**World Robotics Olympiad**

Future Engineers Challenges

Self-driving Autonomous Car: Time attack and Obstacle Avoidance

Team Brainiacs

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**Introduction**

Team Brainiacs has developed a self-driving autonomous car for the 2024 WRO future engineers’ competition. This car uses the principles of computer vision and PID to complete the specified rounds of this challenge. The car uses PID to control its movement and steering while using a color sensor to detect the corners of the playfield and turn accordingly. Moreover, computer vision was implemented using a Raspberry PI 5 and raspberry Logitech C270 camera to detect the traffic signs and steer the car to complete the whole track.

The code for the self-driving autonomous race robotic car consists of several modules that are related to the electromechanical components of the vehicle. The Raspberry Pi 5 module runs computer vision algorithms that analyze camera data to detect obstacles in the car's path. The Arduino Uno modules are responsible for controlling the motors, servos, and sensors that enable the car to move and navigate. The MPU6050 gyroscope sensor is used for PID control, which enhances the vehicle’s movement and ensures turns are centered and aligned with the provided lanes as well as helping to maintain the car's stability and balance while driving. The TCS34725 color sensor detects colors in the environment, which can be used to help the car navigate and turn accordingly.

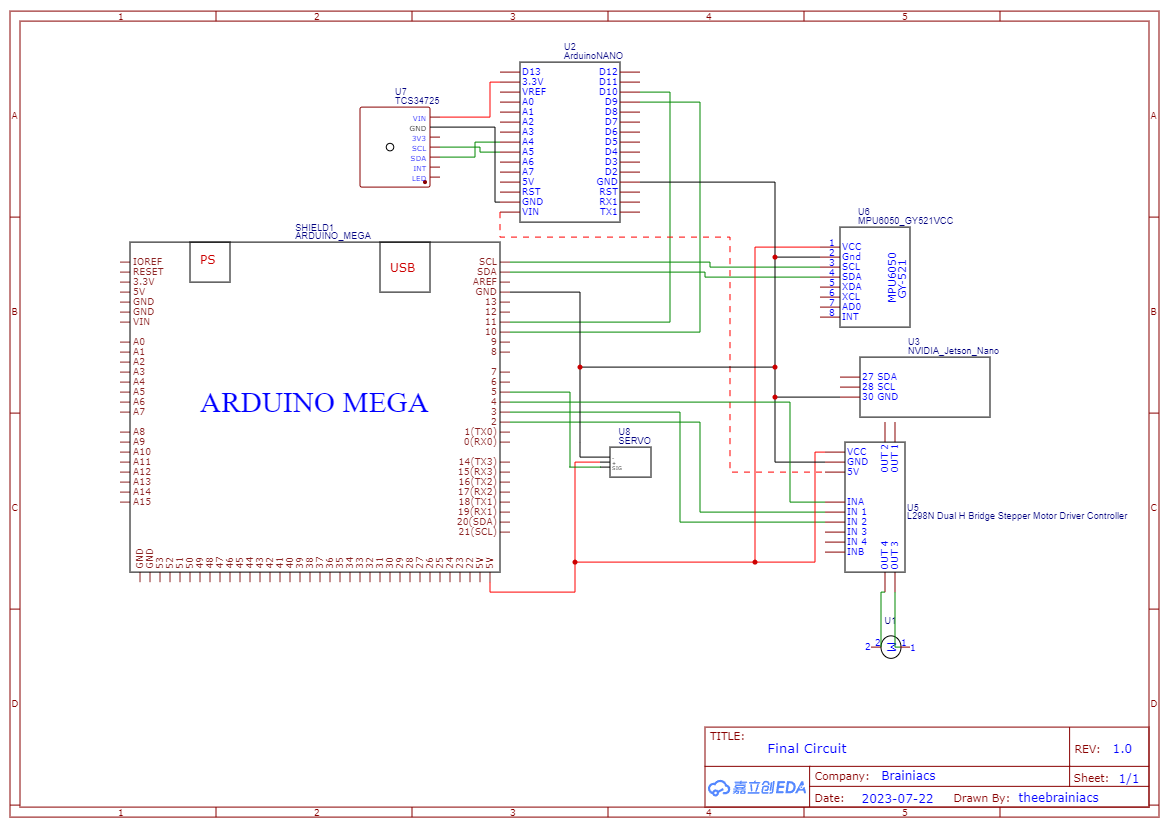
**Materials**

* Raspberry Pi 5 8gb
* Arduino UNO R3
* MPU6050 gyroscope
* Adafruit TCS34725 color sensor
* Logitech C270 720p30 webcam
* 1 High Speed DC motor
* 1 Mg995 geared servo motor
* 2500mAh Li-po battery packs
* L298N Dual H-bridge Motor controller
* Auxiliary 3D printed parts and laser cut chassis

