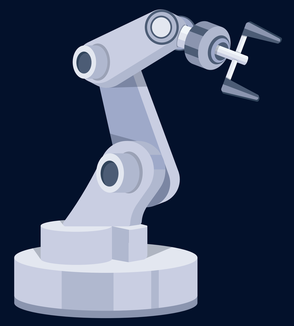
VIRTUAL TELEPRESENCE ROBOT

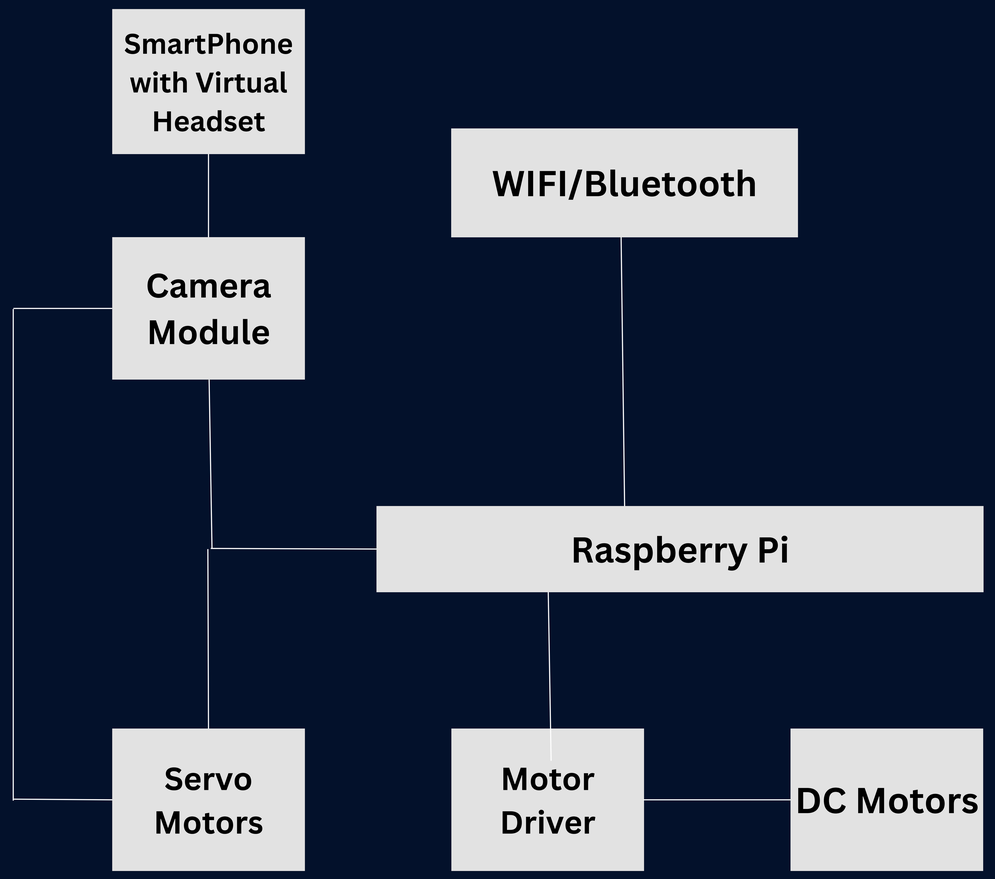
INTRODUCTION :

The virtual telepresence robot is a robotic platform equipped with various sensors, cameras, microphones, and speakers, It is controlled remotely by a user, who can operate the robot from a different location using a computer or a mobile device.

The user's head movements are trasmitted to the robot, allowing it to navigate the remote environment and look at the objects around it.



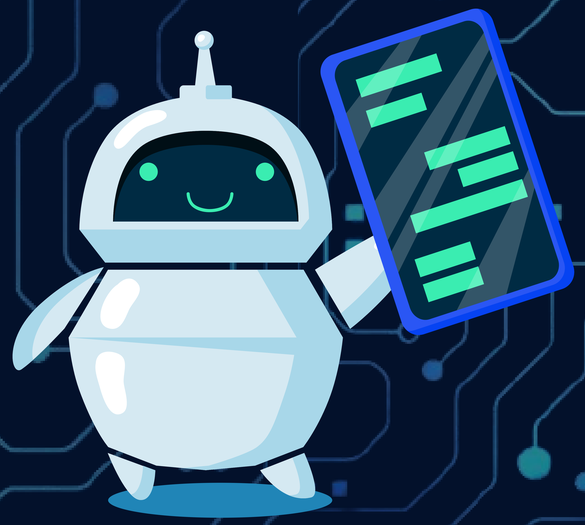
ABOUT THE PROJECT :



BLOCK DIAGRAM

Hardware

- Raspberry Pi
- Motors and Chassis
- Camera Setup
  - camera module
  - servo motor
- Output Screen



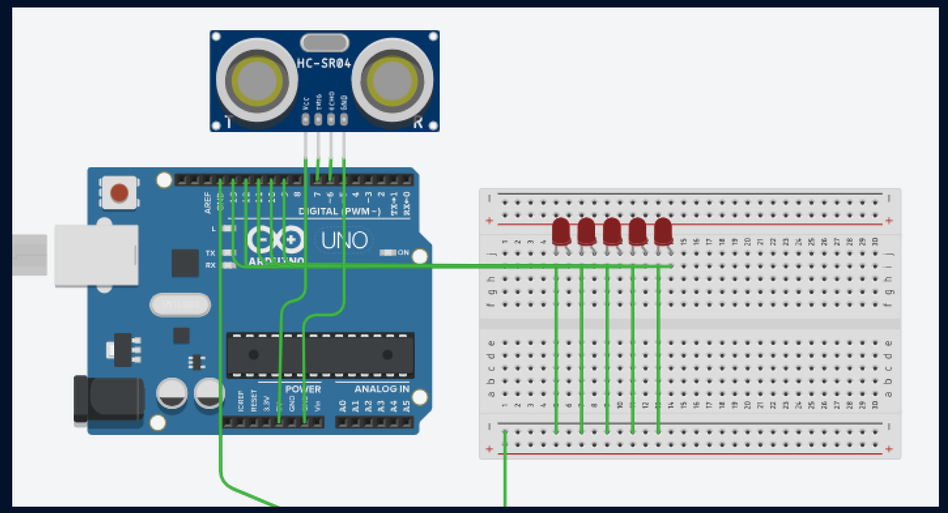
SoftWare

- Wifi and Bluetooth setup
- Virtual remote by wifi commander
- setup webpage and apache server
- live stream the video input captured by the robo

