# Multi Color Line Following Robot

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Project Description

- This project aims to design and build a robot with color sensing. The robot will light a red LED when it detects white color, and a white LED will light when it detects black. At the same time, it will make a sound with the help of a buzzer and change the tone depending on the color. Also, when it detects black color, it will move and travel a certain distance.
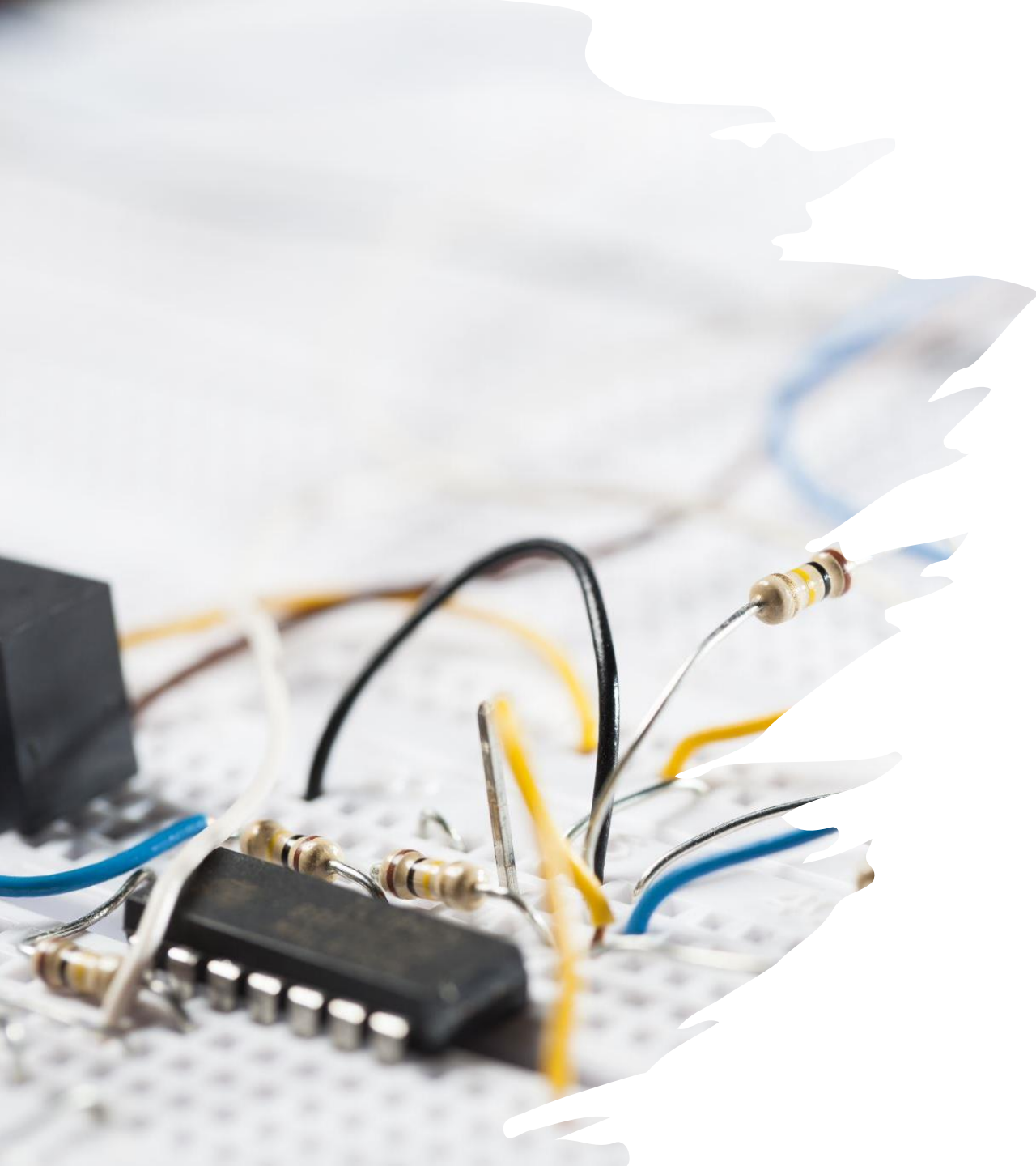
Arduino UNO R3 (Clone - CH340 USB Chip - USB Cable Gift): Arduino based microcontroller board. It is used as the control unit of the project. 4WD Vehicle Platform (Transparent): The chassis or body structure of the robotic vehicle. It provides a platform for the assembly of other components.

