Report on SIT Lonavala's Victory at Ultimate Robotics Competition (URC)

Introduction:

The students of Sinhgad Institute of Technology, Lonavala participated in the prestigious Ultimate Robotics Competition (URC) held at PCEOR on **16th and 17th October 2024**. Competing against several teams, the SIT students showcased their innovative robotic design and problem-solving skills, achieving remarkable success.

Tasks Overview and Completion Process:

1. **Round 1: Line Follower (Autonomous Task)**
   - The robot autonomously follows a predefined black line.
   - Goal: Complete the course while navigating curves and intersections without deviating.
2. **Round 2: Maze Solver (Autonomous Task)**
   - The robot autonomously navigates a maze/grid, identifying and following the optimal path.
   - Goal: Solve the maze efficiently using pathfinding algorithms like DFS, BFS, or A.
3. **Round 3: Color Code Navigator (Autonomous Task)**
   - The robot follows a track with randomly assigned color codes (red, green, blue).
   - Goal: Detect and follow the designated color using sensors or cameras throughout the course.
4. **Round 4: Pick and Place (Manual Task)**
   - The robot picks up and arranges blocks to match a specified pattern.
   - Goal: Complete the pattern accurately, with penalties for errors or misplacements.
5. **Round 5: Control Pathway (Autonomous Task)**
   - The robot autonomously navigates an obstacle course with barriers like slalom posts, narrow passages, and bridges.
   - Goal: Complete the course while avoiding collisions and adhering to a marked trace.

Team Composition:

The SIT Team Robotics (IIC) comprised the following members:

1) Yash Kamble – TE A Comp
2) Manas Kale – SE A Comp
3) Kumar Patil – TE A Comp
4) Abhilash Talankar – SE B Comp
5) Namanchris Stephen – TE Electrical
6) Radhika Bade – SE Mechanical
7) Omkar Sathe – SE B Comp
8) Utkarsh Betale – SE A Comp

The Supporting Team included:

1) Rohan Vijapure – Alumni
2) Vaishnavi Shinde – TE A Comp
3) Sandhya Khomane – TE Entc
4) Gaurav Shirshat – TE Electrical
5) Gauri Deshpande – FE
6) Samruddhi Deshmukh – FE
7) Rohit Tarse – FE

Team Preparation:

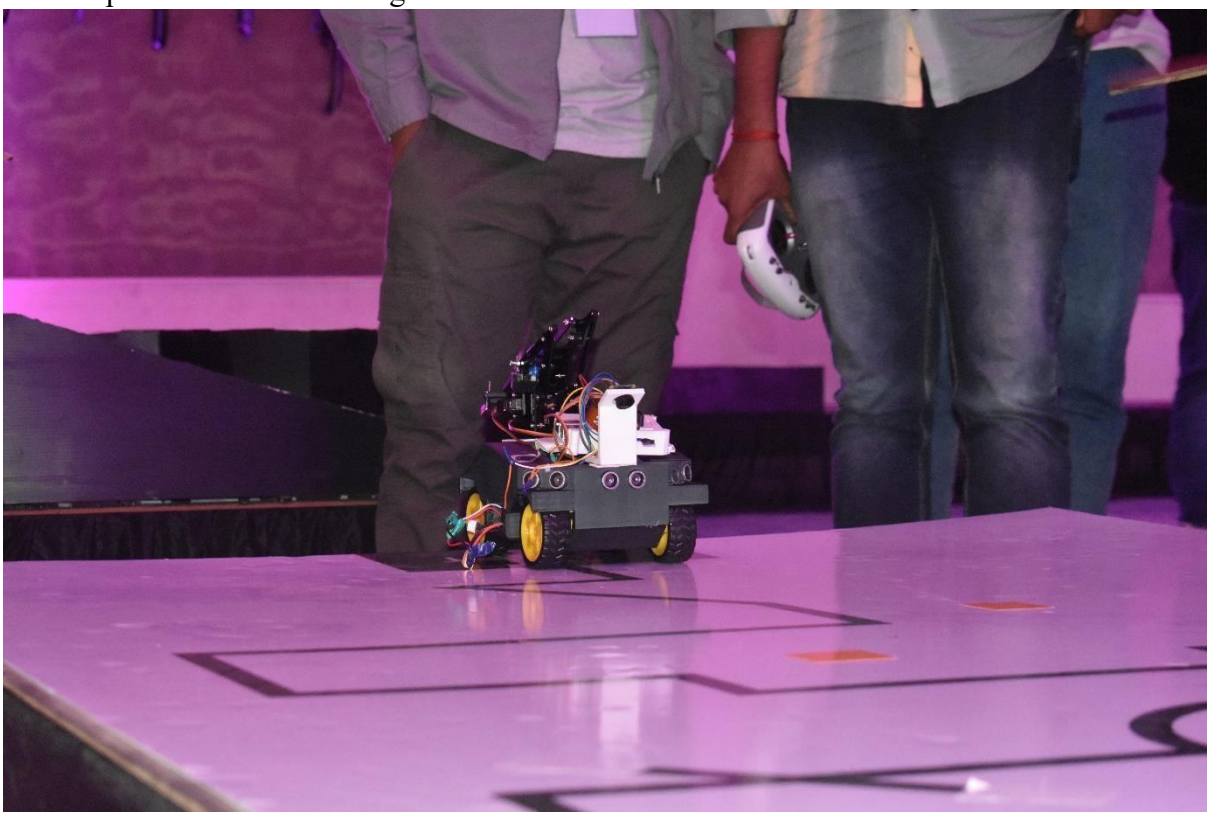
The SIT Robotics Team dedicated two weeks to designing and building their robot using Raspberry Pi as the core processing unit. The Raspberry Pi's powerful processing and interfacing capabilities allowed the team to integrate various sensors and algorithms necessary for the competition tasks.

Colour Line-Following Task:

One of the key challenges in the competition was the colour line-following task, where the robot had to navigate along a pre-defined coloured path while avoiding obstacles. Using color sensors, the robot detected and followed the lines with precision. The SIT team's robot was the only one in the entire competition that successfully completed this task, thanks to careful calibration and programming. The task demanded not only technical skill but also a fine balance between speed and accuracy.

Line-Following Task:

In the standard line-following task, robots had to autonomously follow a path marked by black or white lines. The task tested the robot's ability to remain on track and react to curves, intersections, and potential deviations in the path. The SIT team's robot, equipped with line sensors and efficient path-following algorithms, performed exceptionally well, outperforming other competitors in this challenge.



Achievements:

For their exceptional performance, the SIT students were awarded the Colour Code Commander Trophy. Their robot's ability to excel in both the colour line-following and standard line-following tasks set them apart from the other teams.

Conclusion:

The victory at the Ultimate Robotics Competition highlights the technical expertise, innovation, and teamwork of the SIT Robotics Team. Their success in overcoming the challenges of the colour line-following and line-following tasks using Raspberry Pi and advanced algorithms reflects their dedication and skill. This accomplishment has brought great pride to the institute, further establishing the capabilities of SIT's robotics program.

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