National Textile University,

Faisalabad

Department of Computer Science

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Class:	BSCS 5TH B
Registration No:	23-NTU-CS-1089
Assignment:	1st
Course Name:	IOT AND EMBEDDED SYSTEMS
Submitted To:	SIR NASIR MEHMOOD
Submission Date:	26TH OCTOBER 2025

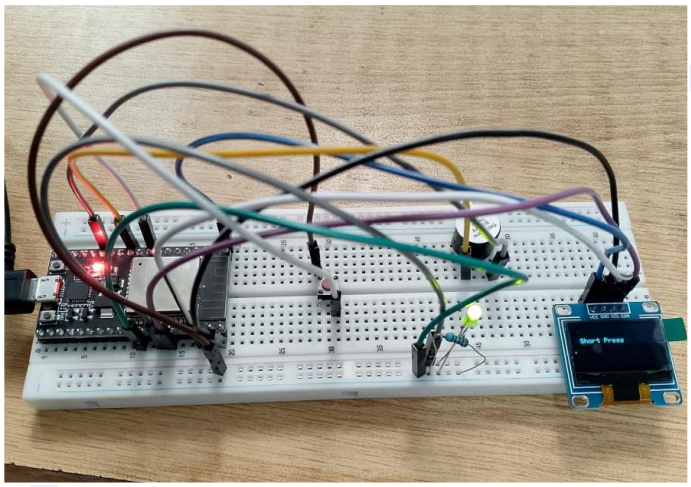
Code Screenshot:

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

//  Pin Definitions
#define BUTTON_PIN 25
#define LED_PIN 18
#define BUZZER_PIN 27
#define SDA_PIN 21
#define SCL_PIN 22

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

// Globals
bool ledState = false;
bool buttonPressed = false;
unsigned long pressStartTime = 0;
const unsigned long longPressDuration = 1500;

//  Display message
void showMessage(const String &msg) {
  display.clearDisplay();
  display.setTextSize(1);
  display.setTextColor(SSD1306_WHITE);
  display.setCursor(10, 20);
  display.print(msg);
  display.display();
}

// Setup
void setup() {
  Serial.begin(115200);
  pinMode(BUTTON_PIN, INPUT_PULLUP);
  pinMode(LED_PIN, OUTPUT);
  pinMode(BUZZER_PIN, OUTPUT);

  // Initialize OLED
  Wire.begin(SDA_PIN, SCL_PIN);
  if (!display.begin(SSD1306_SWITCHCAPVCC, 0x3C)) {
    Serial.println("SSD1306 allocation failed");
    while (true);
  }
  display.clearDisplay();
  display.display();

  showMessage("System Ready");
  digitalWrite(LED_PIN, LOW);
  digitalWrite(BUZZER_PIN, LOW);
}

//  Loop
void loop() {
  bool btnState = digitalRead(BUTTON_PIN);


  if (!btnState && !buttonPressed) {
    buttonPressed = true;
    pressStartTime = millis();
  }

  // Button held down
  if (buttonPressed && !btnState) {
    unsigned long pressDuration = millis() - pressStartTime;
    if (pressDuration > longPressDuration) {

      showMessage("Long Press");

      tone(BUZZER_PIN, 2000);


    }
  }

  // Button released
  if (buttonPressed && btnState) {
    unsigned long pressDuration = millis() - pressStartTime;
    buttonPressed = false;

