

## CSE461 : Introduction to Robotics



### Project Manual

**Project Title :** 3-in-One Obstacle detection, Line following RC Robot

**Group No : 05, CSE461 Lab Section : 09, Spring 2024**

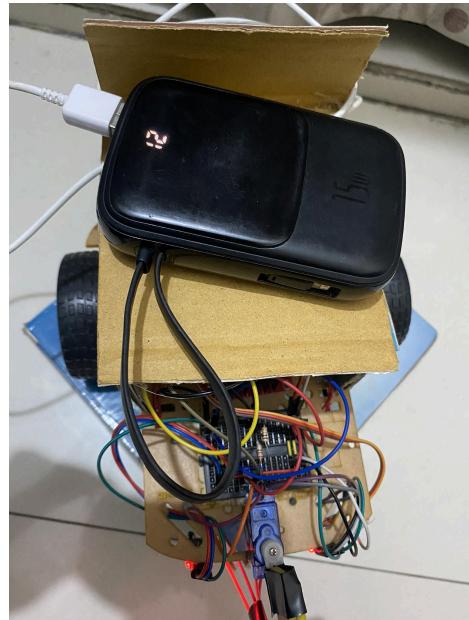
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# User Manual

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## 1. Powerbank

In order to boot up our raspberry pi and to keep it running continuously at all times a power source is required. Here the power bank acts as that power source which has to be connected by the user.



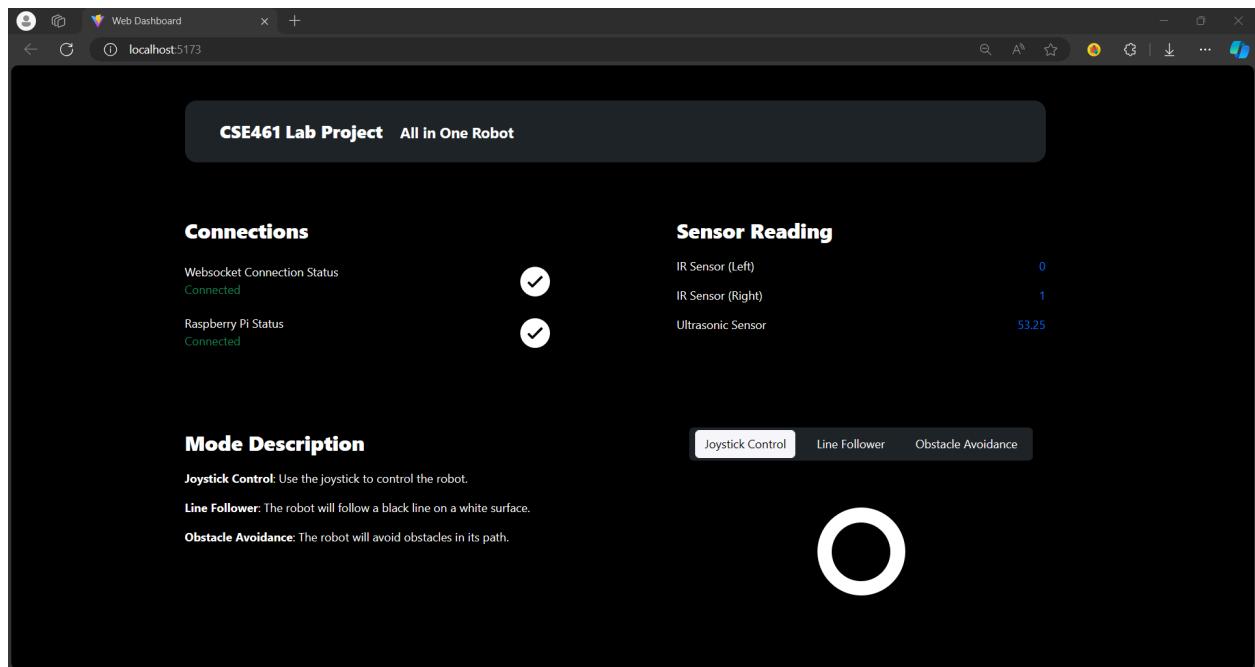
## 2. Battery Pack

In order to get the motor driver and its connected motor going the user has to attach four 1.5V AA batteries underneath the first layer chassis.