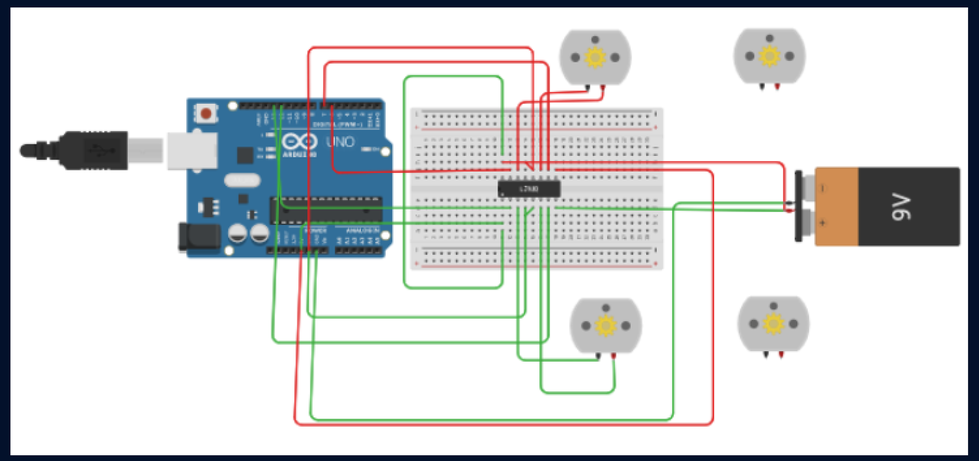
TIMELINE....

WEEK 1 & WEEK 2

- **Using Tinkercad**

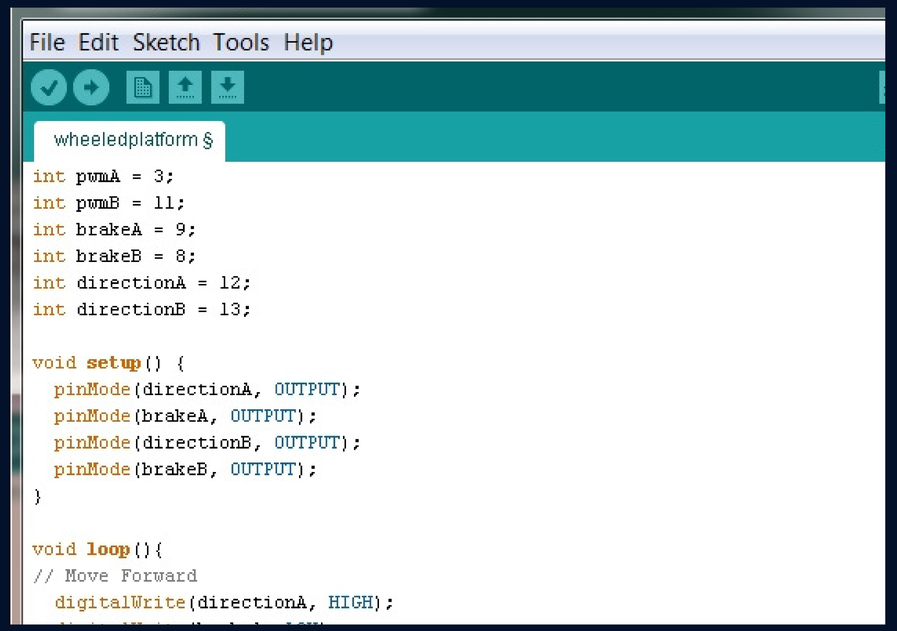


Ultrasonic Sensor to control the frequency of Blinker



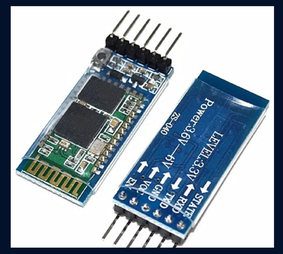
Controlled the motors

- **Using Arduino UNO**



Learnt writing codes in Arduino IDE

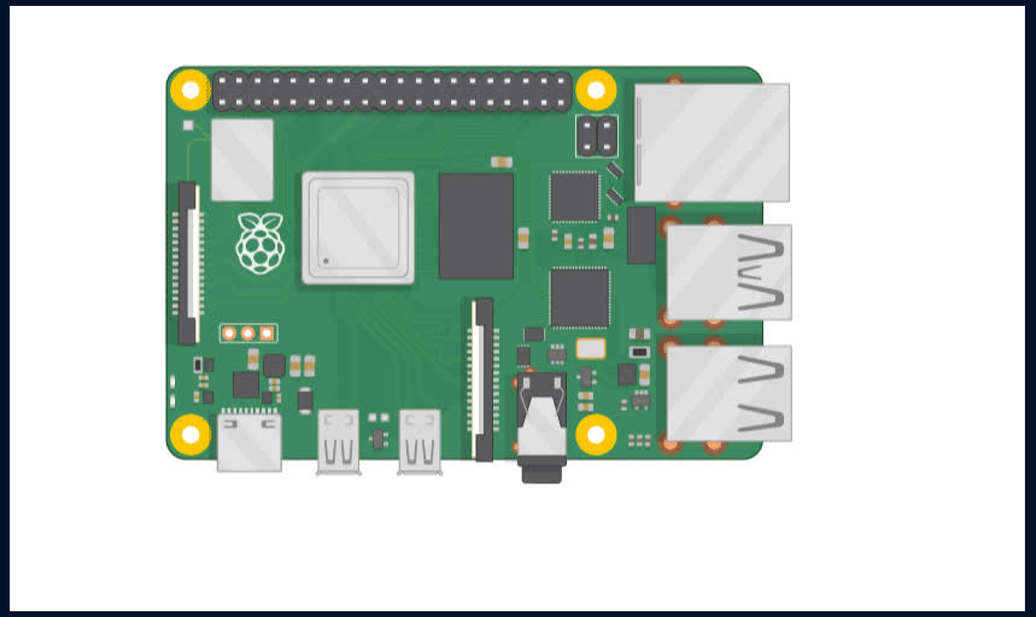
Blinker :
We made a blinker circuit using breadboard, LEDs, jumper wires, resistors.



