

INTRODUCTION

Our team, CODEX, is dedicated to advancing the frontiers of robotics and collaboration by participating in **RoboCup Junior Asia Pacific 2024** for the category Rescue line. We are a group of three students from diverse backgrounds, united by our passion for problem-solving through the integration of AI and programming. We are committed to excellence and a spirit of competition and hope to exhibit our efforts while making a meaningful impact in not only the world of robotics but its immense uses beyond. Together, we are excited to tackle the challenges ahead and contribute to the future of Rescue Robotics!

MEET THE TEAM

Kashvi Khajanchi

AI strategy designer and Programmer

- "If there is a glitch, there is a fix - just waiting to be DEBUGGED!"
- builds the strategy to make the robot solve different problems related to rescue line mission
 - Uses AI in optimising robot performance.
 - Running trials of different strategies to refine the performance



Navya Singla

Programmer

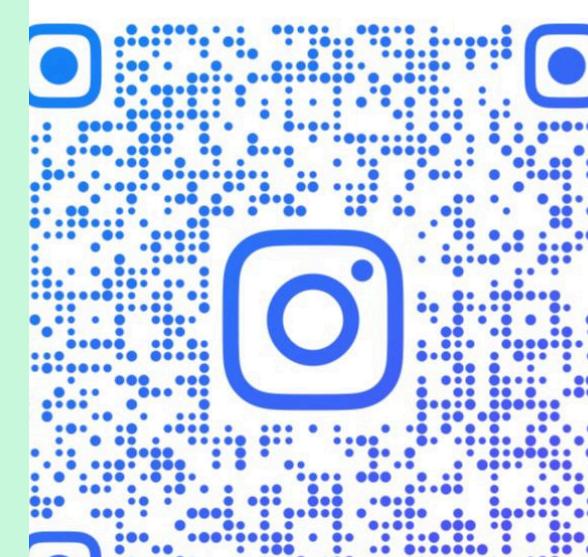
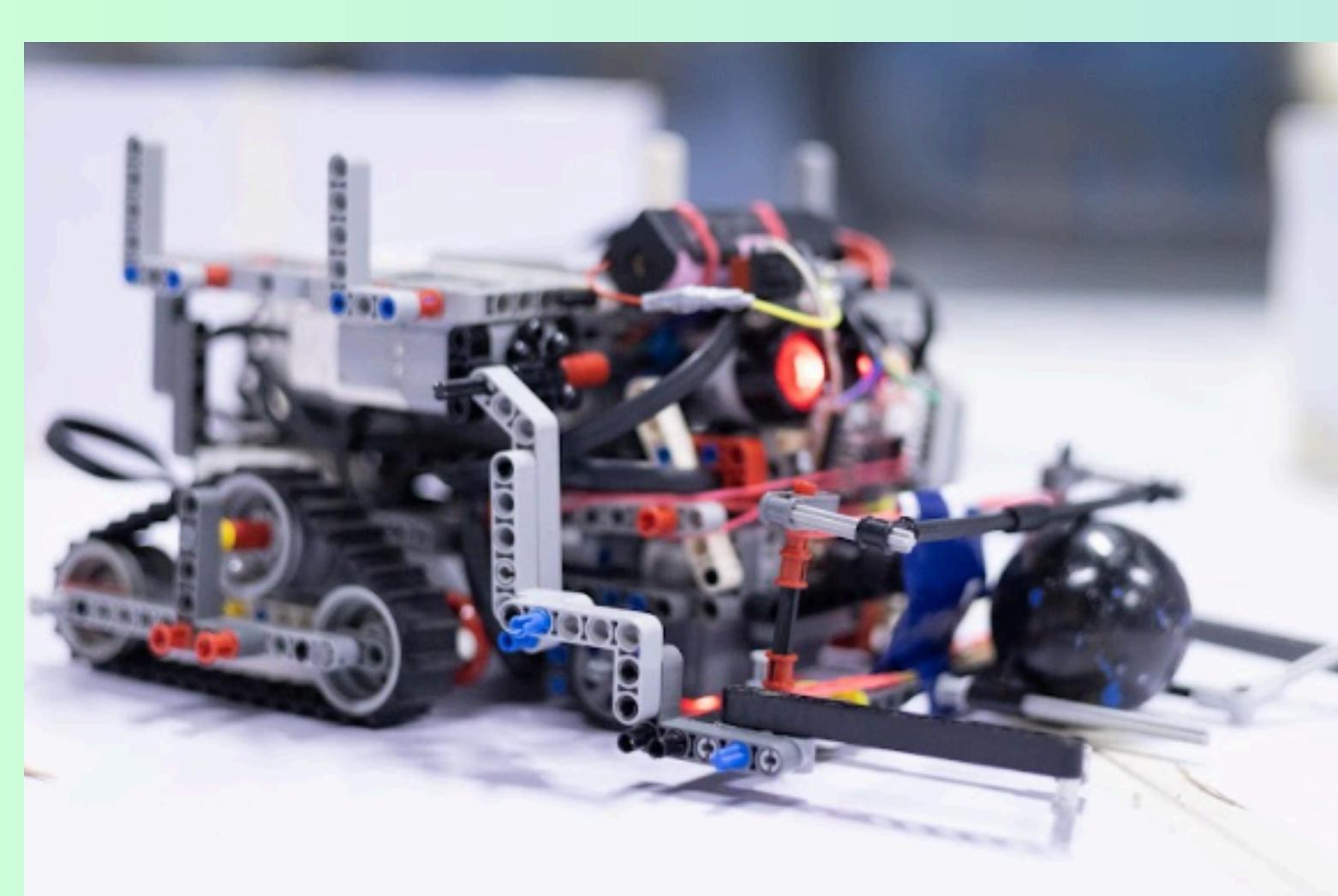
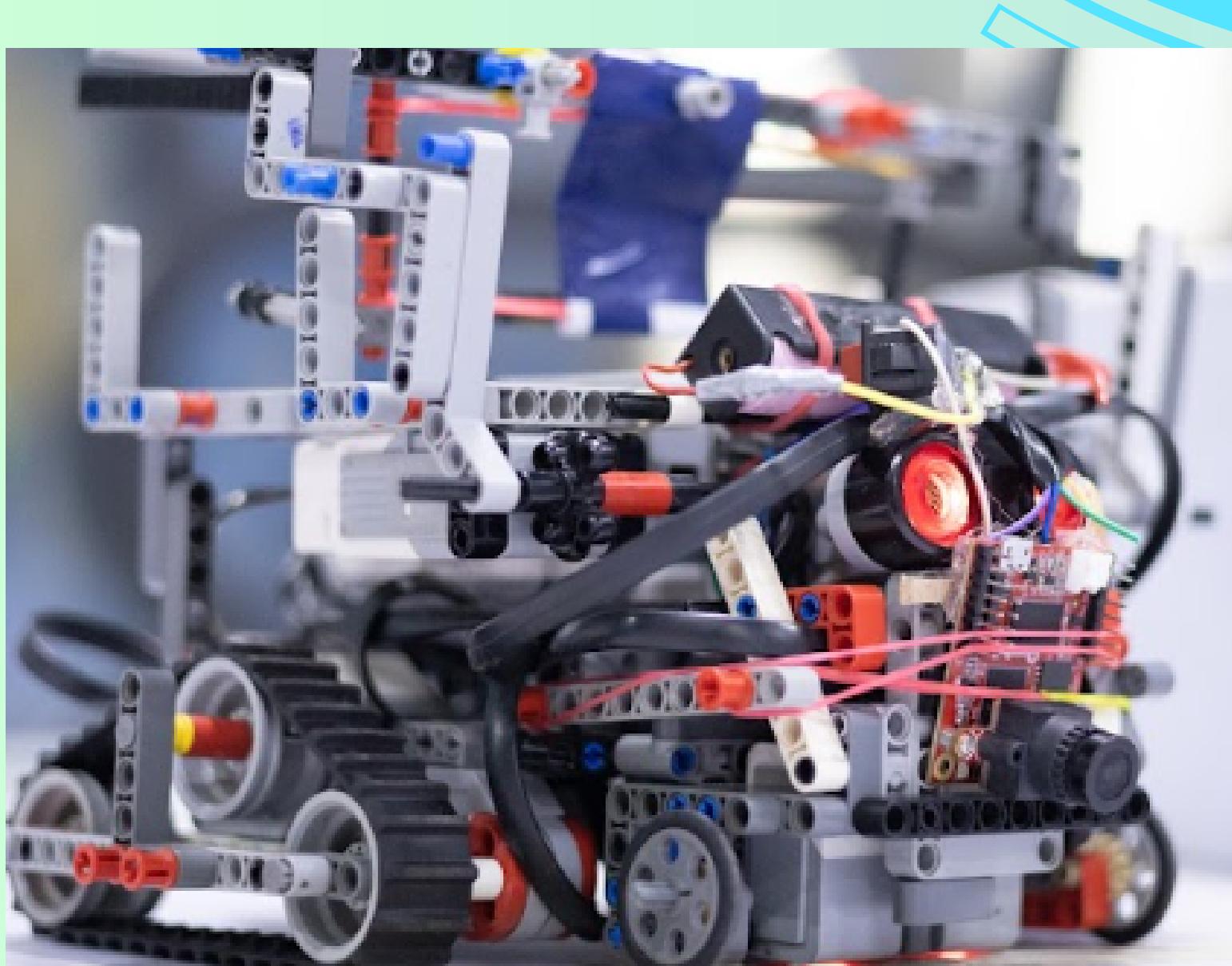
"Logic never crashes...unless I forget a semicolon"