    // Stop buzzer
    noTone(BUZZER_PIN);
    digitalWrite(BUZZER_PIN, LOW);

    if (pressDuration <= longPressDuration) {
      ledState = !ledState;
      digitalWrite(LED_PIN, ledState ? HIGH : LOW);
      showMessage("Short Press");
    }
  }
}
```

Code Explanation

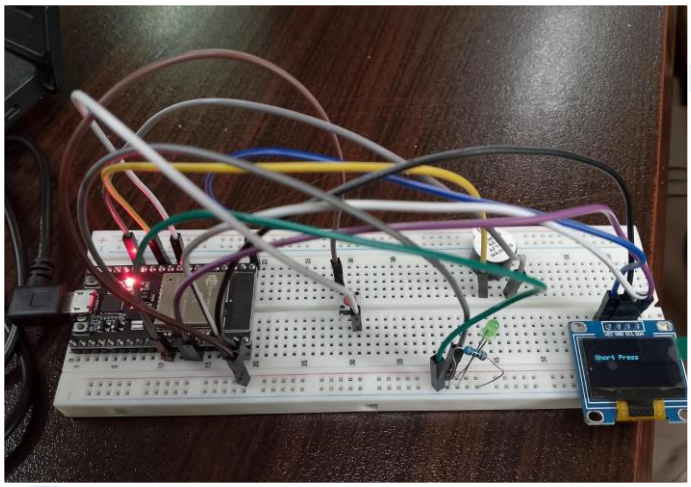
This Arduino code controls an LED, a buzzer, and an OLED display using a single button. When the system starts, it shows “System Ready” on the screen. If you press and quickly release the button, it’s detected as a short press — the LED toggles ON or OFF, and “Short Press” appears on the OLED. If you