Line-Following Robot

EGR314 Spring 2025:
Embedded Systems
Design Project II

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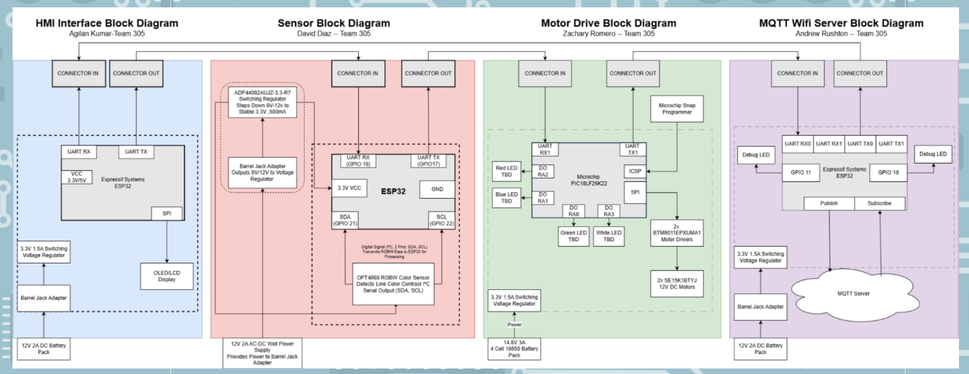

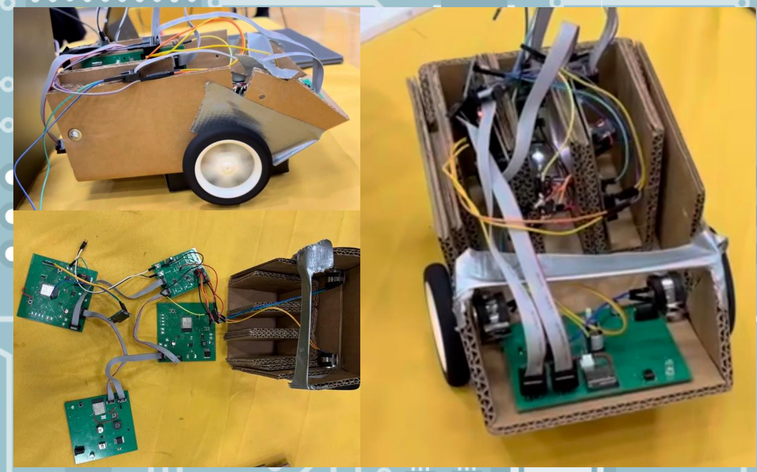

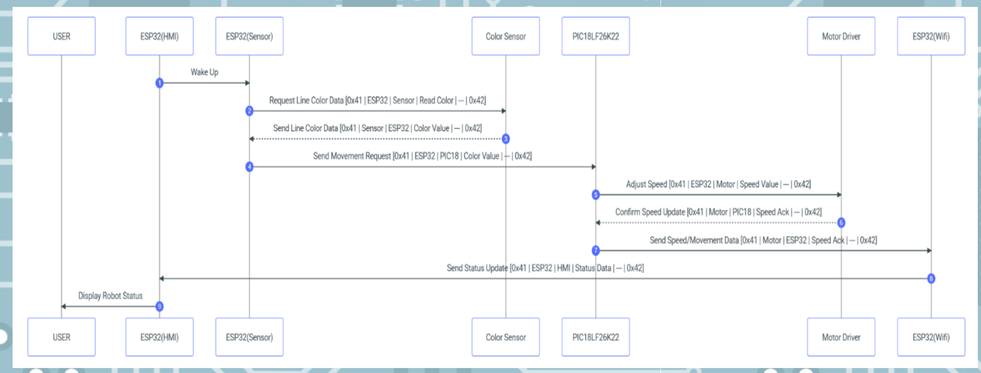

This robot is not an uncommon project, so for our design photo we used an already completed machine to portray our project goal. This is a simple, two-wheeled design that uses similar sensors and control mechanisms to what is contained in our project.

The block diagram contains our 4 subsystems:

The HMI system uses an OLED screen and push buttons to provide the user with input and output functionality.
The sensor subsystem uses a color sensor to detect lines drawn on the board and determine their location. It then sends that data to the motors.
The motor system contains 2 motors, one controlling a wheel on either side. It uses the data sent from the sensor system to determine which direction the machine needs to turn to follow the line, and then by slowing down/speeding up one of the wheels, it will turn the machine.
The MQTT subsystem will act as another output for data from the systems. It will display things like speed and direction, and keep track of the total path that the robot has followed. It will also contain another way to start and test the motor controls.

The communication sequence diagram shows the process of the communications between our boards. The process will start with the HMI system sending a start command to the sensors. The sensors send data to the motors, which move accordingly, then the motors send the data to the MQTT system, where the data is uploaded and the cycle starts again.

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