MIT World Peace University

Internet of Things
Second Year B. Tech, Semester 2

Arudino with Sensors and Actuators

Assignment 2

Prepared By

Krishnaraj Thadesar
Cyber Security and Forensics
Batch A2, PA 20

May 2, 2023

Contents

1 Aim

To interface following Sensors such as Temperature or Ultrasonic or IR or any other sensor with Arduino Uno and display the output on the Serial Monitor.

2 Objectives

- To interface Temperature Sensor with Arduino Uno and display the output on the Serial Monitor.
- To learn how to use Arduino Uno.
- To learn about Actuators and Sensors.

3 Equipments Required

Name	Quantity	Component
U1	1	Arduino Uno R3
U5	1	Temperature Sensor [TMP36]
PIEZO1	1	Piezo
D1	1	Red LED
MFAN	1	DC Motor
R1	1	1 kΩ Resistor

4 Theory

In this assignment, we will be interfacing a temperature sensor with Arduino Uno and displaying the output on the serial monitor. The temperature sensor used in this project is an analog sensor, which measures temperature by outputting a voltage proportional to the temperature. The TMP36 temperature sensor is a popular choice due to its accuracy and low cost.

The Arduino Uno is a microcontroller board that is commonly used for prototyping and educational purposes. It has 14 digital input/output pins and 6 analog input pins, and is powered by a 5V supply. The board is programmed using the Arduino programming language, which is a simplified version of C++.

To interface the temperature sensor with the Arduino, we connect the output pin of the sensor to one of the analog input pins on the Arduino, and connect the ground and power pins to the appropriate pins on the Arduino. We then read the analog voltage from the sensor using the analogRead() function in the Arduino code.

The output of the temperature sensor is displayed on the serial monitor, which is a useful tool for debugging and monitoring the output of the Arduino. The serial monitor allows us to view the output in real-time and make any necessary adjustments to the code or hardware.

In the context of the Internet of Things (IoT), this project can be extended to include wireless communication, allowing the temperature readings to be monitored and analyzed remotely. For

example, the Arduino could be connected to a Wi-Fi module or a cellular module, and the temperature readings could be sent to a cloud-based platform for analysis and visualization. This could be useful in applications such as environmental monitoring or industrial automation.

5 Platform

Operating System: Arch Linux x86-64
IDEs or Text Editors Used: Arduino IDE
Compilers : g++ and gcc on linux for C++