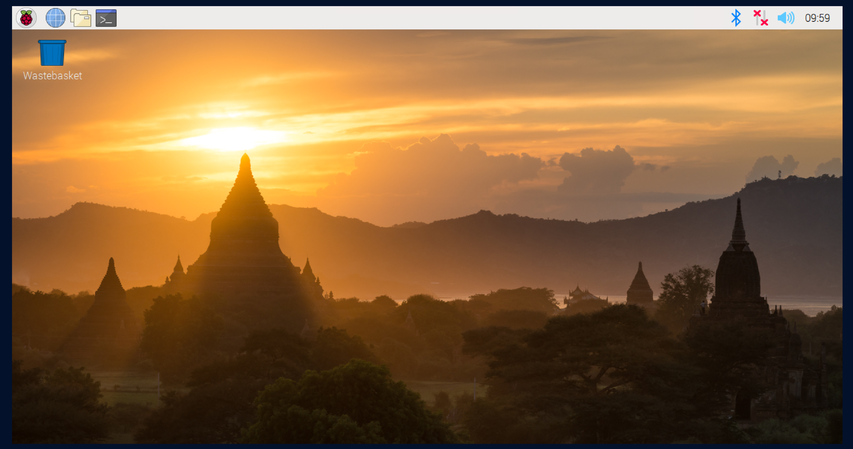
Bluetooth Module :
We used Bluetooth Module and Arduino to make a setup for glowing LEDs from phone

Building The Robo...

- **Setting up the RPi**



Downloading the Raspberry Pi OS on a SD card using Raspberry Pi Imager and then setting up the RPi for offline use



This is the initial screen of the R-Pi operating system

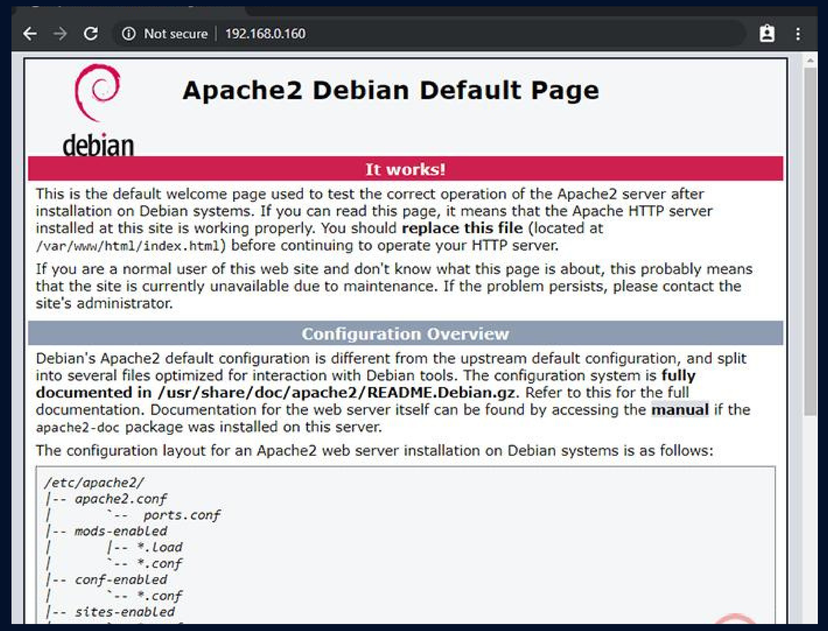
Installing Apache

- This is done to set up a web server
- Wrote few commands in terminal of the R-pi

```
sudo apt-get update
sudo apt-get upgrade
```

```
sudo apt install apache2 -y
```

- In a web browser, we entered our Raspberry Pi's IP Address, it connected and loaded a page like the one below.



