FLIPKART GRID 3.0 - ROBOTICS CHALLENGE

PLS WORK ON BOT

Team Members:

1. Gayathri
2. Amritha
3. Gagan
4. Harish
5. Pavithra
6. Rishitha
7. Sannidhi
8. Satwika
9. Srinivas
10. Vyshnavi

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Problem Statement :

Objective :

This competition aims to test 2 main capabilities in contestants

1. A central monitoring/navigation system (such as a camera or multiple cameras) should be used to understand the arena and the position of the robots and instruct robots on actions to be taken.

   Note: Arrangement of robot tracking via central monitoring system is "Flipkart Patent Pending".

2. Swarm algorithms for maximizing the throughput of the given systems

The participants are expected to build their own robot (both hardware and software) which is able to meet the above objective. In case any third-party hardware kit/software is being used, participants must declare it.

Bot Specification :

- Each bot is to fit within 6x6 inch square
- Each bot has a tray on top to carry 20x20x20 mm cube (approximate size)
- Tray has the ability to flip to drop items in chute
- No sensors for navigation/object detection to be mounted on the robot

The robot can only be touched by the operator when it is in the Induction zone

Round 1 :

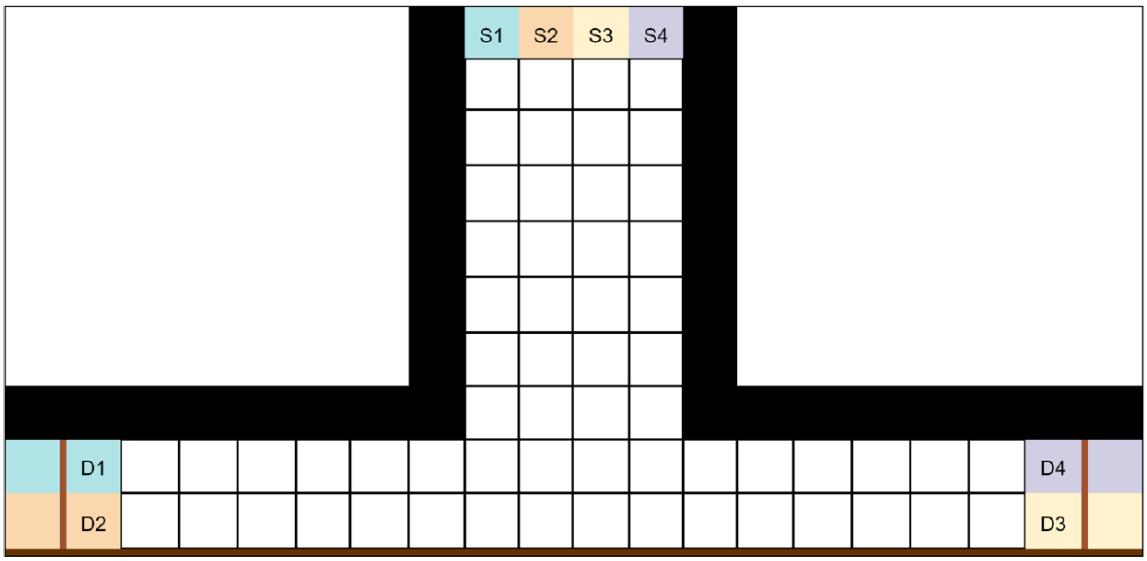
Relay race - 4 Robots

1. Each robot has a package on top
2. Start positions are S1, S2, S3 & S4
3. Bot from S1 is expected to go to D1, Bot from S2 is expected to go to D2 and so on...
4. On start - Bot in the S1 location is expected to go to D1
5. On reaching D1 it should drop the item beyond the wall
6. Once the bot comes back to S1 (Completely inside S1 square), only then Bot from S2 can start
7. Race is over when S4 robot comes back to its square after dropping the parcel

No touching of the robots hardware/software is allowed once the race starts - Completely autonomous robots

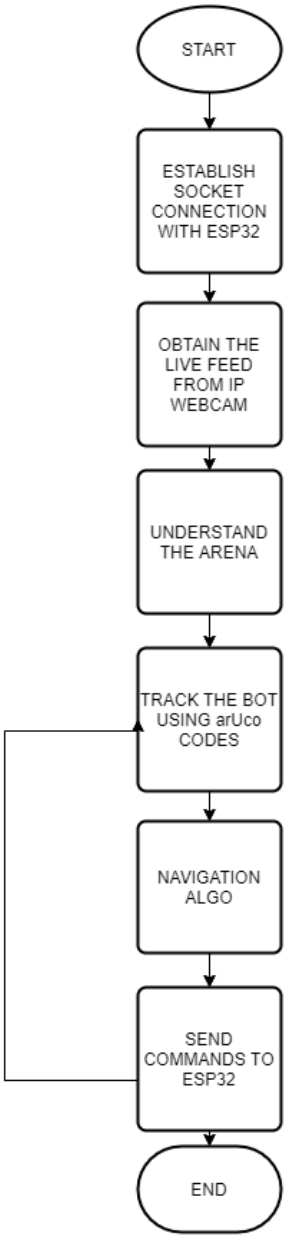
Arena :