6 Circuit

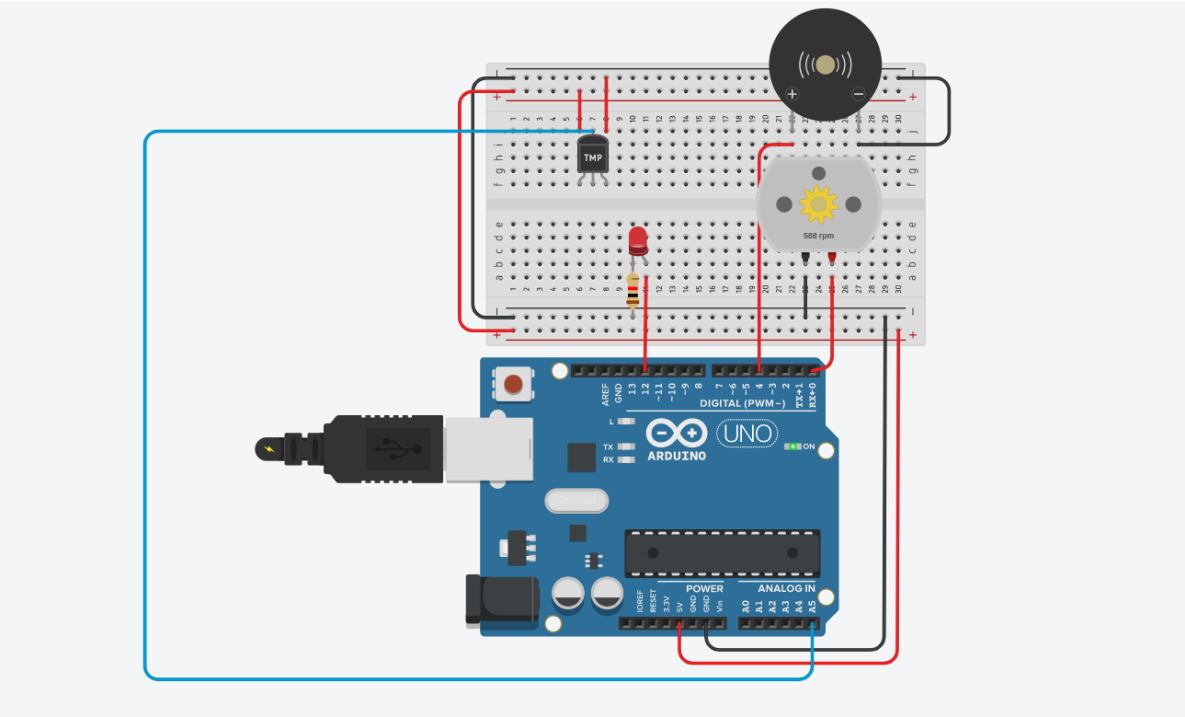

Figure 1: Tinkercad Circuit

7 Circuit Diagram

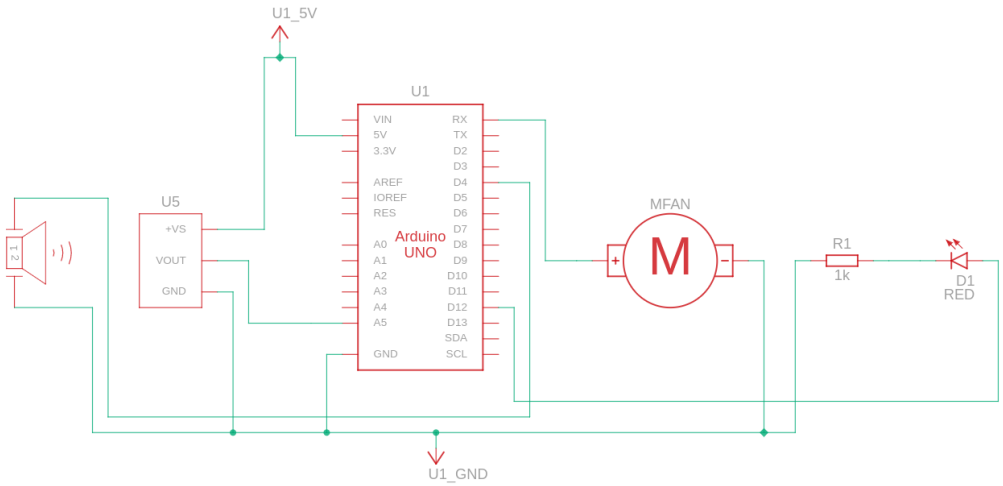

Figure 2: Circuit Diagram

8 Input

Input from the Temperature Sensor TMP36

9 Output

```
Temperature is too much
153
Temperature is too much
153
27
27
20
20
```

10 Code

```
1
2  #define LED_PIN 12
3  #define MOTOR_PIN 0
4  #define BUZZER_PIN 4
5  int analogPin = A5;
6  int val = 0;
7
8
9  void setup() {
10   Serial.begin(9600);  //  setup serial
```

```
  pinMode(LED_PIN, OUTPUT);
  pinMode(MOTOR_PIN, OUTPUT);
  pinMode(BUZZER_PIN, OUTPUT);
}

void loop() {
  val = analogRead(analogPin);  // read the input pin
  Serial.println(val); // debug value

  if(val > 100){
    Serial.println("Temperature is too much");
  digitalWrite(0, HIGH);
    digitalWrite(LED_PIN, HIGH);
  tone(BUZZER_PIN, val, 1000);
  }
}
```

11 Conclusion

Thus, we have successfully interfaced Temperature Sensor with Arduino Uno and displayed the output on the Serial Monitor.

12 FAQ

1. Arduino Uno R3 (Code: U1)
    - Type: Microcontroller board
    - Digital pins: 14
    - Analog input pins: 6
    - Operating voltage: 5V
    - Input voltage (recommended): 7-12V
    - Input voltage (limits): 6-20V
    - Flash memory: 32 KB (ATmega328P microcontroller)
    - SRAM: 2 KB (ATmega328P microcontroller)
    - EEPROM: 1 KB (ATmega328P microcontroller)
    - Clock speed: 16 MHz (ATmega328P microcontroller)
2. Temperature Sensor [TMP36] (Code: U2)
    - Type: Analog sensor
    - Pin 1: Output voltage (analog)
    - Pin 2: Ground
    - Pin 3: Input voltage (3.3V - 5V)
    - Temperature range: -40°C to +125°C
    - Output voltage range: 0V to 1.75V (at 25°C)
3. Buzzer (Code: U4)
    - Type: Electromechanical transducer
    - Operating voltage: 5V to 12V
    - Sound frequency: 2kHz to 4kHz
    - Sound pressure level: 80dB to 110dB
    - Pin 1: Positive terminal (+)
    - Pin 2: Negative terminal (-)
4. DC Motor:
    - Type: Electromechanical motor
    - Operating voltage: Varies depending on the motor specifications, typically 3-12V
    - Maximum voltage: Varies depending on the motor specifications, typically 6-24V
    - Maximum current: Varies depending on the motor specifications, typically 100mA - 1A
    - Control type: Typically controlled using pulse width modulation (PWM)
    - Speed range: Varies depending on the motor specifications, typically 1000-5000 RPM
    - Direction of rotation: Can be reversed by reversing the polarity of the power supply
    - Shaft diameter: Varies depending on the motor specifications, typically 2-5mm
    - Stall torque: Varies depending on the motor specifications, typically 0.1-1 Nm
    - Gearbox: Some DC motors come with a gearbox for increased torque or reduced spee