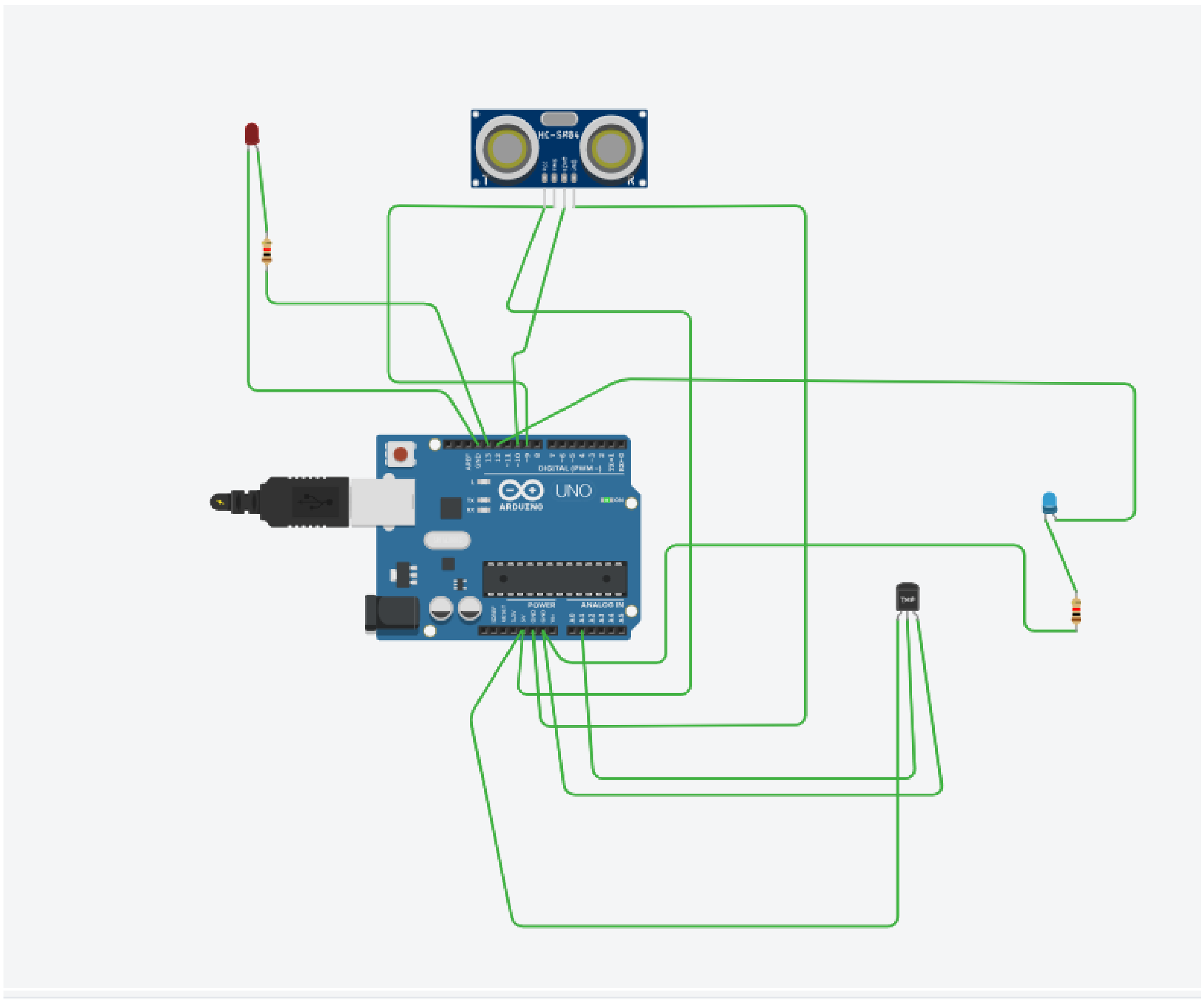
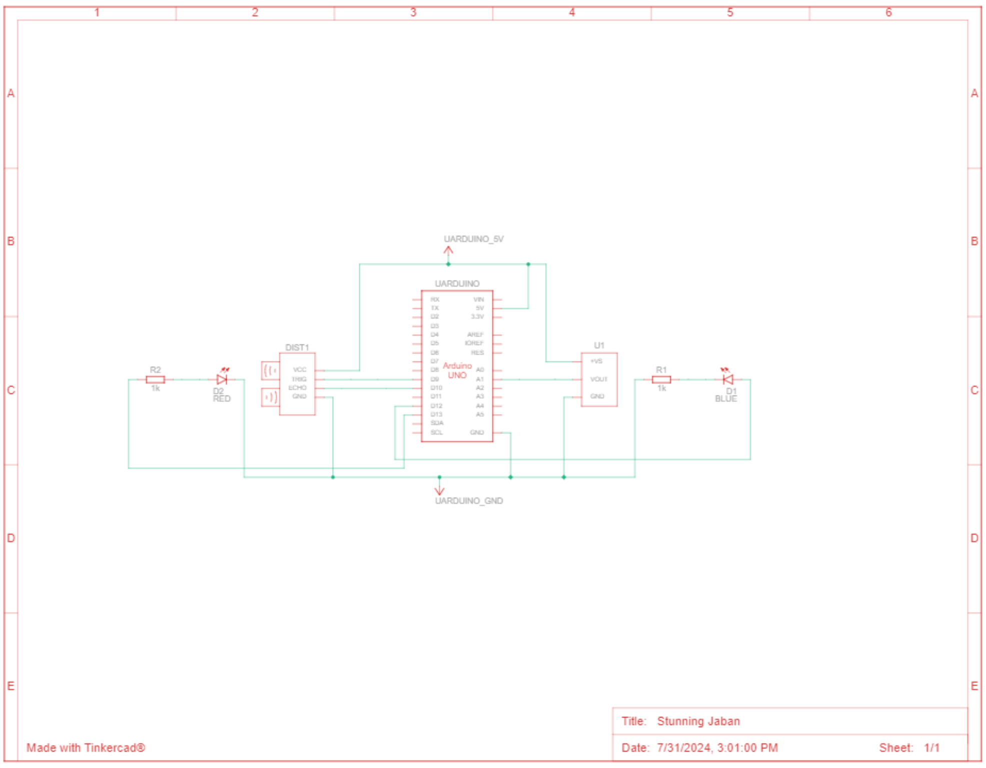
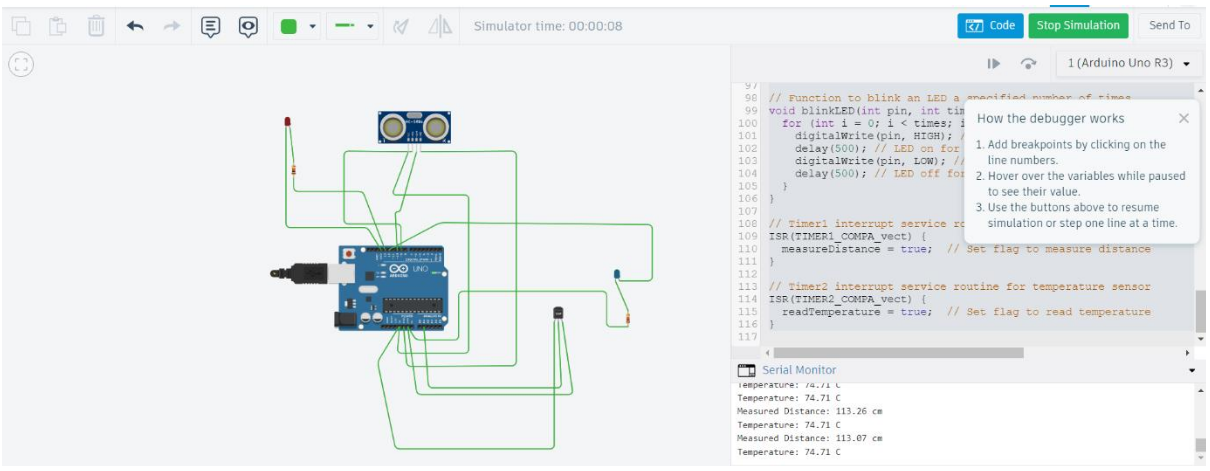

