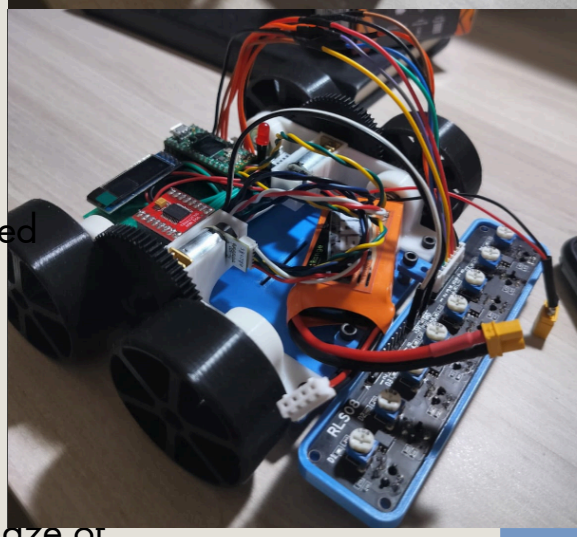
MESHMERIZE



The zonal round of a line-maze solving competition, Meshmerize was organized by IIT Bombay on 26th October 2024. Held in Bangalore, Havoltz participated in this competition with their own custom-made line-maze solving bot. While the team didn't achieve the desired outcome, let's delve into their innovative approach to tackling this challenge!

The problem statement required a bot to navigate a maze of lines in the shortest route as fast as possible. Each team would be given two runs, one dry run for the bot to explore the maze and the main run where the bot has to solve the maze in the shortest path as fast as possible.

The team's approach involved a four-wheel drive bot with 3D printed chassis and wheels. Two N20 motors along with gears to deemphasize torque in favour of increased speed Line detection was accomplished using an array of infrared sensors, enabling the bot to identify turns and intersections.

The four-wheel chassis design provided a small turning radius and balanced weight distribution, facilitating faster and more agile turns. The control system involved a teensy 4.0 microcontroller using which a PID controller was programmed for accurate path following. The drive control involved two N20 motors with a max speed of 300RPM controlled by TB6612FNG motor drivers and powered by a 11.1V 600mAh lithium polymer battery pack.

Maze-solving was achieved by mapping all explored paths, pruning dead ends and longer routes, and ultimately selecting the shortest path to complete the maze efficiently. The algorithm used is RSLB(Right-Straight-Left-Back). The bot will always follow the RSLB order of preference whenever faced with a choice in intersections. These decisions would be stored in an array which at the end of the dry run would be scanned to find the shortest possible path.

S.No	Components Used
1.	Teensy 4.0 Microcontroller
2.	N20 Motors
3.	TB6612FNG Motor Driver
4.	RLS08 Line Sensor
5.	600mAh Li-Po Battery