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Course Name:	Embedded Systems and Iot
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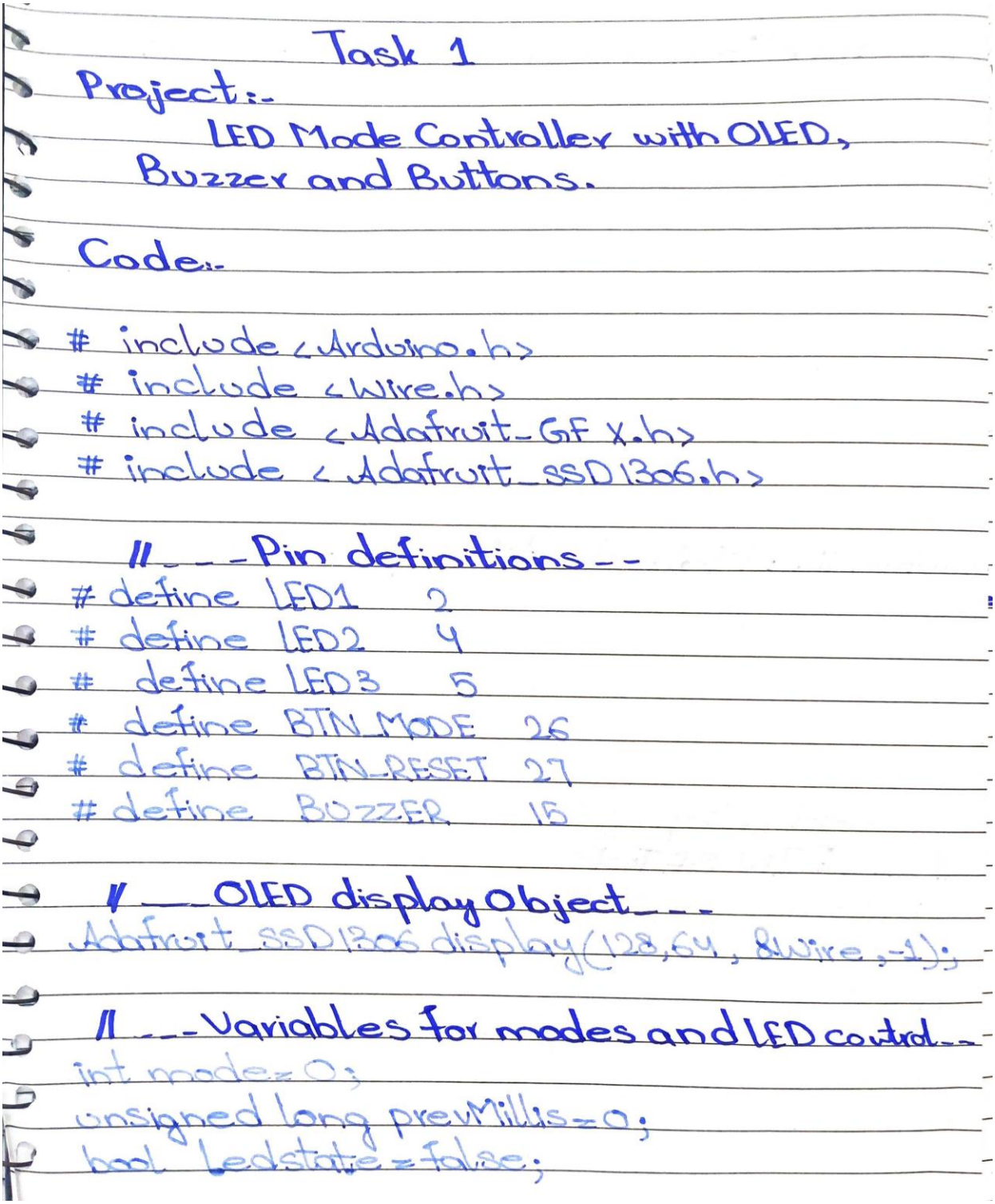
CODE and Wokwi Diagrams

Task 1:

Handwritten Code:



Task 1

Project:-

LED Mode Controller with OLED, Buzzer and Buttons.

