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Assignment 1:	Task B
Course Name:	IoT & Embedded Systems
Submitted To:	Dr. Nasir Mehmood

Document of Assignment 1

Task B

Code Screenshot:

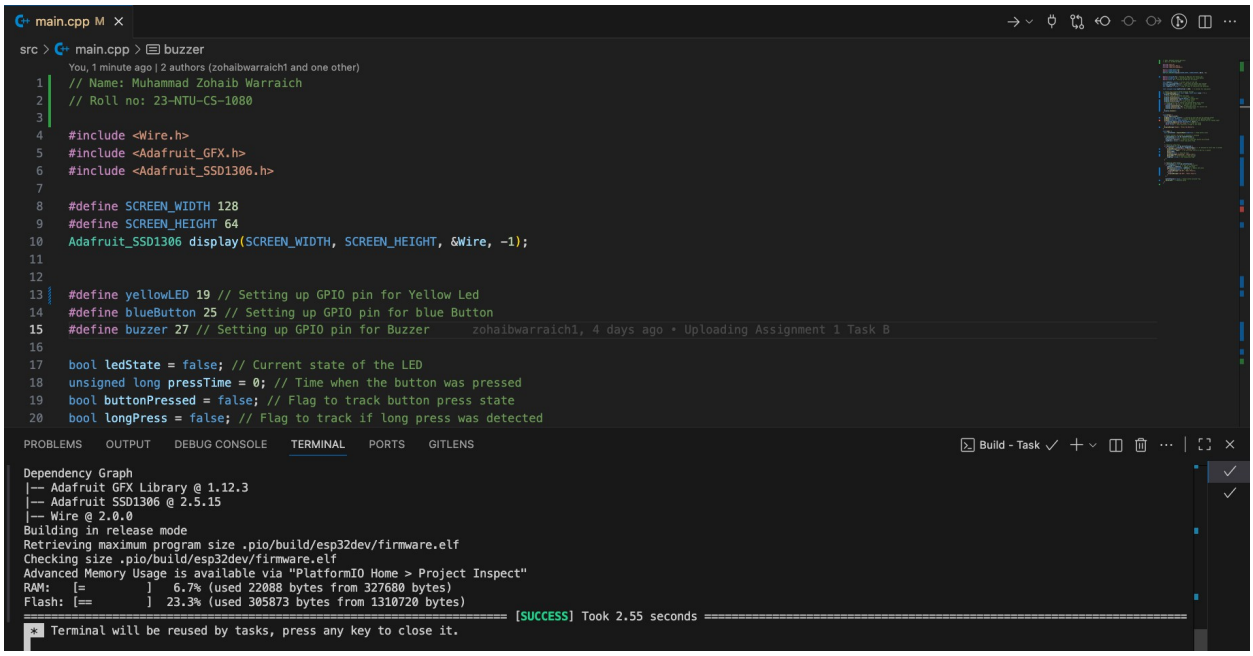
```
// Name: Muhammad Zohaib Warraich
// Roll no: 23-NTU-CS-1080

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

#define SCREEN_WIDTH 128
#define SCREEN_HEIGHT 64
Adafruit_SSD1306 display(SCREEN_WIDTH, SCREEN_HEIGHT, &Wire, -1);


#define yellowLED 19 // Setting up GPIO pin for Yellow Led
#define blueButton 25 // Setting up GPIO pin for blue Button
#define buzzer 27 // Setting up GPIO pin for Buzzer

bool ledState = false; // Current state of the LED
unsigned long pressTime = 0; // Time when the button was pressed
bool buttonPressed = false; // Flag to track button press state
bool longPress = false; // Flag to track if long press was detected

const unsigned long longPressTime = 2000;  // 2 seconds for long press

// Simple but visually better display message
void displayMessage(const char* line1, const char* line2 = "") {
  display.clearDisplay();
  // First line will be bold and large
  display.setTextSize(2);  // Large text size
  display.setTextColor(SSD1306_WHITE); // White text
  display.setCursor(15, 10); // Centered cursor
  display.println(line1); // Print first line
  // Second line will be smaller and placed below First line
  if (line2[0] != '\0') { // If second line is not empty
    display.setTextSize(1); // Smaller text size
    display.setCursor(20, 40); // Centered cursor for second line
    display.println(line2); // Print second line
  }
  display.display();
}

void setup() {
  Serial.begin(115200);
  pinMode(yellowLED, OUTPUT); // setting up blue LED pin for getting output
  pinMode(buzzer, OUTPUT); // setting up buzzer pin for getting output
  pinMode(blueButton, INPUT_PULLUP); // Initialize blue button pin for taking input
  if (!display.begin(SSD1306_SWITCHCAPVCC, 0x3C)) {
    Serial.println("OLED not found!"); // OLED not found
    while (true); // Halt execution if OLED is not found
  }
  displayMessage("Ready", "Press the Button");
}

void loop() {
  bool buttonState = digitalRead(blueButton); // Read button state

  // Detect whether the button is pressed or released
  if (buttonState == LOW && !buttonPressed) {
    buttonPressed = true; // Button is pressed
    pressTime = millis(); // Record the time when button was pressed
```

```
    longPress = false; // Reset long press flag
  }

  // Check for long press
  if (buttonState == LOW && buttonPressed) {
    if ((millis() - pressTime > longPressTime)) { // If pressed for more than 2 seconds
      displayMessage("Long Press", "Buzzer ON");
      tone(buzzer, 1000);   // It will play tone of 1 kHz for 1 second
      delay(1000);
      noTone(buzzer); // Stop the tone
      displayMessage("Completed", "Buzzer OFF");
      delay(500); // Brief delay to show message
      longPress = true; // Set long press flag
    }
  }

  // Check for short press
  if (buttonState == HIGH && buttonPressed) {
    if (!longPress) { // If it was not a long press
      ledState = !ledState; // Toggle LED state
      digitalWrite(yellowLED, ledState); // Update LED state
      if (ledState==HIGH) { // If LED is on
        displayMessage("LED ON", "Short Press");
      } else {
        displayMessage("LED OFF", "Short Press");
      }
    }

    buttonPressed = false; // Reset button pressed flag
    delay(300);  // Debounce delay
  }
}