WEEK 3 & WEEK 4

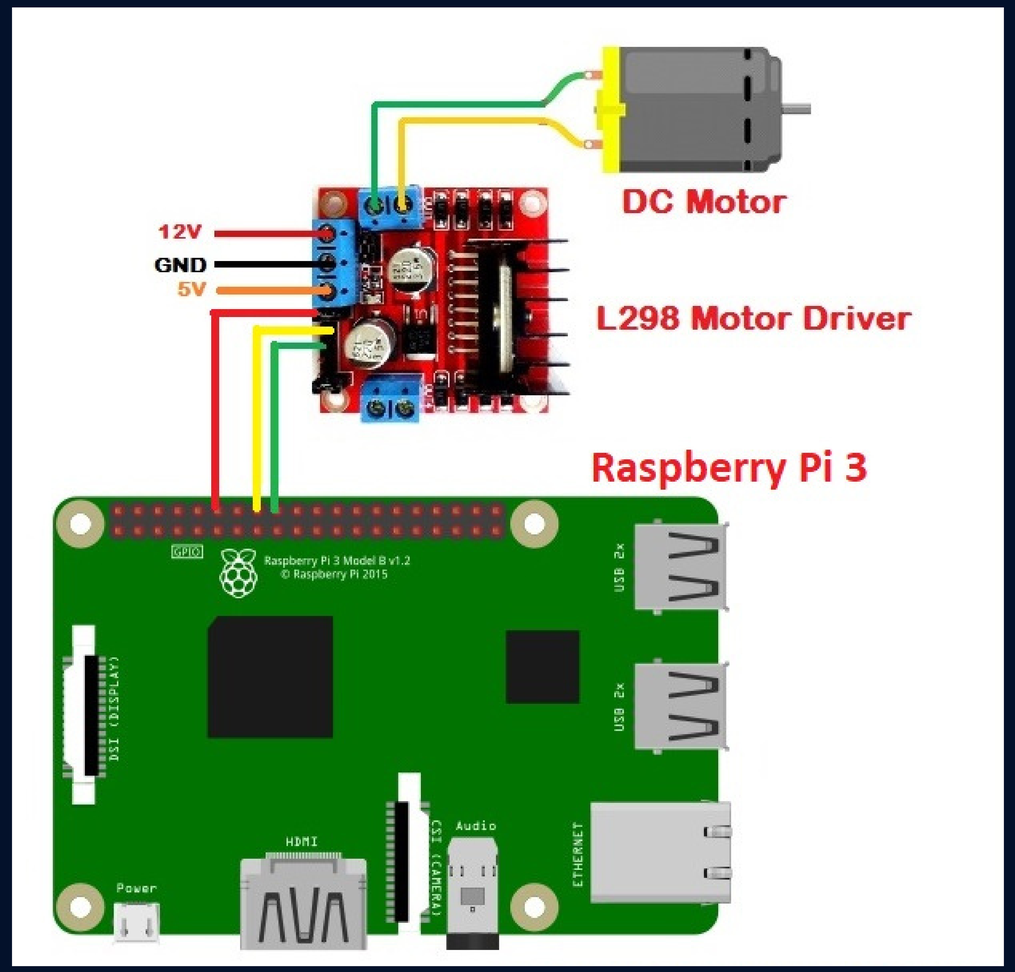
We successfully ran the DC and Servo motors using R-Pi

```
from gpiozero import Motor
```

```
motor1 = Motor(4, 14)
motor2 = Motor(17, 27)
```

```
motor1.forward()
```

```
motor1.forward()
motor2.backward()
while True:
    sleep(5)
    motor1.reverse()
    motor2.reverse()
```

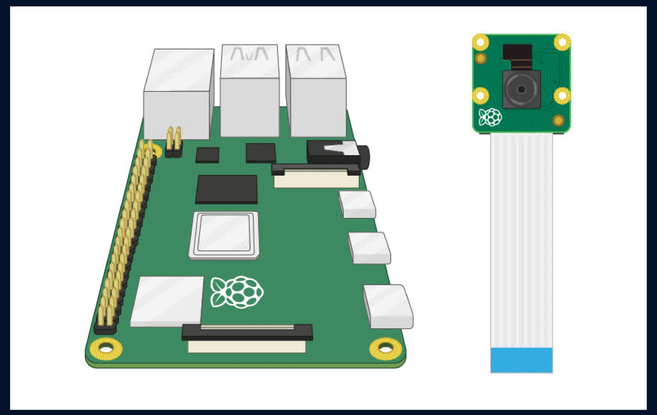


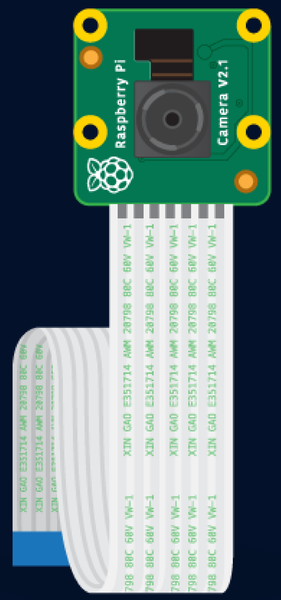
CAMERA MODULE

We streamed the R-Pi camera video capture on a local server , took pictures and recorded videos

```
pi@raspberrypi: ~
File  Edit  Tabs  Help
pi@raspberrypi:~ $ raspistill -o Desktop/image.jpg
```

