



Autonomous Mobile Robot Challenge

Y.AL-Mahameed , L.Othman , B.Qabani
Supervisor: Prof. Esam Al Qaralleh
Embedded System Final Design Project , Spring 2026

Introduction

This project proposes a line follower robot and obstacle-detector using infrared sensors for line following and ultrasonic sensors designed in such a way as to provide fixed-distance obstacle detection.

Design

The PIC16F877A microcontroller controls the robot by reading IR sensors, an LDR, and an ultrasonic sensor. IR sensors are used for line and wall detection, while the ultrasonic sensor detects obstacles, and the LDR measures light intensity.

An L298N H-bridge drives the left and right DC motors for movement. A servo motor is used only for the flag mechanism.

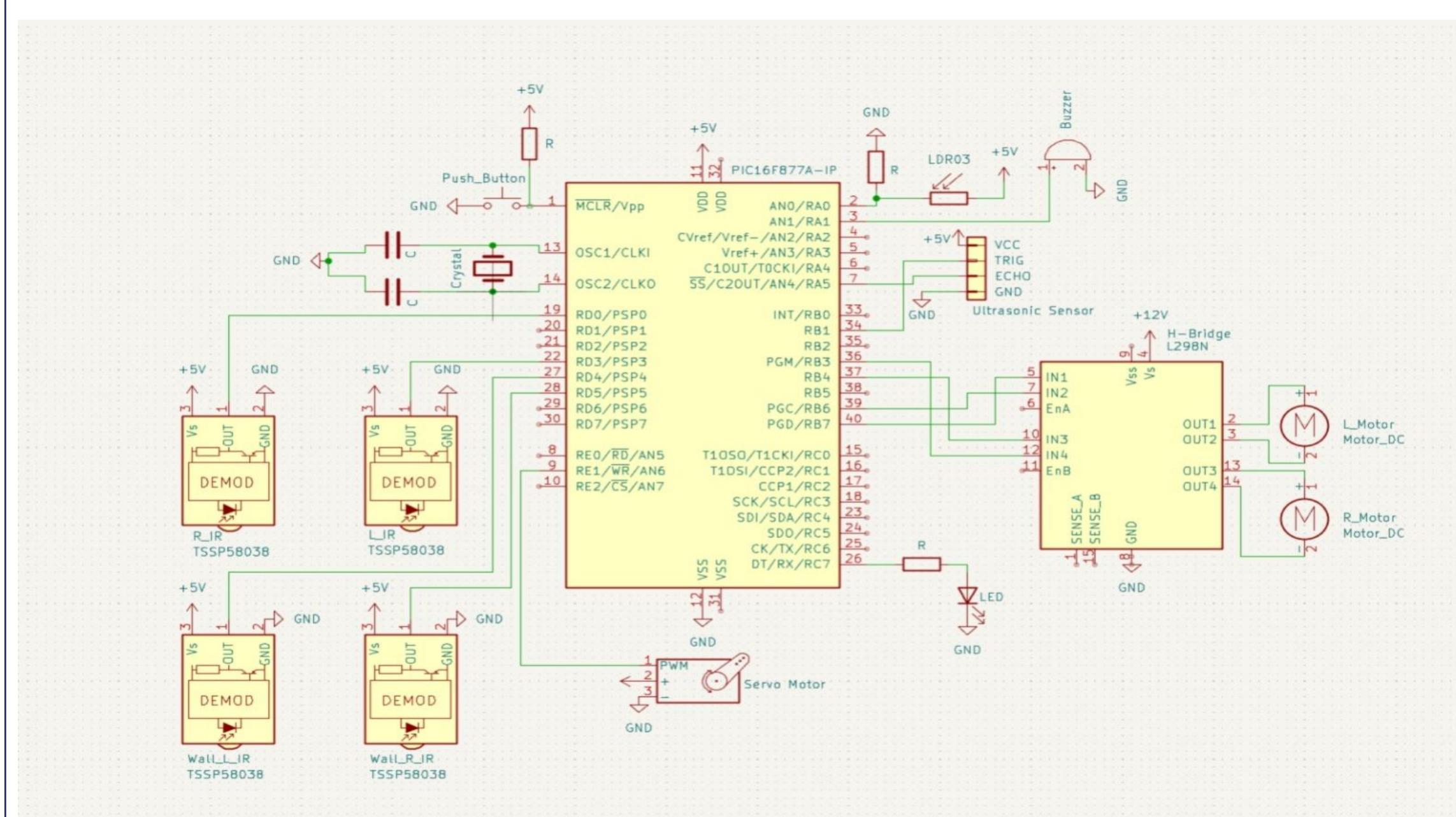


Figure 1: Electrical Design

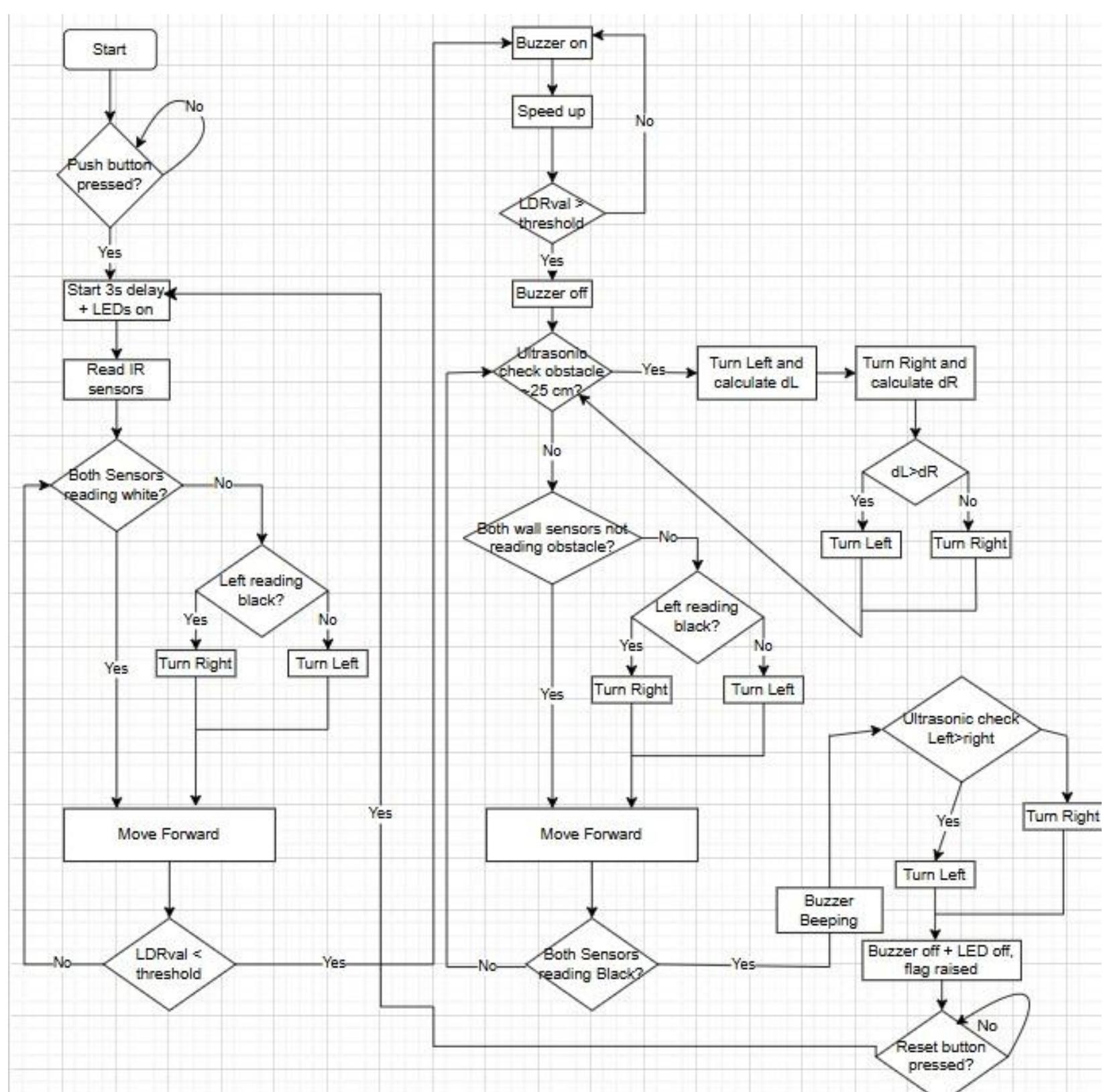


Figure 2: Software Design

Results

The robot was able to successfully follow the line on the track using IR sensors. It also detected obstacles in front of it using the ultrasonic sensor and responded by stopping or changing direction. The motors operated correctly through the H-bridge driver, and the flag servo mechanism functioned as expected. Overall, the system performed reliably under normal testing conditions.

