**Wania Zanib**

**23-NTU-CS-1289**

**BSAI 5th**

**Embedded IOT**

**Week 3 – Assignment 1**

## Code:

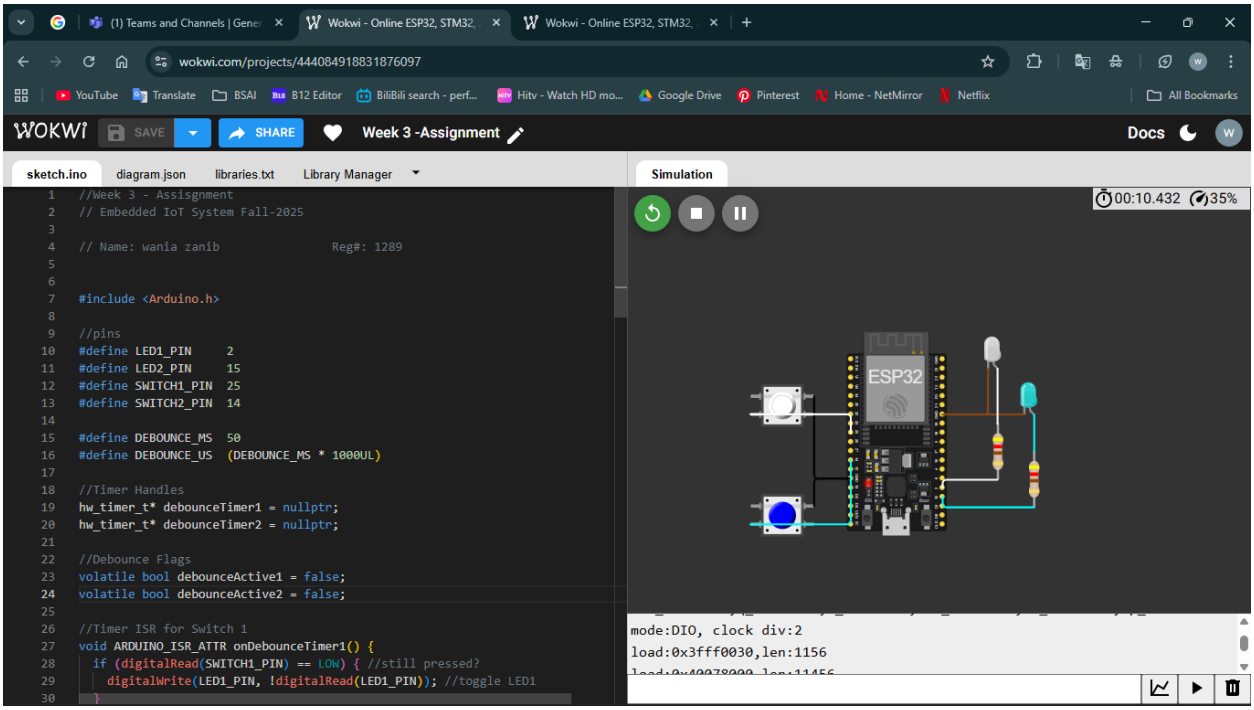
```
//Week 3 - Assisgnment
// Embedded IoT System Fall-2025

// Name: wania zanib                Reg#: 1289


#include <Arduino.h>

//pins
#define LED1_PIN     2
#define LED2_PIN     15
#define SWITCH1_PIN  25
#define SWITCH2_PIN  14

#define DEBOUNCE_MS  50
#define DEBOUNCE_US  (DEBOUNCE_MS * 1000UL)

//Timer Handles
hw_timer_t* debounceTimer1 = nullptr;
hw_timer_t* debounceTimer2 = nullptr;

//Debounce Flags
volatile bool debounceActive1 = false;
volatile bool debounceActive2 = false;

//Timer ISR for Switch 1
void ARDUINO_ISR_ATTR onDebounceTimer1() {
  if (digitalRead(SWITCH1_PIN) == LOW) { //still pressed?
    digitalWrite(LED1_PIN, !digitalRead(LED1_PIN)); //toggle LED1
  }
  debounceActive1 = false; //ready for next press
}
```

```
//Timer ISR for Switch 2
void ARDUINO_ISR_ATTR onDebounceTimer2() {
  if (digitalRead(SWITCH2_PIN) == LOW) { //still pressed?
    digitalWrite(LED2_PIN, !digitalRead(LED2_PIN)); //toggle LED2
  }
  debounceActive2 = false; //ready for next press
}

//External interrupt for Switch 1
void ARDUINO_ISR_ATTR onSwitch1ISR() {
  if (!debounceActive1) {
    debounceActive1 = true;
    timerAlarm(debounceTimer1, DEBOUNCE_US, false, 0);  //start one-shot timer
  }
}

//External interrupt for Switch 2
void ARDUINO_ISR_ATTR onSwitch2ISR() {
  if (!debounceActive2) {
    debounceActive2 = true;
    timerAlarm(debounceTimer2, DEBOUNCE_US, false, 0);  //start one-shot timer
  }
}

void setup() {
  Serial.begin(115200);

  //LEDs
  pinMode(LED1_PIN, OUTPUT);
  pinMode(LED2_PIN, OUTPUT);
  digitalWrite(LED1_PIN, LOW);
  digitalWrite(LED2_PIN, LOW);

  //Configure switches with internal pull-ups
  pinMode(SWITCH1_PIN, INPUT_PULLUP);
  pinMode(SWITCH2_PIN, INPUT_PULLUP);

  //Attached external interrupts (on button press)
  attachInterrupt(SWITCH1_PIN, onSwitch1ISR, FALLING);
  attachInterrupt(SWITCH2_PIN, onSwitch2ISR, FALLING);

  //Created 1 MHz timers
  debounceTimer1 = timerBegin(1000000);
  debounceTimer2 = timerBegin(1000000);
```