- Designing and coding algorithms for navigation, obstacle detection.
- Creating tools for real-time monitoring and data analysis to evaluate mission success.

Swayambhav Siddharth Madhur

Hardware designer

- "Short circuits build robots..not just robots "
- Creating tools for real-time monitoring and data analysis to evaluate mission success.
 - Integrating various hardware components, such as motors, controllers, and communication devices, into a cohesive system.



[YouTube](#)

@CODEX.ROBOTS

Website

Achievements



- Won Inspire Manak held at National Level in November 2023.
- Won Technoxoan World Robotics Championship for Best Rocket design in year August 2024.

Participated in

- World Robotics Olympiad
- ATL Marathon
- Smart India Hackathon,
- Coolest Projects by Raspberry Pi Foundation

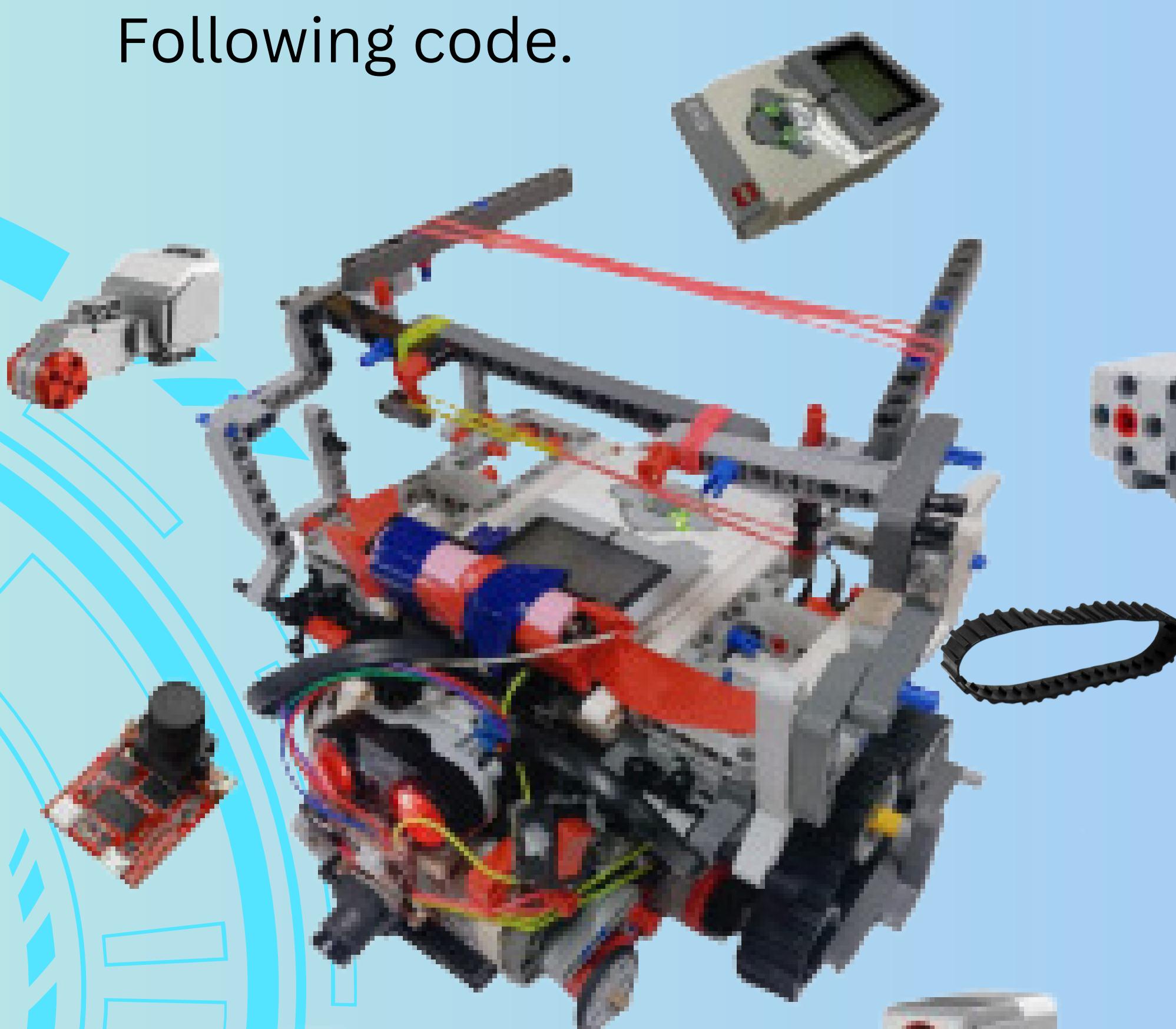
SOFTWARE



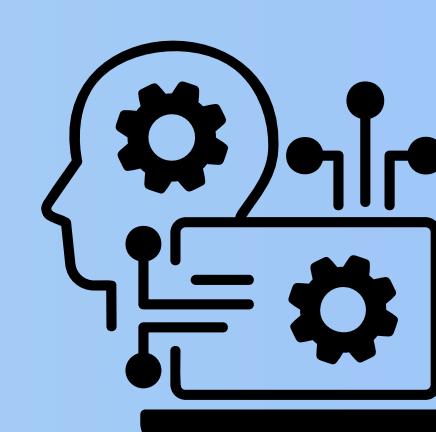
OPEN MV IDE is used for the Open MV coding to operate camera



