

National Textile University, Faisalabad



Department of Computer Science

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|-------------------------|----------------------|
| Name: | Muhammad Abdullah |
| Class: | BSCS-B |
| Registration No: | 23-NTU-CS-1056 |
| Lab Report: | Embedded IoT Systems |
| Course Code: | |
| Course Name: | Embedded IoT Systems |
| Submitted To: | Sir Nasir |
| Submission Date: | 09-10-2025 |

HOME TASK

Code:

```
// *****

// HOME TASK

// Dual LED Toggle using External Interrupts and Timer Debouncing

// Embedded IoT System - Fall 2025

//

// Name: Muhammad Abdullah

// Reg#: 23-NTU-CS-1056

//

// Description:

// Two switches control two LEDs independently using external interrupts.

// Each button press is debounced with a one-shot timer interrupt.

// *****


#include <Arduino.h>


#define LED1_PIN  4

#define LED2_PIN  15

#define BTN1_PIN  32

#define BTN2_PIN  14


#define DEBOUNCE_MS 50

#define DEBOUNCE_US (DEBOUNCE_MS * 1000UL)


hw_timer_t* timer1 = nullptr;

hw_timer_t* timer2 = nullptr;
```

```
volatile bool debounce1Active = false;
```

```
volatile bool debounce2Active = false;
```

```
void ARDUINO_ISR_ATTR onDebounce1() {  
    if (digitalRead(BTN1_PIN) == LOW) {  
        digitalWrite(LED1_PIN, !digitalRead(LED1_PIN));  
    }  
    debounce1Active = false;  
}
```

```
void ARDUINO_ISR_ATTR onDebounce2() {  
    if (digitalRead(BTN2_PIN) == LOW) {  
        digitalWrite(LED2_PIN, !digitalRead(LED2_PIN));  
    }  
    debounce2Active = false;  
}
```

```
void ARDUINO_ISR_ATTR onButton1() {  
    if (!debounce1Active) {  
        debounce1Active = true;  
        timerAlarm(timer1, DEBOUNCE_US, false, 0);  
    }  
}
```

```
void ARDUINO_ISR_ATTR onButton2() {  
    if (!debounce2Active) {  
        debounce2Active = true;
```

```
    timerAlarm(timer2, DEBOUNCE_US, false, 0);
}
}

void setup() {
    Serial.begin(115200);
    Serial.println("ESP32 Dual LED with Interrupt + Timer Debounce");

    pinMode(LED1_PIN, OUTPUT);
    pinMode(LED2_PIN, OUTPUT);
    pinMode(BTN1_PIN, INPUT_PULLUP);
    pinMode(BTN2_PIN, INPUT_PULLUP);

    digitalWrite(LED1_PIN, LOW);
    digitalWrite(LED2_PIN, LOW);

    timer1 = timerBegin(1000000);
    timerAttachInterrupt(timer1, &onDebounce1);

    timer2 = timerBegin(1000000);
    timerAttachInterrupt(timer2, &onDebounce2);

    attachInterrupt(BTN1_PIN, onButton1, FALLING);
    attachInterrupt(BTN2_PIN, onButton2, FALLING);
}

void loop() {
```

}

Pictures:

WOKWI

SAVE SHARE

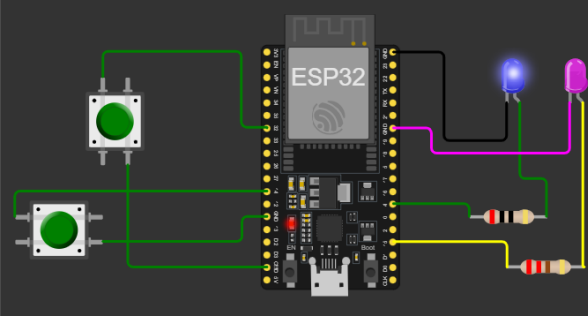
Docs

sketch.ino diagram.json Library Manager

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26
27 volatile bool debounce1Active = false;
28 volatile bool debounce2Active = false;
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30 void Arduino_ISR_ATTR onDebounce1()
```

Simulation

00:06.666 39%



load:0x40080400, len:2972
entry 0x400805dc
ESP32 Dual LED with Interrupt + Timer Debounce

Type here to search

21°C Light rain ENG 6:36 PM 10/6/2025

WOKWI

SAVE SHARE

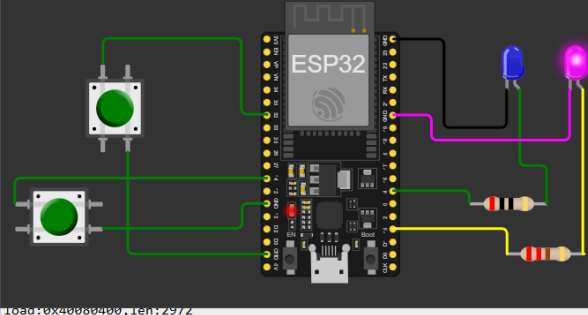
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Simulation

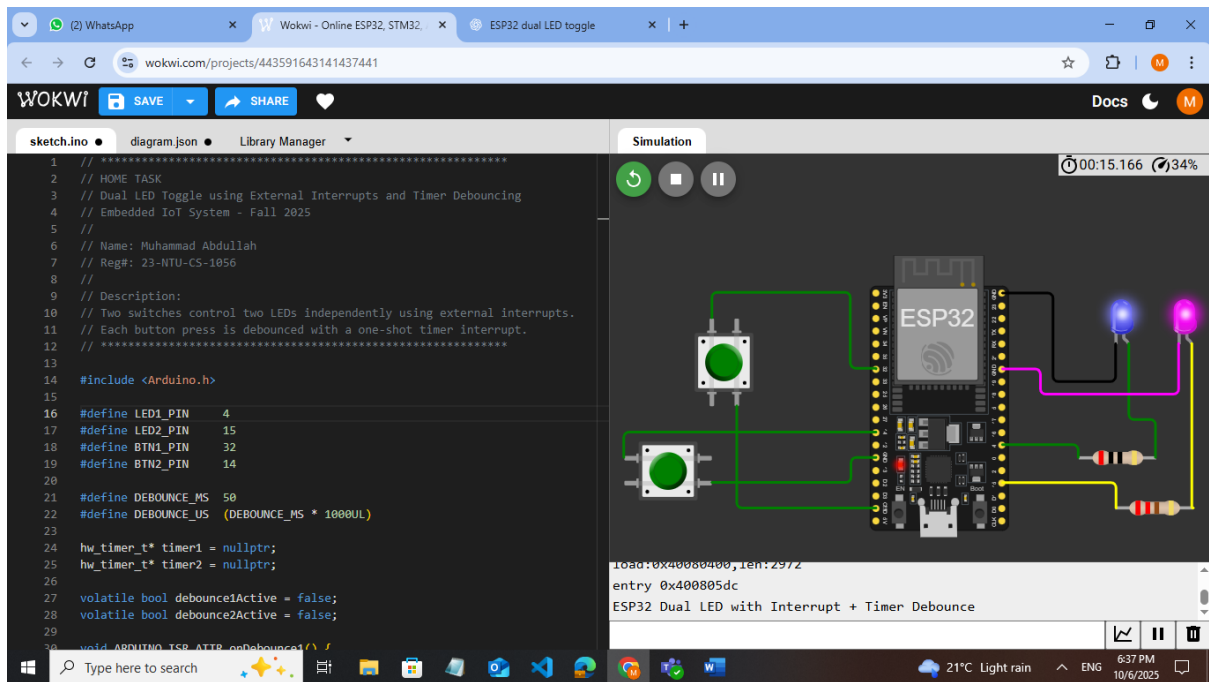
00:12.833 35%



load:0x40080400, len:2972
entry 0x400805dc
ESP32 Dual LED with Interrupt + Timer Debounce

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Wokwi Link:

<https://wokwi.com/projects/444071227258133505>