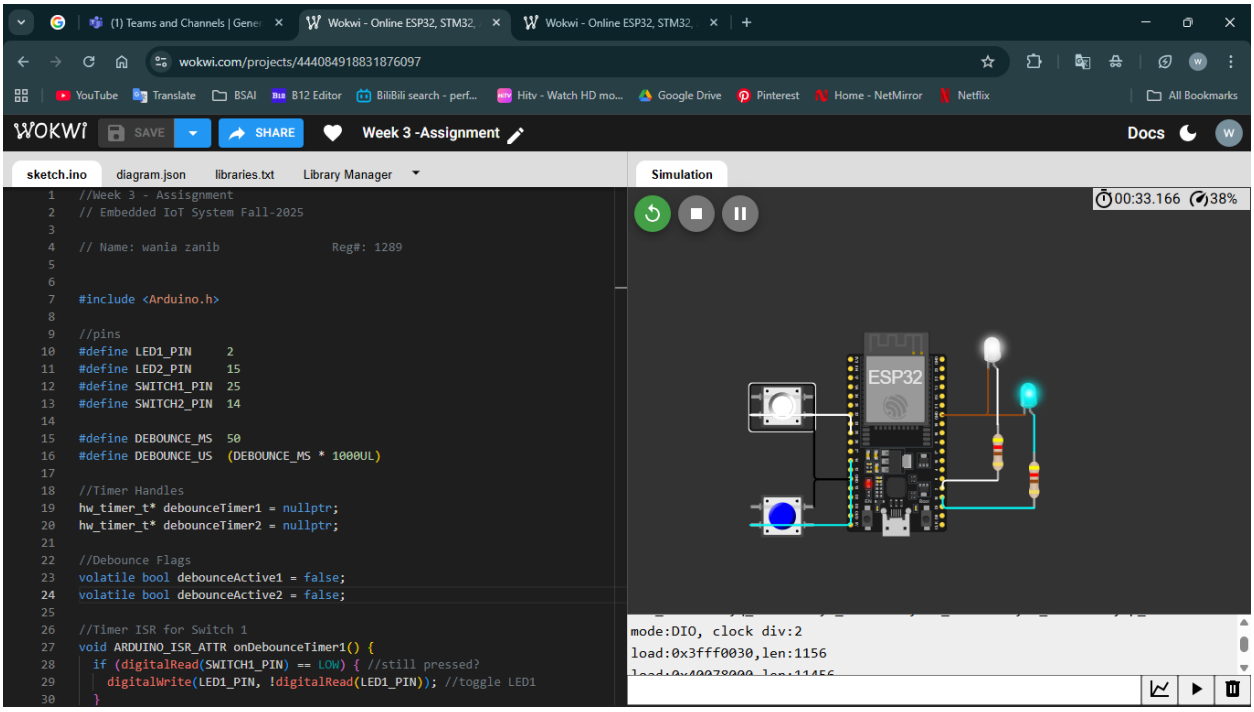
```
  //Attached debounce ISRs
  timerAttachInterrupt(debounceTimer1, &onDebounceTimer1);
  timerAttachInterrupt(debounceTimer2, &onDebounceTimer2);

  Serial.println("System Ready – Press Buttons to Toggle LEDs");
}

void loop() {
  // Nothing needed here; interrupts do all the work.
}
```