L298N DC/Step Motor Driver Board: A driver board used to control DC motors or stepper motors. It is used in this project to steer the wheels.

2 Pieces of TCRT5000 Infrared Distance / Line Detection Module: Infrared sensors used to detect lines on the surface or detect obstacles.
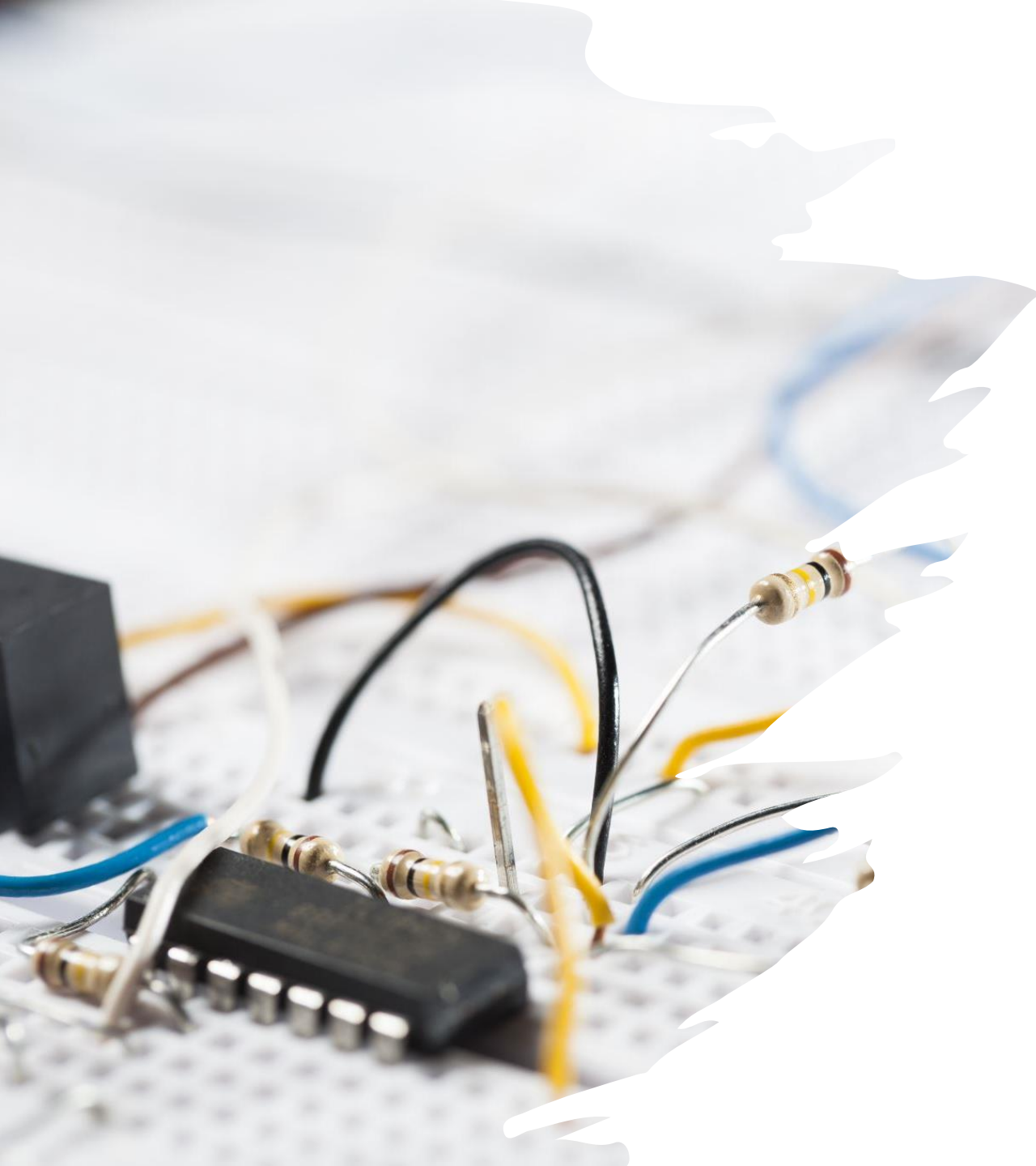
Jumper Cable Female Male (20cm) and Jumper Cable Male-Male (20cm): Cables used to provide connection between circuit elements. They are used to connect the components in the project together.

