

LAB 6 PART B

Occupancy Counter

IoT - Spring 2024

Overview: -

In this Lab session you will work on two sensors together that are the ultrasonic and IR sensors. You will count the total number of people present inside the room at the given moment and show this count value on your local web server using Wi-Fi functionality of ESP32. Moving on we will convert this local IP address to a global link so that anyone across globe could access it.

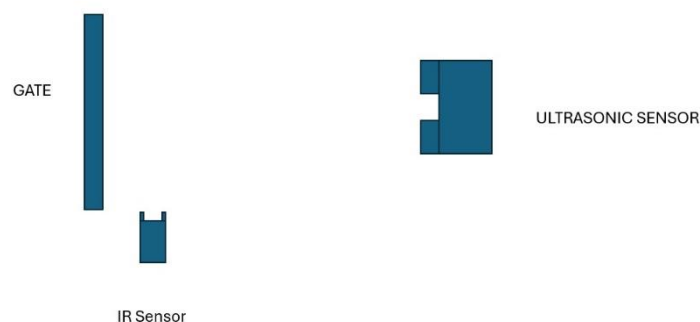
Experiment: part 1

Make a system that could count the number of people present inside a room which has a single door (both entry and exit takes place through it only) and show this count on your local host.

Required hardware: -

- Breadboard
- ESP32 Dev Module
- HC-SR04 sensor
- IR sensor
- Jumper Cables

Diagram showing tentative arrangement of sensors.



Working principal:

- An IR sensor is placed just at the entrance of the gate and an ultrasonic sensor is placed in front of the gate facing towards it.
- Whenever a person moves in or out IR sensor will detect it and whether to increase count or decrease it is based on the direction of motion that could be found out by the ultrasonic sensor.

Procedure:

- Connect both the sensors to the ESP32.
- Place the sensors in proper position as shown in the diagram to emulate the given scenario.
- Write the code with proper logic to display the count on Webserver.

Pseudocode:

FOR SETTING UP LOCAL HOST

Refer to the part 1 manual.

FOR WORKING OF THE CIRCUIT

1. **Initialize Variables:**
 - Set *count* = 0
 - Set *previous distance* = 0
2. **Main Loop:**
 - Enter an infinite loop:
3. **Read Sensors:**
 - Read the status of the IR sensor (*ir_status*)
 - Read the distance from the ultrasonic sensor (*ultrasonic distance*)
4. **Motion Detection:**
 - If *ir_status* is HIGH (indicating motion detected):
 - Check the change in distance from the ultrasonic sensor:
 - If *ultrasonic distance* is greater than *previous distance*: Increment *count*.
 - If *ultrasonic distance* is less than *previous distance*: Decrement *count*.
5. **Update Previous Distance:**
 - Set *previous distance* = *ultrasonic distance*
6. **Display or Transmit Count:**
 - Display the current count value on the webserver (process to setup is described in previous lab manual)
7. **Delay:**
 - Introduce a delay (e.g., delay (100) or set accordingly) to prevent rapid counting.
8. **Repeat Loop:**
 - Go back to the beginning of the loop to continue monitoring.

Expected Output:

You must count the number of persons inside room correctly and show that on local host.

Experiment: part 2

Turn your local IP or local host into a global link using 3rd party applications.

Ngrok provides a real-time web UI where you can introspect all HTTP traffic running over your tunnels. Replay any request against your tunnel with one click. <https://ngrok.com/> for documentation.

Steps:

1. Signup for ngrok.
2. Look into <https://dashboard.ngrok.com/get-started/setup> for setup.
3. Create a link from running in the command terminal `./ngrok http` For **example** `./ngrok http 10.62.35.34`
4. Embed you link in to a **QR code** for the TA to easily access you web server.

If you face difficulties in using ngrok, you may use other applications like localtunnel etc. Please see their documentation.