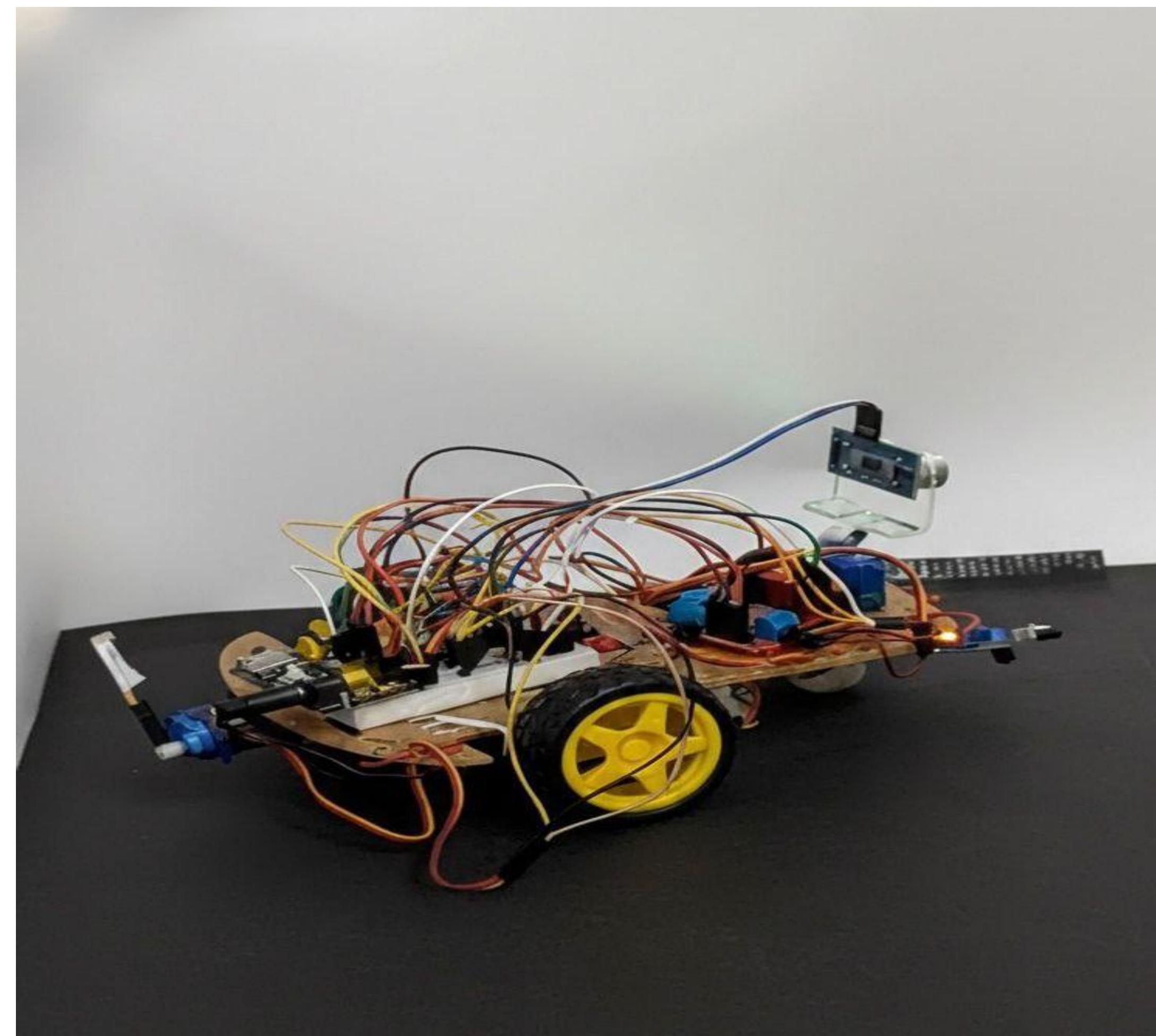
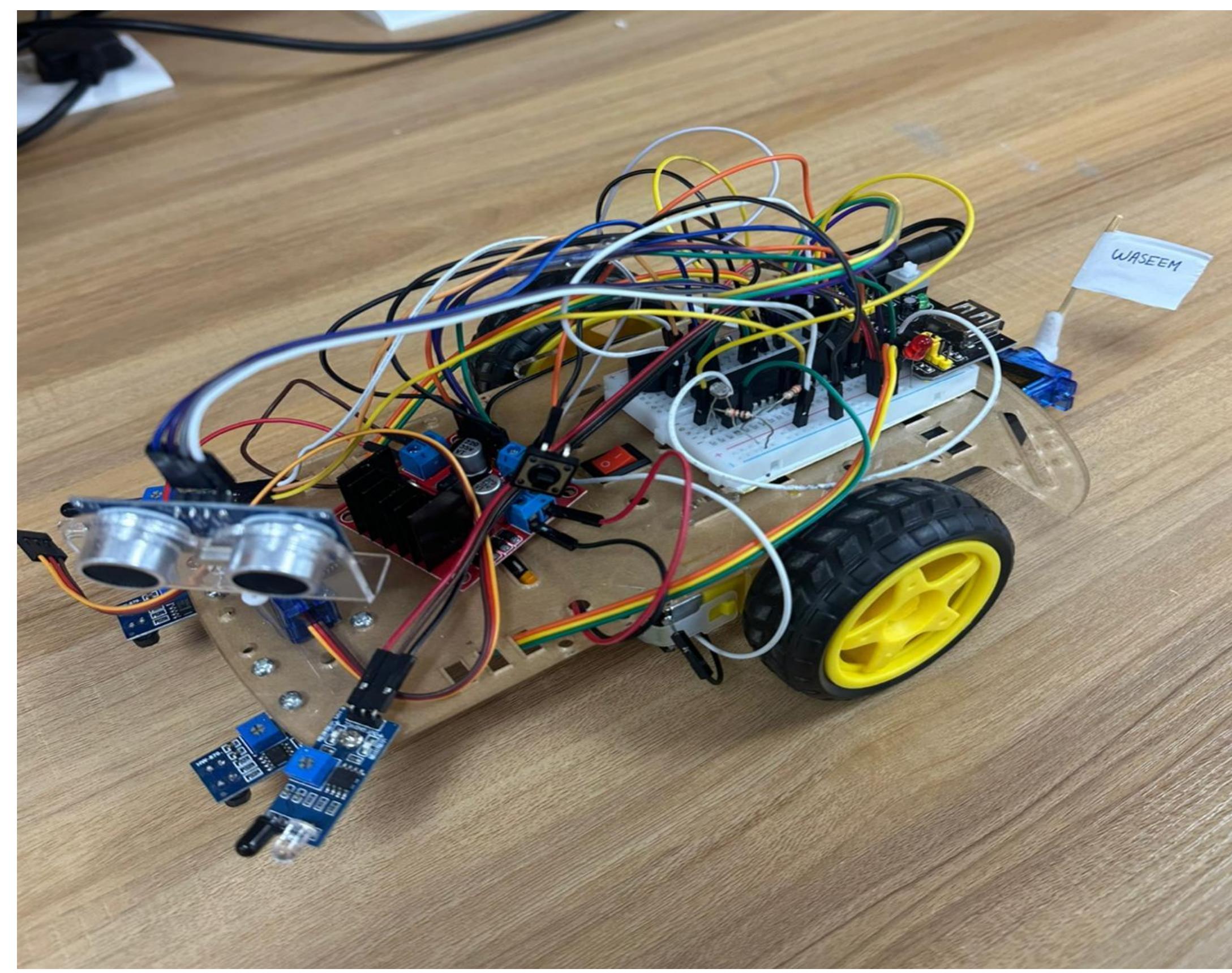


Figure 3: Result

Conclusion

The project successfully demonstrates a line follower robot with obstacle detection. It highlights practical embedded systems concepts such as sensor interfacing, motor control, and real-time decision making.