

Name - Yash Lakhtariya & Kirtan Patel
Enrollment number - 21162101012 & 21162101017
Branch - CBA Batch - 71
IOT Practical 4

AIM : Interface Ultrasonic Sensor with Arduino, LED and a buzzer.

1. Serial Monitor as Output

Materials used :

- Arduino Uno
- USB A to B cable
- 1 UltraSonic Sensor

Code :

```
#define TRIG_PIN 3
#define ECHO_PIN 2

long duration;
int distance;

void setup() {
    pinMode(TRIG_PIN, OUTPUT);
    pinMode(ECHO_PIN, INPUT);

    Serial.begin(9600); // Start serial communication
}

void loop() {
    // Send a 10µs pulse to the TRIG pin
    digitalWrite(TRIG_PIN, LOW);
    delayMicroseconds(2);
    digitalWrite(TRIG_PIN, HIGH);
    delayMicroseconds(10);
    digitalWrite(TRIG_PIN, LOW);
```

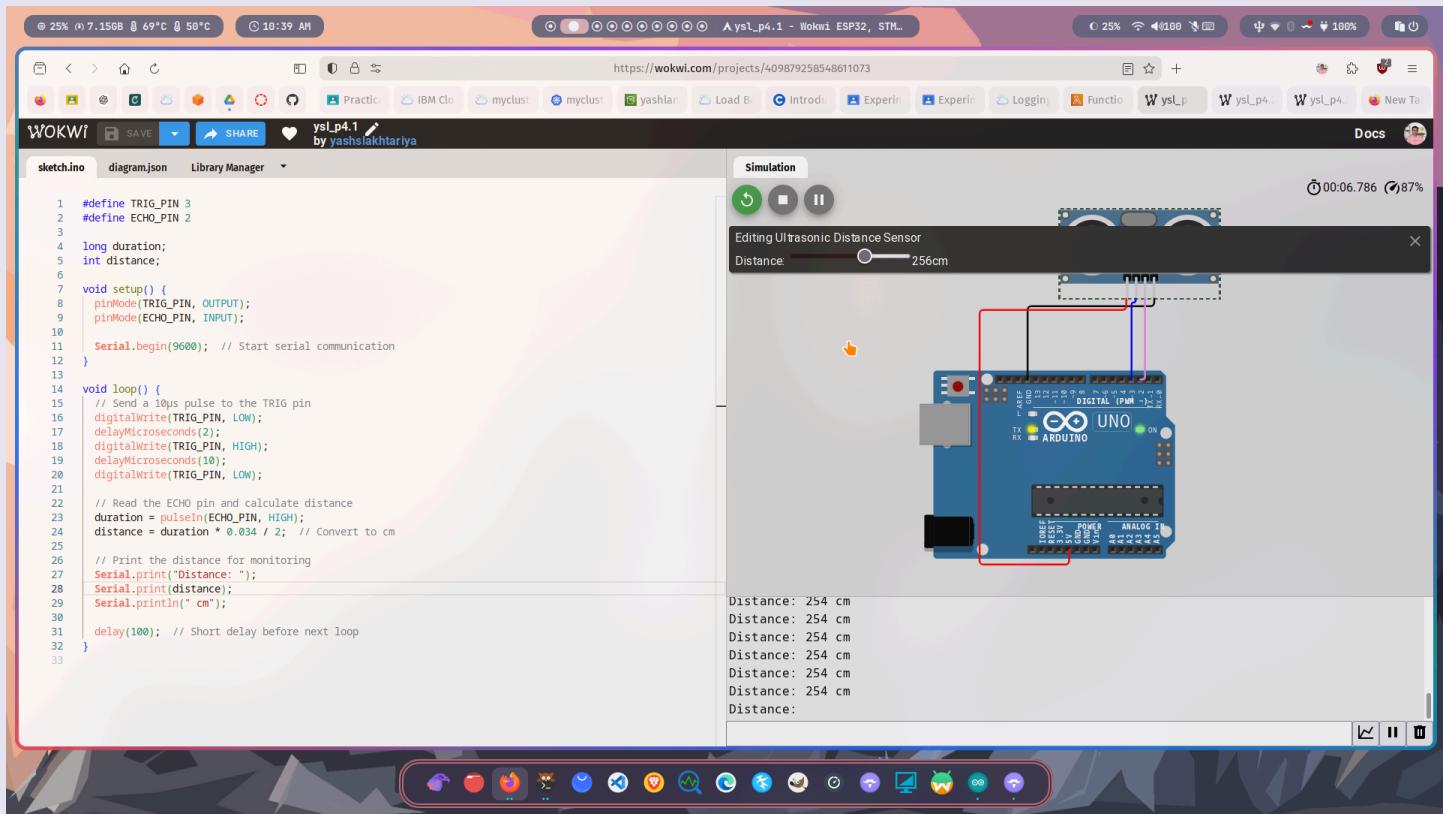
Name - Yash Lakhtariya & Kirtan Patel
Enrollment number - 21162101012 & 21162101017
Branch - CBA Batch - 71
IOT Practical 4

```
// Read the ECHO pin and calculate distance
duration = pulseIn(ECHO_PIN, HIGH);
distance = duration * 0.034 / 2; // Convert to cm

// Print the distance for monitoring
Serial.print("Distance: ");
Serial.print(distance);
Serial.println(" cm");

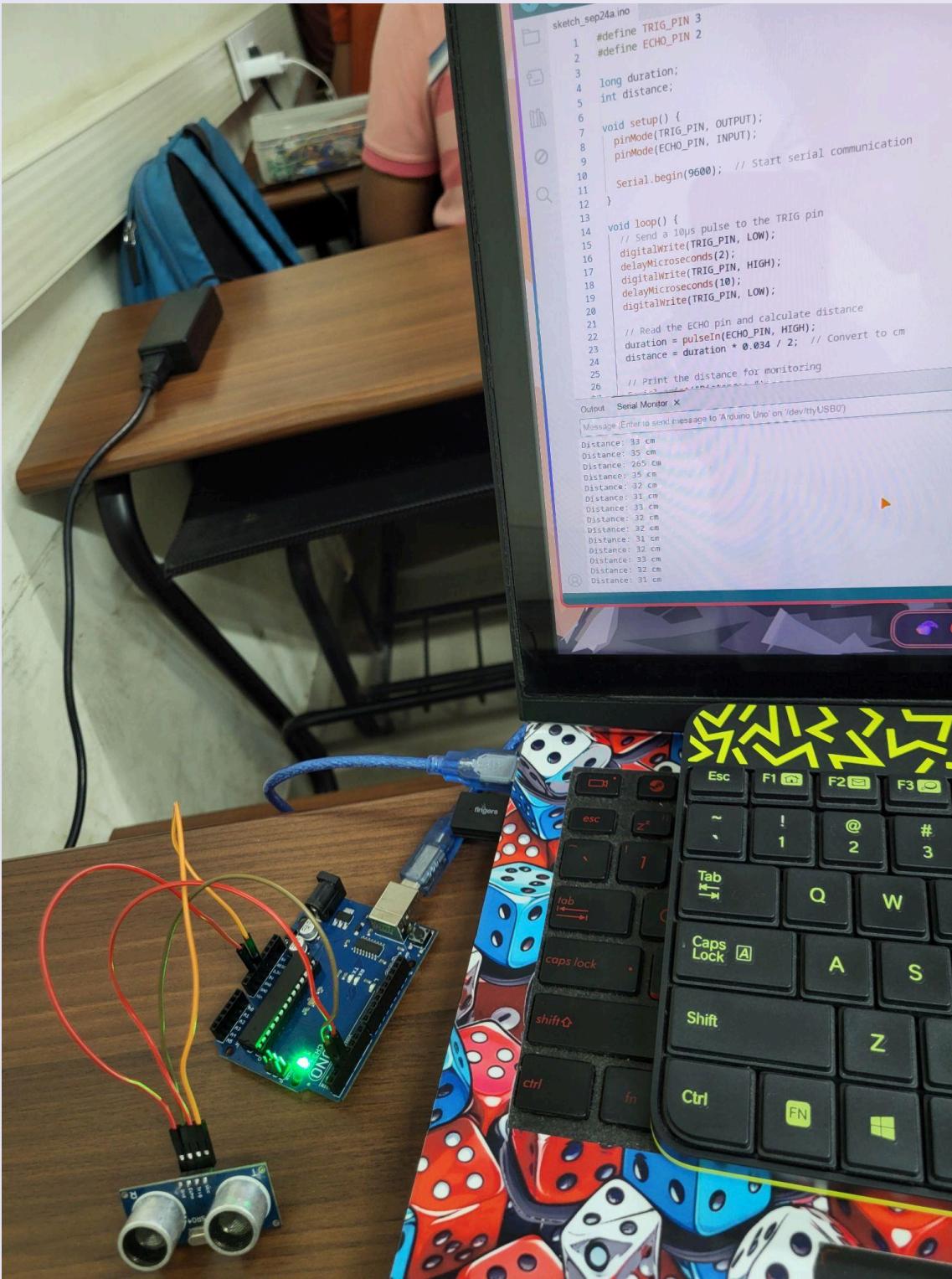
delay(100); // Short delay before next loop
}
```

