Task 2 Documentation

Title: Single Button with Press-Type Detection and OLED Display

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Course: Embedded IoT Systems (CSE-3079)

Objective

To detect **short and long button presses** on an ESP32 using a **single push button**, perform different actions (LED toggle / buzzer tone), and display feedback messages on an **OLED**. This demonstrates button debouncing, time-based event handling, and OLED text updates.

Hardware Components

Component	Quantity	Description
ESP32 (NodeMCU-32S)	1	Main controller
Push Button	1	Input device for press detection
LED	1	Output for short-press feedback
Buzzer	1	Output for long-press feedback
OLED Display (SSD1306 128×64)	1	I^2C screen for text messages
Resistor (220 Ω)	1	LED current-limiting
Jumper Wires + Breadboard	—	Connections

Pin Configuration

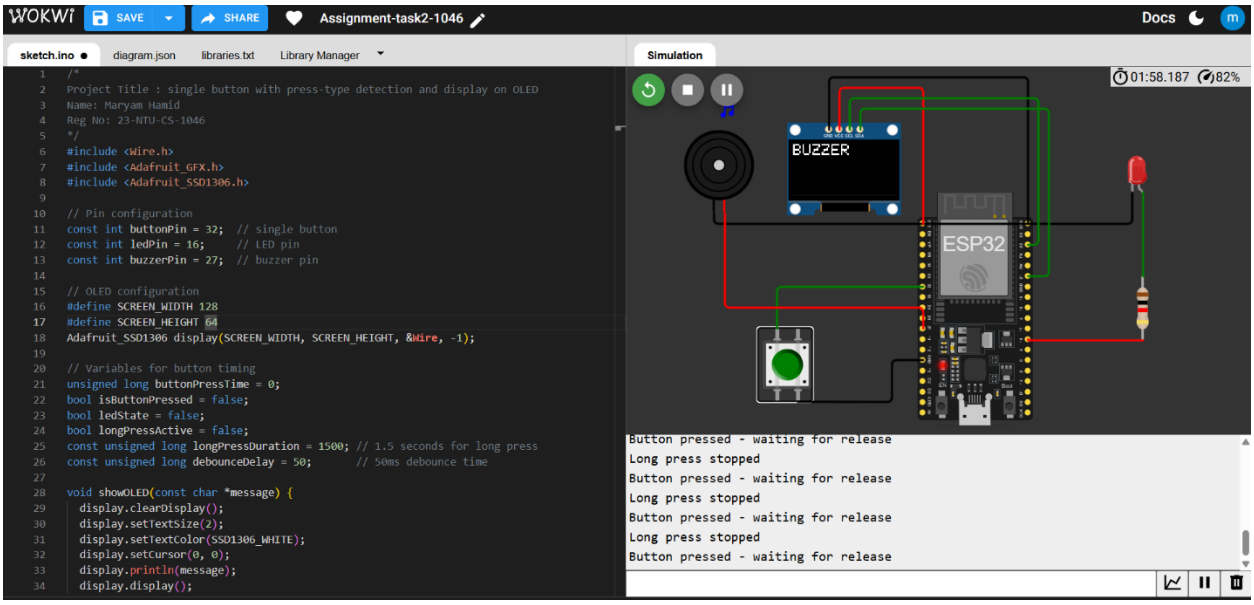
Component	Function	GPIO Pin
Push Button	Input (active LOW)	32
LED	Output	16
Buzzer	Output	27
OLED SDA	I²C Data	21
OLED SCL	I²C Clock	22
OLED VCC	Power	3.3 V
OLED GND	Ground	GND