Mini Breadboard: A small port used for prototyping or temporary circuit setup. Allows temporary placement of electronic components.

Resistance: Resistors used to provide resistance between circuit elements. They are used to control current and voltage values.

Led: Light-emitting diodes used for visual indicators. They are used to represent a particular state or process.

Battery: The battery used to power the project. It provides energy to power the Arduino and motors.

These materials are used to perform different functions such as control, sensing, communication and power supply in a robotic vehicle project.
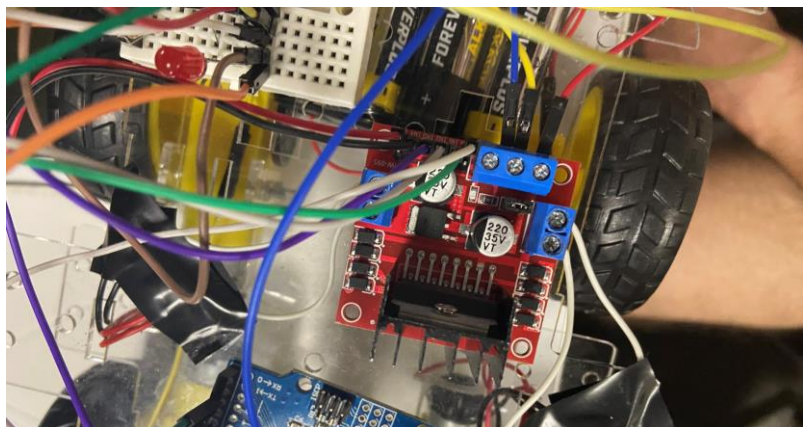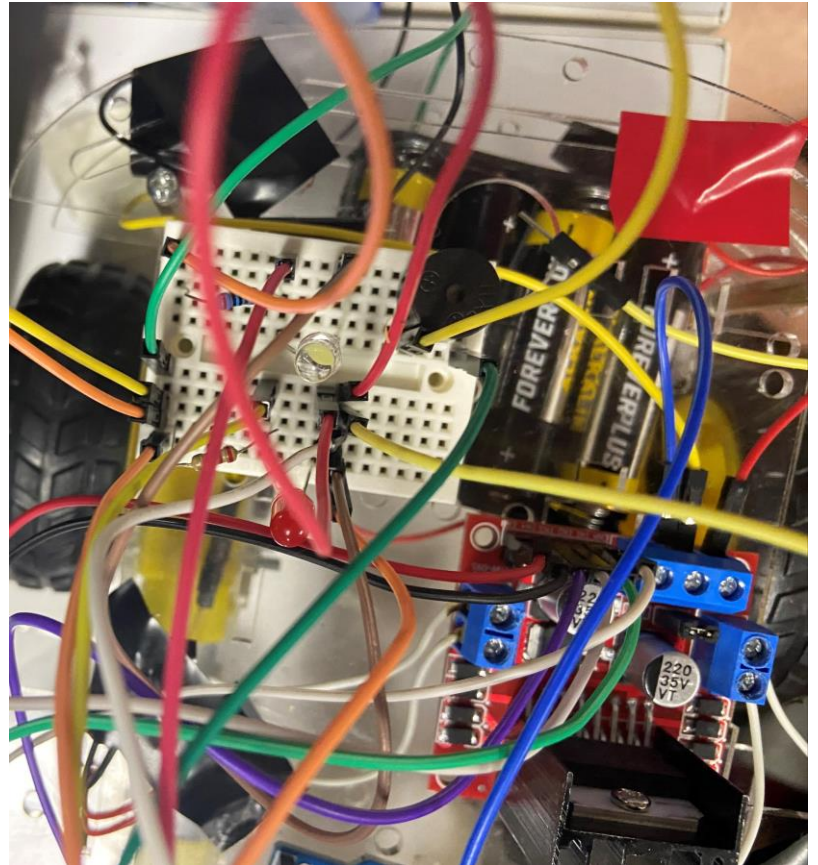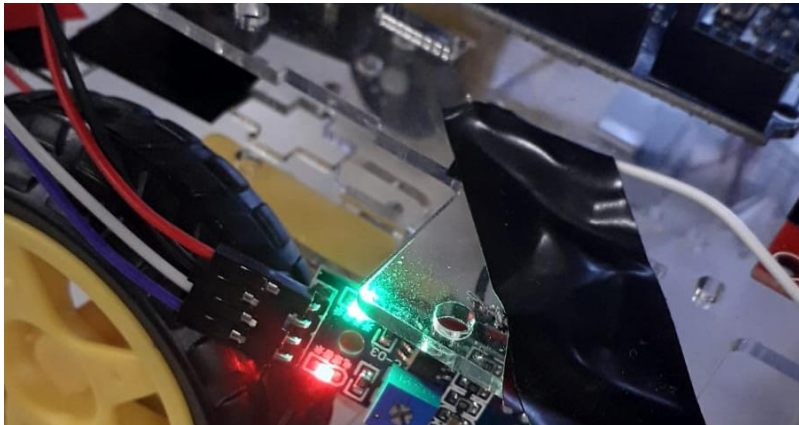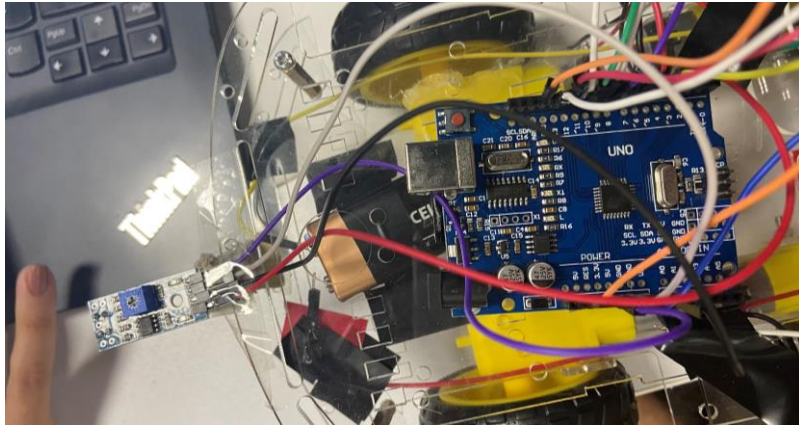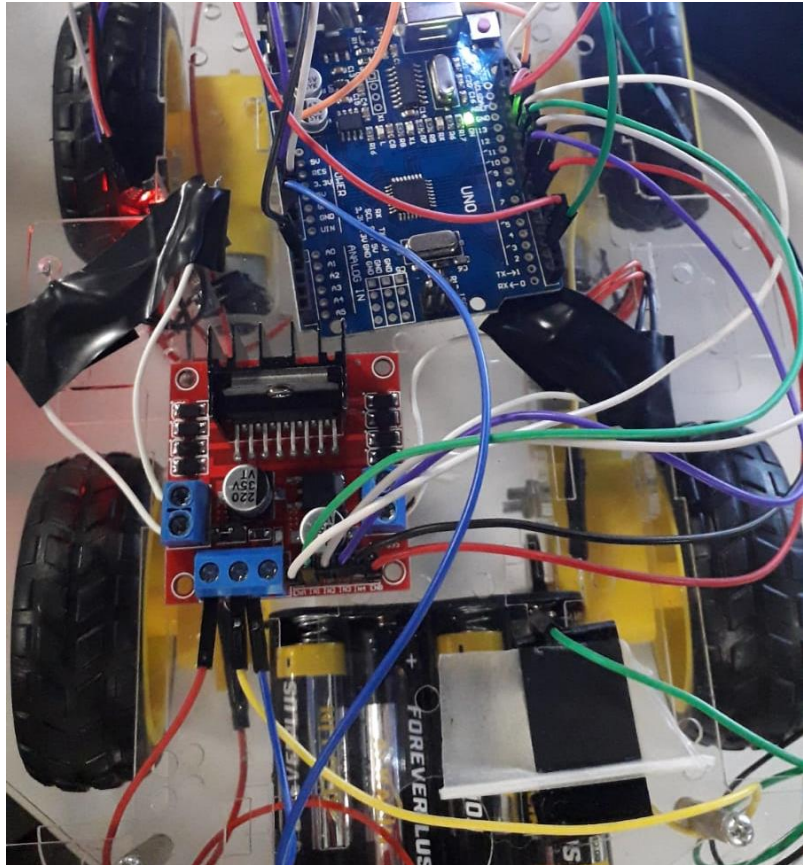
PROJECT PHOTOS