Virtual Output :

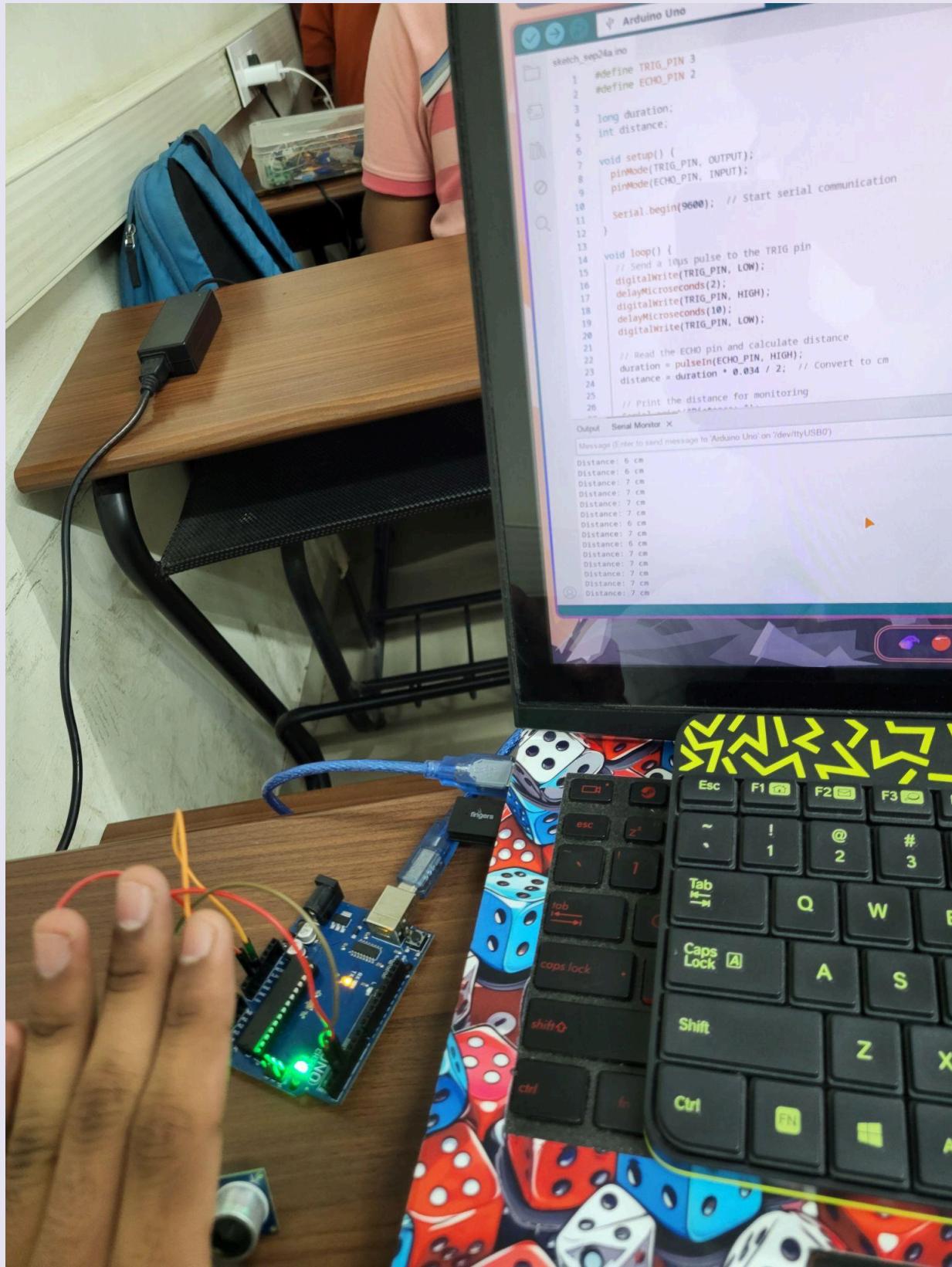


Name - Yash Lakhtariya & Kirtan Patel
Enrollment number - 21162101012 & 21162101017
Branch - CBA Batch - 71
IOT Practical 4

Physical Output :



Name - Yash Lakhtariya & Kirtan Patel
Enrollment number - 21162101012 & 21162101017
Branch - CBA Batch - 71
IOT Practical 4



Name - Yash Lakhtariya & Kirtan Patel
Enrollment number - 21162101012 & 21162101017
Branch - CBA Batch - 71
IOT Practical 4

2. LED blinking as output

Materials used :

- Arduino Uno
- USB A to B cable
- 1 UltraSonic Sensor
- 1 LED

Code :

```
#define TRIG_PIN 3
#define ECHO_PIN 2
#define LED_PIN 13

long duration;
int distance;

void setup() {
    pinMode(TRIG_PIN, OUTPUT);
    pinMode(ECHO_PIN, INPUT);
    pinMode(LED_PIN, OUTPUT);
}

void loop() {
    // Send a 10µs pulse to the TRIG pin
    digitalWrite(TRIG_PIN, LOW);
    delayMicroseconds(2);
    digitalWrite(TRIG_PIN, HIGH);
    delayMicroseconds(10);
    digitalWrite(TRIG_PIN, LOW);
```