```

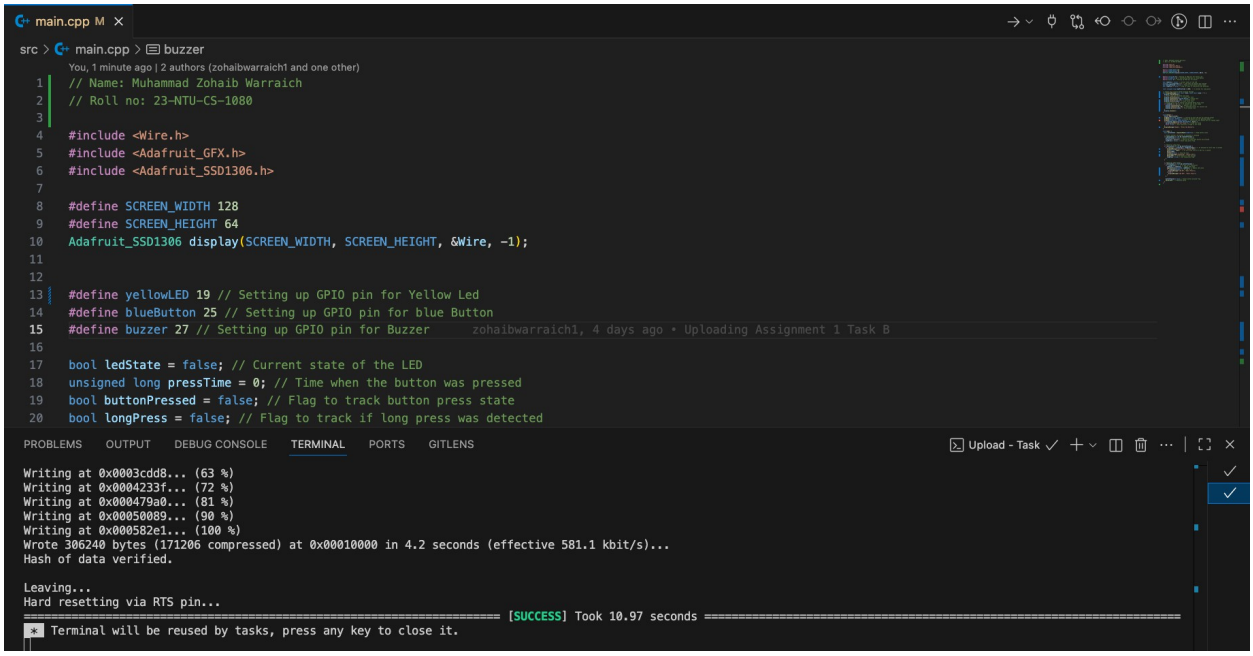
Short explanation about code:

This program is designed for an ESP32 (or Arduino) that uses a yellow LED, a buzzer, and an OLED display. When powered on, the display shows a “Ready” message, indicating that the system is waiting for user input. The blue button controls the actions, if it’s pressed briefly, the LED toggles between ON and OFF, and the display updates to show the LED’s status. However, if the button is held down for more than two seconds, it’s recognized as a long press, causing the buzzer to sound for one second while displaying a “Buzzer ON” message. Afterward, the screen confirms that the buzzer has turned off. Overall, the code provides both visual and sound feedback based on the type of button press.