HC-SR04
UNO
ARDUINO
DIGITAL (PWM ~)
POWER
ANALOG IN
TMP


UARDUINO_5V
UARDUINO
Arduino UNO
DIST1
VCC
TRIG
ECHO
GND
U1
+VS
VOUT
GND
R2
1k
D2
RED
R1
1k
D1
BLUE
UARDUINO_GND
Title: Stunning Jaban
Date: 7/31/2024, 3:01:00 PM
Sheet: 1/1
Made with Tinkercad®



```
// Function to blink an LED a specified number of times
void blinkLED(int pin, int tim
  for (int i = 0; i < times; i
    digitalWrite(pin, HIGH); /
    delay(500); // LED on for
    digitalWrite(pin, LOW); //
    delay(500); // LED off for
  }
}

// Timer1 interrupt service ro
ISR(TIMER1_COMPA_vect) {
  measureDistance = true;  // Set flag to measure distance
}

// Timer2 interrupt service routine for temperature sensor
ISR(TIMER2_COMPA_vect) {
  readTemperature = true;  // Set flag to read temperature
}
```

How the debugger works

1. Add breakpoints by clicking on the line numbers.
2. Hover over the variables while paused to see their value.
3. Use the buttons above to resume simulation or step one line at a time.

Serial Monitor

```
Temperature: 74.71 C
Temperature: 74.71 C
Measured Distance: 113.26 cm
Temperature: 74.71 C
Measured Distance: 113.07 cm
Temperature: 74.71 C
```

```
const int triggerPin = 9;   // Pin for HC-SR04 trigger
const int echoPin = 10;     // Pin for HC-SR04 echo
const int tempPin = A1;     // Pin for the temperature sensor (analog)
const int ledPin1 = 13;     // Pin for the first LED (for HC-SR04)
const int ledPin2 = 12;     // Pin for the second LED (for temperature sensor)

volatile bool measureDistance = false; // Flag to measure distance
volatile bool readTemperature = false; // Flag to read temperature
volatile float measuredDistance = 0.0; // Store the distance
volatile float temperature = 0.0;      // Store the temperature

void setup() {
  pinMode(triggerPin, OUTPUT); // Set trigger pin as OUTPUT
  pinMode(echoPin, INPUT);     // Set echo pin as INPUT
  pinMode(tempPin, INPUT);     // Set temperature pin as INPUT
  pinMode(ledPin1, OUTPUT);    // Set LED1 pin as OUTPUT
  pinMode(ledPin2, OUTPUT);    // Set LED2 pin as OUTPUT
  Serial.begin(9600);          // Initialize serial communication

  // Configure Timer1 to trigger an interrupt every 100 milliseconds
  noInterrupts(); // Disable interrupts while configuring timer
  TCCR1A = 0;
  TCCR1B = 0;
  TCNT1 = 0; // Initialize counter value to 0
  OCR1A = 15624; // Set compare match register for 100ms (assuming 16MHz clock)
  TCCR1B |= (1 << WGM12); // Turn on CTC mode
  TCCR1B |= (1 << CS12) | (1 << CS10); // Set prescaler to 1024
  TIMSK1 |= (1 << OCIE1A); // Enable Timer1 compare interrupt

  // Configure Timer2 to trigger an interrupt every 50 milliseconds for temperature sensor
  TCCR2A = 0;
  TCCR2B = 0;
  TCNT2 = 0; // Initialize counter value to 0
  OCR2A = 124; // Set compare match register for 50ms (assuming 16MHz clock)
  TCCR2A |= (1 << WGM21); // Turn on CTC mode
  TCCR2B |= (1 << CS22) | (1 << CS21); // Set prescaler to 256
  TIMSK2 |= (1 << OCIE2A); // Enable Timer2 compare interrupt

  interrupts(); // Enable interrupts
}

void loop() {
  // Check if it's time to measure distance
  if (measureDistance) {
    measureDistance = false; // Reset flag

    // Send a signal to the trigger pin
    digitalWrite(triggerPin, LOW);
    delayMicroseconds(2);
    digitalWrite(triggerPin, HIGH);
    delayMicroseconds(10);
    digitalWrite(triggerPin, LOW);