Name - Yash Lakhtariya & Kirtan Patel

Enrollment number - 21162101012 & 21162101017

Branch - CBA Batch - 71

IOT Practical 4

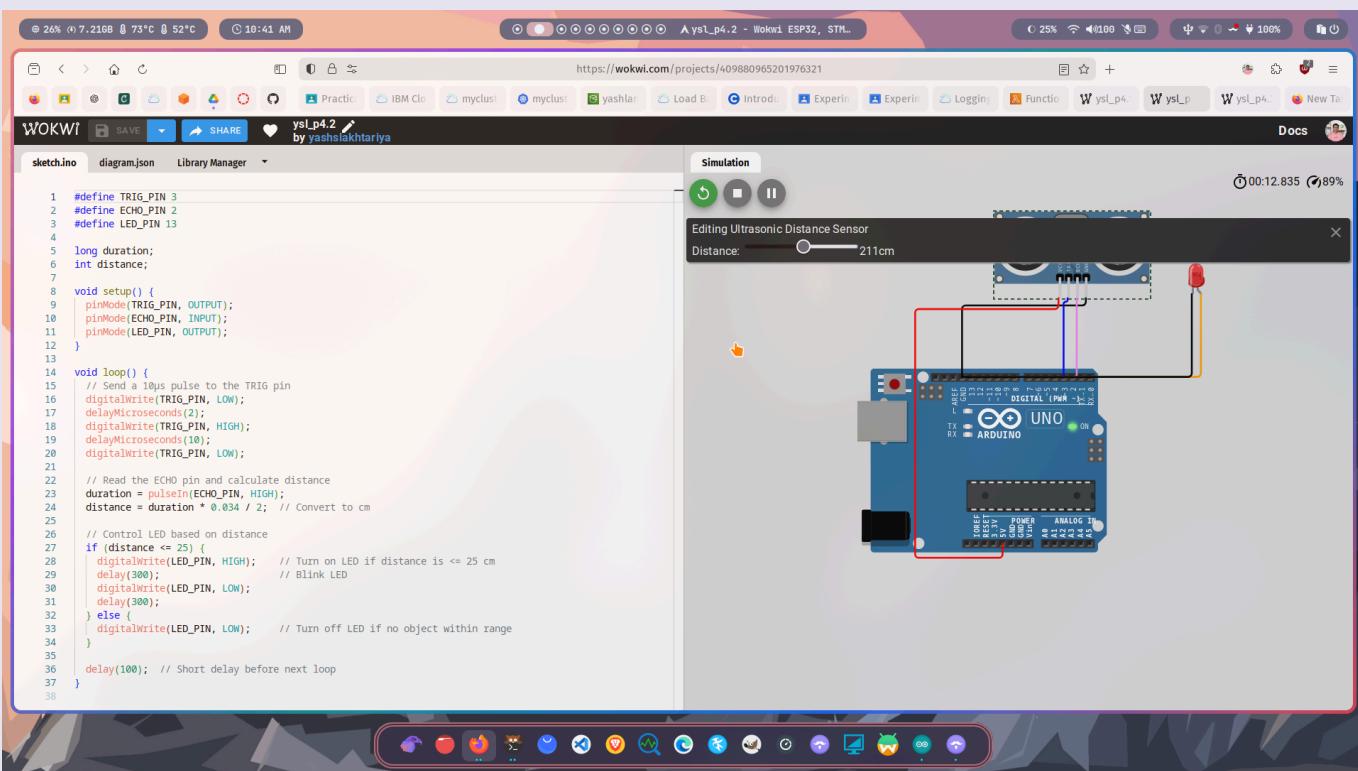
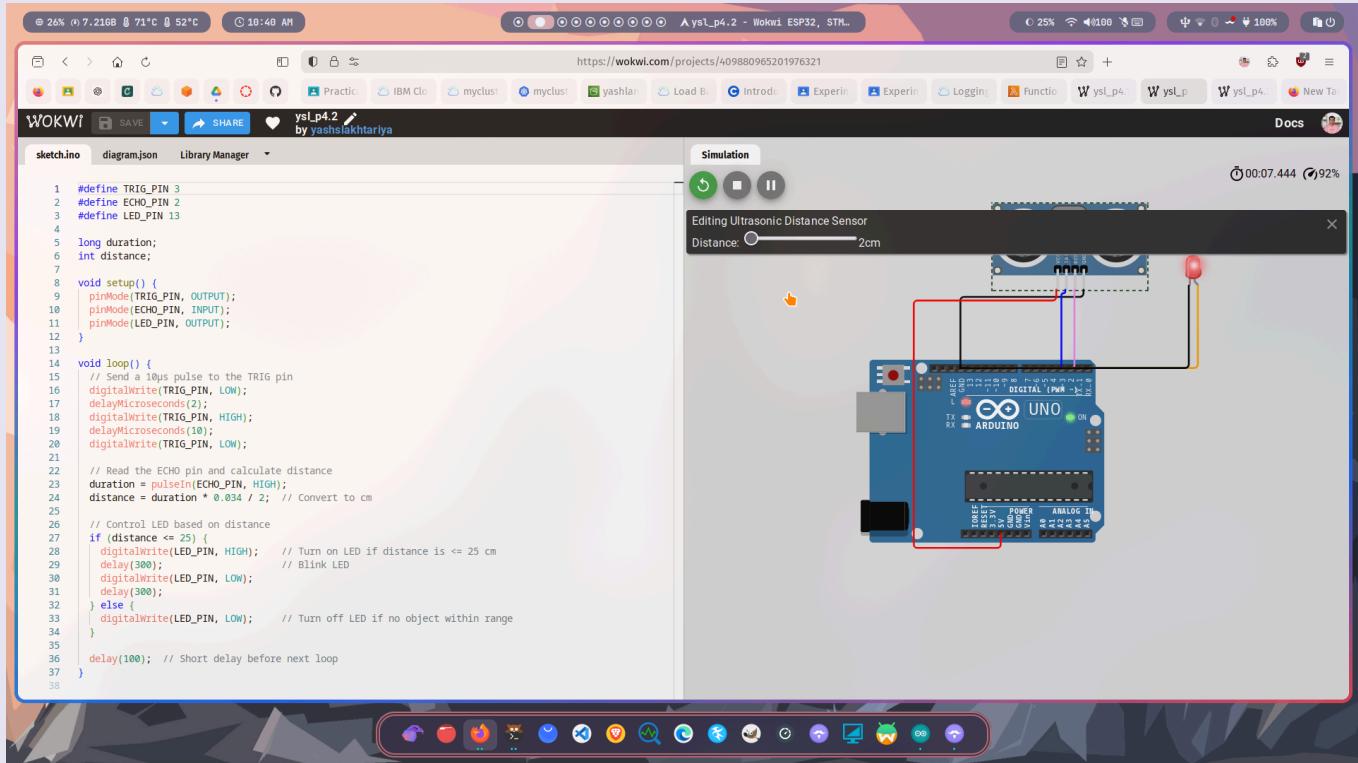
```
// Read the ECHO pin and calculate distance
duration = pulseIn(ECHO_PIN, HIGH);
distance = duration * 0.034 / 2; // Convert to cm

// Control LED based on distance
if (distance <= 25) {
    digitalWrite(LED_PIN, HIGH);      // Turn on LED if distance is
≤ 25 cm
    delay(300);                      // Blink LED
    digitalWrite(LED_PIN, LOW);
    delay(300);
} else {
    digitalWrite(LED_PIN, LOW);      // Turn off LED if no object
within range
}

delay(100); // Short delay before next loop
}
```