This is the project

Arduino code in the project

```arduino
int sag_enable=11; //EnA
int sol_enable=6; //EnB
int sag_ileri=10; // INPUT1
int sag_geri=9; // INPUT2
int sol_ileri=8; //INPUT3
int sol_geri=7; //INPUT4
int sensor=3; //SENSOR
int buzzerPin=2; //buzzer
#define ledbeyazPin=12 //beyaz led
#define ledkirmiziPin=4 //kırmızı led
```

```arduino
void setup() {
  //Tekerler ve motor
pinMode(sag_ileri, OUTPUT);
pinMode(sag_geri, OUTPUT);
pinMode(sol_ileri, OUTPUT);
pinMode(sol_geri,OUTPUT);
pinMode(sag_enable, OUTPUT);
pinMode(sol_enable, OUTPUT);
// Siyah ve beyaz okuyan kızılötesi sensör
pinMode(sensor, INPUT);
//Buzzer
pinMode(buzzerPin, OUTPUT);

Serial.begin(9600);

//Led
pinMode(12, OUTPUT); // beyaz led
pinMode(4, OUTPUT);  // kırmızı led

}
```

```
digitalWrite(4, HIGH);
 delay(100);
 digitalWrite(12,LOW);
 delay(50);
 /*digitalWrite(4, LOW);
 delay(1000);*/
  }
    }
```

```
void loop() {
  int veri= digitalRead(sensor);
Serial.println(veri); // sensörün okuduğu rengi 1-0 olarak monitöre yazdırma

  if (veri==1){ //siyah rengi okuması durumu
    digitalWrite(sag_ileri, HIGH);
    digitalWrite(sag_geri, LOW);
    digitalWrite(sol_ileri, HIGH);
    digitalWrite(sol_geri, LOW);
    analogWrite(sag_enable, 255);
    analogWrite(sol_enable, 255);

   //LED KOMUT KODLARI
  digitalWrite(12, HIGH);
  delay(100);
  digitalWrite(4,LOW);
  delay(50);
/* digitalWrite(12, LOW);
  delay(50);*/
```

```
//Buzzerkodu
int notalar[] = {1000, 294, 330, 349, 392, 440, 494, 523};

for (int i = 0; i < 8; i++) {
    tone(buzzerPin, notalar[i], 500); // Her nota 0.5 saniye boyunca çalacak
delay(500); // Her nota arasında yarım saniye bekle */
}

  }
  else if (veri==0){
    digitalWrite(sag_ileri, LOW);
    digitalWrite(sag_geri, LOW);
    digitalWrite(sol_ileri, LOW);
    digitalWrite(sol_geri, LOW);
    analogWrite(sag_enable, 0);
    analogWrite(sol_enable, 0);

  /*noTone(buzzerPin); // Ses kapat
    delay(500); // Notalar arasında 0.5 saniye bekle*/
```

