



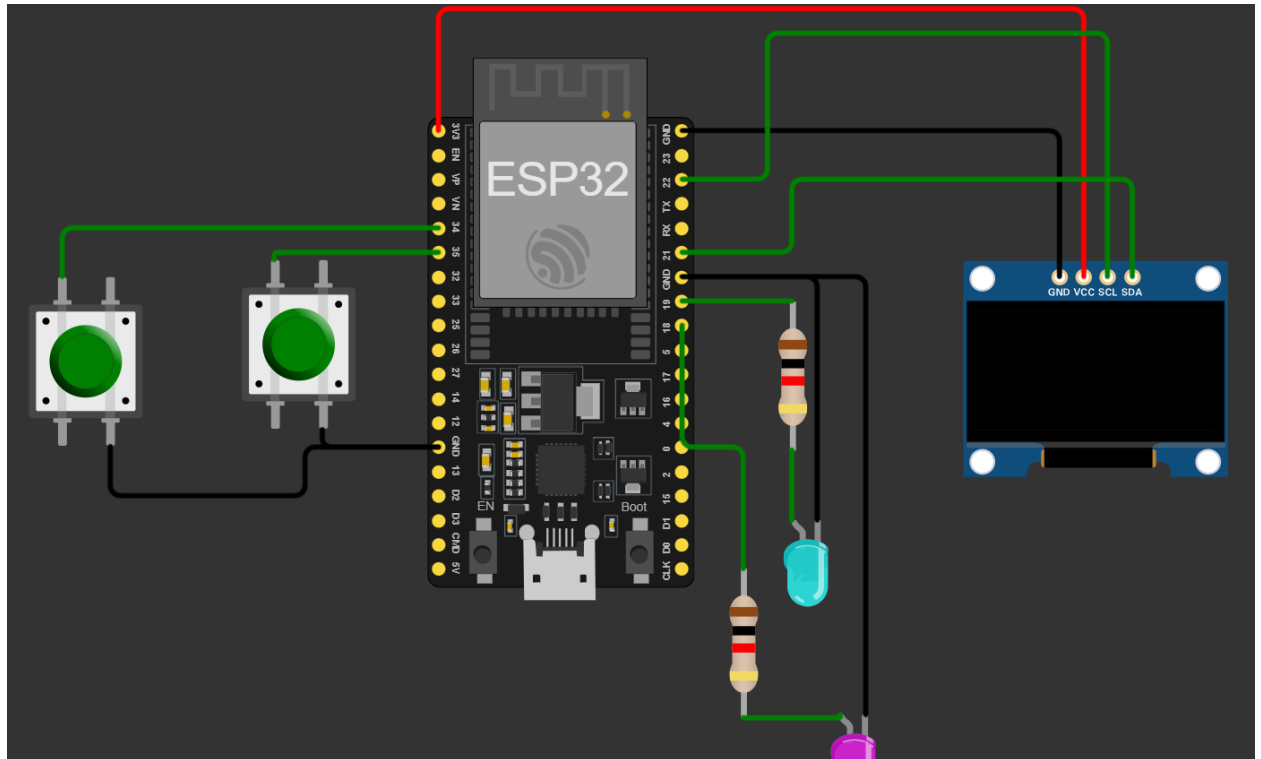
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Reg No:	23-NTU-CS-1269
Section:	BSAI ^{4TH}
Subject	Embedded IOT
Submitted To:	Sir. Nasir Mehmood

