Title: **IoT based Comfort Room Occupancy Monitoring System Using NodeMCU ESP8266 with ThingSpeak**

By: **Gopole, Khyle Matthew (Pablo)**

Objectives

1. To be able to implement an IoT based comfort room occupancy monitoring system using NodeMCU ESP8266.
2. To be able to demonstrate how the measured light intensity would open the door using servo motors (male or female) depending on the activated comfort room which can either be entry or exit using a button.
3. To be able to demonstrate how the seven-segment display and LEDs would indicate the number of persons occupying the comfort room and the current activated comfort room, respectively.
4. To be able to demonstrate how the LCD would display current operations executed in the system.
5. To be able to send the data of the number of occupants in the two comfort rooms using Thingspeak.

Discussion

Despite the people already adjusting and responding to the crisis brought by the COVID-19 pandemic using vaccines, assurance can still be made most especially for contact tracings and preventing crowded areas. As such, comfort rooms which are used for human waste disposal, are more prone to transmissions hence sanitations are strictly implemented. Aside from sanitation, transmissions can be prevented by only allowing limited number of persons in the comfort rooms. Hence, the developer thought that an IoT based comfort room occupancy monitoring system can be implemented to carry out this job.

The NodeMCU ESP8266 will be used as the WiFi and microcontroller board for the system. Since it only offers limited number of GPIO pins (9 digital pins and 1 analog pin), the developer maximized the use of components which utilized all of these pins. The developer plans to have two comfort rooms (male and female), both having a maximum capacity of 9 person. A button is used to switch from one comfort room to another (male or female). Two servo motors are used for each comfort room which would handle the opening and closing of the gate. A photoresistor would serve as the sensor for the activation of entry or exit in the comfort room. Two threshold values would be set to the system. One threshold value is used for entry, while another one is for the prompting of exit. Of course, the number displayed in the 7-segment module would be consistent to the number of entry or exit done in either comfort room of the system.

In addition, since the maximum capacity of each comfort room would only be nine (9), entry would be prohibited once this number is reached despite reaching the threshold value condition for entry. Likewise, exit will only be prompted if there is a single or more person in the comfort room. If there is no occupant in the comfort room, the exit would not activate as it is empty. When these two events happen, the servo motors would not activate and doors would remain closed.

As for the IoT feature of the system, the number of person in both comfort room (male or female) would be sent using Thingspeak channel. Two edit fields would be created for both comfort rooms. The system would only send data if and only if an entry or exit happened in the activated comfort room.

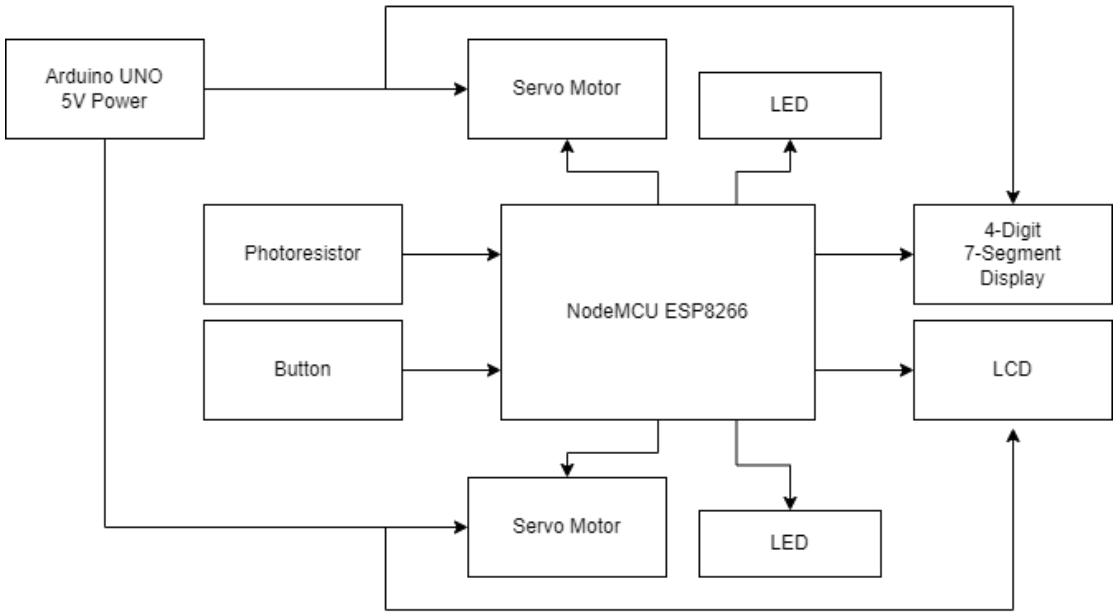
As for the creation of the prototype, the developer would utilize a shoe box as the overall system casing which would serve as the comfort rooms at the same time. The developer would make sure that the threshold value for the photoresistor would be based from a related article to improve functionalities. Also, it will be calibrated