we wrote the above code to take a picture and save it on desktop





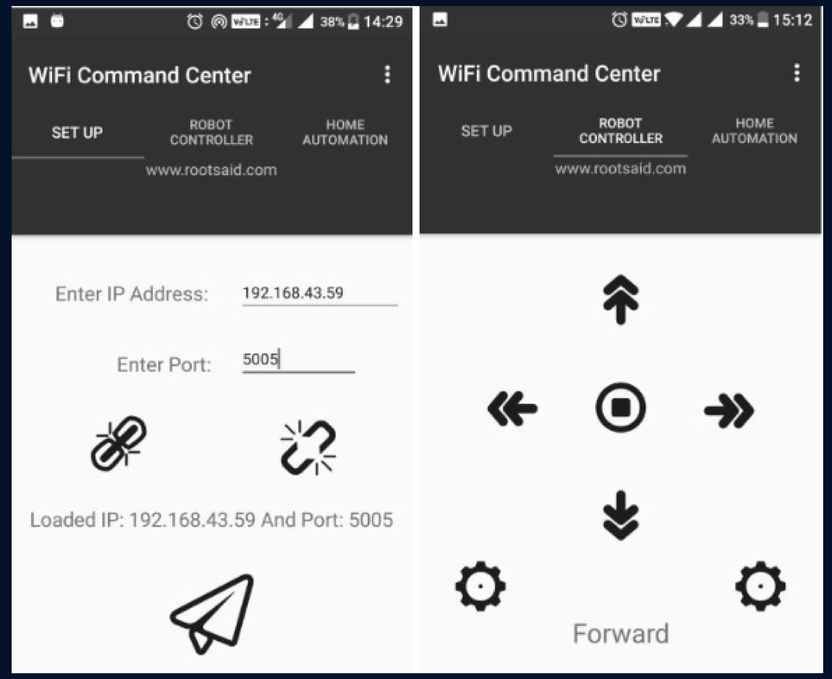
Raspberry Pi Camera

Code in the the pythonto control the r-pi

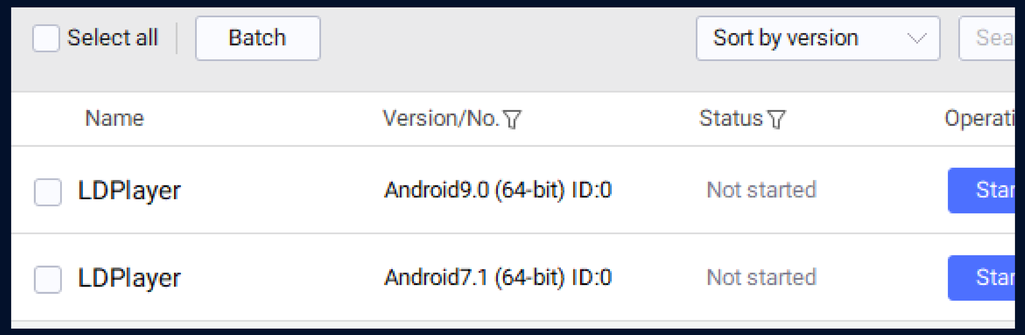
```
from picamera import PiCamer
from time import sleep

camera = PiCamera()

camera.start_preview()
sleep(5)
camera.stop_preview()
```

WIFI COMMAND CENTER APP

- This app provides an interface to connect to a given port on a server and an interface to send commands to the robot.

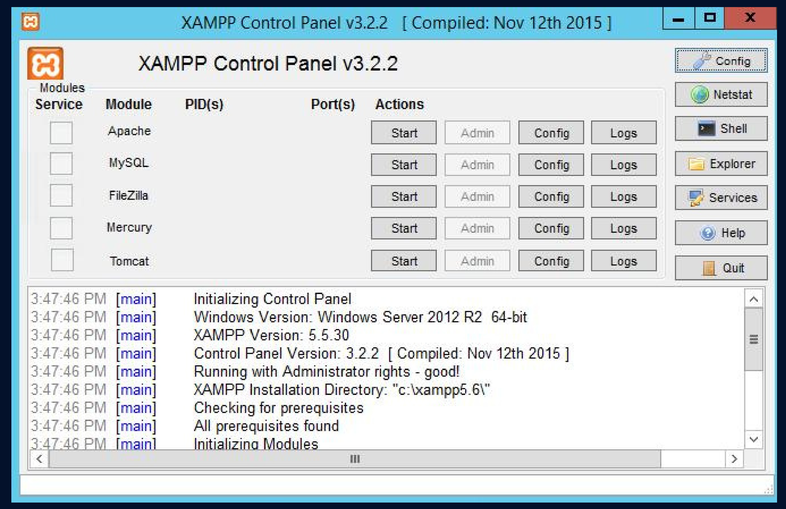


For the app to be installed we emulated Android on our laptops to get an older version of android



Many issues with this app , so we will be building a similar kind of app using MIT app inventor

XAMPP



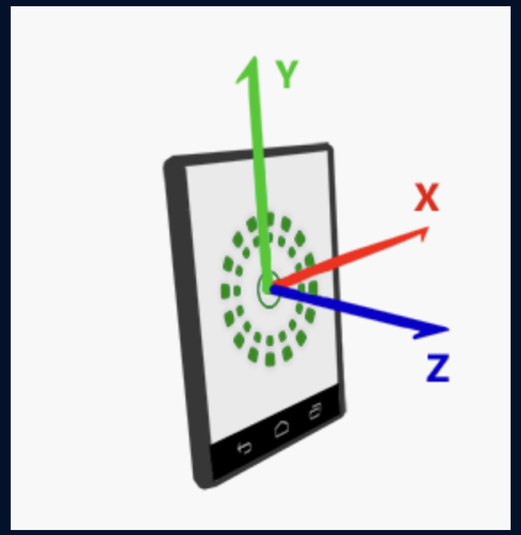
- Its a package of Apache, MySQL and PHP together
- This was used to host a webpage on windows creating a linux based environment
- We also hosted a webpage and streamed the video using the webcam of laptop using Linux in virtual machine