Build Output:

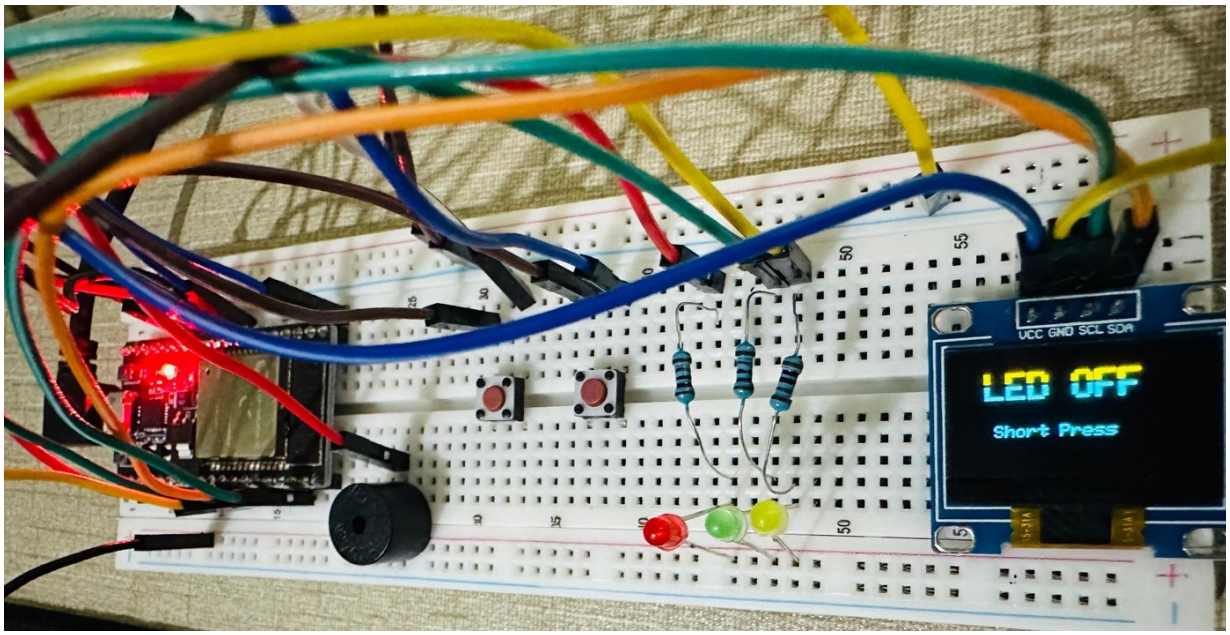


Upload Output:

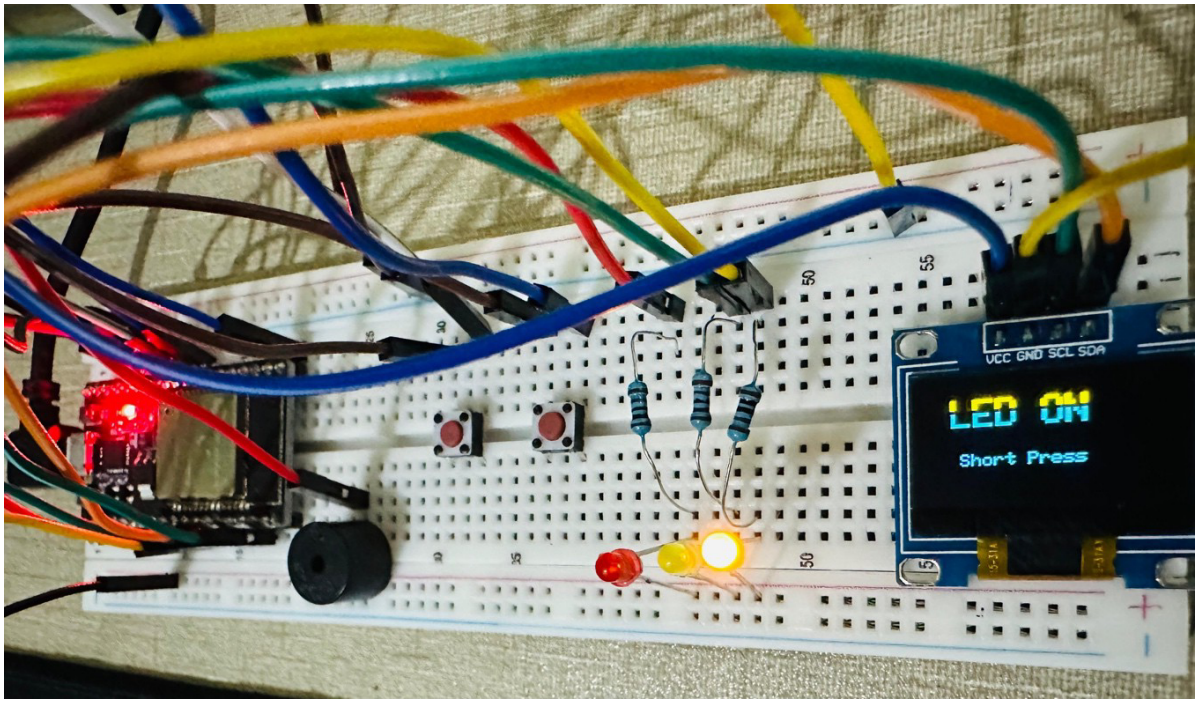


Hardware Output:

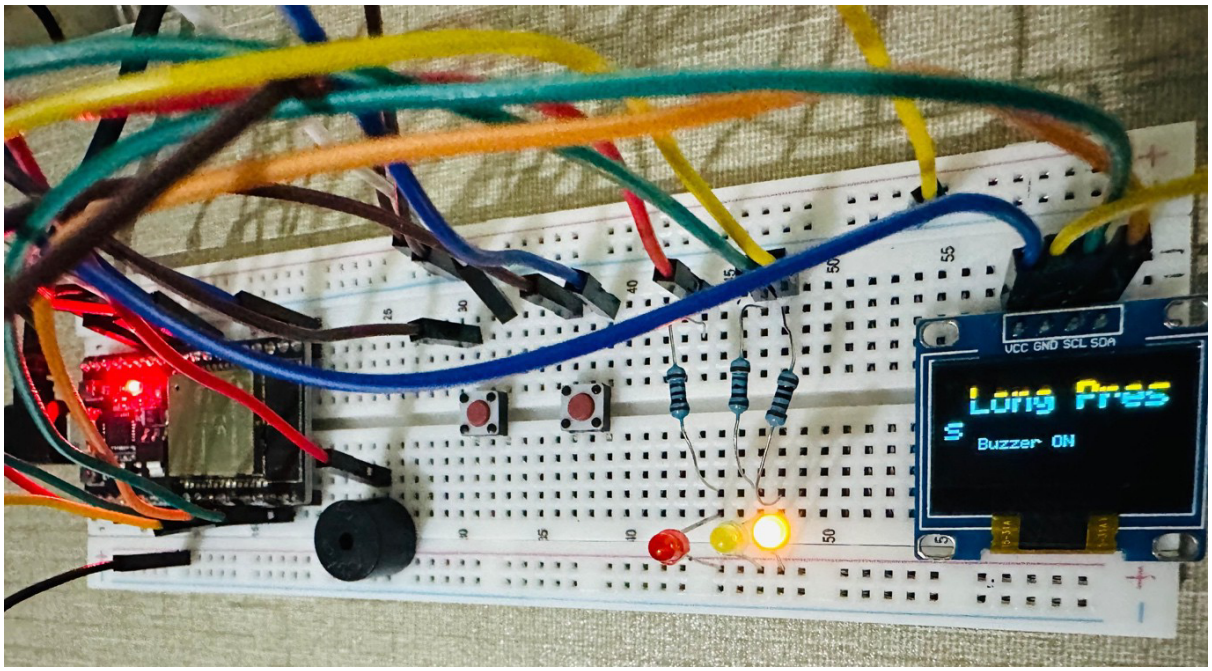
Short Press LED OFF:



Short Press LED ON:



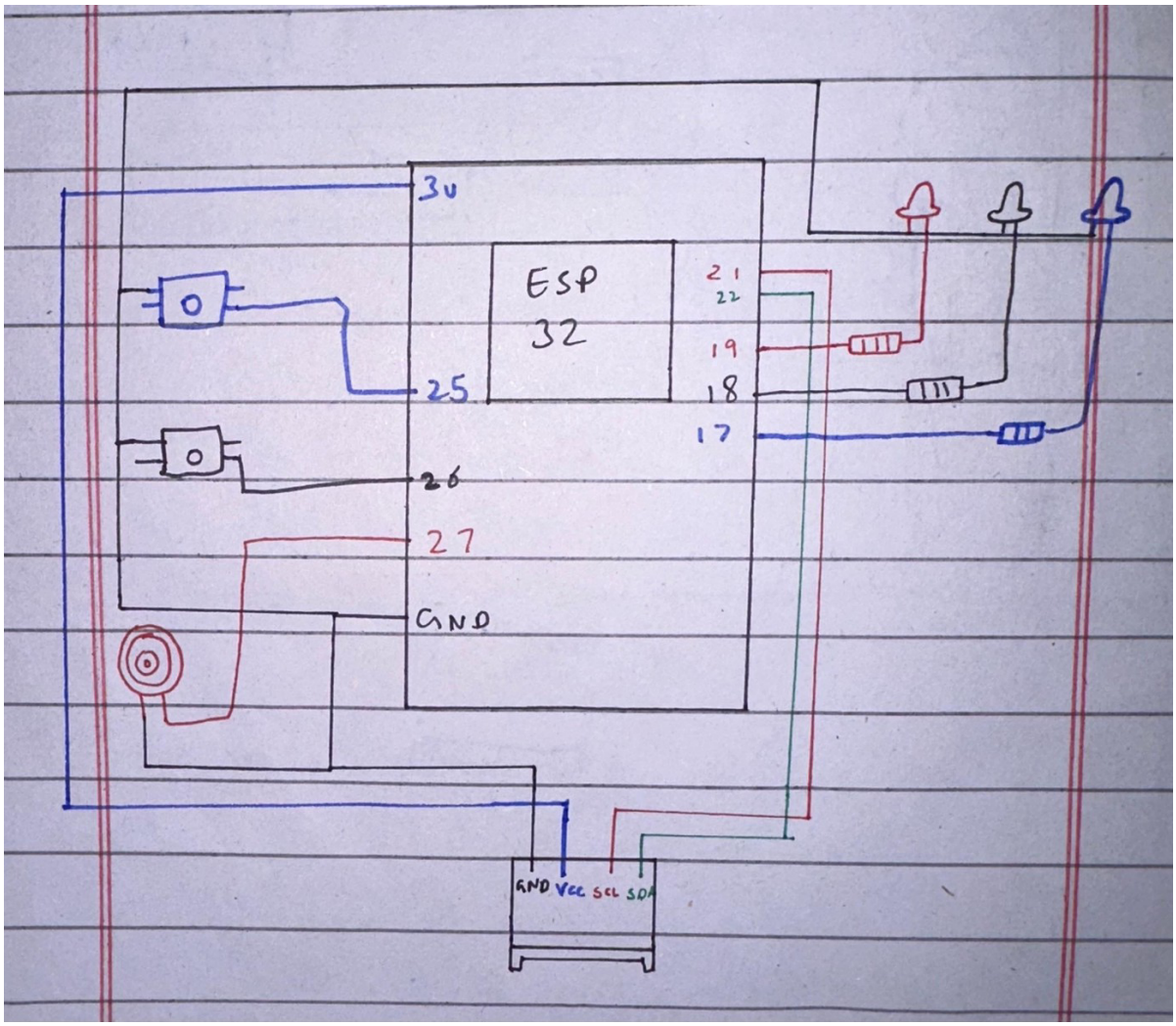
Long Press:



Wokwi Project Link:

https://wokwi.com/projects/445165207310341121

Circuit Diagram:



Pin Map Diagram:

Pin No	Name	Function	Use Case
GND .2	Ground	Common Ground	For all LEDs, Buzzer, Buttons, OLED
25	GPIO 25	Pin for Blue Button	Output for Blue Button (Modebtn)
26	GPIO 26	Pin for White Button	Output for White Button (Resetbtn)
27	GPIO 27	Pin for Buzzer	Output for Buzzer
3v3	Power	3.3V output power	OLED VCC
22	GPIO 22	I2C SCL	OLED SCL
21	GPIO 21	I2C SDA	OLED SDA
19	GPIO 19	Pin for Yellow LED	Output for Yellow LED
18	GPIO 18	Pin for Green LED	Output for Green LED
17	GPIO 17	Pin for Red LED	Output for Red LED