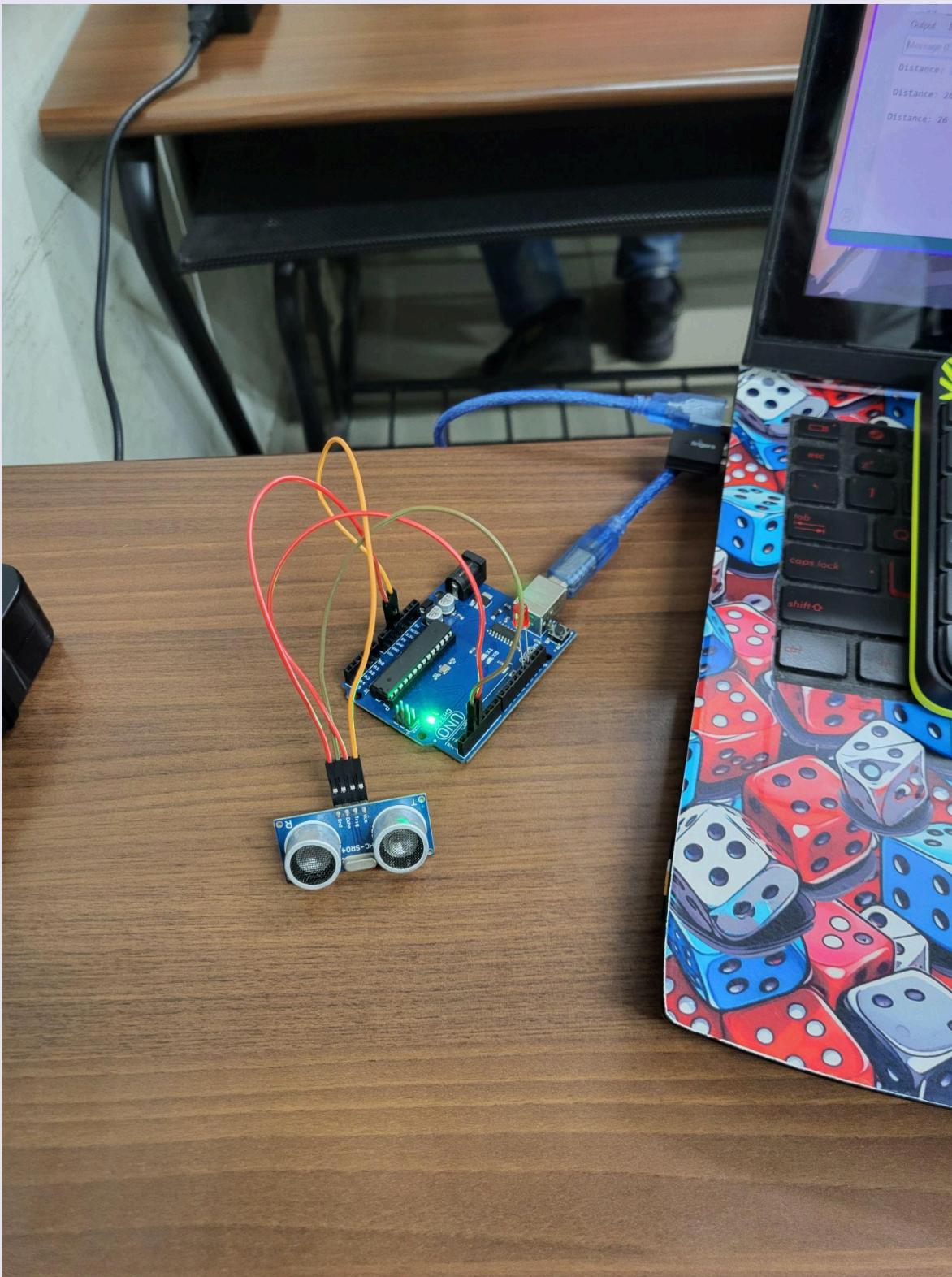
Name - Yash Lakhtariya & Kirtan Patel
Enrollment number - 21162101012 & 21162101017
Branch - CBA Batch - 71
IOT Practical 4

Virtual Output :

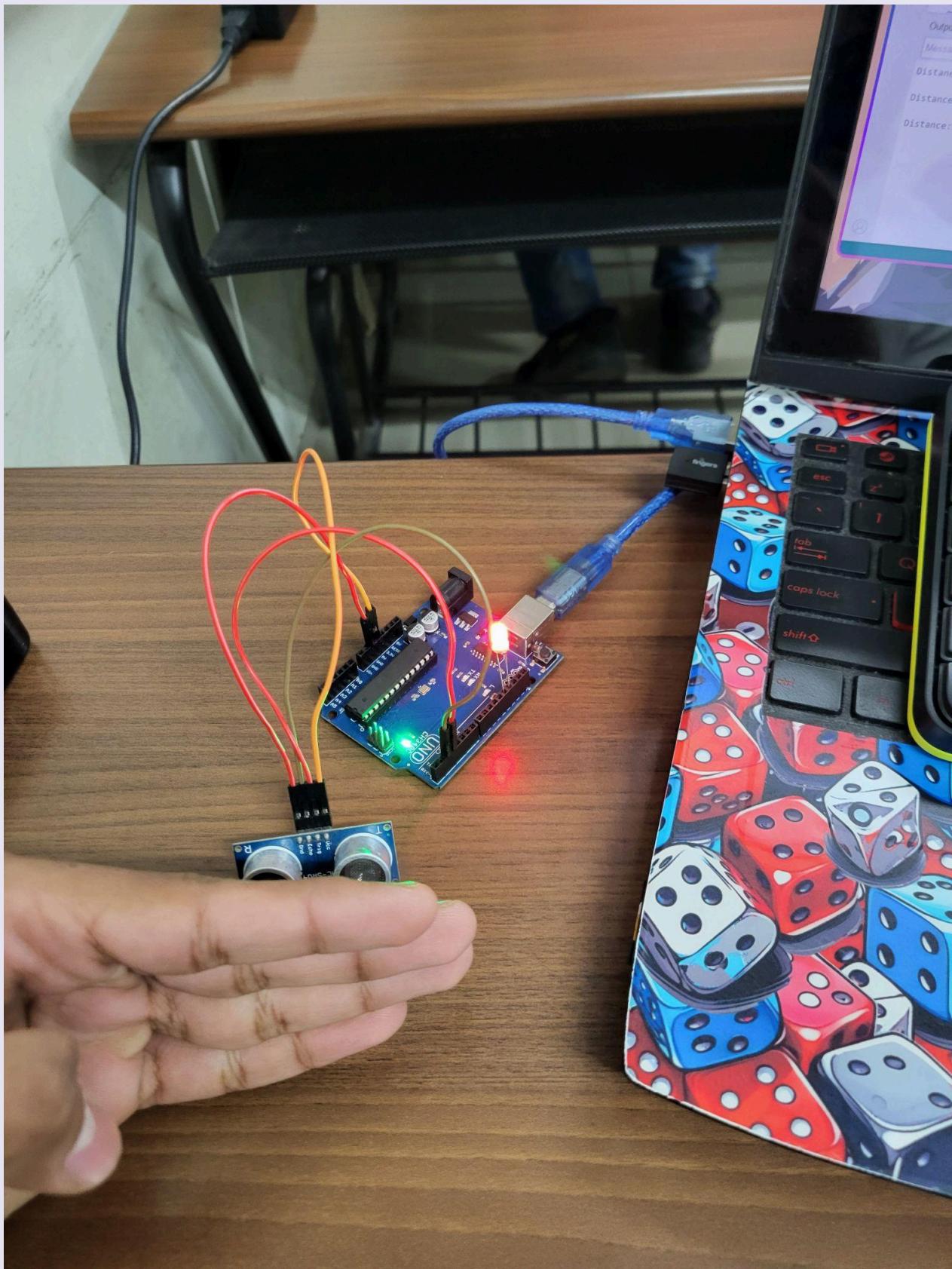


Name - Yash Lakhtariya & Kirtan Patel
Enrollment number - 21162101012 & 21162101017
Branch - CBA Batch - 71
IOT Practical 4

Physical Output :



Name - Yash Lakhtariya & Kirtan Patel
Enrollment number - 21162101012 & 21162101017
Branch - CBA Batch - 71
IOT Practical 4



Name - Yash Lakhtariya & Kirtan Patel
Enrollment number - 21162101012 & 21162101017
Branch - CBA Batch - 71
IOT Practical 4

3. Sound buzzer as Output

Materials used :

- Arduino Uno
- USB A to B cable
- 1 UltraSonic Sensor
- 1 Sound Buzzer

Code :

```
const int TRIG_PIN    = 3; // Arduino pin connected to Ultrasonic
Sensor's TRIG pin
const int ECHO_PIN    = 2; // Arduino pin connected to Ultrasonic
Sensor's ECHO pin
const int BUZZER_PIN = 12; // Arduino pin connected to Piezo
Buzzer's pin
const int DISTANCE_THRESHOLD = 20; // centimeters

// variables will change:
float duration_us, distance_cm;

void setup() {
  Serial.begin (9600);      // initialize serial port
  pinMode(TRIG_PIN, OUTPUT); // set arduino pin to output mode
  pinMode(ECHO_PIN, INPUT); // set arduino pin to input mode
  pinMode(BUZZER_PIN, OUTPUT); // set arduino pin to output mode
}

void loop() {
  // generate 10-microsecond pulse to TRIG pin
  digitalWrite(TRIG_PIN, HIGH);
```

Name - Yash Lakhtariya & Kirtan Patel
Enrollment number - 21162101012 & 21162101017
Branch - CBA Batch - 71
IOT Practical 4