Code:-

```
# include <Arduino.h>
# include <Wire.h>
# include <Adafruit_GFX.h>
# include <Adafruit_SSD1306.h>

// ---Pin definitions---
# define LED1   2
# define LED2   4
# define LED3   5
# define BTN_MODE   26
# define BTN_RESET  27
# define BUZZER   15

// ___OLED display object___
Adafruit_SSD1306 display(128,64, &Wire, -1);

// ---Variables for modes and LED control---
int mode=0;
unsigned long prevMillis=0;
bool ledstate=false;
```

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```
// --- Function: show message on OLED ---
void showMsg(String msg){
display.clearDisplay();
display.setTextSize(1);
display.setTextColor(WHITE);
display.setCursor(0,20);
display.print("Mode: ");
display.println(msg);
display.display();
}

// --Function: Make short beep sound ---
void beepBuzzer(int freq, int dur){
  tone(Buzzer, freq, dur);
  delay(dur+50);
  noTone(BUZZER);
}

void setup(){
// --- PIN SETUP ---
pinMode(LED1,OUTPUT)
pinMode(LED2,OUTPUT)
pinMode(LED3,OUTPUT)
pinMode(BTN_MODE,INPUT_PULLUP);
pinMode(BTN_RESET,INPUT_PULLUP);
pinMode(BUZZER,OUTPUT);
```

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```
// --Initialize OLED Display---
display.begin(SSD1306_SWITCHCAPVCC,0x3C);
display.clearDisplay();
display.display();

showMsg("BOTH OFF");
}
void loop(){
// -- Check Mode Button---
if(digitalRead(BTN_MODE)==low){
delay(200);
mode++;
if(mode>4)mode=1;

// --- Changes behaviour based on select mode
switch(mode){
case 1:
// --- Mode 1: Both LED's off
digitalWrite(LED1,low);
digitalWrite(LED2,low);
showMsg("Bothoff");
beepBuzzer(200,120);
break;

case 2;
Mode 2: Alternate blink
showMsg("Alternate blink");
beepBuzzer(1000,120);
break;
```

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```
case 4:
Mode 4: PWM Fade
showMsg("PWM Fade");
beepBuzzer(1500, 120);
break;
}

// --- Check Reset Button
if (digitalRead(BTN_RESET) == LOW) {
delay(200);
mode = 1;
digitalWrite(LED1, LOW);
digitalWrite(LED2, LOW);
analogWrite(LED3, 0);
showMsg("Reset to OFF");
beepBuzzer(400, 200);
}