hold the button for more than 1.5 seconds, it’s a long press — the display shows “Long Press” and the buzzer sounds while the button is held.

Output Screenshot:



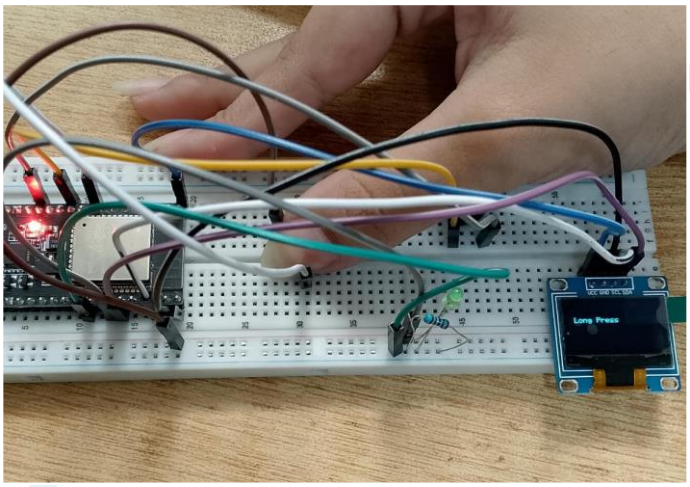
Short press

led is on



short press

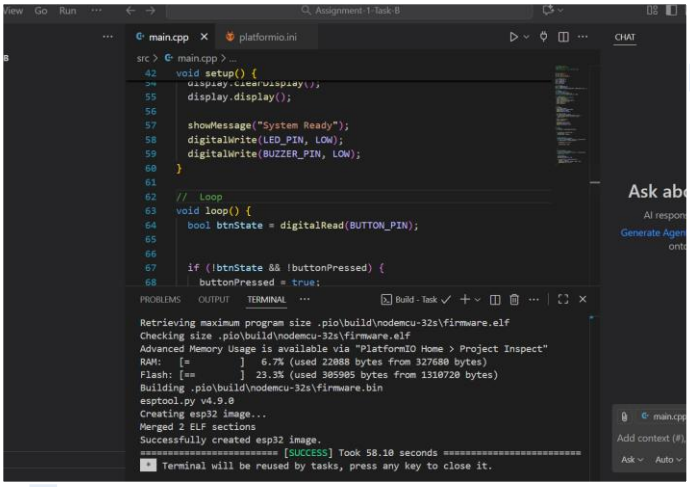
led is off



long press

buzzer is played

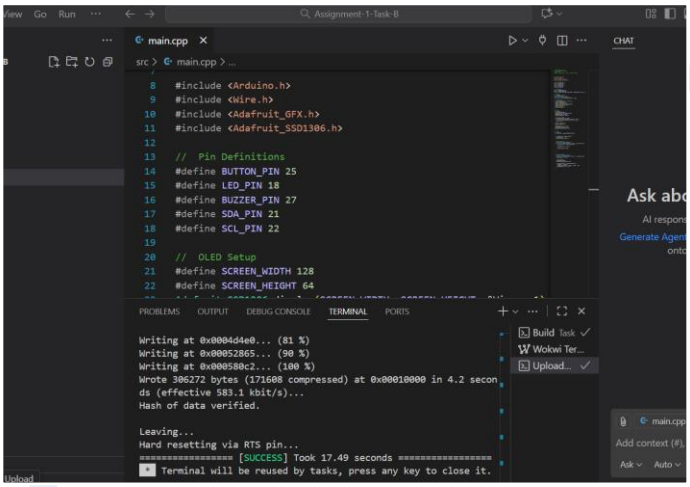
Code Build Screenshot:



code build

code is build successfully

Code Upload Success:



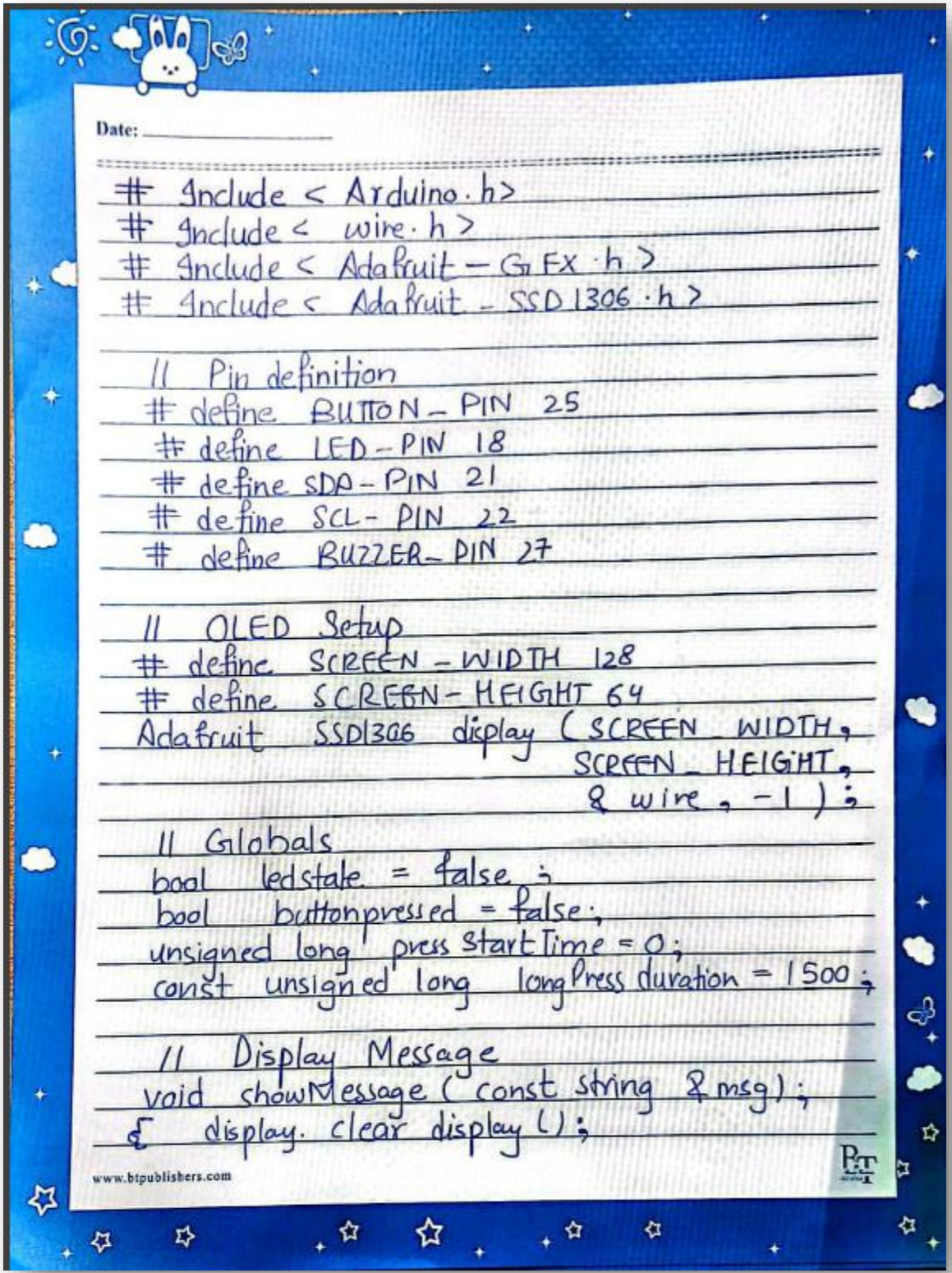
Code Upload

Code is uploaded successfully

WOKWI project link:

https://wokwi.com/projects/445578682914863105

Handwritten Code:



Date: _____

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

// Pin definition
#define BUTTON_PIN 25
#define LED_PIN 18
#define SDA_PIN 21
#define SCL_PIN 22
#define BUZZER_PIN 27

// OLED Setup
#define SCREEN_WIDTH 128
#define SCREEN_HEIGHT 64
Adafruit_SSD1306 display (SCREEN_WIDTH,
                          SCREEN_HEIGHT,
                          &wire, -1);

// Globals
bool ledstate = false;
bool buttonpressed = false;
unsigned long pressStartTime = 0;
const unsigned long longPressDuration = 1500;

// Display Message
void showMessage (const string &msg);
{ display.clear display();
```