Assignment-01

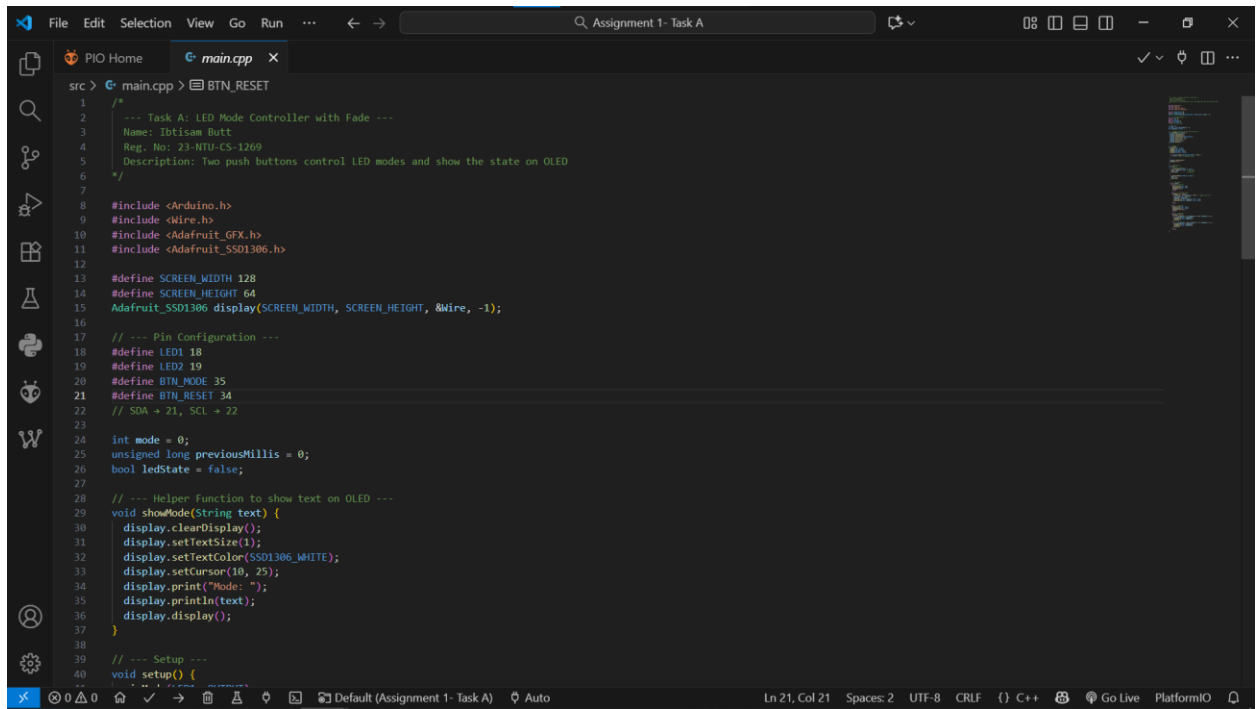
Question 3

Task A:

1. Wokwi: <https://wokwi.com/projects/445901865090999297>
2. Circuit Diagrams:

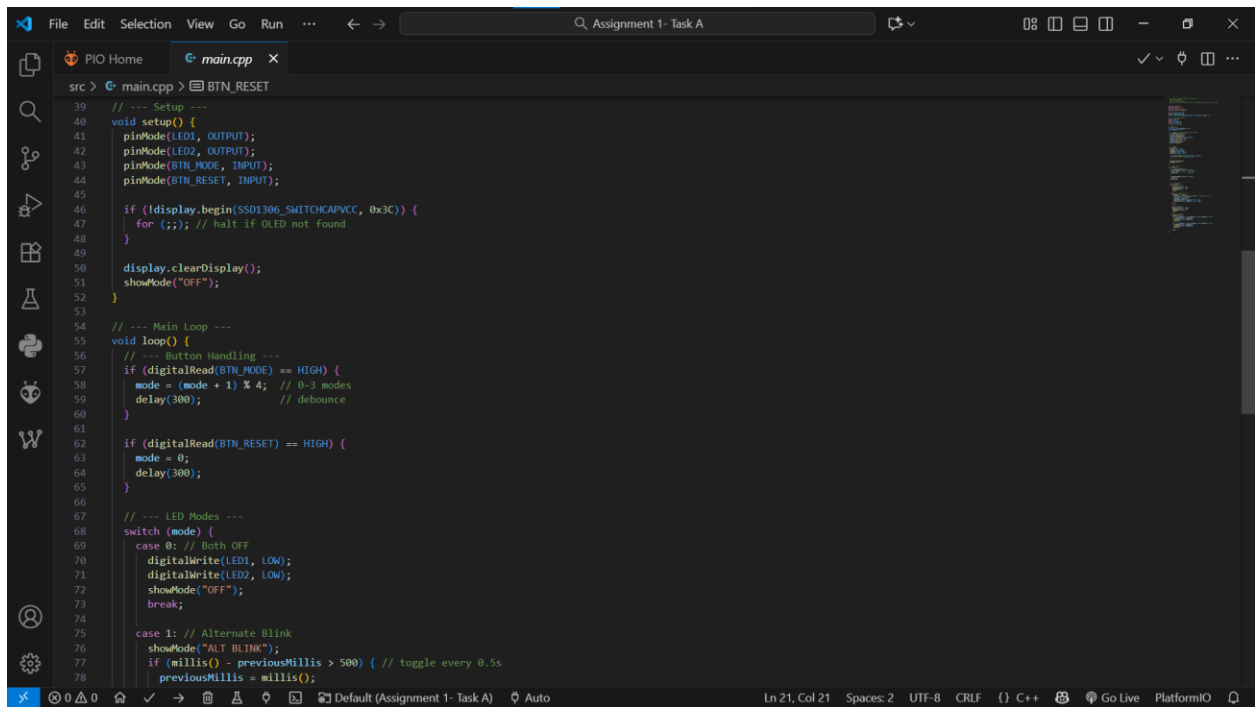


3. Code Snippets:

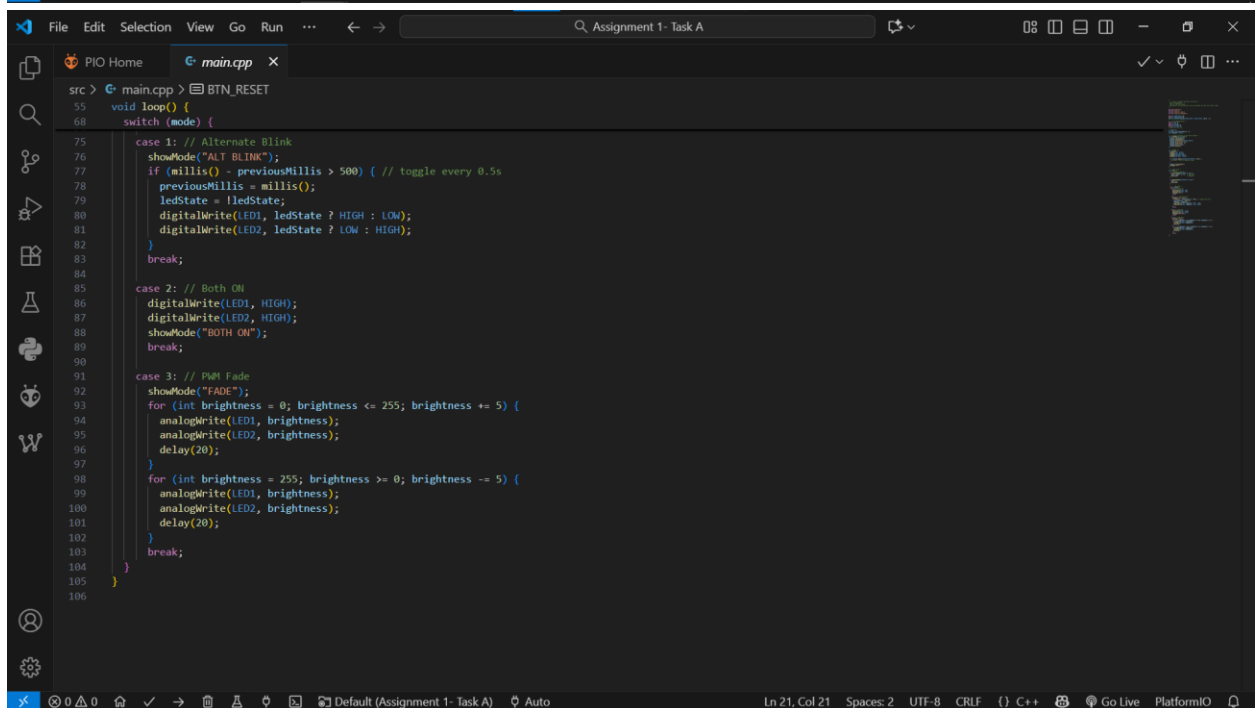


```
1  /*
2  --- Task A: LED Mode Controller with Fade ---
3  Name: Ibtisam Butt
4  Reg. No: 23-NTU-CS-1269
5  Description: Two push buttons control LED modes and show the state on OLED
6  */
7
8  #include <Arduino.h>
9  #include <Wire.h>
10 #include <Adafruit_GFX.h>
11 #include <Adafruit_SSD1306.h>
12
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 #define LED1 18
19 #define LED2 19
20 #define BTN_MODE 35
21 #define BTN_RESET 34
22 // SDA = 21, SCL = 22
23
24 int mode = 0;
25 unsigned long previousMillis = 0;
26 bool ledState = false;
27
28 // --- Helper Function to show text on OLED ---
29 void showMode(String text) {
30   display.clearDisplay();
31   display.setTextSize(1);
32   display.setTextColor(SSD1306_WHITE);
33   display.setCursor(10, 25);
34   display.print("Mode: ");
35   display.println(text);
36   display.display();
37 }
38
39 // --- Setup ---
40 void setup() {
```