Round I Arena



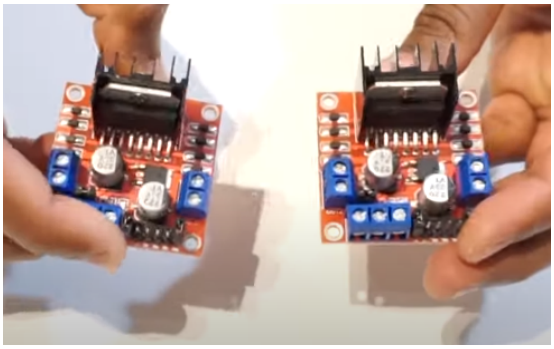
- Overall Arena size is 5 x 10ft
- Each block is 6x6in
- The grid is 1 cm tape / marking
- The brown line next to D1, D2, D3 & D4 is a 1-inch height wall

Basic Working:



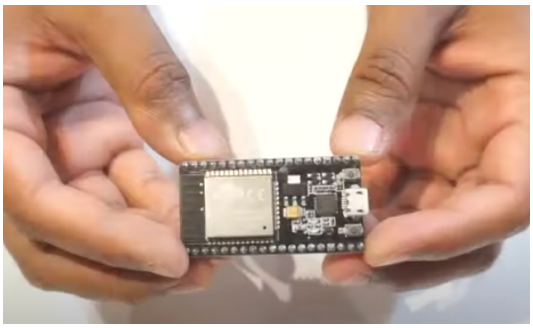
Mechanism of Bot :

Components :