### 3. Web Dashboard

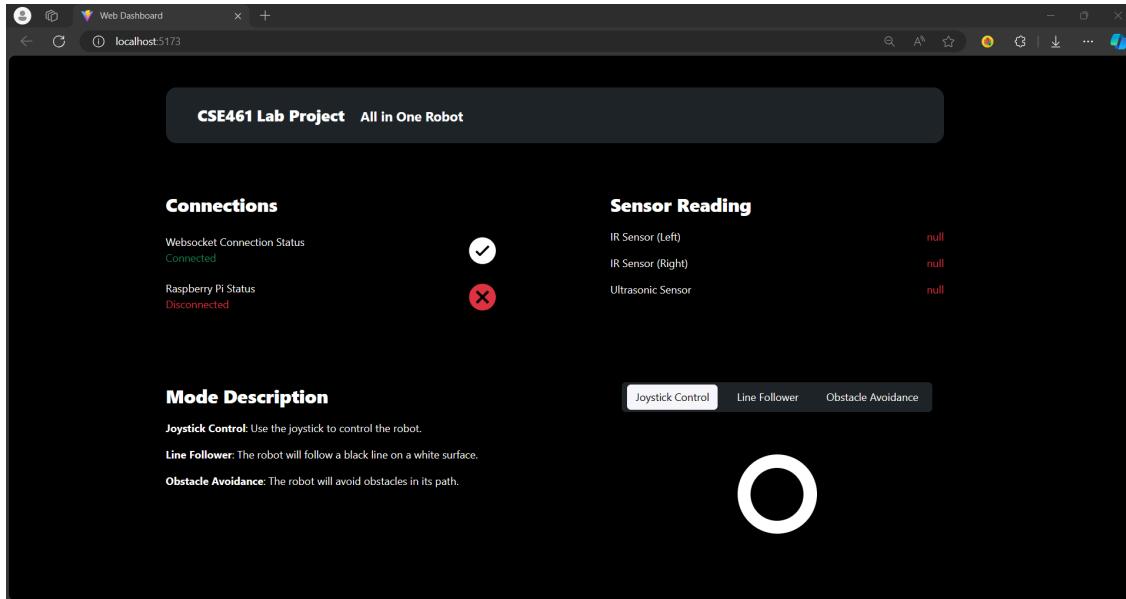
The Web Dashboard is an user-friendly interface that is accessible through a web browser that allows the user to monitor sensor data, check connectivity status to the Raspberry Pi (RPI) and server, and also control the concurrent operational mode of the robot.



## 4. Connections

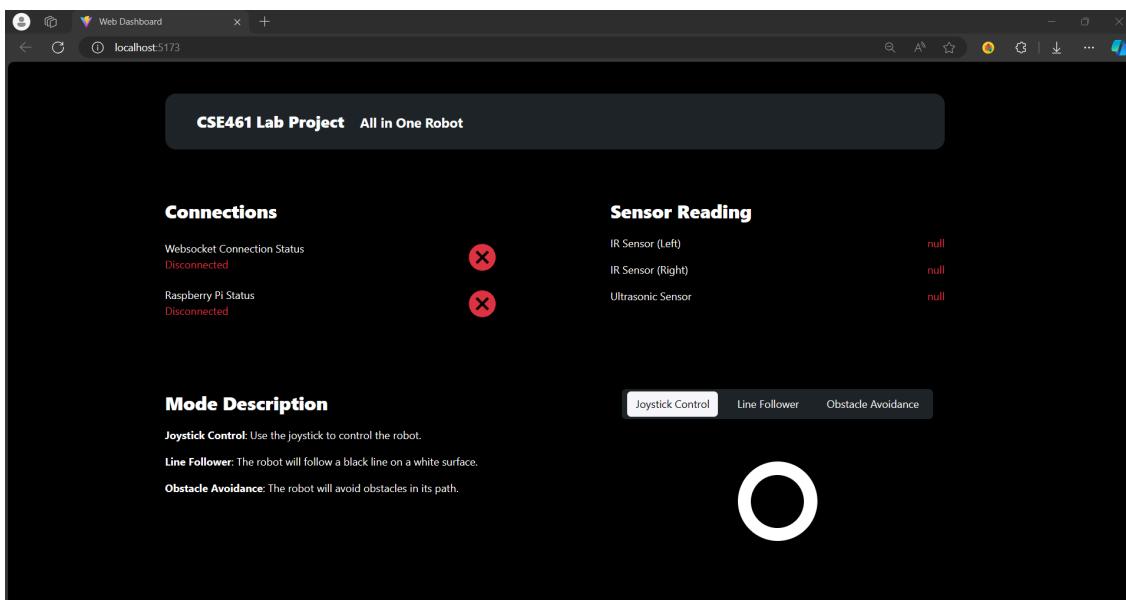
The connections section represents the connectivity status to the Raspberry Pi (RPI) and server. If one of the connections were to get disconnected it swiftly displays that to the user. The following scenarios helps visualize the display of connectivity status:

### Raspberry Pi gets disconnected



This screenshot shows the 'Connections' section of the web dashboard. It lists two items: 'WebSocket Connection Status' (Connected, indicated by a green checkmark) and 'Raspberry Pi Status' (Disconnected, indicated by a red X). The 'Sensor Reading' section shows three sensors: IR Sensor (Left), IR Sensor (Right), and Ultrasonic Sensor, all with null values. Below this is a 'Mode Description' section with tabs for 'Joystick Control' (selected), 'Line Follower', and 'Obstacle Avoidance'. A large white circle is displayed in the center of the screen.

### Server is OFF



This screenshot shows the 'Connections' section of the web dashboard. It lists two items: 'WebSocket Connection Status' (Disconnected, indicated by a red X) and 'Raspberry Pi Status' (Disconnected, indicated by a red X). The 'Sensor Reading' section shows three sensors: IR Sensor (Left), IR Sensor (Right), and Ultrasonic Sensor, all with null values. Below this is a 'Mode Description' section with tabs for 'Joystick Control' (selected), 'Line Follower', and 'Obstacle Avoidance'. A large white circle is displayed in the center of the screen.

## 5. Sensor Readings

The Sensor Readings section provides real-time visualization of sensor data. Here the user can view measurements from various sensors connected to the Raspberry Pi, such as ultrasonic sensor, Infra-red Sensor left and right. Initially the values are set to null

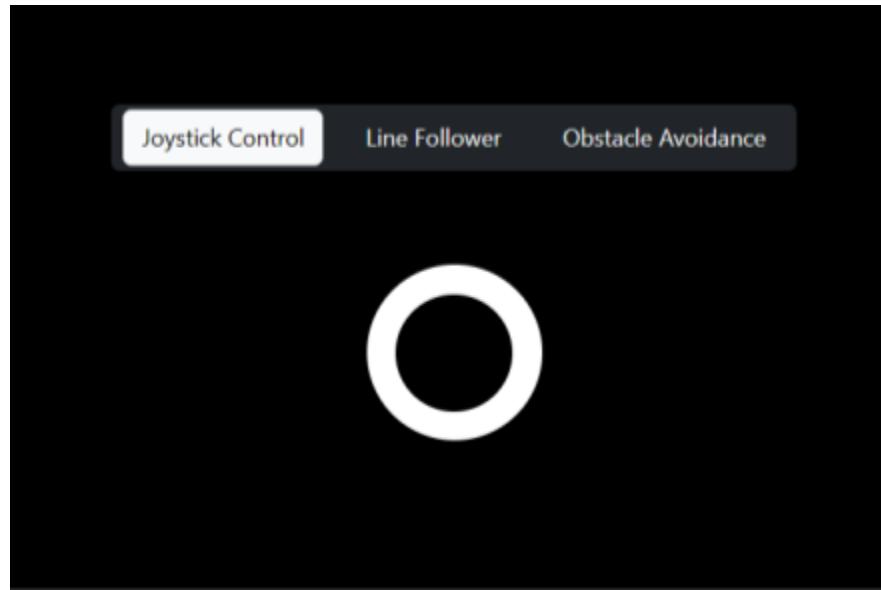
<b>Sensor Reading</b>	
IR Sensor (Left)	null
IR Sensor (Right)	null
Ultrasonic Sensor	null

