Hardware Project 2024

BALL COLLECTING AND SORTING ROBOT

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Content

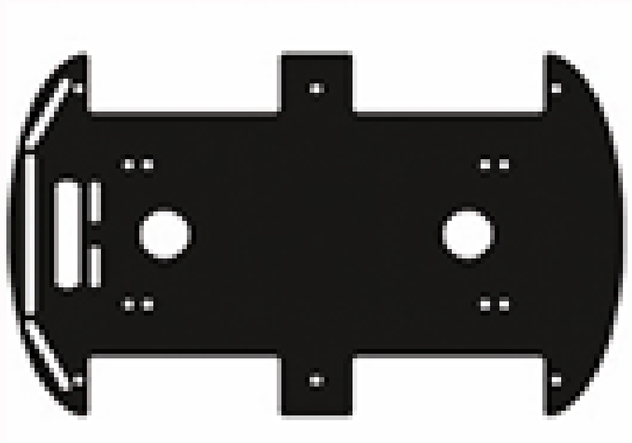
Introduction

Collecting the balls during practice sessions or after matches in tournaments can be rather

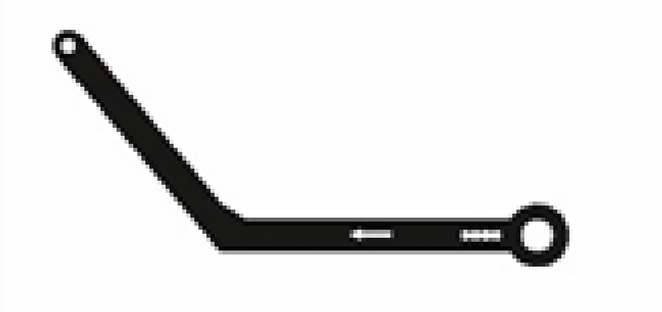
Time-consuming in sports like tennis and golf. We propose a robotic approach to this problem, whereby we automate the procedure of collecting the balls.

Design and Development

car base



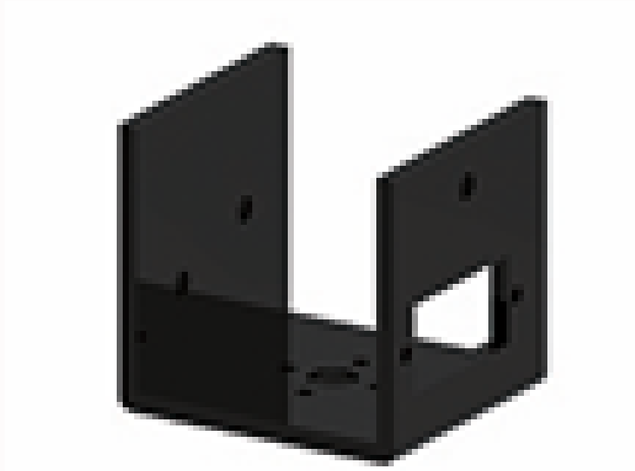
Stand to the arm



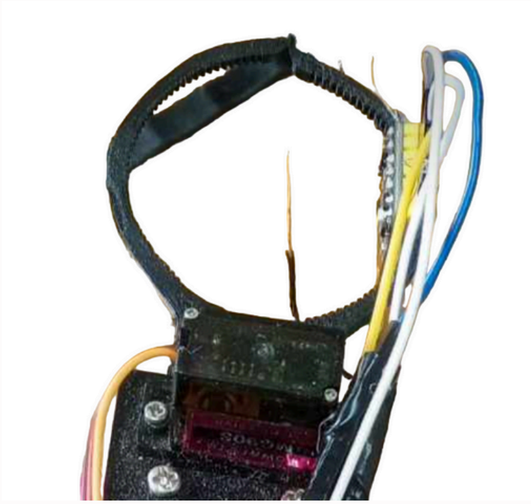
base to claw

Design and Development

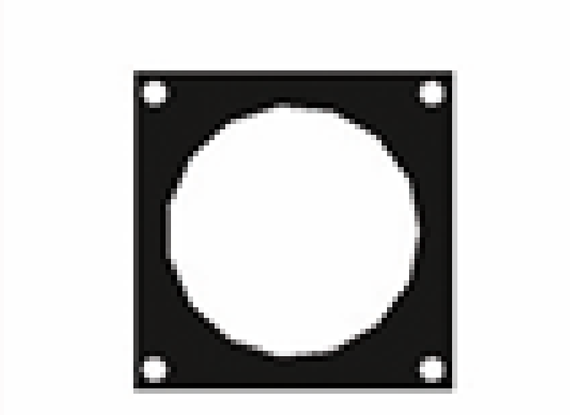
base to Arm



claw

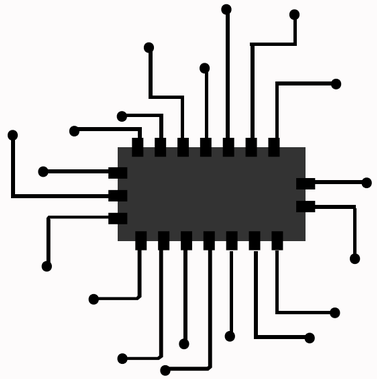


base to base



SOFTWARE DEVELOPMENT

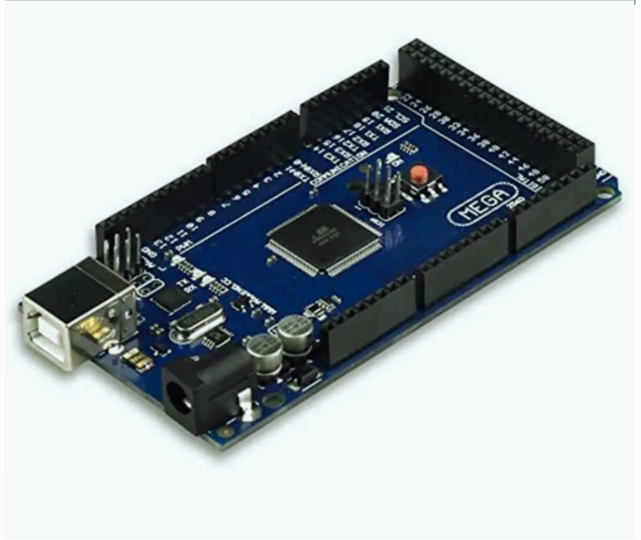
ESP32 Code: Hosts a web page with manual and automatic mode controls.