// --- Mode Behaviour ---
if(mode == 2) {
if (millis() - prevMillis >= 500) {
prevMillis = millis();
ledState = !ledState;
digitalWrite(LED1, ledState);
digitalWrite(LED2, !ledState);
}
}
if(mode == 4) {
// --- inc LED Brightness
for(int i = 0; i <= 255; i++) {
```

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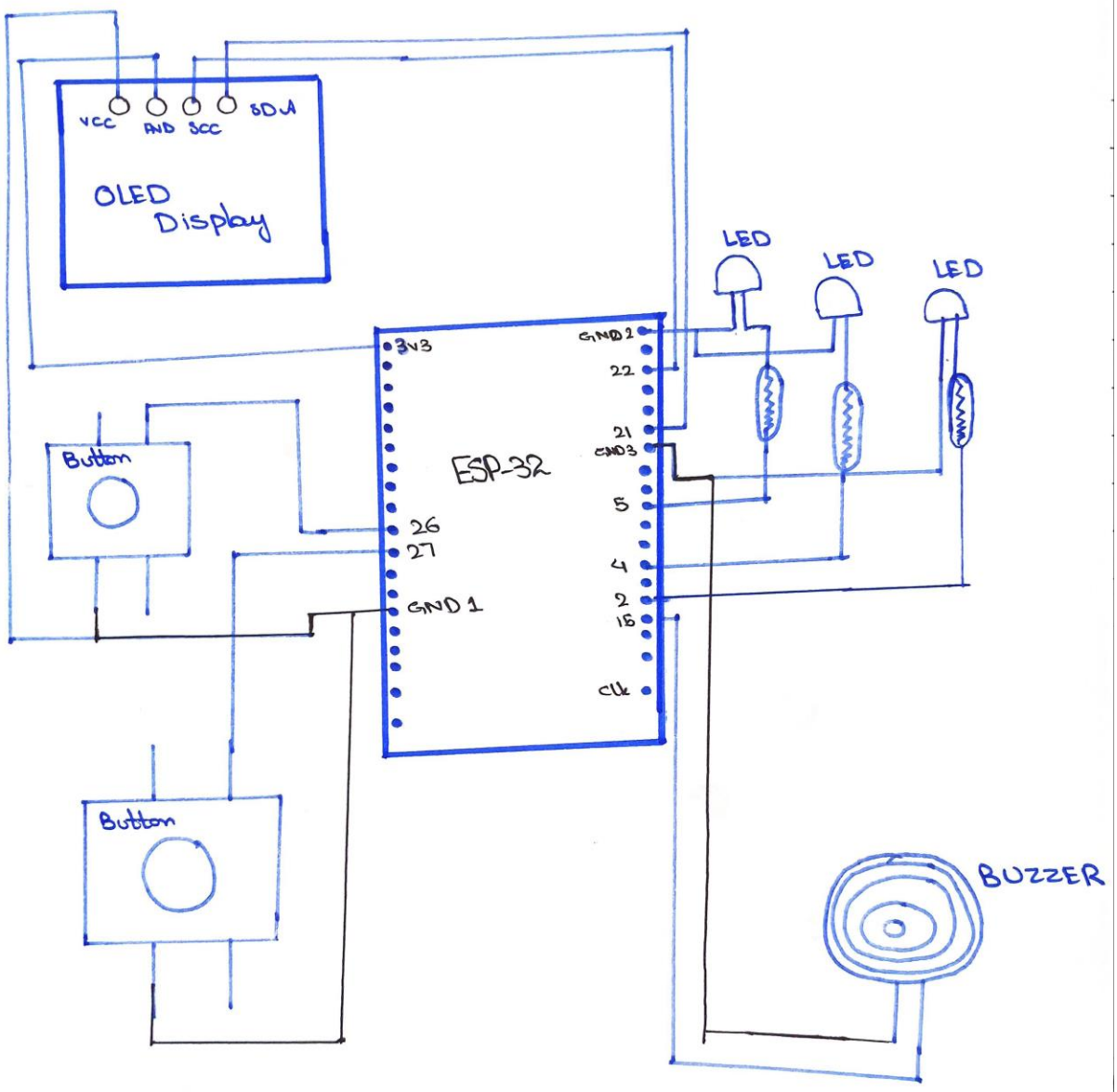