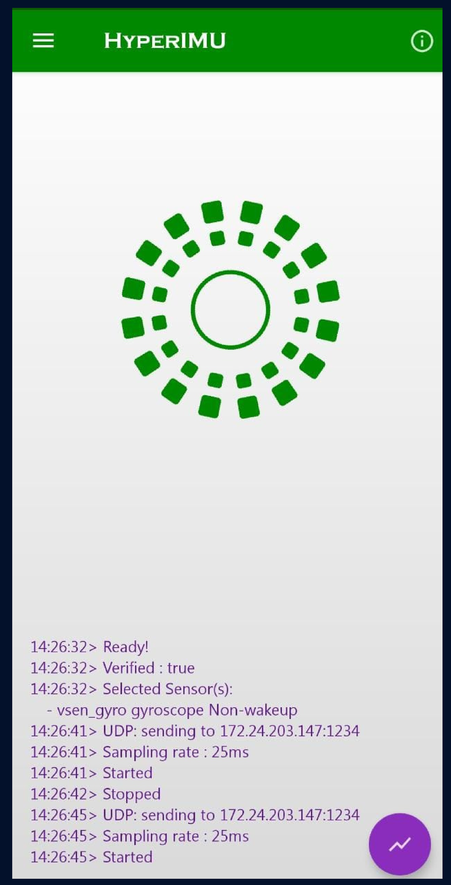
WEEK 5 & WEEK 6

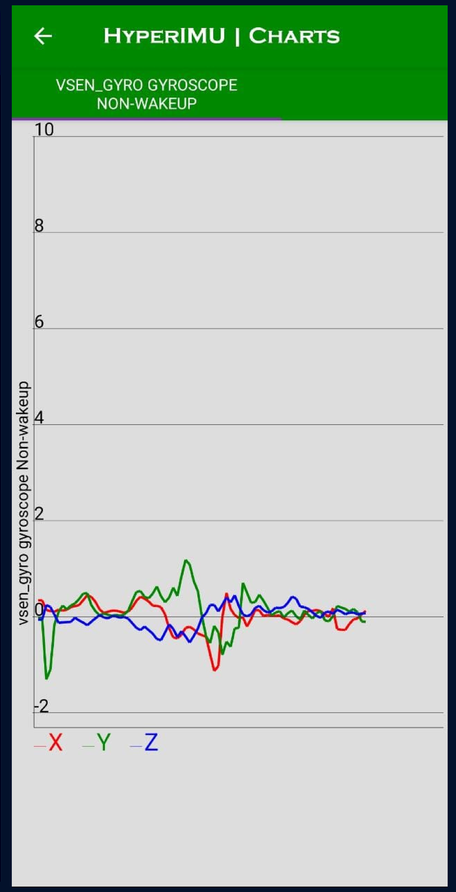
Building a Camera Gimbal

HYPER IMU APP

- We have used this app to send the gyroscopic data of the android phone to Raspberry Pi.
- It sends the data in the form of [x,y,z] which denotes the rotational speed around x,y and z axes of the device.