    // Read the duration of the pulse from the echo pin
    long pulseDuration = pulseIn(echoPin, HIGH);
    // Convert the pulse duration to distance in centimeters
    measuredDistance = (pulseDuration / 2.0) * 0.0344;

    // Display the measured distance on the Serial Monitor
    Serial.print("Measured Distance: ");
    Serial.print(measuredDistance);
    Serial.println(" cm");

    // Control LED1 based on distance
    if (abs(measuredDistance - 113.4) < 1.0) { // Acceptable error margin of 1 cm
      digitalWrite(ledPin1, HIGH);
      delay(500); // LED1 on for 500 milliseconds
      digitalWrite(ledPin1, LOW);
      delay(500); // LED1 off for 500 milliseconds
    } else {
      digitalWrite(ledPin1, LOW);
    }
  }

  // Check if it's time to read temperature
  if (readTemperature) {
    readTemperature = false; // Reset flag

    // Read the temperature sensor value
    int sensorValue = analogRead(tempPin);
    // Convert the sensor value to temperature in Celsius
    temperature = (sensorValue * 5.0 / 1024.0) * 100.0;

    // Display the temperature on the Serial Monitor
    Serial.print("Temperature: ");
```

```
    Serial.print(temperature);
    Serial.println(" C");

    // Check both conditions and blink LED2 if both are met
    if (abs(measuredDistance - 113.4) < 1.0 && abs(temperature - 74.1) < 1.0) { // Acceptable error
margin
      blinkLED(ledPin2, 3); // Blink LED2 thrice
    }
  }

  delay(100); // Short pause before the next measurement
}

// Function to blink an LED a specified number of times
void blinkLED(int pin, int times) {
  for (int i = 0; i < times; i++) {
    digitalWrite(pin, HIGH); // Turn LED on
    delay(500); // LED on for 500 milliseconds
    digitalWrite(pin, LOW);  // Turn LED off
    delay(500); // LED off for 500 milliseconds
  }
}

// Timer1 interrupt service routine for HC-SR04
ISR(TIMER1_COMPA_vect) {
  measureDistance = true;  // Set flag to measure distance
}

// Timer2 interrupt service routine for temperature sensor
ISR(TIMER2_COMPA_vect) {
  readTemperature = true;  // Set flag to read temperature
```

```
}
```

In this setup, the Arduino board is configured to handle two sensors using interrupts for effective real-time monitoring. The HC-SR04 ultrasonic distance sensor is connected with its trigger pin on digital pin 9 and echo pin on digital pin 10. The temperature sensor is connected to analog pin A1. The system uses Timer1 to trigger interrupts every 100 milliseconds for distance measurements and Timer2 to trigger interrupts every 50 milliseconds for temperature readings. The flags measureDistance and readTemperature, set by the interrupt service routines (ISRs) associated with Timer1 and Timer2 respectively, indicate when to process the sensor data. The loop function checks if the distance measured by the HC-SR04 (using pin 10) is approximately 113.4 cm and if the temperature read from the analog pin A1 is approximately 74.1°C. If both conditions are satisfied, the LED connected to digital pin 12 blinks thrice to signal the result. Additionally, another LED connected to digital pin 13 provides visual feedback based on the distance measurement. This setup efficiently integrates multiple sensors and outputs, utilizing interrupts to ensure timely and accurate responses based on the collected data.

https://github.com/s223200581/Module-1-sit-315-task-1.3c