

National Textile University, Faisalabad



Department of Computer Science

|                             |                         |
|-----------------------------|-------------------------|
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| <b>Reg-No:</b>              | 23-NTU-CS-1029          |
| <b>Semester and Section</b> | BS CS 5 <sup>th</sup> A |
| <b>Assignment no:</b>       | 01 Task 3 Part 2        |
| <b>Course :</b>             | EM-IOT                  |
| <b>Submitted to:</b>        | Sir Nasir Mehmood       |
| <b>Submission Date:</b>     | 10/26/2025              |

**Task 2 :**

**Code :**

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

//OLED Setup
#define SCREEN_WIDTH 128
#define SCREEN_HEIGHT 64
#define OLED_ADDR 0x3C
Adafruit_SSD1306 display(SCREEN_WIDTH, SCREEN_HEIGHT, &Wire, -1);

//Pin map like for what purpose pins are being used
#define LED_PIN    15    // for output Led pin
#define BUZZER_PIN 17    // for buzzer
#define BTN_PIN    32    // Button press

// Variables declared also flag set
unsigned long pressStart = 0; // to store button pressed state
bool buttonPressed = false; // flag to check button pressed state
bool ledState = false; // flag to check led state

const unsigned long LONG_PRESS_TIME = 2000; // 2 sec

//Display Text on OLED
void updateOLED(const String &line1, const String &line2 = "") {
```

```
display.clearDisplay();
display.setTextSize(1);
display.setTextColor(SSD1306_WHITE);
display.setCursor(0, 10);
display.println(line1);
if (line2 != "") {
    display.setCursor(0, 30);
    display.println(line2);
}
display.display();
}

//Handling if button pressed for brief time less than 2 sec
// so Toggle Led
void handleShortPress() {
    ledState = !ledState;
    digitalWrite(LED_PIN, ledState);
    Serial.println("Short Press → Toggle LED");
    updateOLED("Short Press", ledState ? "LED: ON" : "LED: OFF");
}

//Handle for long press like more than 2 sec or upto 2 sec so Play
// Buzzer
void handleLongPress() {
    Serial.println("Long Press → Play Buzzer");
    updateOLED("Long Press", "Buzzer Tone...");
    tone(BUZZER_PIN, 1000, 400); // 1kHz tone for 400ms
    delay(400);
}
```

```
noTone(BUZZER_PIN);
updateOLED("Long Press", "Done");
}
// In setup done things and provide input and output in pin mode
void setup() {
  Serial.begin(115200);
  Wire.begin();
  display.begin(SSD1306_SWITCHCAPVCC, OLED_ADDR);
  display.clearDisplay();
  display.display();