The screenshot shows a code editor with a dark theme. The top bar includes a search bar with the text "Assignment 1- Task A". The left sidebar contains icons for file explorer, search, and other IDE features. The main editor area displays the C++ code for an Arduino sketch. The code includes comments for task identification, pin definitions, and a helper function for displaying text on an OLED screen. The status bar at the bottom indicates the current line and column (Ln 21, Col 21), encoding (UTF-8), and other settings.



```
39 // --- Setup ---
40 void setup() {
41   pinMode(LED1, OUTPUT);
42   pinMode(LED2, OUTPUT);
43   pinMode(BTN_MODE, INPUT);
44   pinMode(BTN_RESET, INPUT);
45
46   if (!display.begin(SSD1306_SWITCHCAPVCC, 0x3C)) {
47     for (;;) // halt if OLED not found
48   }
49
50   display.clearDisplay();
51   showMode("OFF");
52 }
53
54 // --- Main Loop ---
55 void loop() {
56   // --- Button Handling ---
57   if (digitalRead(BTN_MODE) == HIGH) {
58     mode = (mode + 1) % 4; // 0-3 modes
59     delay(300); // debounce
60   }
61
62   if (digitalRead(BTN_RESET) == HIGH) {
63     mode = 0;
64     delay(300);
65   }
66
67   // --- LED Modes ---
68   switch (mode) {
69     case 0: // Both OFF
70       digitalWrite(LED1, LOW);
71       digitalWrite(LED2, LOW);
72       showMode("OFF");
73       break;
74
75     case 1: // Alternate Blink
76       showMode("ALT BLINK");
77       if (millis() - previousMillis > 500) { // toggle every 0.5s
78         previousMillis = millis();
79         ledState = !ledState;
80         digitalWrite(LED1, ledState ? HIGH : LOW);
81         digitalWrite(LED2, ledState ? LOW : HIGH);
82       }
83       break;
84
85     case 2: // Both ON
86       digitalWrite(LED1, HIGH);
87       digitalWrite(LED2, HIGH);
88       showMode("BOTH ON");
89       break;
90
91     case 3: // PWM Fade
92       showMode("FADE");
93       for (int brightness = 0; brightness <= 255; brightness += 5) {
94         analogWrite(LED1, brightness);
95         analogWrite(LED2, brightness);
96         delay(20);
97       }
98       for (int brightness = 255; brightness >= 0; brightness -= 5) {
99         analogWrite(LED1, brightness);
100        analogWrite(LED2, brightness);
101        delay(20);
102      }
103      break;
104   }
105 }
```