Arduino Code: Manages ball detection, color sorting, and movement control based on sensor data.

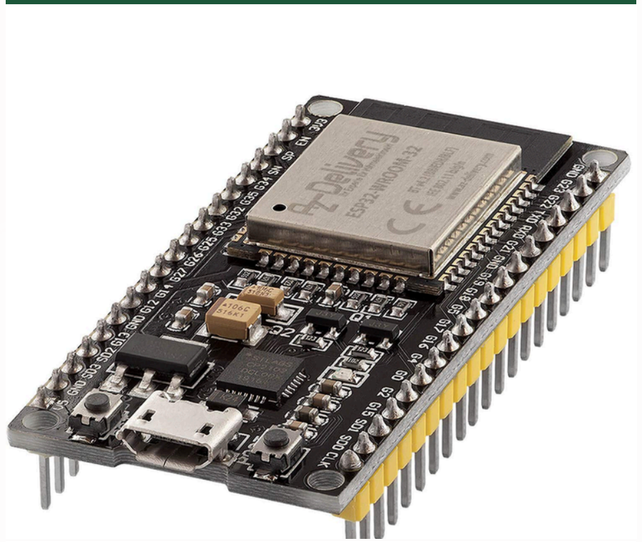
Hardware Components

Arduino Mega



Central controller for the robot.

ESP32 Module



Facilitates wireless control via a web interface.

DC motors

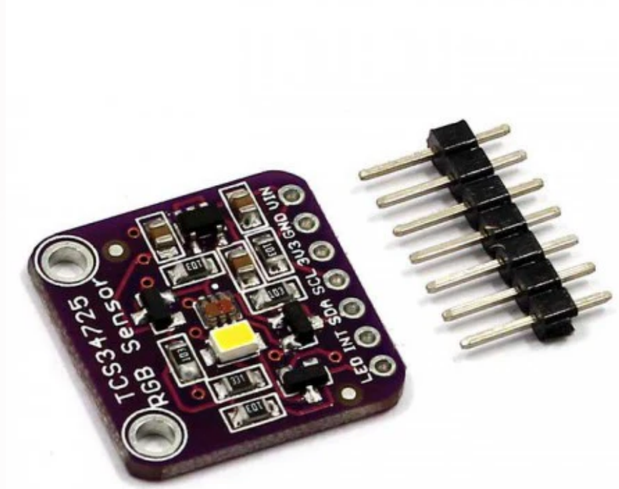
4 DC motors for wheel movement.

Hardware Components

servo motors

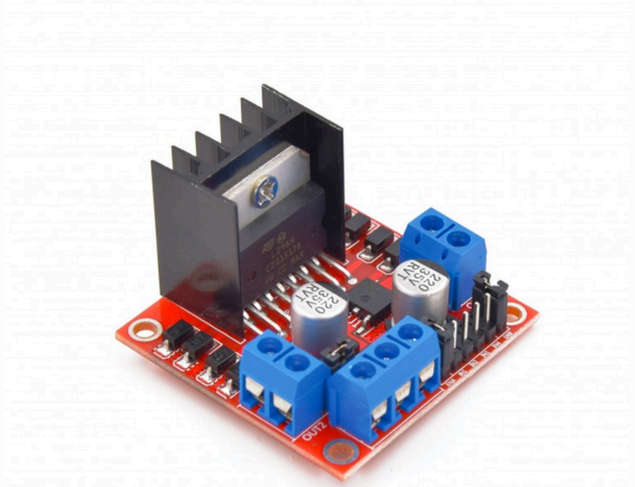
3 servo motors for arm control.

Color sensor



Color sensor (TCS34725) and ultrasonic sensor for object detection.

H-Bridge (L298N)



Controls the direction of DC motors.

Features

Feature 1

Movement Control: Control the robot's movement using DC motors in manual and automatic modes.

Feature 2

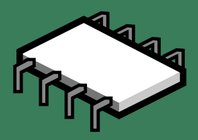
Arm Control: Control the robotic arm to pick up, sort, and place balls in separate baskets.

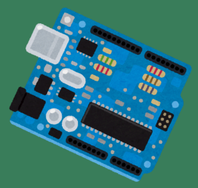
Feature 03

Color Sorting: Use a color sensor to distinguish between red and green balls and sort them accordingly.

Feature 4

Ultrasonic Sensor: Detect obstacles and assist in ball location.





Limitations

- Size
- Hardware problems
- Time

Future Work

1.Image Processing Application: Adding the Raspberry Pi and image processing will greatly reduce the errors of some sensors, such as the ultrasonic sensor and the cooler sensor.

2. Interface Enhancement: Improving the web interface for our robot, also adding more functionalities that can be done within its capacities.

3. CAR size: Enlarging the size of the car as a whole and the arm to fit larger balls in the future, as this robot becomes suitable for other games such as football.

Acknowledgements

We would like to express our deepest appreciation to our supervisor, Dr. Luai Malhis, for his outstanding assistance during the project, Our families, doctors, friends and colleagues for their support.