  pinMode(LED_PIN, OUTPUT);
  pinMode(BUZZER_PIN, OUTPUT);
  pinMode(BTN_PIN, INPUT_PULLUP);
  //Initialize system
  updateOLED("System Ready");
  Serial.println("System Ready");
}
//Loop Function using if -else for button states
void loop() {
  int buttonState = digitalRead(BTN_PIN);
  //Button pressed (Low as a result of using input_pullup)
  if (buttonState == LOW && !buttonPressed) {
    buttonPressed = true;
    pressStart = millis();
    updateOLED("Button Pressed...");
  }
}
```

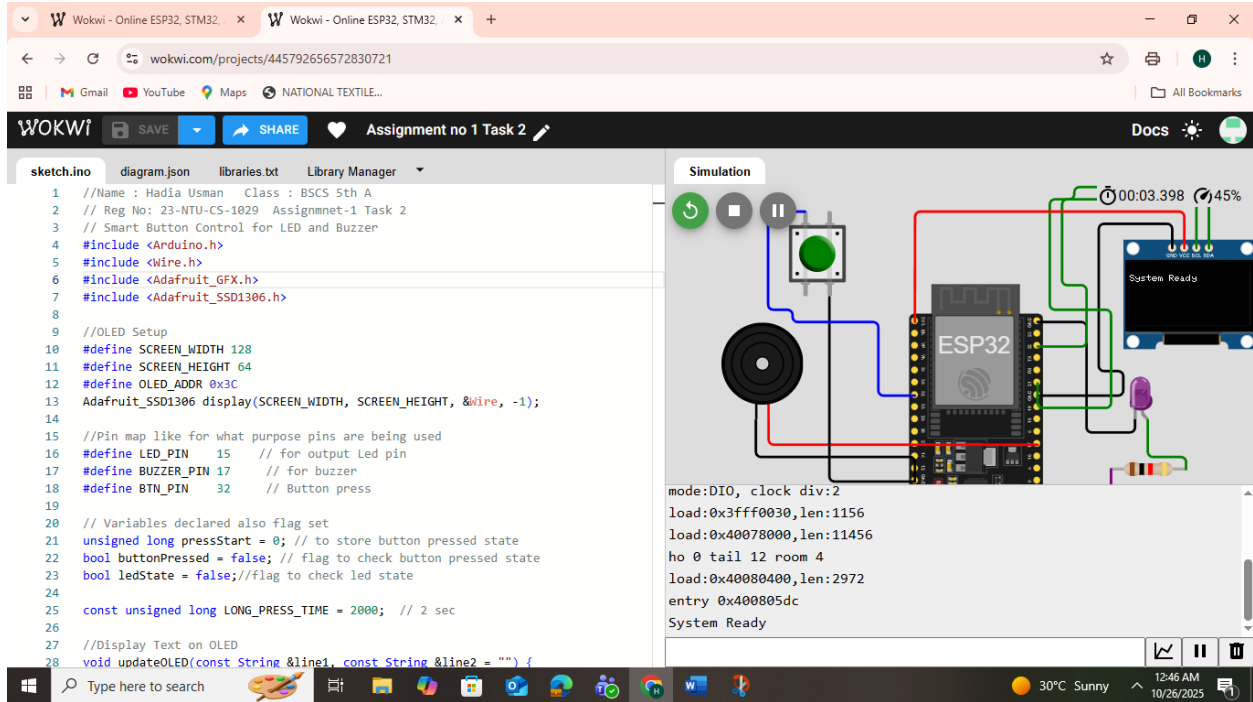
```
//When after pressing release button then check
// if long press or short press
if (buttonState == HIGH && buttonPressed) {
    buttonPressed = false;
    unsigned long pressDuration = millis() - pressStart;
    if (pressDuration > LONG_PRESS_TIME) {
        handleLongPress();
    } else {
        handleShortPress();
    }
}
delay(20); //simple debounce delay
}
```

### **Explanation of code :**

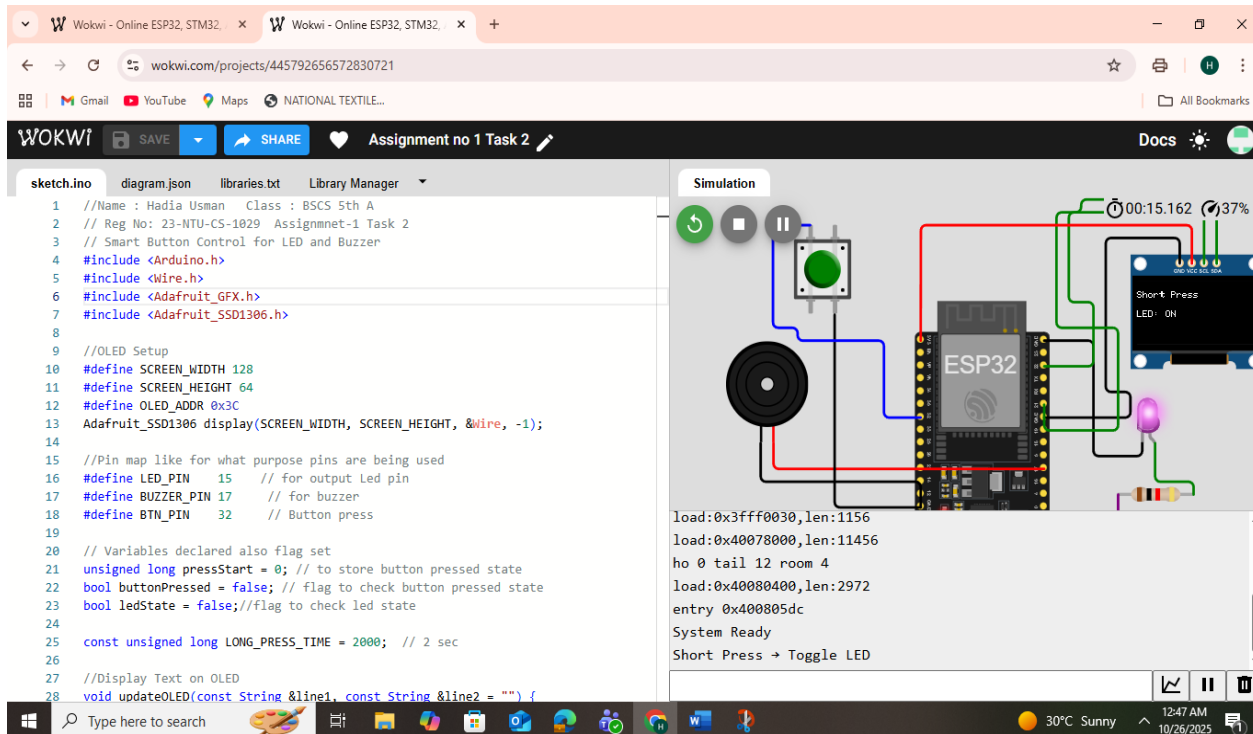
The Smart Button Control for Led and Buzzer program controls an led and a buzzer with the help of the button pressed detection . It checks whether the button is pressed for short time or long time .The **short press** is detected if it is pressed less than **2 seconds** and if short press so toggle the led if led on so off and off so on .On the other hand, if the button pressed state is detected to be **more than 2 seconds to activate buzzer** with a tone . The program uses **millis()** to measure press duration and a small delay for debounce. An OLED screen provides real-time feedback, showing whether a short or long press occurred and the corresponding LED or buzzer action, making the system interactive and easy to monitor.

## OUTPUT :

### System Ready :



### Led State on :



## Assignment 01 -Task 3-part 2

### Led State off :

Wokwi - Online ESP32, STM32, x Wokwi - Online ESP32, STM32, x +

wokwi.com/projects/445792656572830721

WOKWI SAVE SHARE Assignment no 1 Task 2 Docs

sketch.ino diagram.json libraries.txt Library Manager