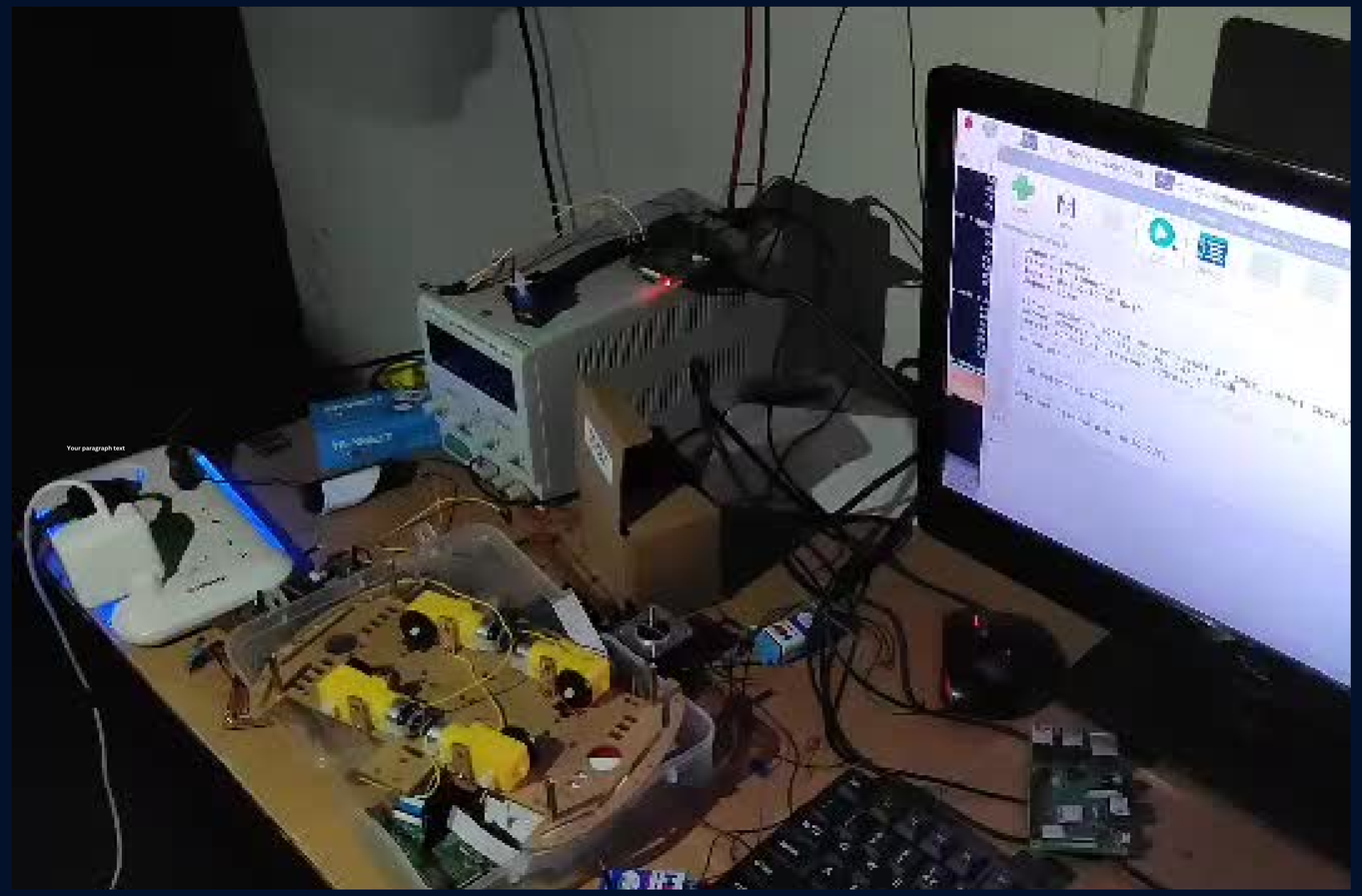






Working Video

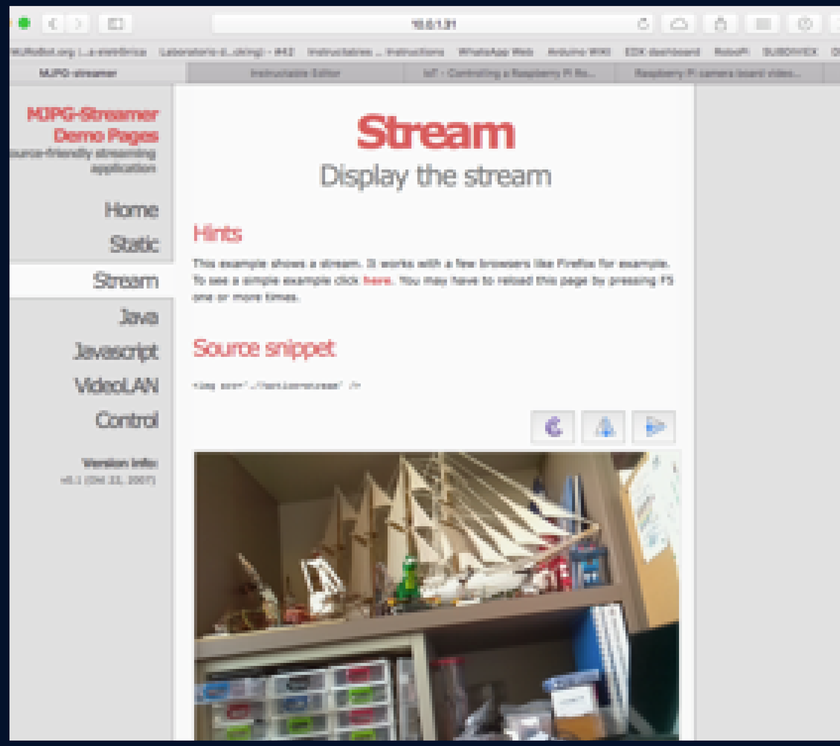
- We have mounted the camera on the servo motor .
- We successfully ran the servo motor according to the data received by the Raspberry Pi with the help of Python code.



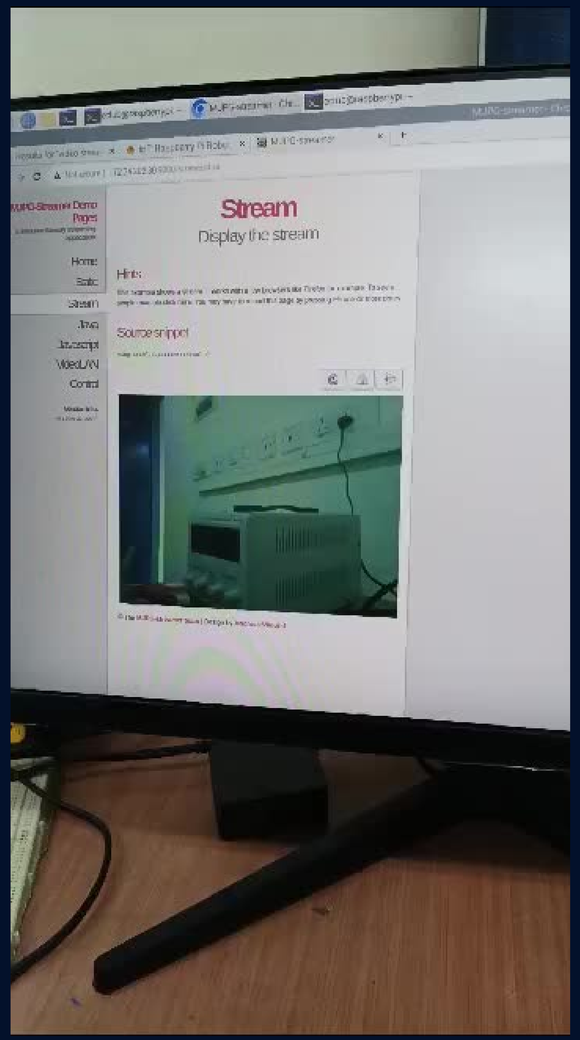
Video Streaming

- We used the MJPG streamer to stream the video to the web-page

- We set a static IP address for our Rpi so that it can be controlled from any device connected to the iitk-sec wifi