Upon receiving data this is how it looks

<b>Sensor Reading</b>	
IR Sensor (Left)	0
IR Sensor (Right)	1
Ultrasonic Sensor	54.21

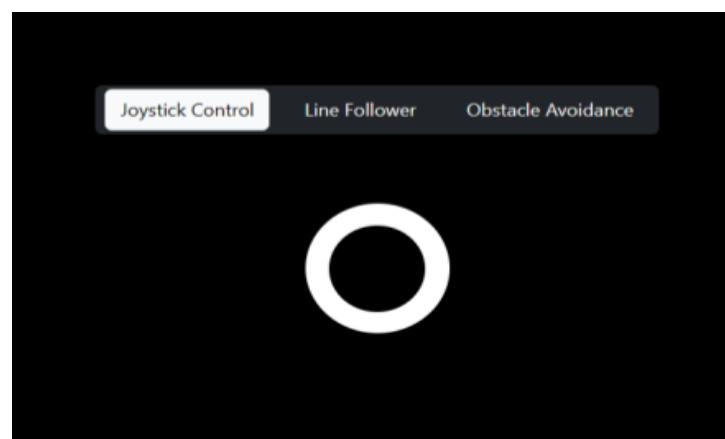
## 6. Operating Modes

There are **3** major features for the robot. They are - Joystick Control, line Follower Obstacle Avoidance.



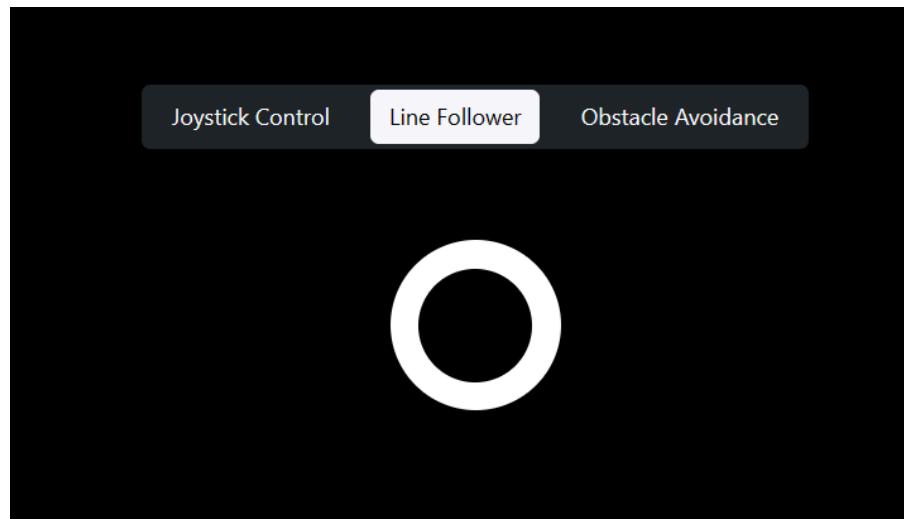
### 6.1. Joystick Control

The Joystick control module is responsible for allowing the user to control the robot up down left and right. It is the White circle underneath the modes using their mouse users can control the joystick in the above mentioned directions and the robot will respond accordingly



## 6.2. Line follower

The Line Follower module emits an event to the robot to change its mode to line following. As soon the user presses the line follower the robot utilizes its IR sensor data and engages in Line follow mode.



## 6.3. Obstacle Avoidance

The Obstacle avoidance is right beside the line follower and upon pressing it the server emits the obstacle avoiding event to the raspberry pi which triggers the obstacle avoiding mode utilizing the readings taken from the ultrasonic sensor.