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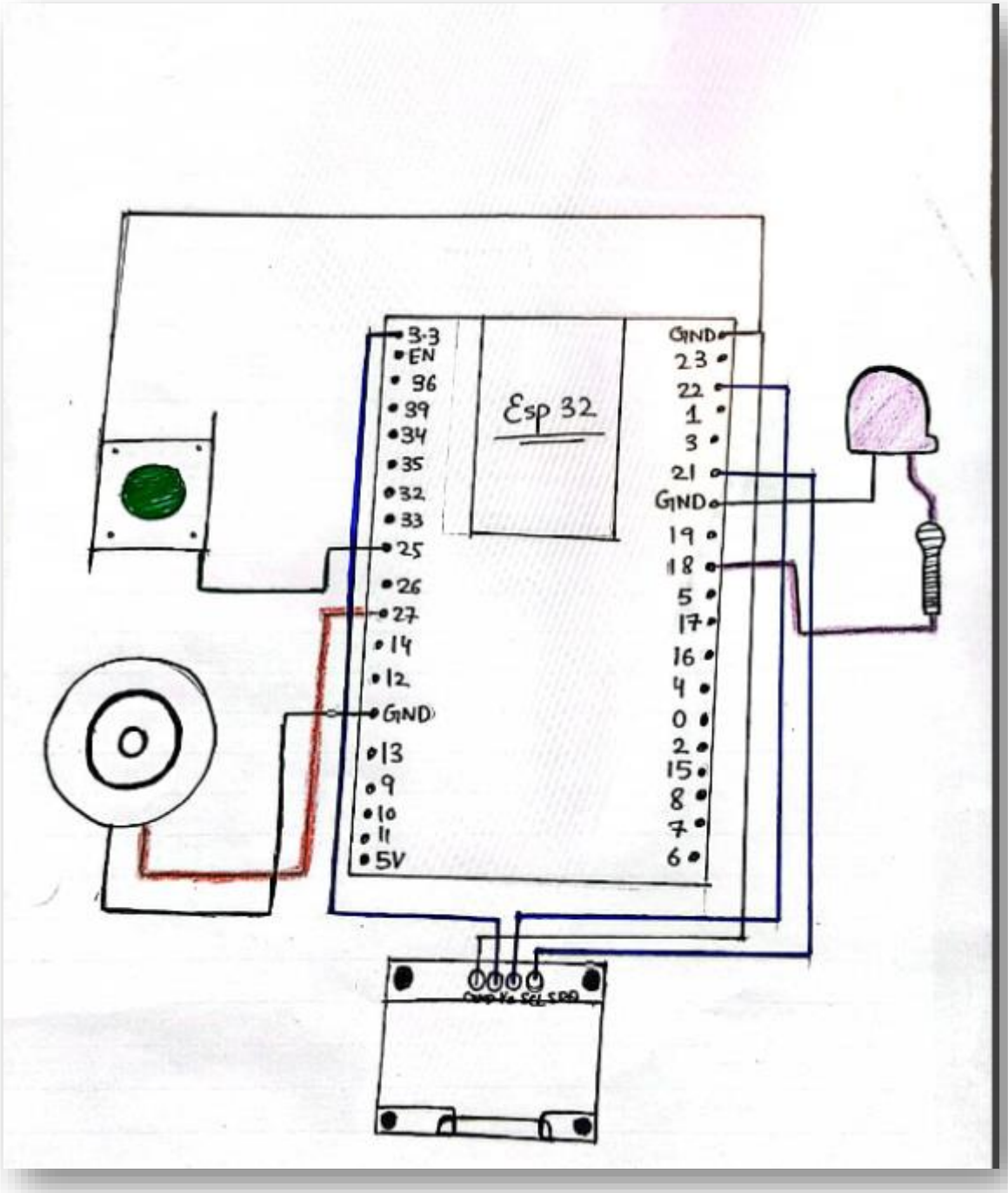
```
display.setTextSize(1);
display.setTextColor(SSD_1306_white);
display.setCursor(10,20);
display.print(msg);
display.display();
}

// Setup
void setup()
{ Serial.begin(115200);
pinMode(BUTTON_PIN, INPUT_PULLUP);
pinMode(LED_PIN, Output);
pinMode(BUZZER_PIN, Output);

//Initialize OLED
Wire.begin(SDA_PIN, SCL_PIN); {
if (!display.begin(SSD1306_SWITCHCAP VCC)
{ Serial.Println("SSD allocation failed");
while(true);
}

Show Message("System Ready");
digitalWrite(LED_PIN, LOW);
digitalWrite(BUZZER_PIN, LOW);

// loop
void loop()
{ bool btnstate = digitalRead(BUTTON_PIN);}
```

Date: _____

```
// Button held down
if (buttonPressed && !btnstate)
{ unsigned long pressduration = millis();
  if (press duration > longPress duration)
    { Show message ("Long Press");
      tone (BUZZER_PIN, 2000);

// Button Released
if (buttonPressed && btnstate)
{ unsigned longPress Duration = millis();
   buttonpressed = false;
}

// Stop buzzer

noTone (BUZZER_PIN);
digitalWrite (BUZZER_PIN, LOW);

if (pressDuration <= longPress Duration)
  { ledstate = !ledstate;
    digitalWrite (LED_PIN, ledstate ? HIGH:
                  LOW);
    Show Message ("Short Press");
  }
}
}
```

Hand Drawn Sketch:



Pin map:

Component	Pin Name	Pin number
LED	Resistor pin	GPIO 18
LED	Ground pin	GND 3
Button	Button pin	GPIO 25
Button	Ground pin	GND 2
OLED	Ground pin	GND 2
OLED	Voltage pin	GPIO 3.3
OLED	Serial clock pin	GPIO 22
OLED	Serial data pin	GPIO 21
Buzzer	Buzzer pin	GPIO 27
Buzzer	Ground Pin	GND 1