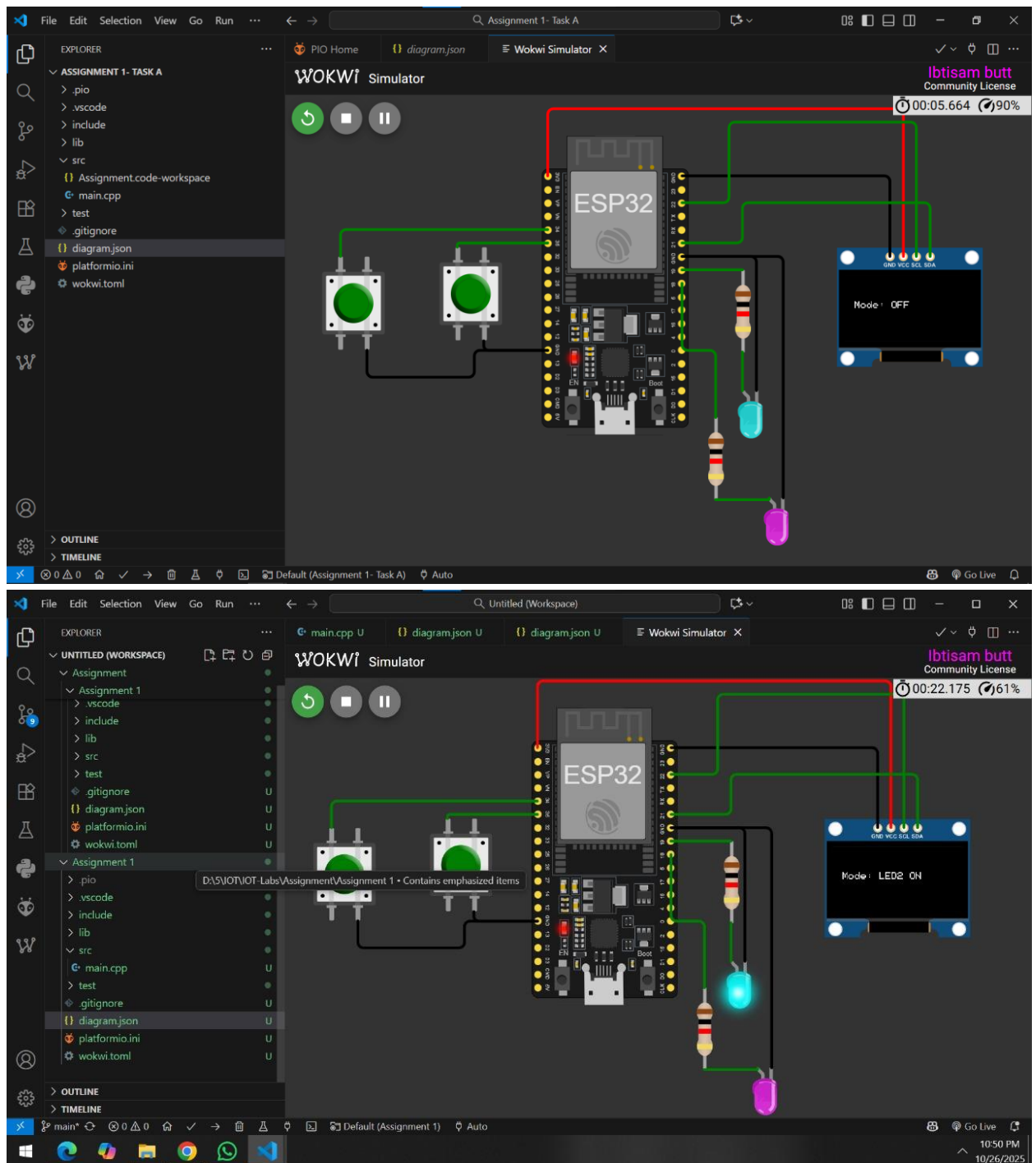
```
55 void loop() {
56   switch (mode) {
57
58     case 1: // Alternate Blink
59       showMode("ALT BLINK");
60       if (millis() - previousMillis > 500) { // toggle every 0.5s
61         previousMillis = millis();
62         ledState = !ledState;
63         digitalWrite(LED1, ledState ? HIGH : LOW);
64         digitalWrite(LED2, ledState ? LOW : HIGH);
65       }
66       break;
67
68     case 2: // Both ON
69       digitalWrite(LED1, HIGH);
70       digitalWrite(LED2, HIGH);
71       showMode("BOTH ON");
72       break;
73
74     case 3: // PWM Fade
75       showMode("FADE");
76       for (int brightness = 0; brightness <= 255; brightness += 5) {
77         analogWrite(LED1, brightness);
78         analogWrite(LED2, brightness);
79         delay(20);
80       }
81       for (int brightness = 255; brightness >= 0; brightness -= 5) {
82         analogWrite(LED1, brightness);
83         analogWrite(LED2, brightness);
84         delay(20);
85       }
86       break;
87   }
88 }
```