UART Connection



ALGORITHM



HARDWARE

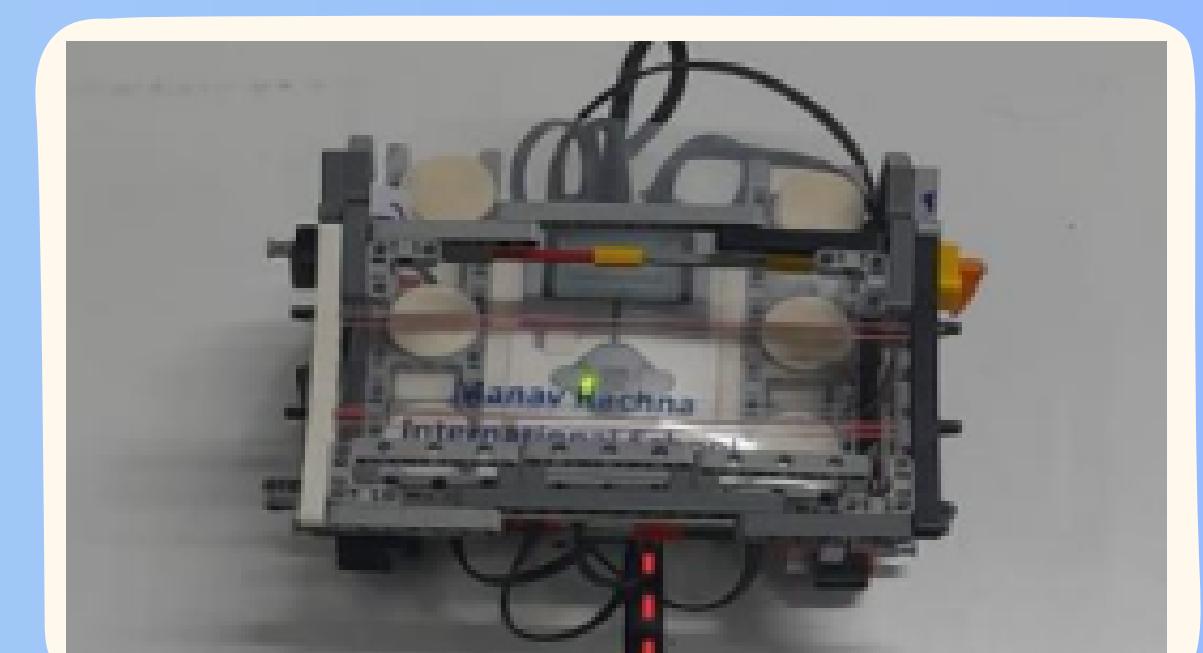
Main structure of the vehicle

- Colour Sensors
- Two large motors
- The caterpillar tracks
- The EV3 Brick

Rescue mission mechanism

- Claw

OpenMV



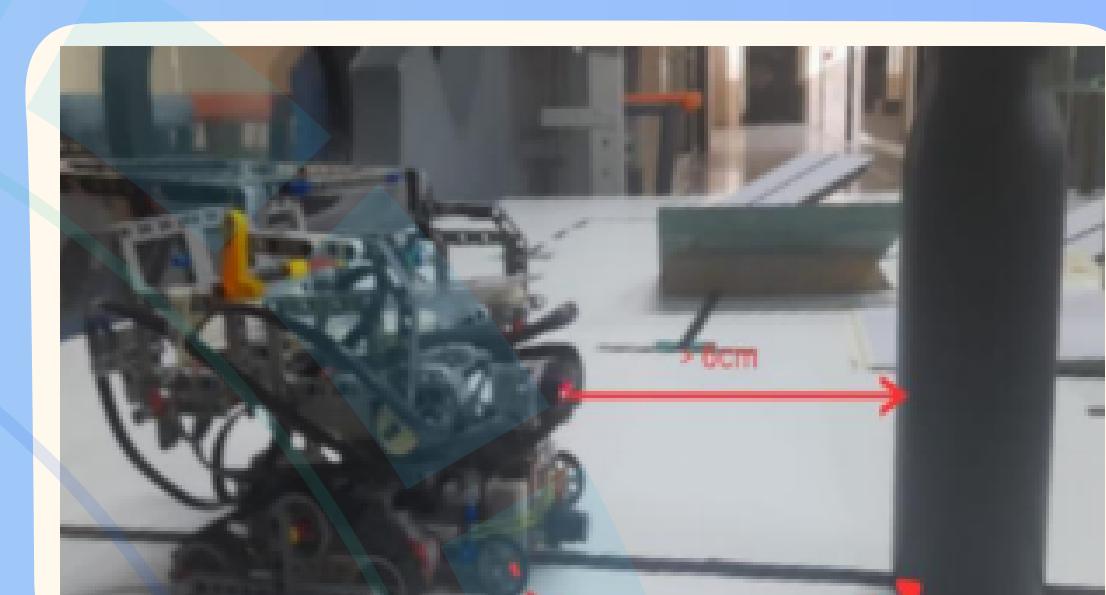
Line Following

The robot uses EV3 Colour Sensors and a proportional control system to follow a line. The error value from two sensors adjusts motor speeds, correcting the robot's path if it deviates.



Turn Detection

Turns are managed by monitoring the error value. For U-turns, the robot detects green on both sensors and turns accordingly. If no green is found, it checks for red and stops.



Obstacle Avoidance

An EV3 ultrasonic sensor detects obstacles. If an object is closer than 6 cm, the robot turns to avoid it and realigns with the line.



Victim Detection

Using machine learning (FOMO), the robot's camera detects balls in the rescue zone and sends signals to the EV3 for appropriate actions.

Corner Detection

The camera identifies red and green corners using machine learning, sending signals to the EV3 for turning and aligning with the corners.

Entry/Exit Detection

After completing the mission, the robot uses ultrasonic sensors and colour sensors to detect the exit (black line) or entry (silver line) and proceeds accordingly.

OpenMV and EV3 Connection

The OpenMV camera is connected to the EV3 using UART, programmed via MicroPython in Open MV IDE to send instructions to the EV3 for further actions.