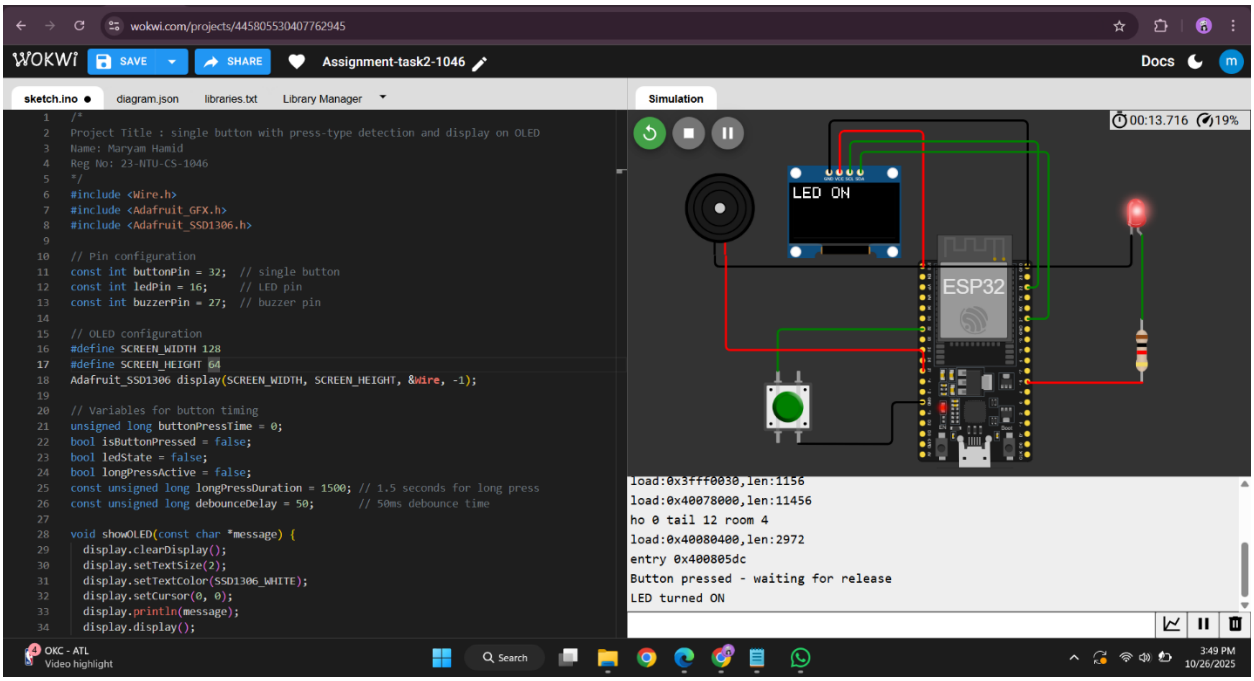
Working Principle

- The button is connected with **INPUT_PULLUP** — logic LOW means pressed.
- The program tracks press duration using millis().
- If the press lasts **< 1.5 s → short press**, it toggles the LED and displays “LED ON”/“LED OFF”.
- If the press lasts **> 1.5 s → long press**, it activates a 1 kHz tone on the buzzer and shows **“BUZZER”** on the OLED.
- When released after a long press, the buzzer stops and the OLED shows **“Stopped”**.

Key Features

- **Single button multi-function control** (short vs long press)
- **Debouncing** to avoid false triggers
- **Non-blocking millis()-based timing** (no delay loops except tiny debounce)
- **Real-time feedback** on OLED display
- **Buzzer control** using Arduino tone() and noTone() functions





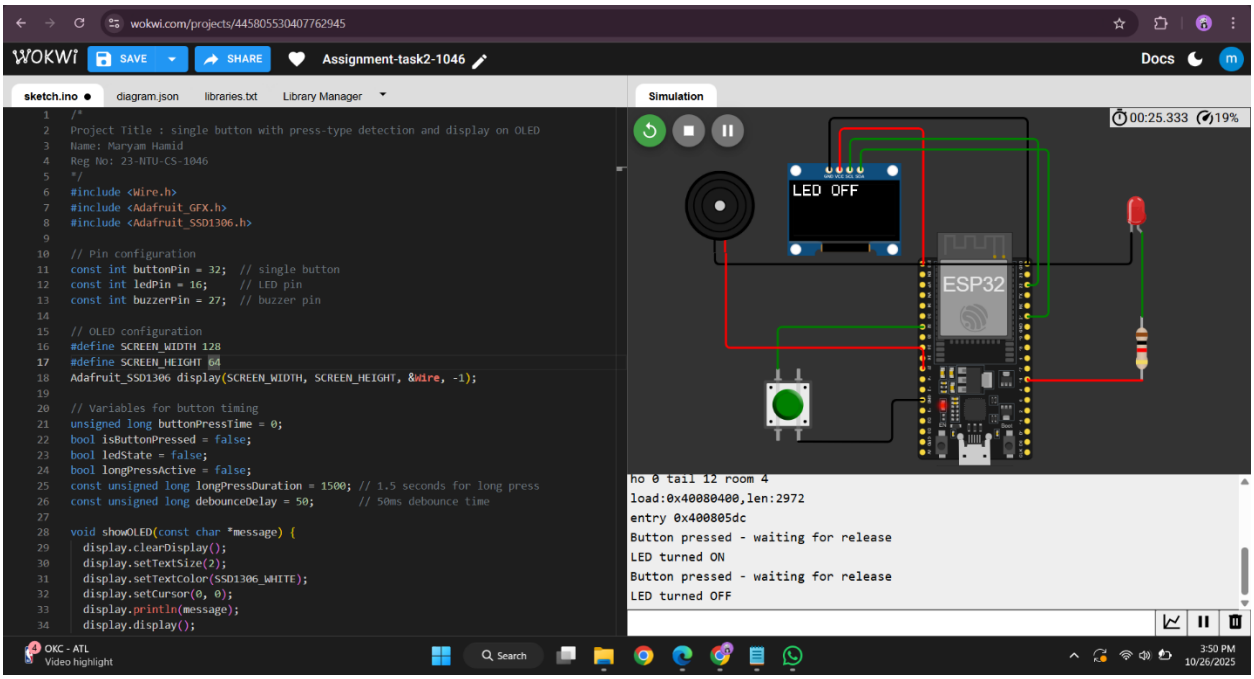

```
/*
Project Title : single button with press-type detection and display on OLED
Name: Maryam Hamid
Reg No: 23-NTU-CS-1046
*/
#include <Wire.h>
#include <Adafruit_GFX.h>
#include <Adafruit_SSD1306.h>

// Pin configuration
const int buttonPin = 32;  // single button
const int ledPin = 16;     // LED pin
const int buzzerPin = 27;  // buzzer pin

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

// Variables for button timing
unsigned long buttonPressTime = 0;
bool isButtonPressed = false;
bool ledState = false;
bool longPressActive = false;
const unsigned long longPressDuration = 1500; // 1.5 seconds for long press
const unsigned long debounceDelay = 50;       // 50ms debounce time

void showOLED(const char *message) {
  display.clearDisplay();
  display.setTextSize(2);
  display.setTextColor(SSD1306_WHITE);
  display.setCursor(0, 0);
  display.println(message);
  display.display();
```


wokwi.com/projects/445805530407762945
WOKWI
SAVE
SHARE
Assignment-task2-1046
Docs
sketch.ino
diagram.json
libraries.txt
Library Manager
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Simulation
00:25.333
19%
LED OFF
ESP32
ho 0 tail 12 room 4
load:0x40080400,len:2972
entry 0x400805dc
Button pressed - waiting for release
LED turned ON
Button pressed - waiting for release
LED turned OFF
OKC - ATL
Video highlight
Search
3:50 PM
10/26/2025