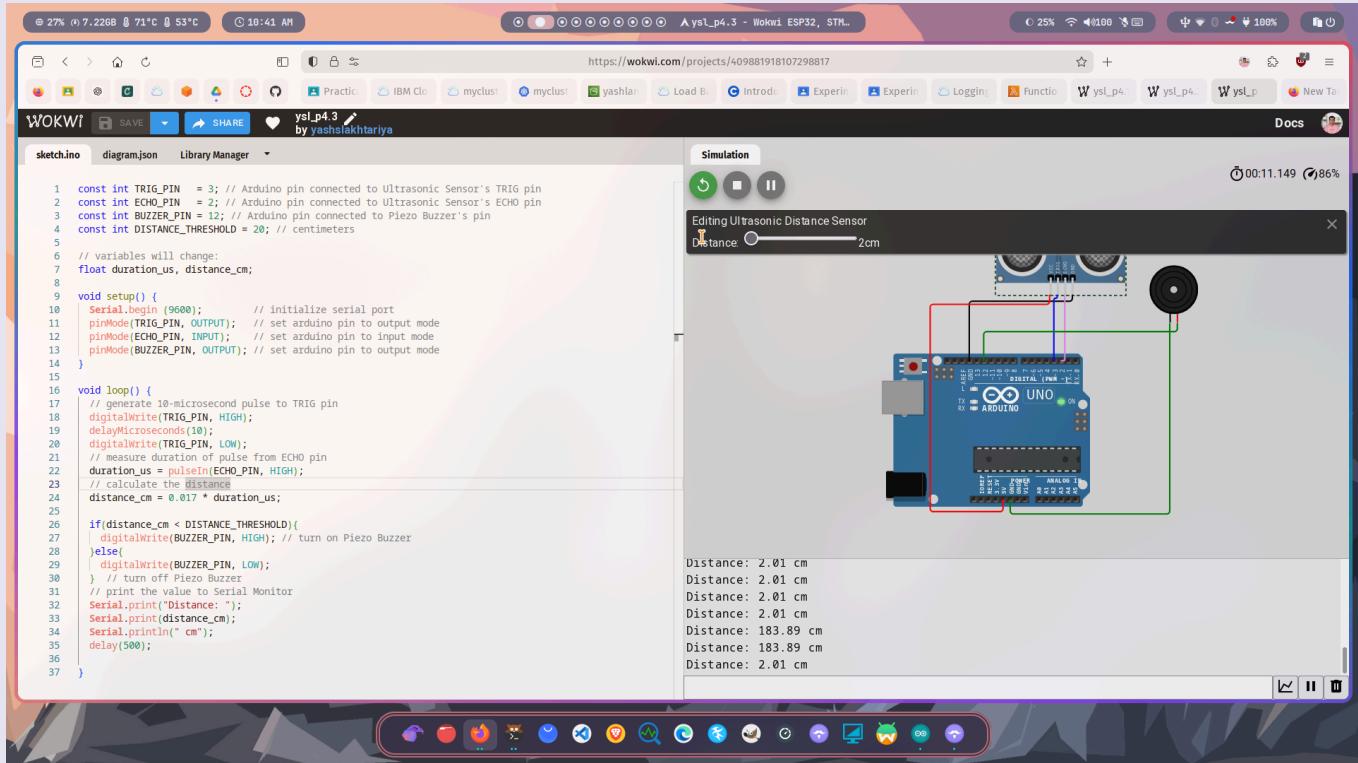
```
delayMicroseconds(10);
digitalWrite(TRIG_PIN, LOW);
// measure duration of pulse from ECHO pin
duration_us = pulseIn(ECHO_PIN, HIGH);
// calculate the distance
distance_cm = 0.017 * duration_us;

if(distance_cm < DISTANCE_THRESHOLD){
    digitalWrite(BUZZER_PIN, HIGH); // turn on Piezo Buzzer
}else{
    digitalWrite(BUZZER_PIN, LOW);
} // turn off Piezo Buzzer
// print the value to Serial Monitor
Serial.print("Distance: ");
Serial.print(distance_cm);
Serial.println(" cm");
delay(500);

}
```

Name - Yash Lakhtariya & Kirtan Patel
Enrollment number - 21162101012 & 21162101017
Branch - CBA Batch - 71
IOT Practical 4

Virtual Output :



