



eYantra

Engineering a better tomorrow

ERTS Lab
Department of Computer Science and Engineering
Indian Institute of Technology Bombay,
Powai, Mumbai-400 076.



Certificate of Participation

This is to certify that **Shirish**, a student of **Indian Institute of Information Technology, Kalyani, West Bengal** has participated in the **e-Yantra Robotics Competition (eYRC 2023-24)**.

He/She is a member of the team having the following team members:

1. Pravar Gupta
2. Shirish
3. Manish Kumar Gond
4. Anubhav Ranjan

This team has participated in **Lunar Scout** theme.

Prof. Kavi Arya
Principal Investigator, e-Yantra
Professor
Department of Computer Science and Engineering
Indian Institute of Technology Bombay



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Theme: *Lunar Scout*

Theme Description: Through this theme, participants developed a Self Balancing, omni wheel based robot. They implemented controller techniques like PID or LQR to maintain the orientation of the robot using the sensor data from Inertial Measurement Unit, perform path traversal without colliding with the colonies. To achieve this participants developed Mathematical Models of their robot design using GNU Octave and then simulated them in CoppeliaSim. Further they fabricated the chassis using their choice of material and the electronic circuits of the robot and the remote controller using the provided electronics components. The control law was then implemented using the Embedded C. The robot was also equipped with the Hall Effect sensors to detect the polarity of the magnets placed in the colonies.

Theme Learning: *Euler-Lagrangian mechanics, State space modeling, Control techniques (PID, LQR), 3D designing, Physics engine simulations, Data filtering & sensor fusion, Embedded systems.*

Team Learning: The team has been awarded **Level 3** in the e-Yantra Robotics Competition (eYRC).

This level indicates that the team was able to show a fair understanding of the problem statement by implementing a partial solution of the problem statement

Certificate Table

Certificate Level	Certificate Description
Level 1	Certificate of Merit
Level 2	Certificate of Completion
Level 3	Certificate of Participation
Level 4	Letter of Participation

**level 1 > level 2 > level 3 > level 4*