PROJECT VIDEO
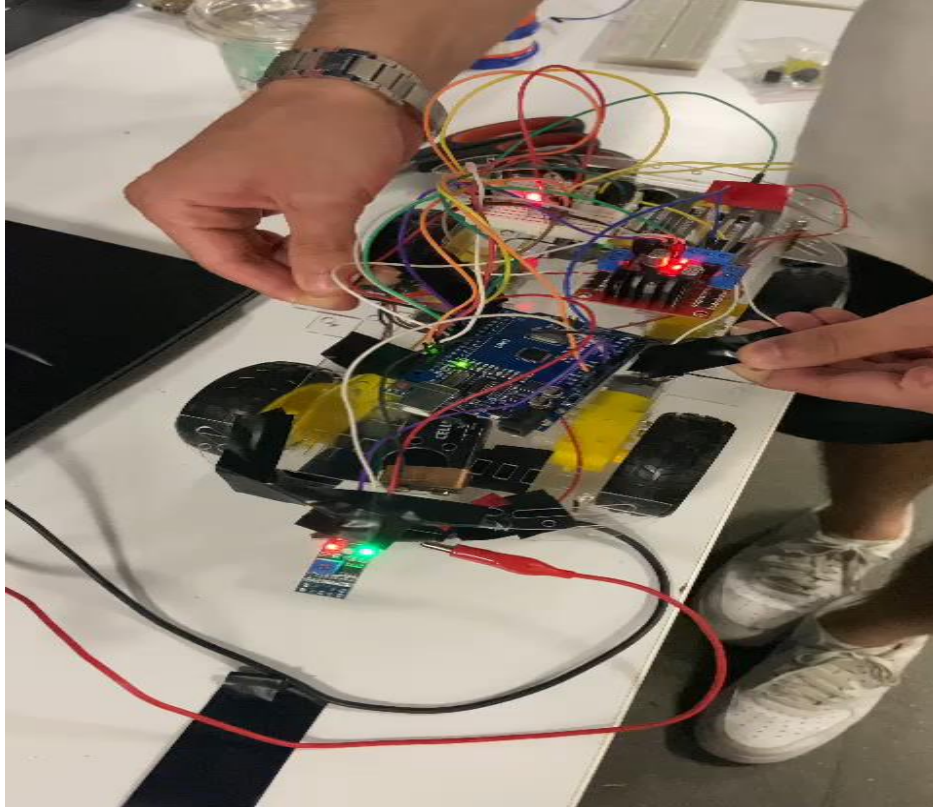
As you can see in the video , vehicle's wheels do not move because of that the color sensor detects white , when it sees the black , it gives permission motor to run them and vehicle goes through to black line until sensor sees white again.

REFERENCES

- Luo, M. R., & Rigg, B. (2001). The development of color sensors for industrial applications. Color Research & Application, 26(5), 376-389.

  - Szeliski, R. (2010). Computer vision: algorithms and applications. Springer Science &Business Media.

  - Bowman, D. A., Kruijff, E., LaViola Jr, J. J., & Poupyrev, I. (2004). 3D user interfaces: Theory and practice. Addison-Wesley Professional.