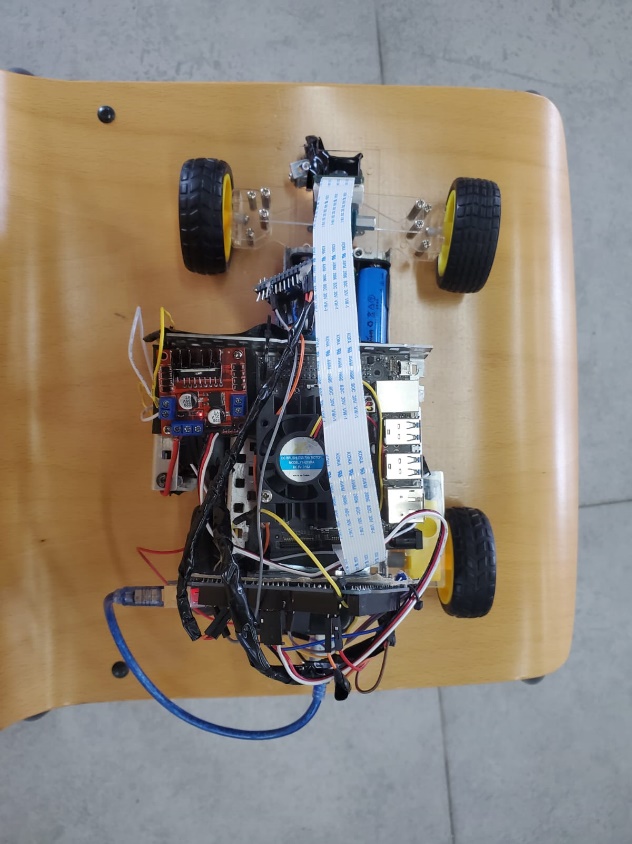
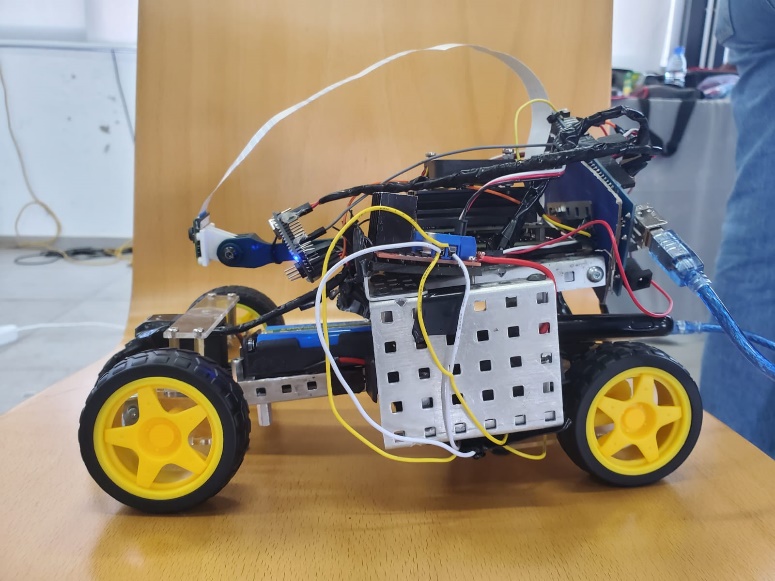
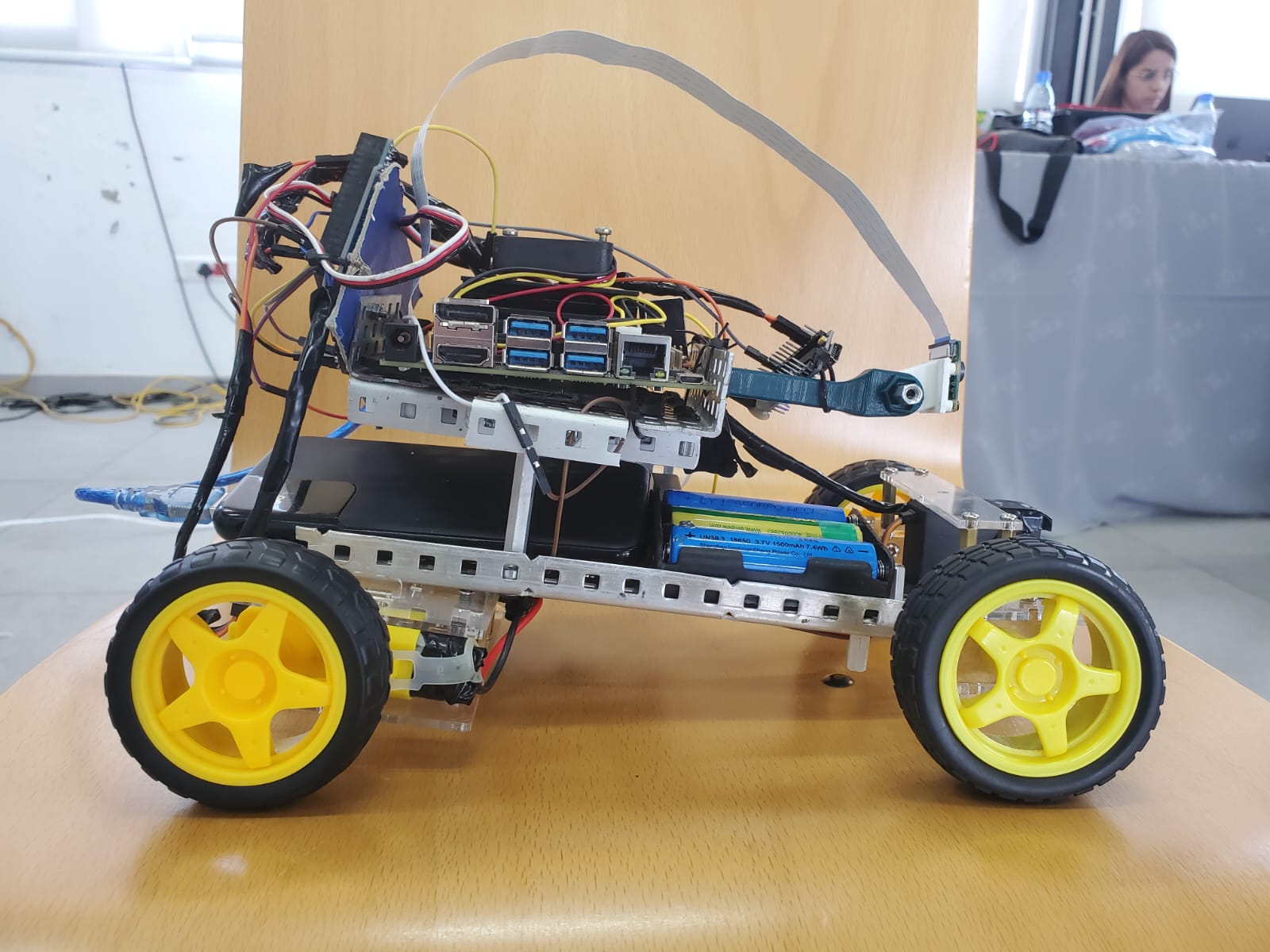