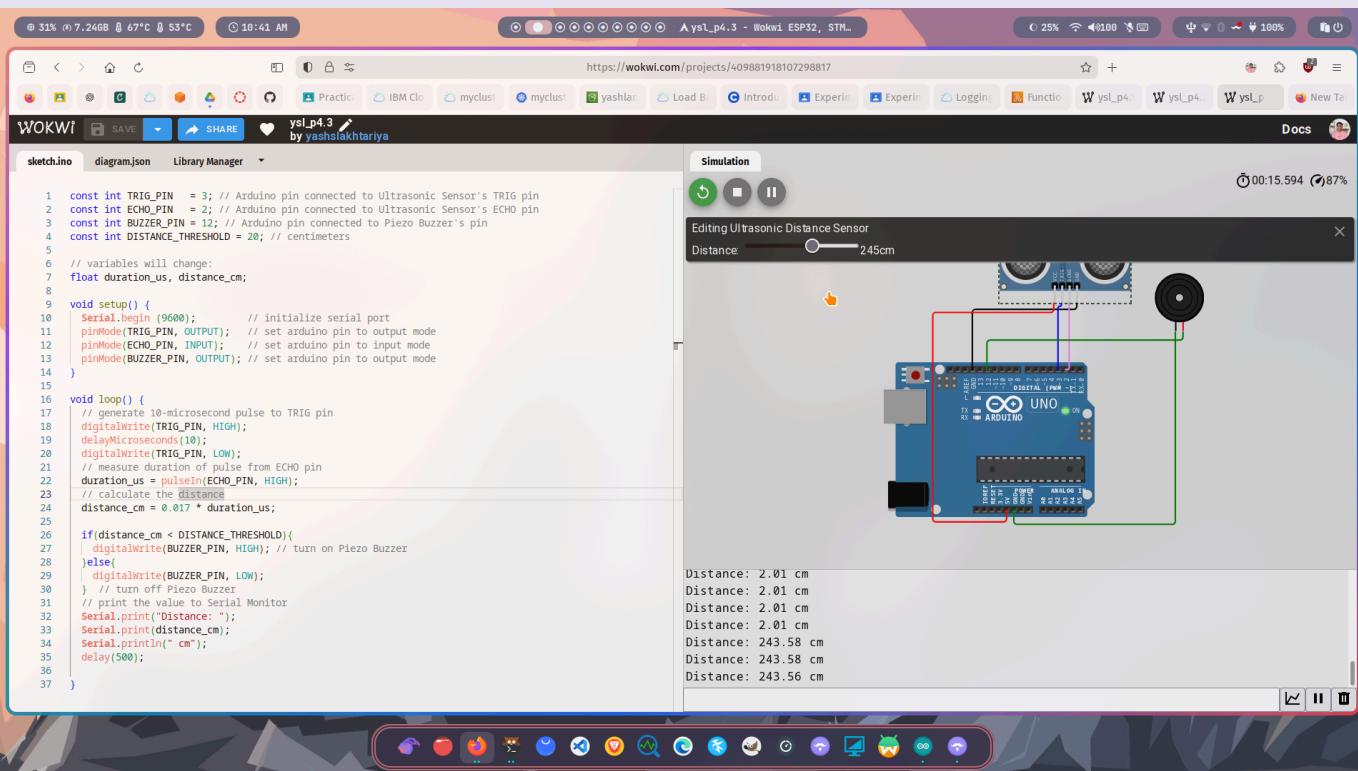
WOKWI sketch.ino

```

1 const int TRIG_PIN = 3; // Arduino pin connected to Ultrasonic Sensor's TRIG pin
2 const int ECHO_PIN = 2; // Arduino pin connected to Ultrasonic Sensor's ECHO pin
3 const int BUZZER_PIN = 12; // Arduino pin connected to Piezo Buzzer's pin
4 const int DISTANCE_THRESHOLD = 20; // centimeters
5
6 // variables will change:
7 float duration_us, distance_cm;
8
9 void setup() {
10    Serial.begin(9600); // initialize serial port
11    pinMode(TRIG_PIN, OUTPUT); // set arduino pin to output mode
12    pinMode(ECHO_PIN, INPUT); // set arduino pin to input mode
13    pinMode(BUZZER_PIN, OUTPUT); // set arduino pin to output mode
14 }
15
16 void loop() {
17    // generate 10-microsecond pulse to TRIG pin
18    digitalWrite(TRIG_PIN, HIGH);
19    delayMicroseconds(10);
20    digitalWrite(TRIG_PIN, LOW);
21    // measure duration of pulse from ECHO pin
22    duration_us = pulseIn(ECHO_PIN, HIGH);
23    // calculate the distance
24    distance_cm = 0.017 * duration_us;
25
26    if(distance_cm < DISTANCE_THRESHOLD){
27        digitalWrite(BUZZER_PIN, HIGH); // turn on Piezo Buzzer
28    }else{
29        digitalWrite(BUZZER_PIN, LOW);
30    } // turn off Piezo Buzzer
31    // print the value to Serial Monitor
32    Serial.print("Distance: ");
33    Serial.print(distance_cm);
34    Serial.println(" cm");
35    delay(500);
36 }
37

```

Distance: 2.01 cm
Distance: 2.01 cm
Distance: 2.01 cm
Distance: 2.01 cm
Distance: 183.89 cm
Distance: 183.89 cm
Distance: 2.01 cm



WOKWI sketch.ino

```

1 const int TRIG_PIN = 3; // Arduino pin connected to Ultrasonic Sensor's TRIG pin
2 const int ECHO_PIN = 2; // Arduino pin connected to Ultrasonic Sensor's ECHO pin
3 const int BUZZER_PIN = 12; // Arduino pin connected to Piezo Buzzer's pin
4 const int DISTANCE_THRESHOLD = 20; // centimeters
5
6 // variables will change:
7 float duration_us, distance_cm;
8
9 void setup() {
10    Serial.begin(9600); // initialize serial port
11    pinMode(TRIG_PIN, OUTPUT); // set arduino pin to output mode
12    pinMode(ECHO_PIN, INPUT); // set arduino pin to input mode
13    pinMode(BUZZER_PIN, OUTPUT); // set arduino pin to output mode
14 }
15
16 void loop() {
17    // generate 10-microsecond pulse to TRIG pin
18    digitalWrite(TRIG_PIN, HIGH);
19    delayMicroseconds(10);
20    digitalWrite(TRIG_PIN, LOW);
21    // measure duration of pulse from ECHO pin
22    duration_us = pulseIn(ECHO_PIN, HIGH);
23    // calculate the distance
24    distance_cm = 0.017 * duration_us;
25
26    if(distance_cm < DISTANCE_THRESHOLD){
27        digitalWrite(BUZZER_PIN, HIGH); // turn on Piezo Buzzer
28    }else{
29        digitalWrite(BUZZER_PIN, LOW);
30    } // turn off Piezo Buzzer
31    // print the value to Serial Monitor
32    Serial.print("Distance: ");
33    Serial.print(distance_cm);
34    Serial.println(" cm");
35    delay(500);
36 }
37

```

Distance: 2.01 cm
Distance: 2.01 cm
Distance: 2.01 cm
Distance: 2.01 cm
Distance: 243.58 cm
Distance: 243.58 cm
Distance: 243.56 cm

Name - Yash Lakhtariya & Kirtan Patel
Enrollment number - 21162101012 & 21162101017
Branch - CBA Batch - 71
IOT Practical 4

Physical Output :