accordingly to prevent unnecessary input from affecting the functionalities of the system such as the light coming from the testing site. The two doors would just be coming from cut parts of the shoebox and tie them to a yarn or metal coil to be able to pull by the servo motors. Hence, opening and closing the door when signaled by the system.

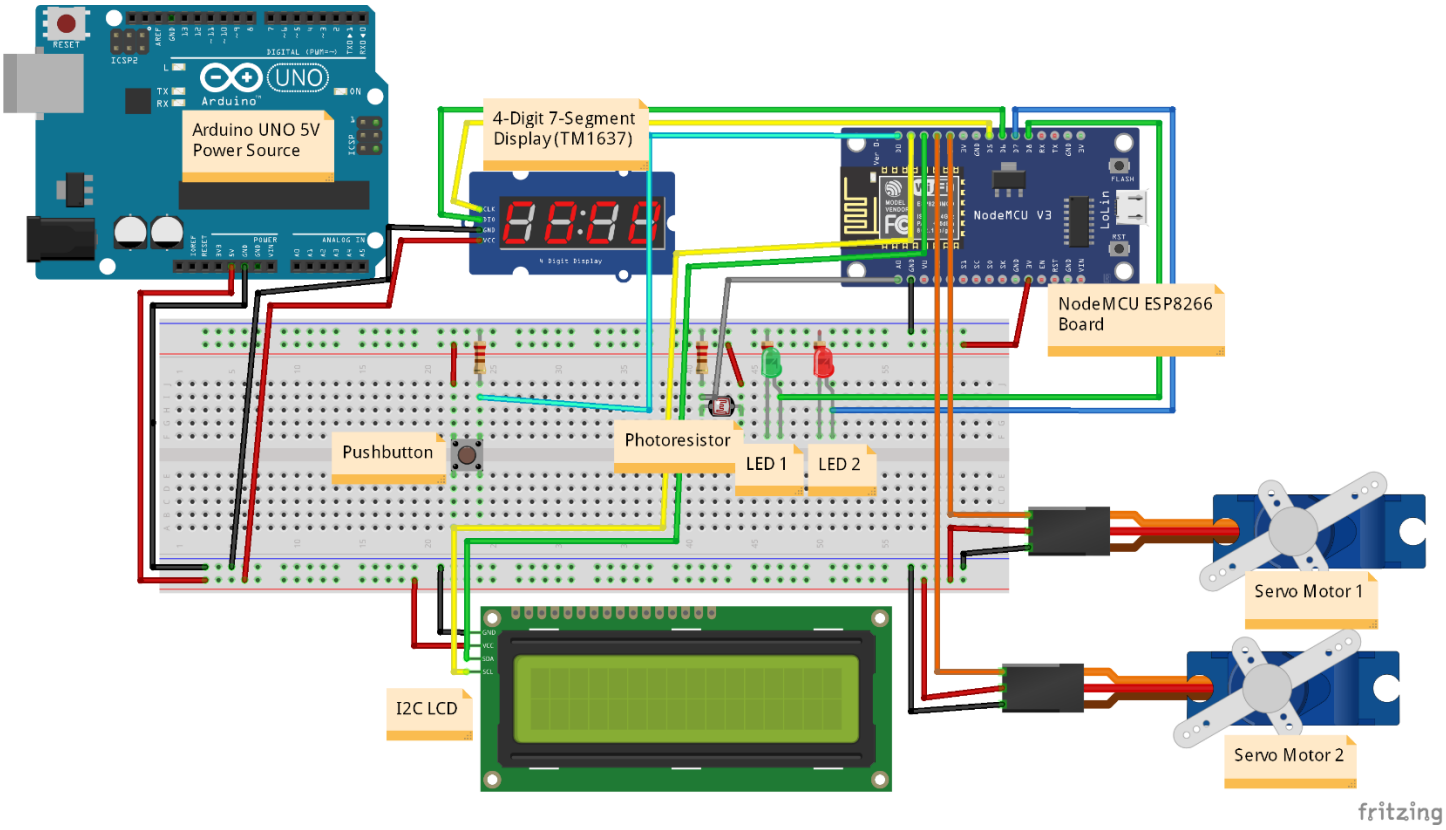
List of materials:

- 1 pc NodeMCU ESP8266 Board
- 1 pc Arduino UNO
- 2 pcs Breadboard
- 1 pc Button
- 1 pc Photoresistor
- 2 pcs Servo Motor (SG90)
- 2 pcs LEDs
- 1 pc LCD
- Four-Digit Seven-Segment Display Module (TM1637)
- Jumper Wires

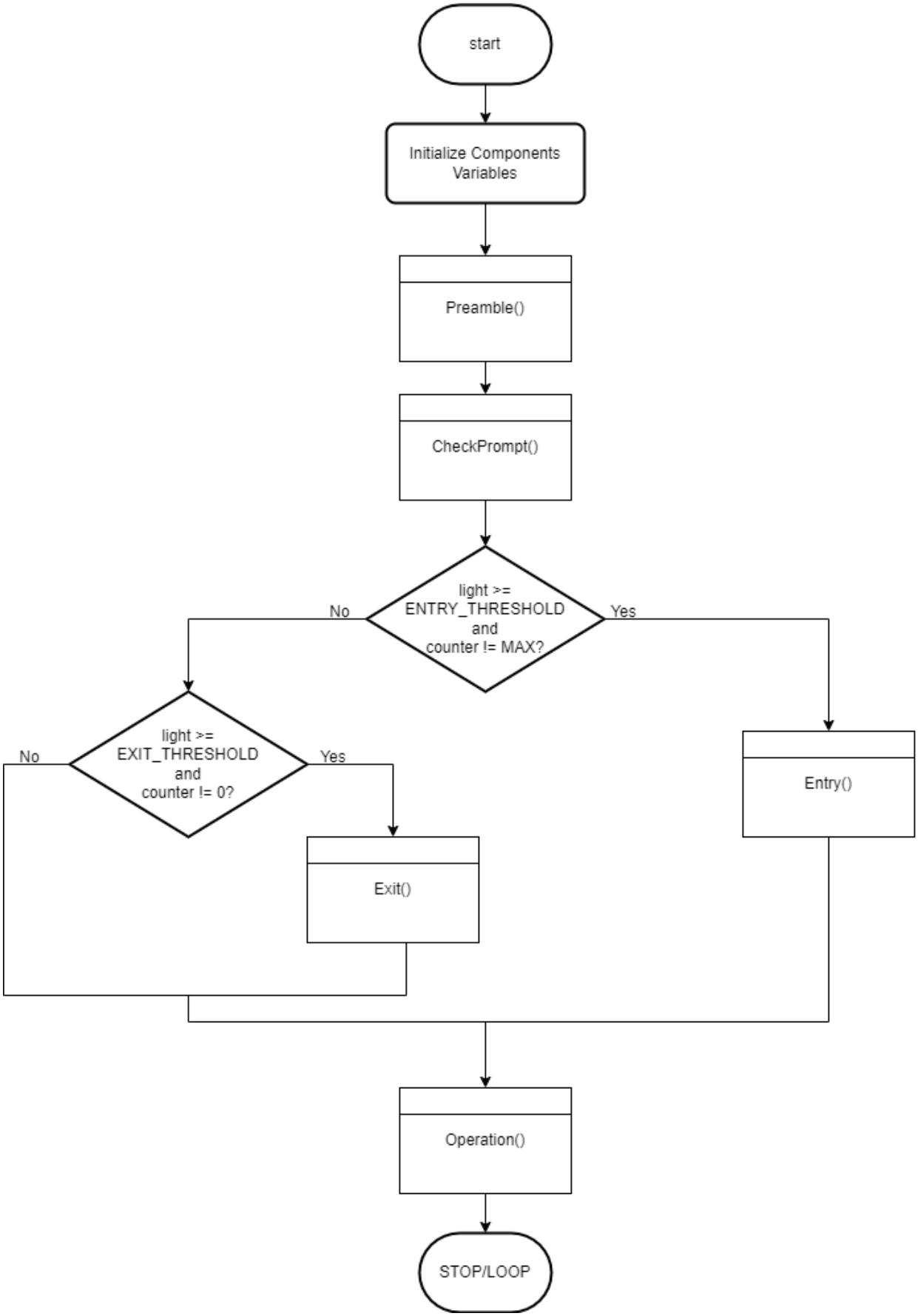
Block Diagram:



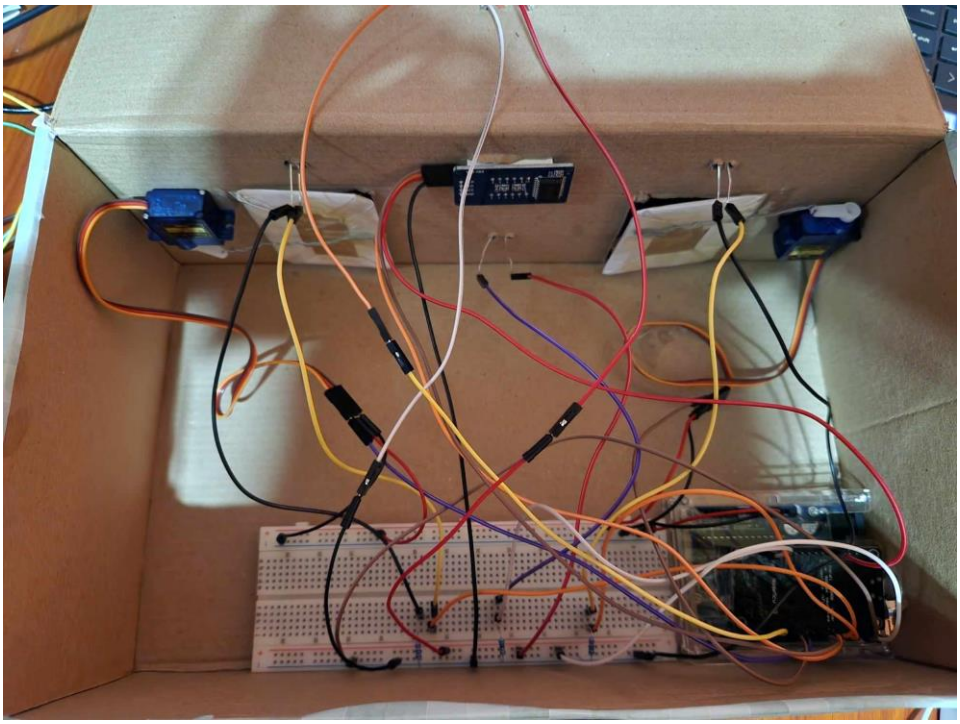
Circuit Diagram:

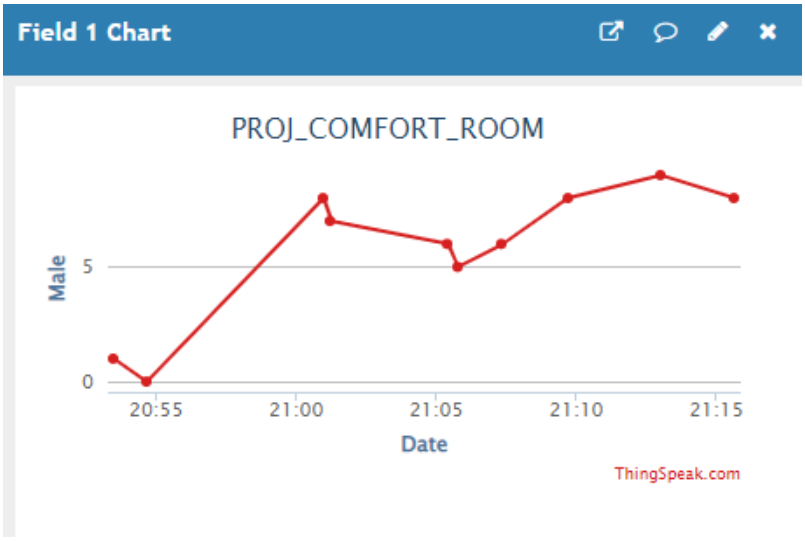


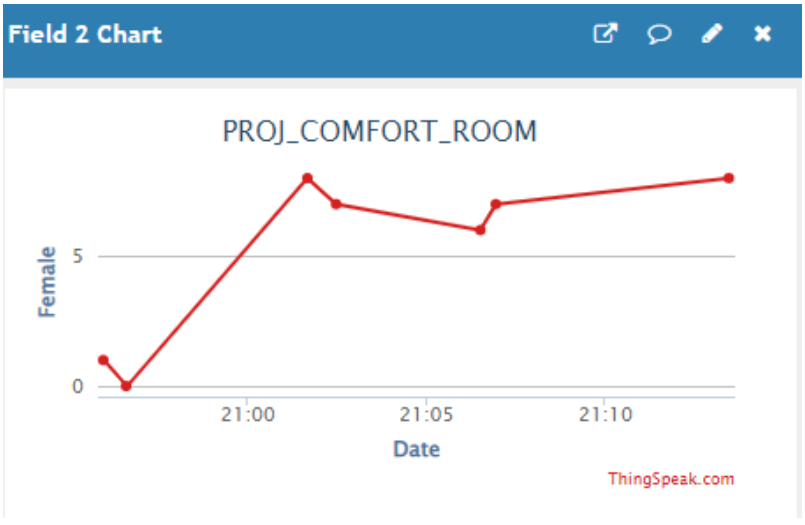
Flowchart (process/how the system will work):

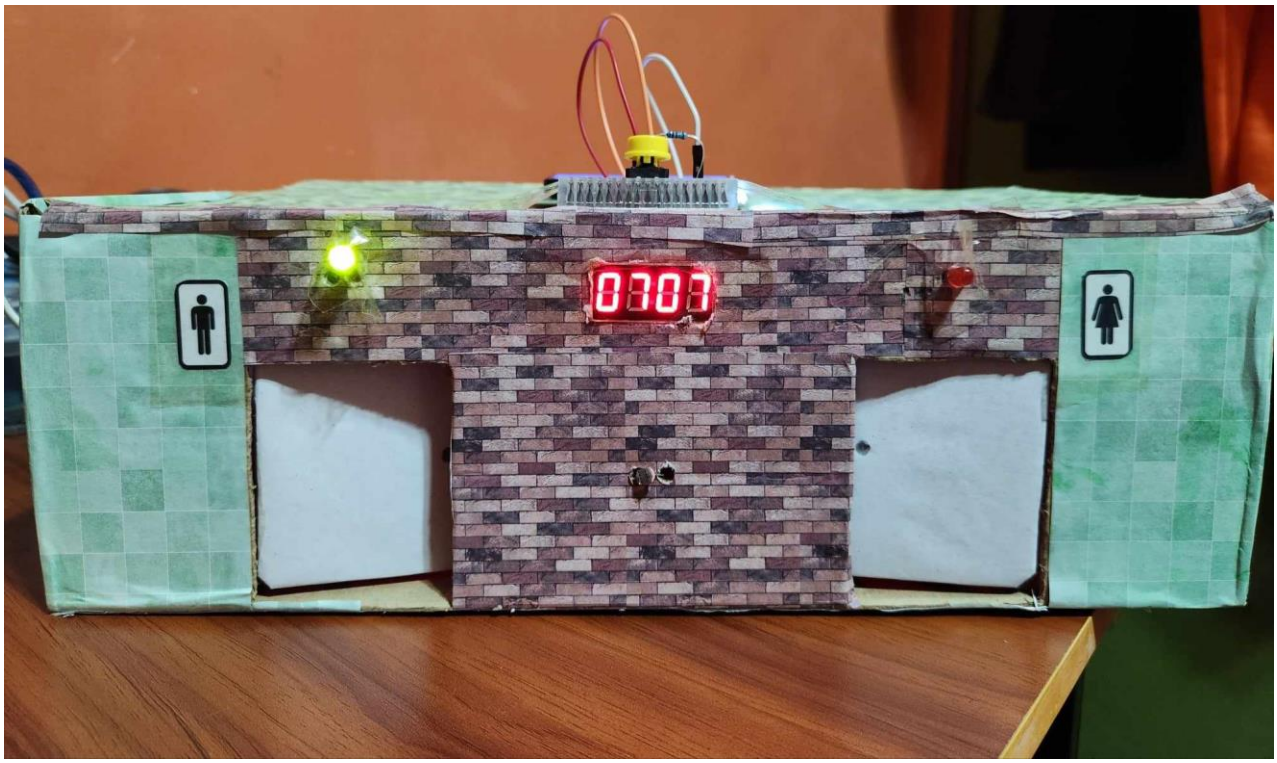


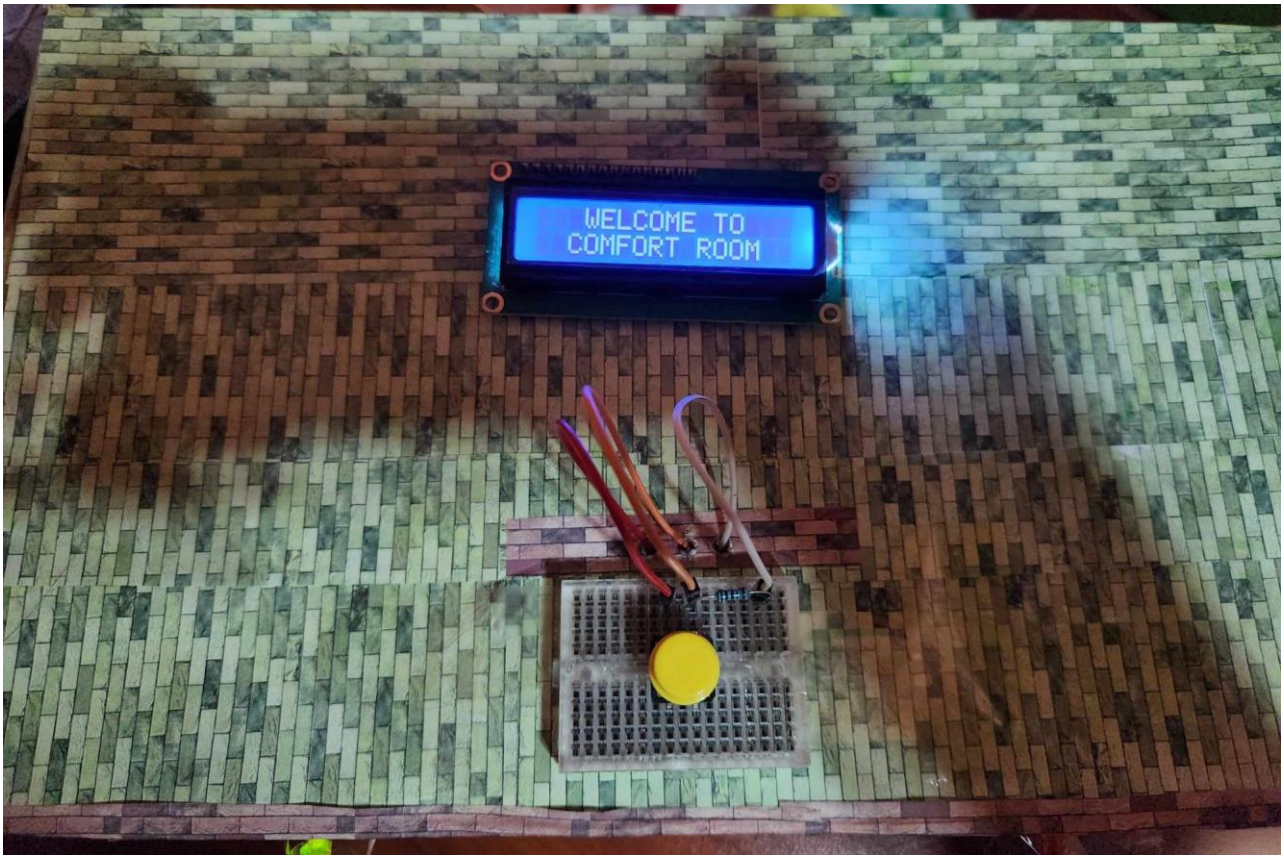
Prototype Setup:








0303


WELCOME TO
COMFORT ROOM