```
1 //Name : Hadia Usman Class : BSCS 5th A
2 // Reg No: 23-NTU-CS-1029 Assignmet-1 Task 2
3 // Smart Button Control for LED and Buzzer
4 #include <Arduino.h>
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10 #define SCREEN_WIDTH 128
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12 #define OLED_ADDR 0x3C
13 Adafruit_SSD1306 display(SCREEN_WIDTH, SCREEN_HEIGHT, &Wire, -1);
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15 //Pin map like for what purpose pins are being used
16 #define LED_PIN 15 // for output Led pin
17 #define BUZZER_PIN 17 // for buzzer
18 #define BTN_PIN 32 // Button press
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22 bool buttonPressed = false; // flag to check button pressed state
23 bool ledState = false; // flag to check led state
24
25 const unsigned long LONG_PRESS_TIME = 2000; // 2 sec
26
27 //Display Text on OLED
28 void updateOLED(const String &line1, const String &line2 = "") {
```

Simulation

00:31.358 48%

load:0x40078000,len:11456  
ho 0 tail 12 room 4  
load:0x40080400,len:2972  
entry 0x400805dc  
System Ready  
Short Press → Toggle LED  
Short Press → Toggle LED

30°C Sunny 12:48 AM 10/26/2025

### Buzzer will play :

Wokwi - Online ESP32, STM32, x Wokwi - Online ESP32, STM32, x +

wokwi.com/projects/445792656572830721

WOKWI SAVE SHARE Assignment no 1 Task 2 Docs

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Simulation

00:48.691 30%

Short Press → Toggle LED  
Short Press → Toggle LED  
Short Press → Toggle LED  
Short Press → Toggle LED  
Short Press → Toggle LED  
Short Press → Toggle LED  
Long Press → Play Buzzer

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Wokwi Project Link :

<https://wokwi.com/projects/445792656572830721>

Loom Video Link :

<https://www.loom.com/share/81de8233dc9948acb81aef14bec43921>

Diagram Sketching:

Task\_3 Part\_2:

