

National Textile University, Faisalabad



Department of Computer Science

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Class:	BSCS-A
Registration No:	23-NTU-CS-1007
Course Name:	Embedded IoT and Systems
Submitted To:	Sir Nasir Mehmood
Submission Date:	26 th October,2025

Project Title:

Button Press Detection using LED, Buzzer and OLED Display

Description:

This project contains one LED, one pushbutton, one buzzer and OLED display.

OLED setup:

```
#define SCREEN_WIDTH 128 // Define the width of the OLED screen
#define SCREEN_HEIGHT 64 // Define the height of the OLED screen
Adafruit_SSD1306 display(SCREEN_WIDTH, SCREEN_HEIGHT, &Wire, -1);
```

Pin Configuration:

```
const int buttonPin = 25;
const int ledPin = 5; // red led
const int buzzerPin = 33;
```

The OLED display shows which event is occurring like when button is pressed for long time it shows "Long press: buzzer played" and when pressed for short time it shows "Short press: LED".

It has two states:

- Short press (<1.5 s) LED toggle.
- Long press (>1.5 s) Buzzer played.

It helps us to understand OLED displays, conditional logic and Handling button inputs etc.

The main purpose of the project is to differentiate between long and short press and performing actions according to that as it continuously reads the button state.

Code:

```
// Task 2 (Assignment 1 )
// Adeen Asif
// 23-NTU-CS-1007

// include necessary libraries
#include <Arduino.h>
#include <Wire.h>
#include <Adafruit_GFX.h>
#include <Adafruit_SSD1306.h>

// OLED setup
// Define the width and height of the OLED screen
#define SCREEN_WIDTH 128
#define SCREEN_HEIGHT 64
Adafruit_SSD1306 display(SCREEN_WIDTH, SCREEN_HEIGHT, &Wire, -1);

// Pin configuration
const int buttonPin = 25;
const int ledPin = 5; // red led
const int buzzerPin = 33;

unsigned long buttonPressTime = 0;
bool buttonPressed = false;
bool ledState = false; // current led state

// Timing thresholds
const unsigned long longPressTime = 1500; // 1.5 seconds

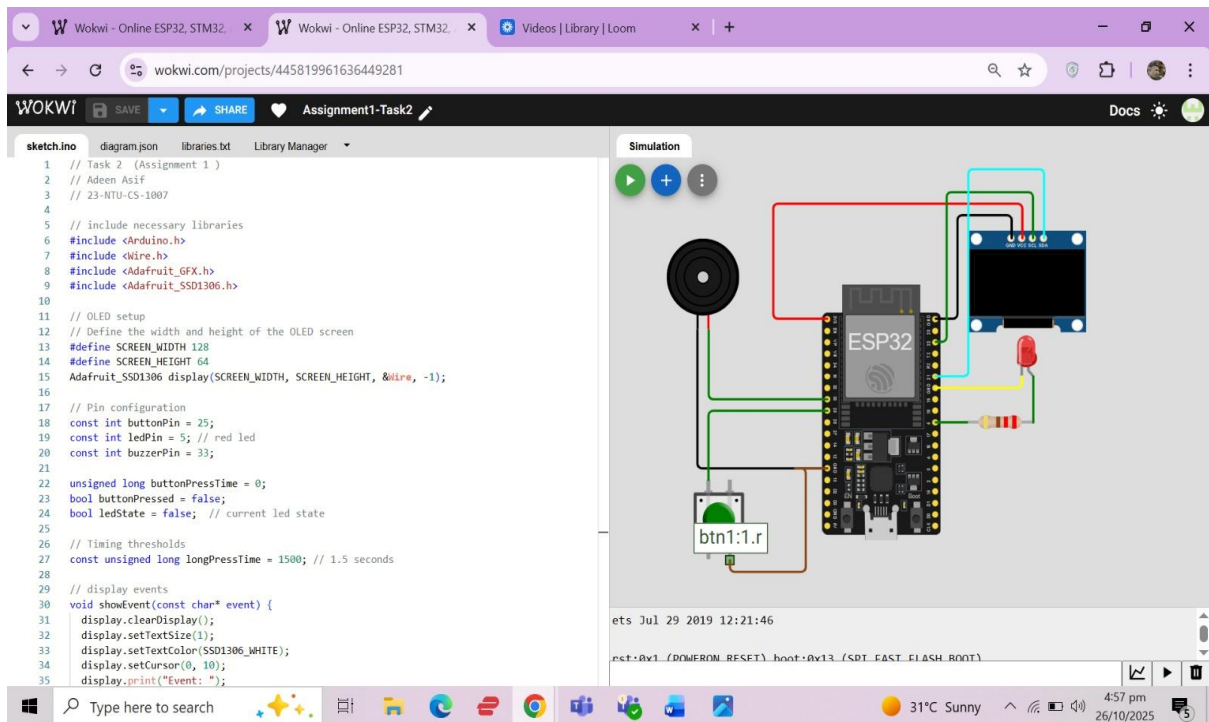
// display events
```

```
void showEvent(const char* event) {  
    display.clearDisplay();  
    display.setTextSize(1);  
    display.setTextColor(SSD1306_WHITE);  
    display.setCursor(0, 10);  
    display.print("Event: ");  
    display.println(event);  
    display.display();  
}
```

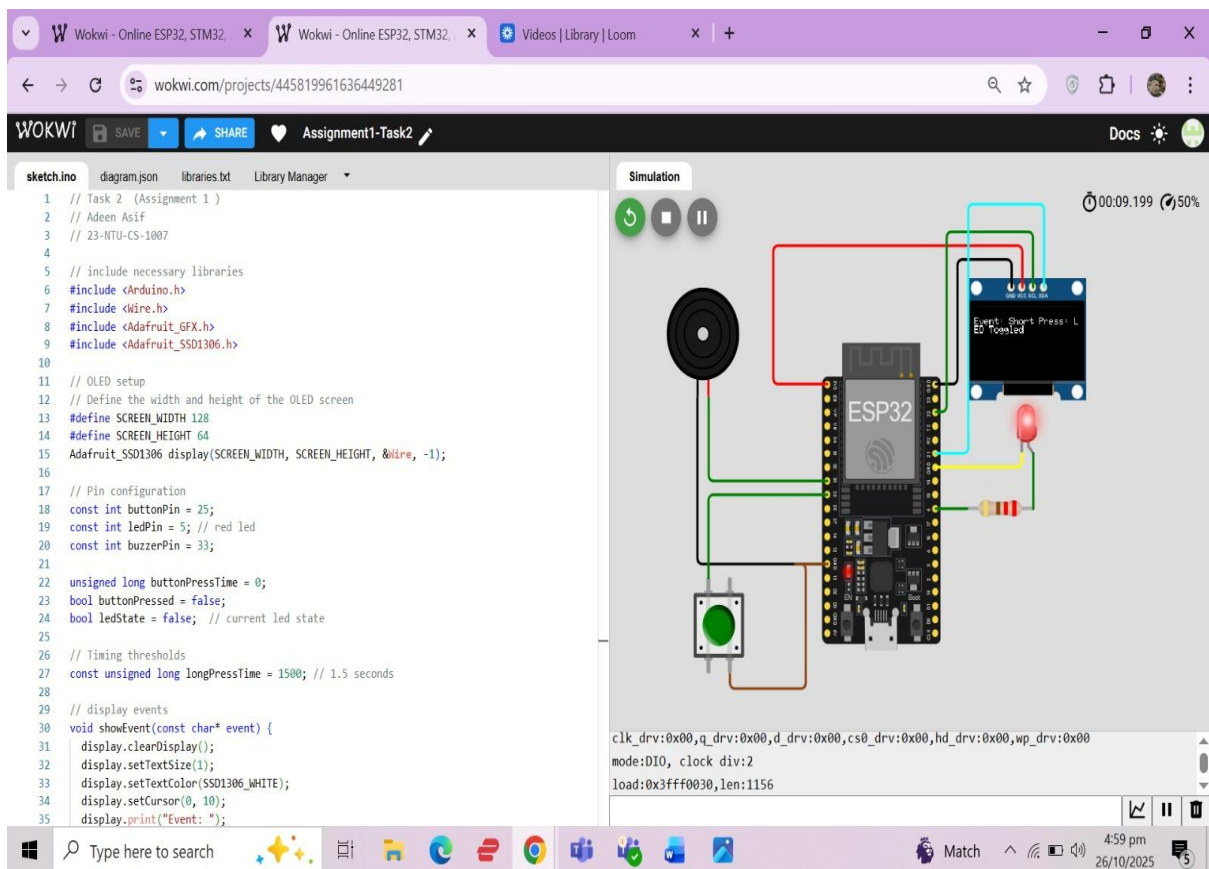
```
void setup() {  
    pinMode(buttonPin, INPUT_PULLUP);  
    pinMode(ledPin, OUTPUT); // led OUTPUT  
    pinMode(buzzerPin, OUTPUT); // buzzer INPUT  
  
    // OLED initialization  
    if (!display.begin(SSD1306_SWITCHCAPVCC, 0x3C)) {  
        Serial.println(F("SSD1306 allocation failed"));  
        for (;;);  
    }  
  
    // first message  
    display.clearDisplay();  
    display.setTextSize(1);  
    display.setTextColor(SSD1306_WHITE);  
    display.setCursor(0, 10);  
    display.print("System Ready");  
    display.display();  
}
```

```
void loop() {  
    int buttonState = digitalRead(buttonPin);  
  
    if (buttonState == LOW && !buttonPressed) {  
        // Button just pressed  
        buttonPressed = true;  
        buttonPressTime = millis();  
    }  
  
    if (buttonState == HIGH && buttonPressed) {  
        // Button released  
        buttonPressed = false;  
        unsigned long pressDuration = millis() - buttonPressTime;  
  
        if (pressDuration < longPressTime) {  
            // Short press (toggle LED)  
            ledState = !ledState;  
            digitalWrite(ledPin, ledState ? HIGH : LOW);  
            showEvent("Short Press: LED Toggled");  
        } else {  
            // Long press (play buzzer)  
            tone(buzzerPin, 1000, 500); // 1 kHz tone for 0.5s  
            showEvent("Long Press: Buzzer Played"); // show event  
        }  
    }  
}
```

Output:



Short Press:



Long Press:

Wokwi - Online ESP32, STM32, x Wokwi - Online ESP32, STM32, x Videos | Library | Loom x +

wokwi.com/projects/445819961636449281

WOKWI SAVE SHARE Assignment1-Task2 Docs

```
1 // Task 2 (Assignment 1)
2 // Adeen Asif
3 // 23-NTU-CS-1007
4
5 // include necessary libraries
6 #include <Arduino.h>
7 #include <Wire.h>
8 #include <Adafruit_GFX.h>
9 #include <Adafruit_SSD1306.h>
10
11 // OLED setup
12 // Define the width and height of the OLED screen
13 #define SCREEN_WIDTH 128
14 #define SCREEN_HEIGHT 64
15 Adafruit_SSD1306 display(SCREEN_WIDTH, SCREEN_HEIGHT, &Wire, -1);
16
17 // Pin configuration
18 const int buttonPin = 25;
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21
22 unsigned long buttonPressTime = 0;
23 bool buttonPressed = false;
24 bool ledState = false; // current led state
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26 // Timing thresholds
27 const unsigned long longPressTime = 1500; // 1.5 seconds
28
29 // display events
30 void showEvent(const char* event) {
31   display.clearDisplay();
32   display.setTextSize(1);
33   display.setTextColor(SSD1306_WHITE);
34   display.setCursor(0, 10);
35   display.print("Event: ");
```