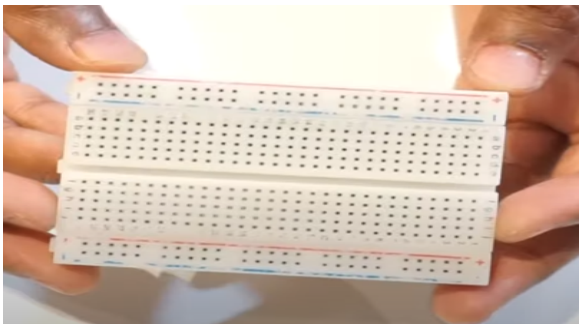


Motor Controller

Motor



ESP32

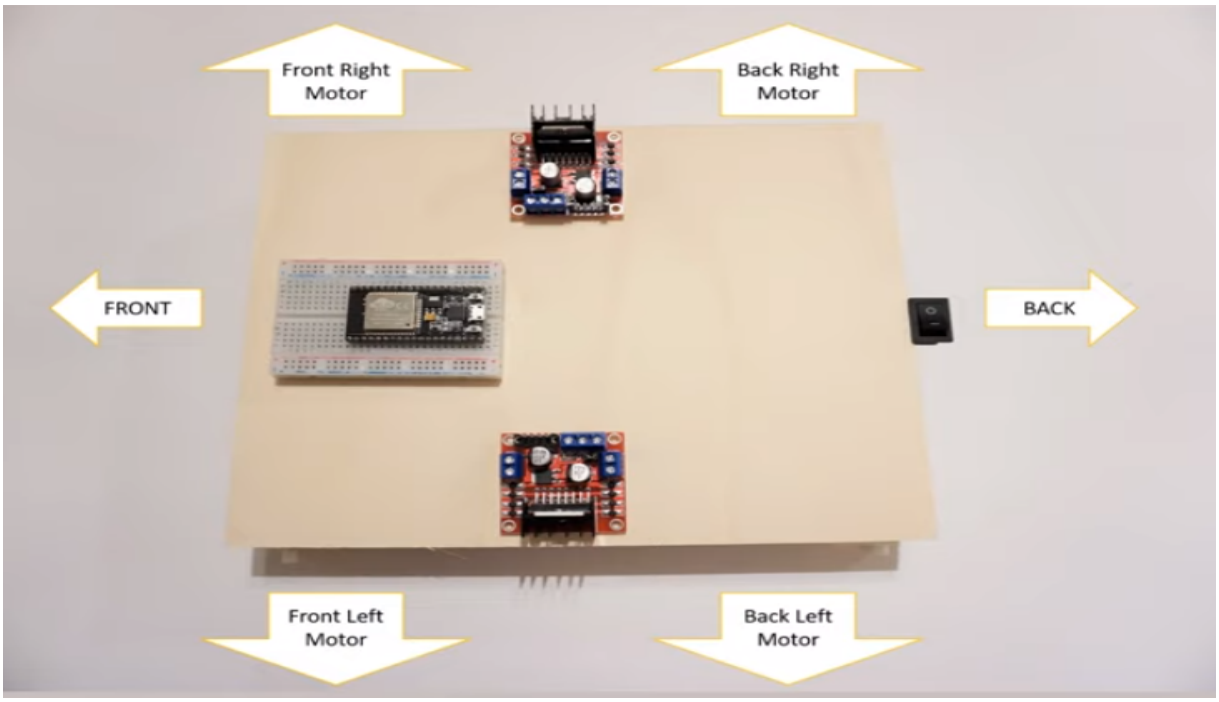


Bread Board

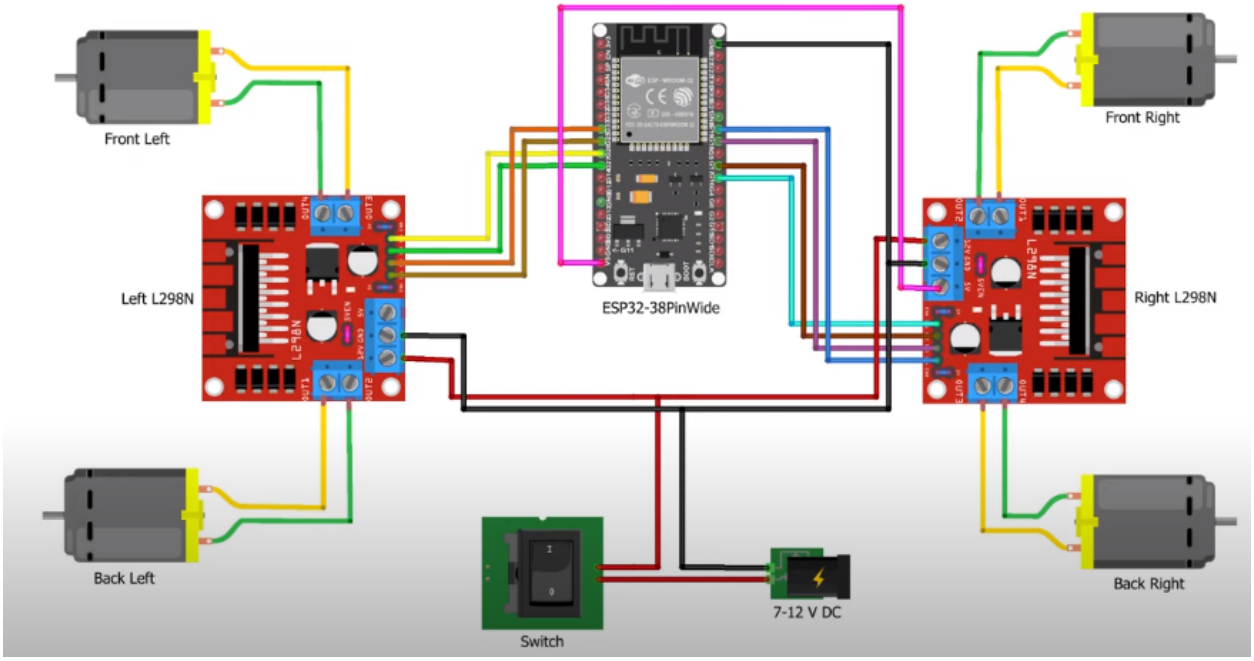
Jumper Wires

Battery

Screws


Front Right Motor
Back Right Motor
FRONT
BACK
Front Left Motor
Back Left Motor

Connections :



Working :

Phone cam/cam is used for tracking movements of the bot every second.
This is the live video of the arena and bot.

How is the Camera connected to the cloud?

Using a webcam server, the phone is connected to the laptop using server code.
This video is fed into the navigation code, which then determines the bot's action based on its position.
The position of the bot is tracked using Aruco code which will be pasted on top of the bot.

How is ESP32 connected to the cloud?

Commands are sent to the ESP32 in the bot as soon as the position is detected. It has a WIFI inbuilt module which connects ESP32 to the laptop hotspot.

How are the bot and ESP32 connected?

ESP32 is used for the movement of the bot. Commands which control the motor drive outputs are already imported in ESP32 using a USB.
Using Jumper wires we connect input pins of ESP32 to output pins of Motor drives.

How is the bot being powered?

Two 18650 Lithium-ion batteries with 3.7 volts and 2600mAmp are used to power up the entire bot.
Batteries are directly connected to the motor drive and its GND and Vcc are connected to ESP32 GND and VCC to power up ESP32.

How are the wheels controlled?

Wheels are connected to the TT gear motors which can run at 150rpm.
Positive and negative terminals of gear motors are connected to the output pins of the motor drive.

Flipping Mechanism :

Aim: 1) Flip an object of 20x20x20 mm cube with a height >5.7mm
2) Decide the weight of the cube
3) Mechanism which can be controlled from the cloud

Components: Aluminium Plate
Servo Motor with spline shaft
Two Links
Two Hinges

Mechanism:
Two hinges are used to connect the platform of the bot and the tilting plate. The motor spline shaft is connected to one of the links which has the spline hole (used for constrained motion (in order to avoid radial movement)). The two links are connected through a pin. The other end of the second link is connected to the plate. When the command is given to the servo motor, through the linkage mechanism, the plate is tilted to the specified angle.

Budget Plan:

Budget

4 kits for bot - 550 *4=2200
8 motor drives-1080
8 batteries(2 on bot) - 1440
4 Breadboard-80*4=320
4 Battery holders +switch +soldering- 480
4 Esp 32 - 1760