## Output:

no input (initial state):



LED 1 turned on:




```ino
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  }
```
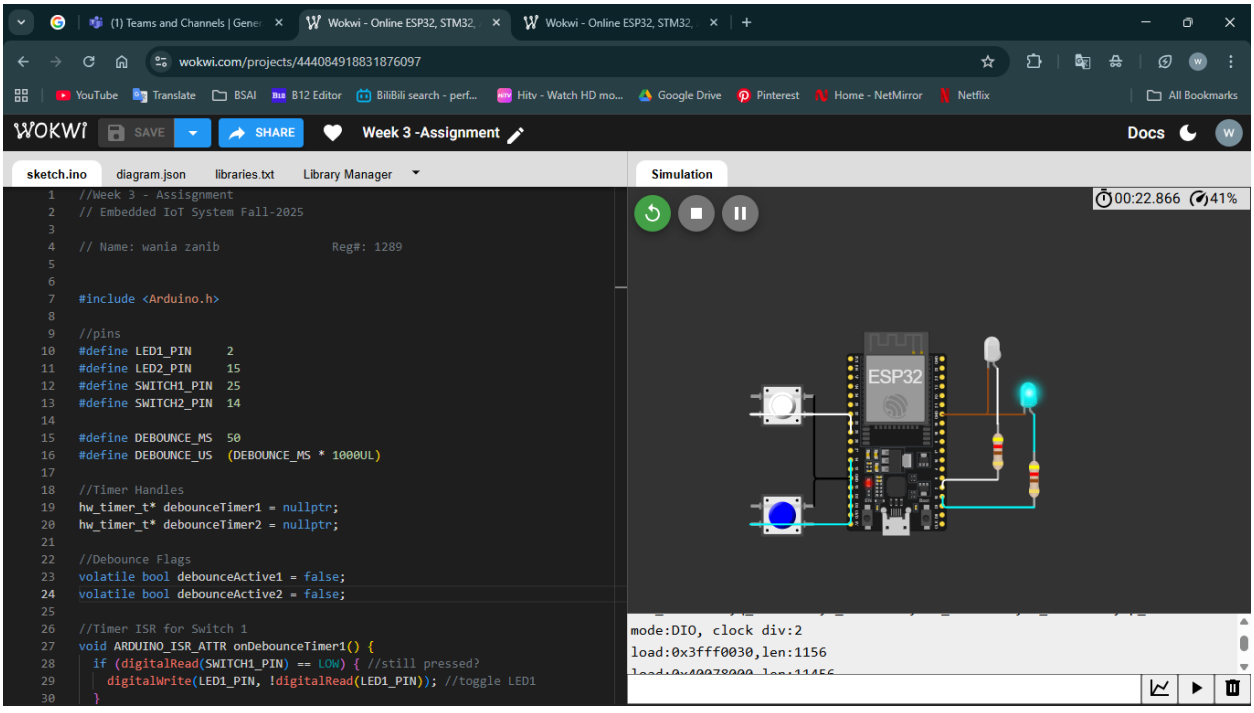

LED 2 turned on:

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## Project Link:

https://wokwi.com/projects/444084918831876097