) Important Photographs

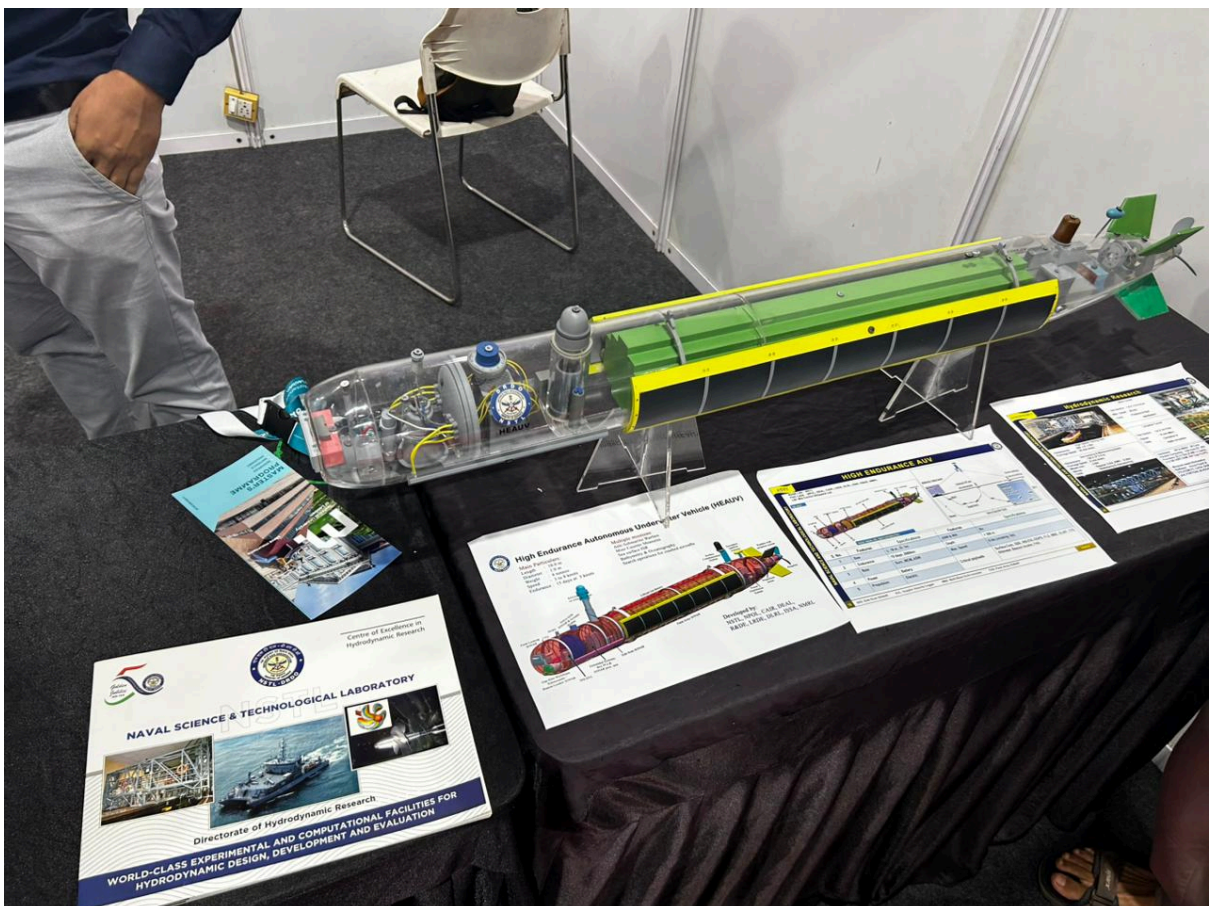


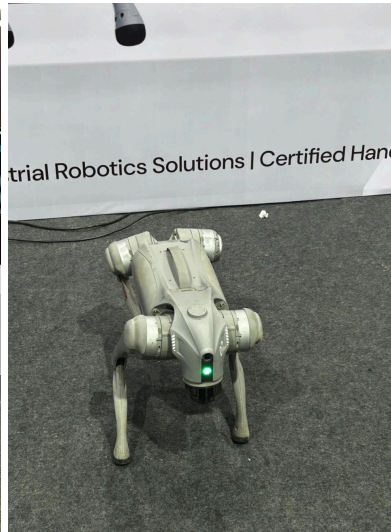




★ EXPO:







★ Drone Competition:





❖ SINE