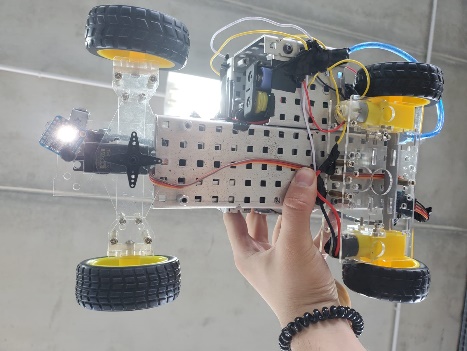
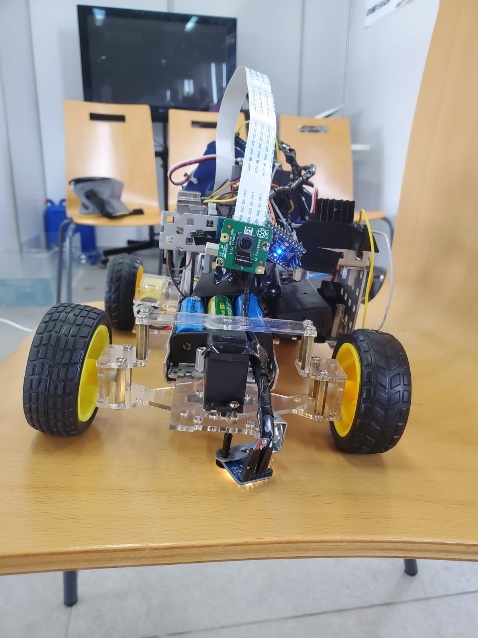
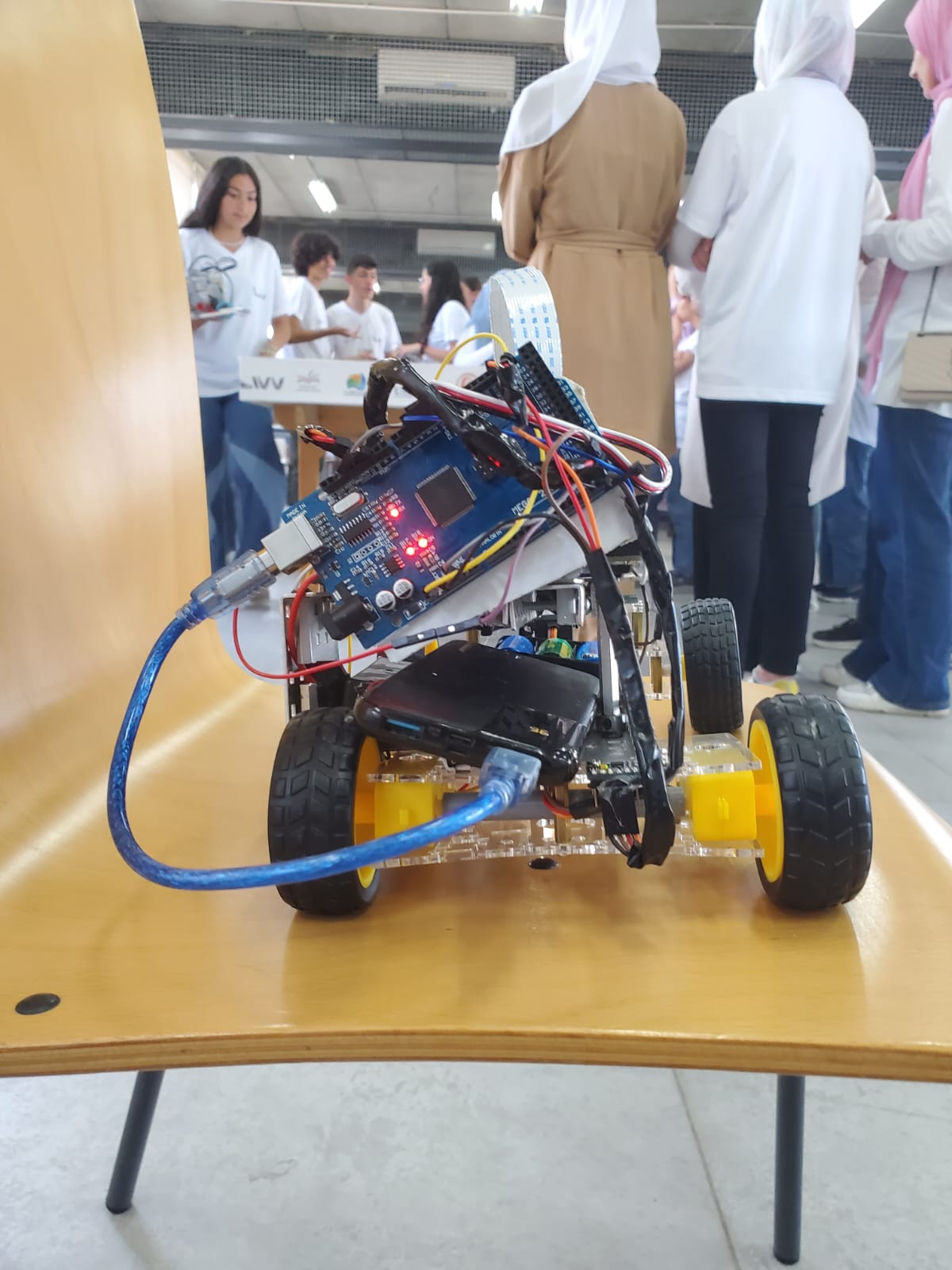
**Programming Languages Used**

* Arduino C++
* Python

**Schematic Diagrams**



**Pictures of The Robot**

**Team Pictures**

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