Simulation

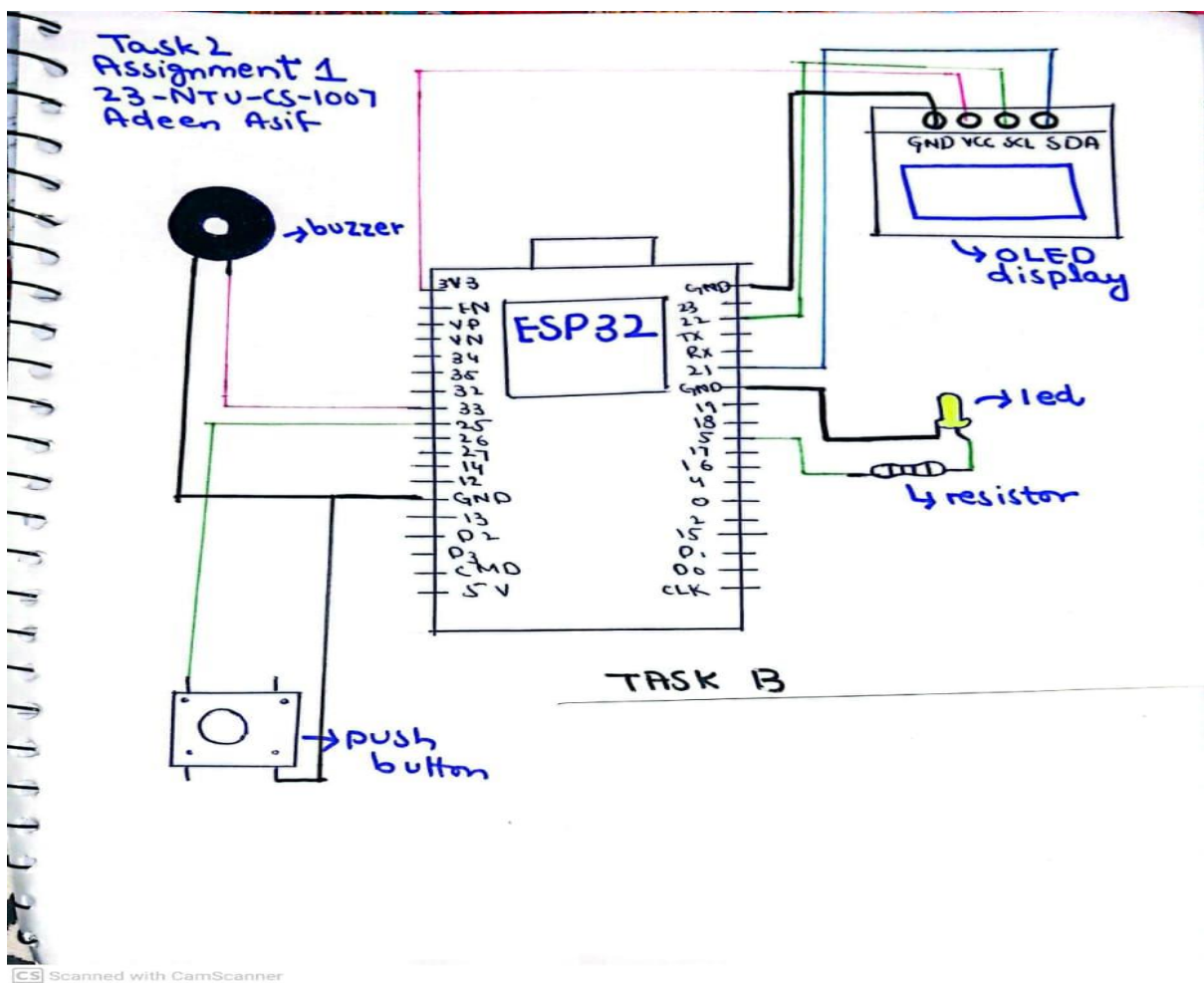
clk_drv:0x00,q_drv:0x00,d_drv:0x00,cs0_drv:0x00,hd_drv:0x00,wp_drv:0x00
mode:DIO, clock div:2
load:0x3fff0030,len:1156

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Sketching:



Wokwi Link:

<https://wokwi.com/projects/445819961636449281>

Loom Video Link:

<https://www.loom.com/share/d17d73a70adf44f5b6df09d2b37fd159>