```
analogWrite(LED3,i);
delay(5);
}
// decrease led brightness ----
for (int i = 255; i >= 0; i--){
analogWrite(LED3, i);
delay(5);
}
}
}
```

Wokwi Diagram (Task 1)

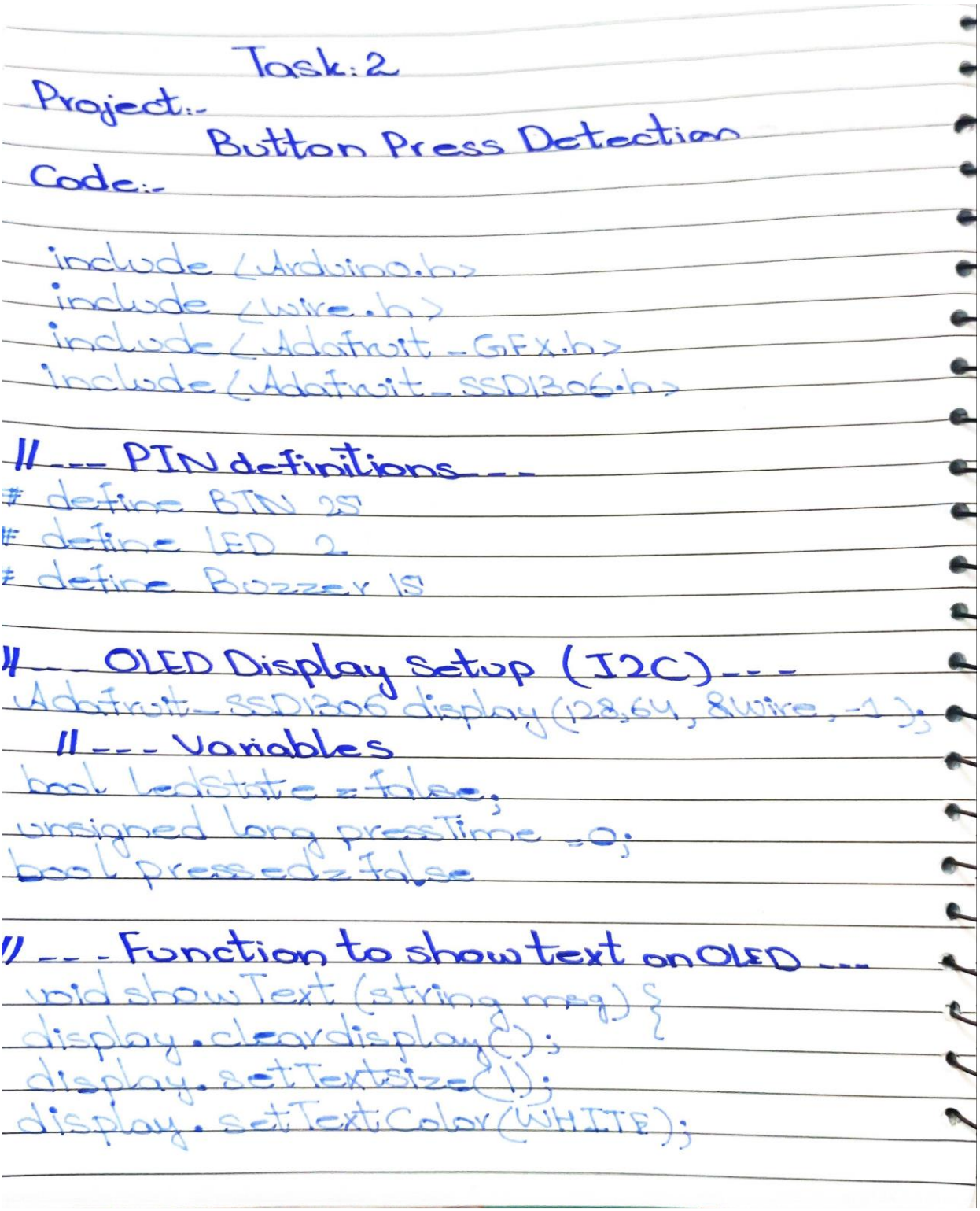


Wokwi link:

https://wokwi.com/projects/445801075490100225

Task 2:

Code:



Task: 2

Project:-

Button Press Detection

Code:-

```
include <Arduino.h>
include <Wire.h>
include <Adafruit_GFX.h>
include <Adafruit_SSD1306.h>

// --- PIN definitions ---
# define BTN 25
# define LED 2
# define Buzzer 15

// --- OLED Display Setup (I2C) ---
Adafruit_SSD1306 display(128,64, &Wire, -1);
// --- Variables
bool ledState = false;
unsigned long pressTime = 0;
bool pressed = false

// --- Function to show text on OLED ---
void showText (string msg) {
display.clearDisplay();
display.setTextSize(1);
display.setTextColor(WHITE);
```

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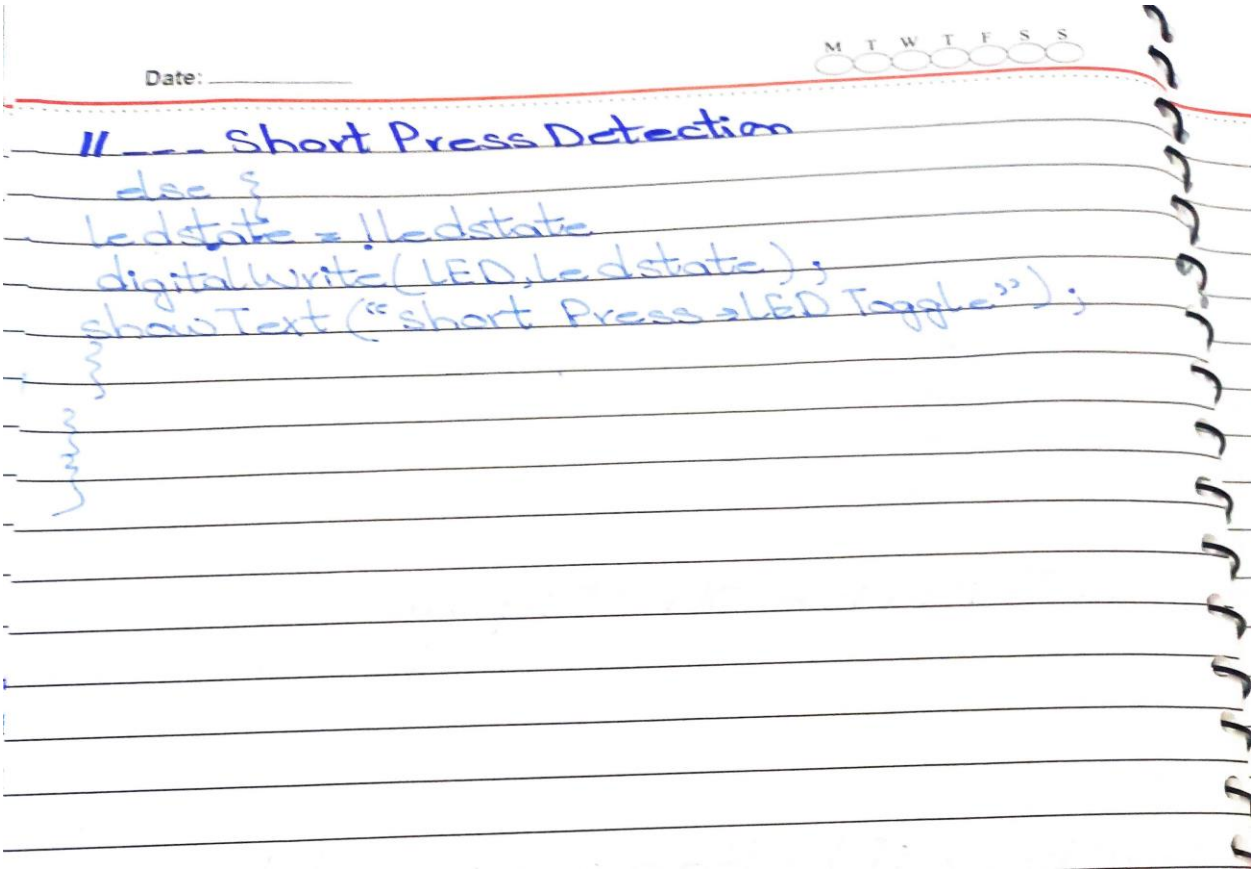
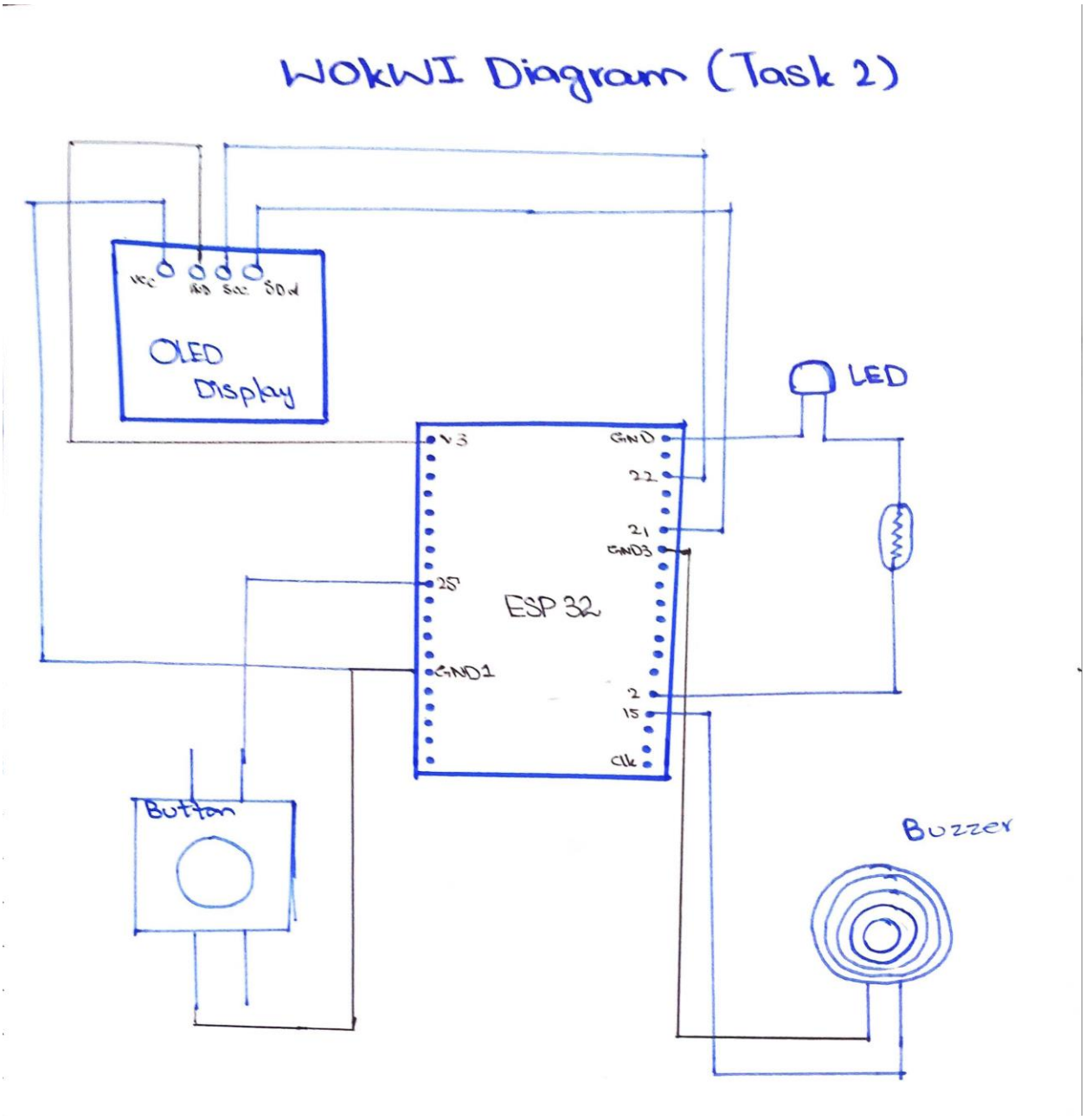
```
display.setCursor(0,20);
display.println(msg);
display.display();
}
void setup() {
pinMode(BTN, INPUT_PULLUP);
pinMode(LED, OUTPUT);
pinMode(BUZZER, OUTPUT);

//--- Initidize OLED Display ---
display.begin(SSD1306_SWITCHCAPVCC, 0x3C);
showText("Ready---");
}
void loop() {
//--- Check if button is pressed down ---
if digitalRead(BTN) == LOW && !pressed) {
  pressed = true;
  pressTime = millis();
}
//--- Check if button is released ---
if (digitalRead(BTN) == HIGH && pressed) {
unsigned long duration = millis() - pressTime;
pressed = false;

//--- Long Press Detection (>1.5s) ---
  if(duration > 1500){
  tone(BUZZER, 1000, 500);
  showText("Long Press -> Buzzer");
}
```



Wokwi Diagram:



Wokwi link:

https://wokwi.com/projects/445802214103270401

Main GITHUB repository link:

https://github.com/aqsadfatima-123/Embedded-IOT-Systems.git