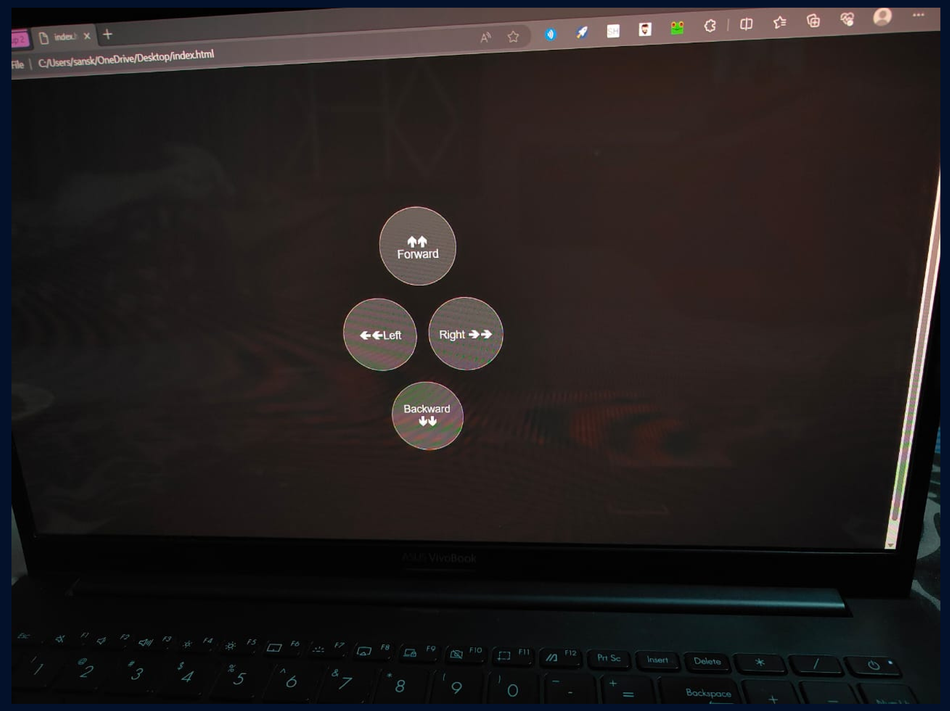
The following video shows the working



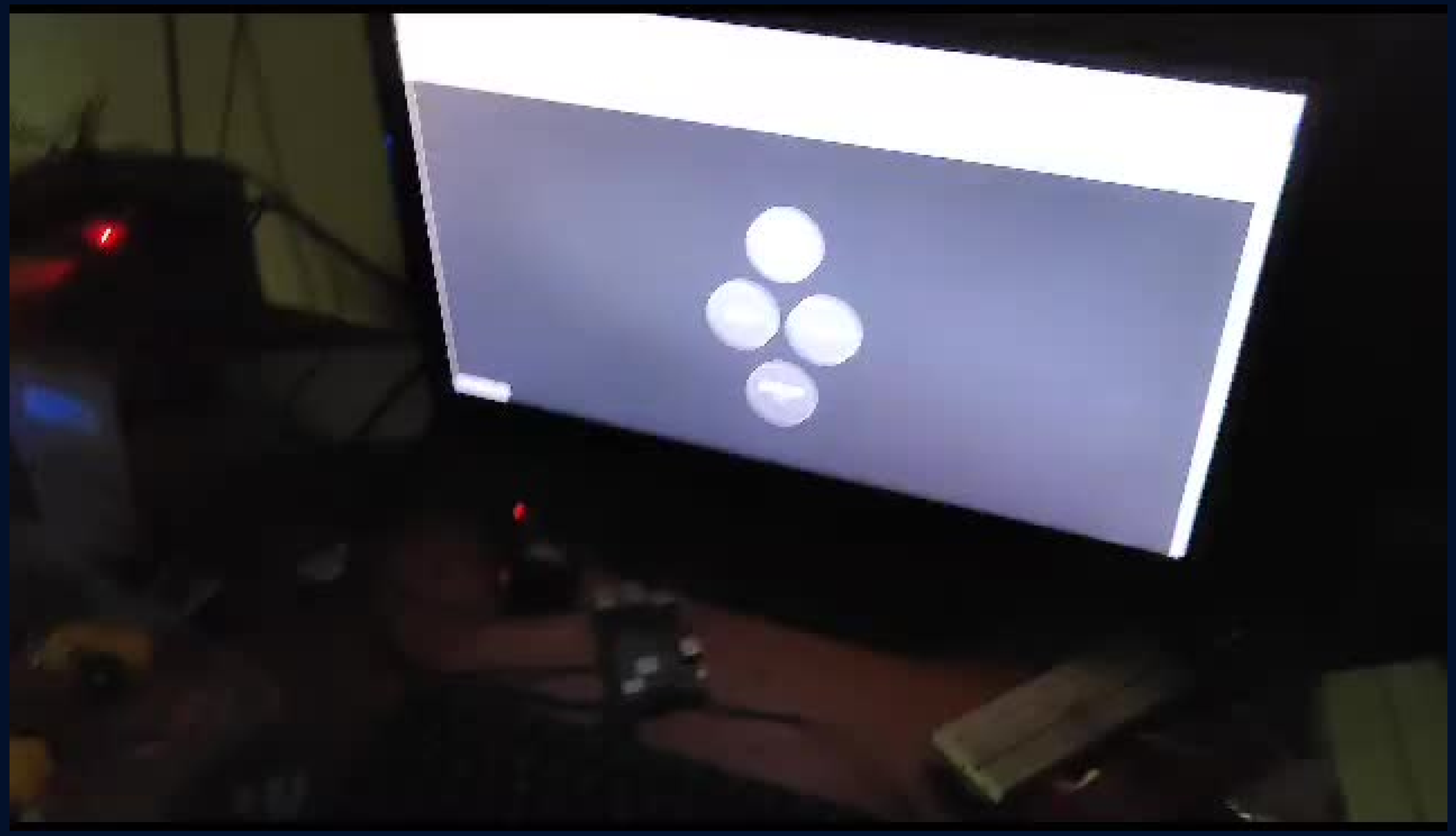
Navigation

- We have done our navigation using python code integrated with flask
- We have successfully tested our code and logic using LED bulbs

The interface of the control page



The video below shows the working

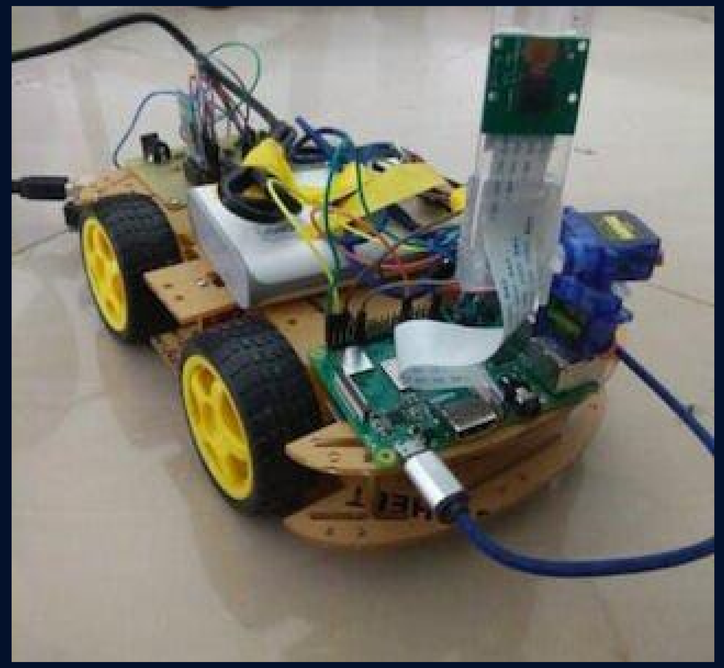


Hardware

- Chassis of the robot, which provides support for mounting other components

- Wheels are used to provide mobility to the robot

- Motors are used to drive the wheels which helps in the movement of the robot, forward,backward and turn



- Sensors like

1. camera - which is used to capture video streams that are sent to the remote user, allowing them to see from the robot perspective ,which helps us to direct easily.

2. Microphone - To capture audio, enabling bidirectional communication between robot and the user.

3. IMU (Inertial Measurement Unit) - which measures the robot orientation, acceleration, and angular velocity

- Communication module which helps the robot to establish the connection with the internet.

OUR TEAM

Mentors

Aastha Punjabi
Kartik Sharma

Mentees

Archit kumar
Divya maloth
Meet pal
Sanskar Yaduka
Sofiyaan Sameer
Soumyadeb saha
Venkatesh

THANK YOU