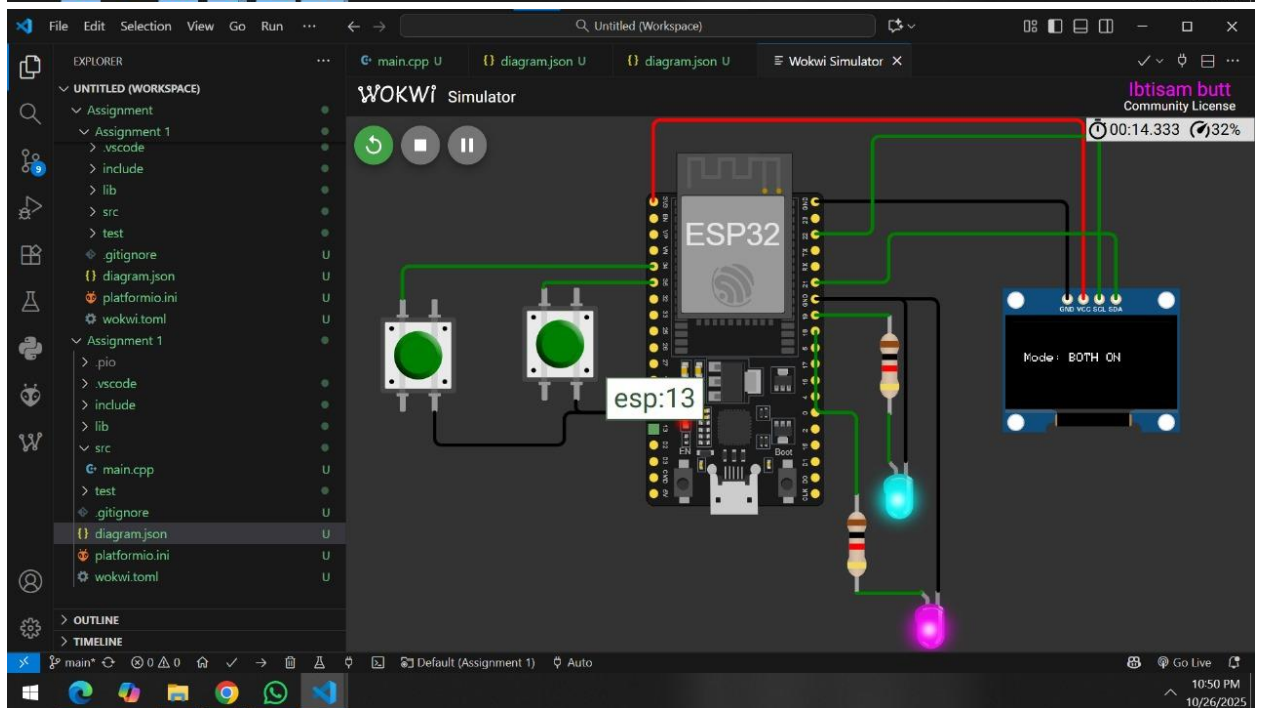
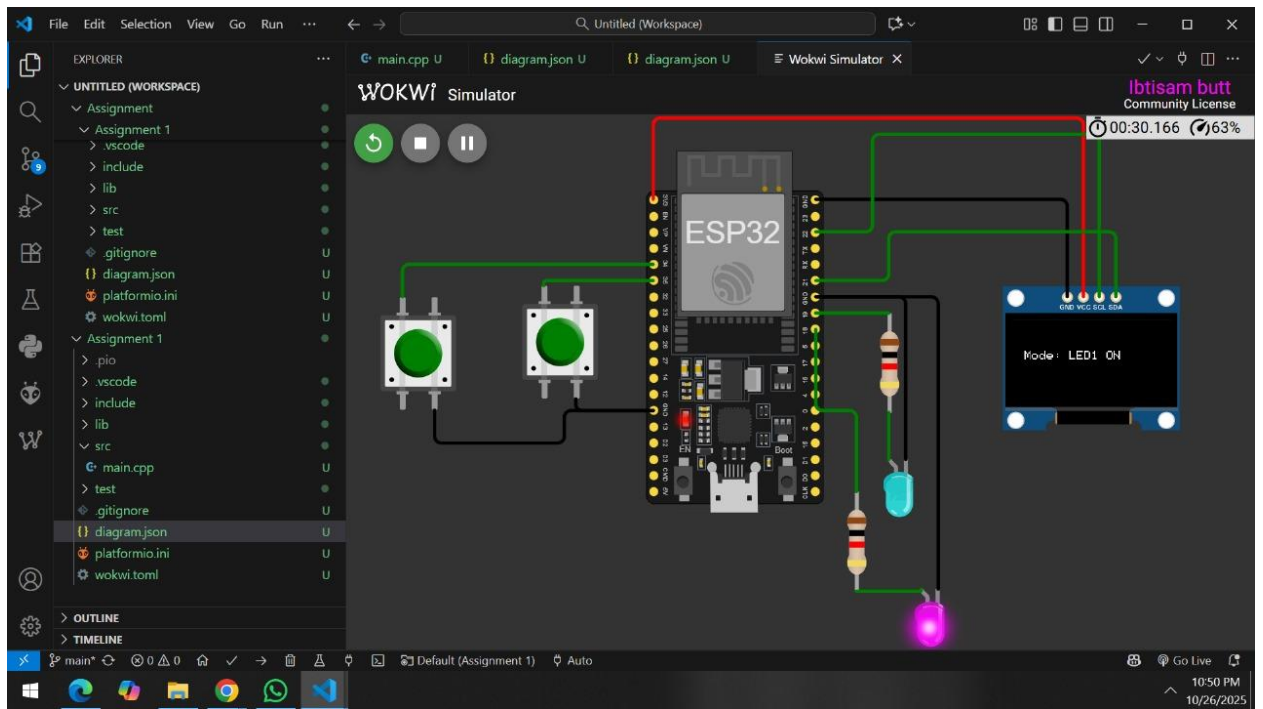
4. Pin Map:

Pin Map

- LED1 → GPIO 18
- LED2 → GPIO 19
- Button1 → GPIO 35
- Button2 → GPIO 34
- OLED → SDA 21, SCL 22

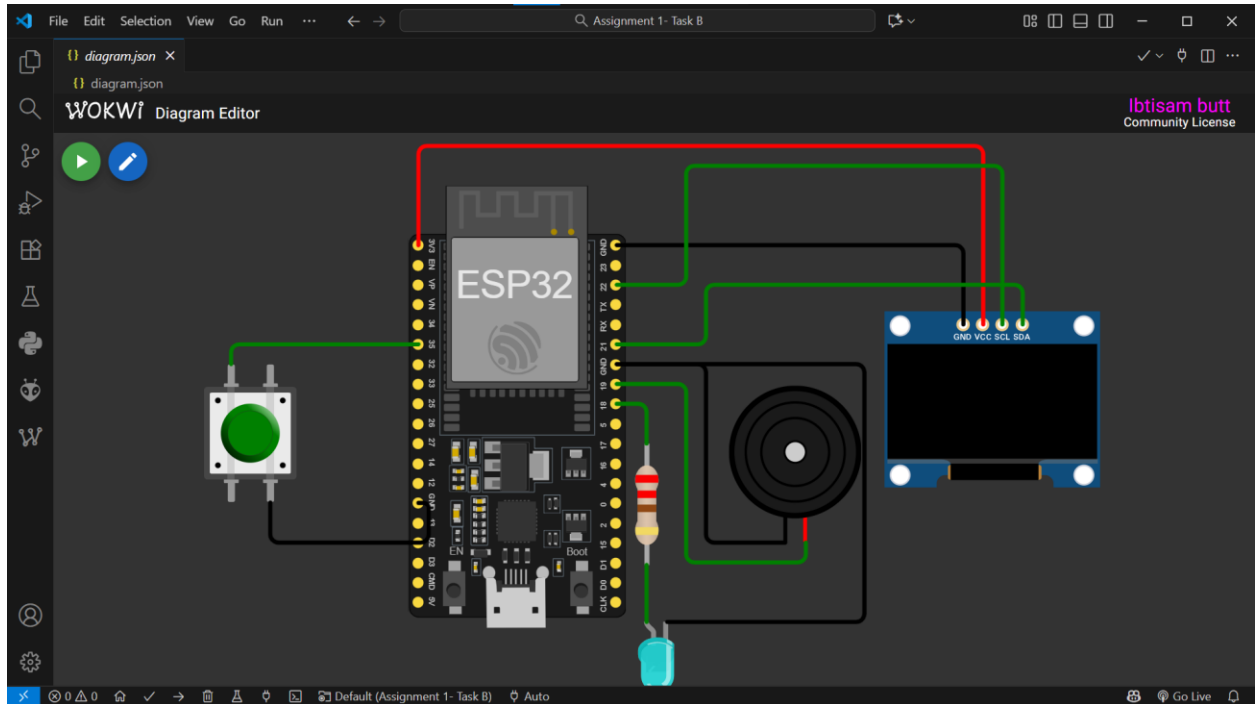
5. Screenshots:



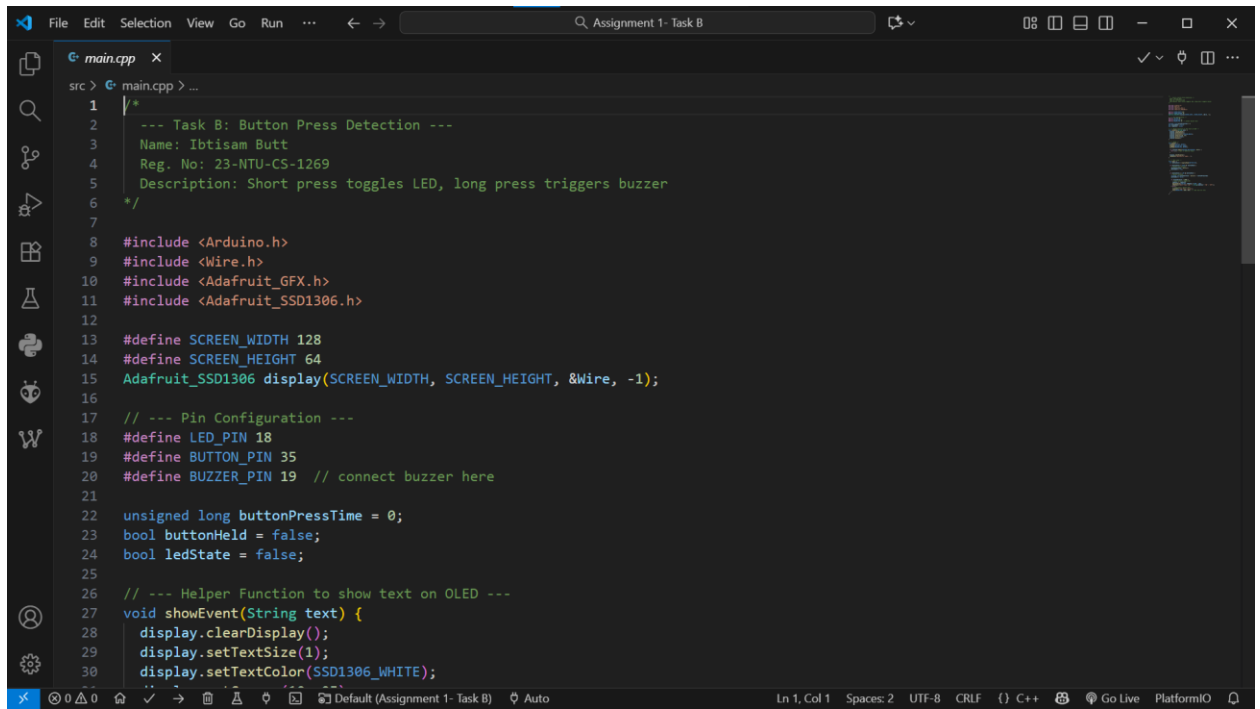


Task B:

1. Wokwi: <https://wokwi.com/projects/445898275769959425>
2. Circuit Diagrams:



3. Code Snippets:



```
1  /*
2  --- Task B: Button Press Detection ---
3  Name: Ibtisam Butt
4  Reg. No: 23-NTU-CS-1269
5  Description: Short press toggles LED, long press triggers buzzer
6  */
7
8  #include <Arduino.h>
9  #include <Wire.h>
10 #include <Adafruit_GFX.h>
11 #include <Adafruit_SSD1306.h>
12
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 #define LED_PIN 18
19 #define BUTTON_PIN 35
20 #define BUZZER_PIN 19 // connect buzzer here
21
22 unsigned long buttonPressTime = 0;
23 bool buttonHeld = false;
24 bool ledState = false;
25
26 // --- Helper Function to show text on OLED ---
27 void showEvent(String text) {
28     display.clearDisplay();
29     display.setTextSize(1);
30     display.setTextColor(SSD1306_WHITE);
```



```
26 // --- Helper Function to show text on OLED ---
27 void showEvent(String text) {
28     display.clearDisplay();
29     display.setTextSize(1);
30     display.setTextColor(SSD1306_WHITE);
31     display.setCursor(10, 25);
32     display.println(text);
33     display.display();
34 }
35
36 // --- Setup ---
37 void setup() {
38     pinMode(LED_PIN, OUTPUT);
39     pinMode(BUTTON_PIN, INPUT);
40     pinMode(BUZZER_PIN, OUTPUT);
41
42     if (!display.begin(SSD1306_SWITCHCAPVCC, 0x3C)) {
43         for (;;); // halt if OLED not found
44     }
45
46     display.clearDisplay();
47     showEvent("Waiting for input...");
48 }
49
50 // --- Main Loop ---
51 void loop() {
52     int buttonState = digitalRead(BUTTON_PIN);
53
54     if (buttonState == HIGH && !buttonHeld) {
55         // Button just pressed
56         buttonPressTime = millis();
57         buttonHeld = true;
58     }
59
60     if (buttonState == LOW && buttonHeld) {
61         // Button released
62         unsigned long pressDuration = millis() - buttonPressTime;
63         buttonHeld = false;
64
65         if (pressDuration < 1500) {
66             // Short press -> toggle LED
67             ledState = !ledState;
68             digitalWrite(LED_PIN, ledState ? HIGH : LOW);
69             showEvent("Short Press: LED " + String(ledState ? "ON" : "OFF"));
70         } else {
71             // Long press -> buzzer tone
72             showEvent("Long Press: Buzzer");
73             tone(BUZZER_PIN, 1000, 500); // 1 kHz tone for 0.5s
74         }
75     }
76 }
77
```

4. Pin Map: ## Pin Map

- LED1 → GPIO 18
- Button → GPIO 35
- Buzzer → GPIO 19
- OLED → SDA 21, SCL 22

5. Screenshots:

