

Practical 3: Program using temperature sensors

Aim:

To study the working of Temperature sensors using Arduino

Simulation Environment: TinkerCAD (Free online simulator)

Components: Arduino UNO, Temperature Sensor TMP 36

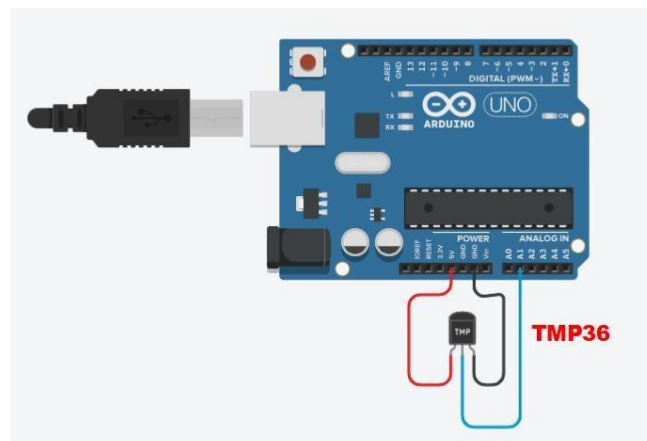
Theory:

The TMP36 is a low-cost analog temperature sensor that can be easily integrated with Arduino boards. It provides an analog voltage output that varies linearly with temperature. This practical aims to show how to measure and display real-time temperature data using a TMP36 temperature sensor and an Arduino. The temperature data will be displayed through suitable method.

The TMP36 temperature sensor is a precision analog sensor. It generates an output voltage that is linearly proportional to the Celsius temperature. It typically has three pins: VCC, GND, and OUT. The sensor's output voltage increases by 10 mV per degree Celsius. At 25°C, it outputs 750 mV.

The demonstration showcases the practical application of the TMP36 temperature sensor in conjunction with an Arduino board for real-time temperature monitoring. It highlights how to interface the sensor, read its analog output, and display the temperature information. This knowledge can be applied to various temperature-sensing applications, including weather stations, environmental monitoring, and more.

Circuit Diagram:



Pin Connections:

Arduino	TMP36 Sensor
5V	Left pin
GND	Right pin
A1	Center pin

Code:

```
char degree = 176;           // ASCII Value of Degree const
int sensor = A1;
void setup()
{
  pinMode(sensor, INPUT);
  Serial.begin(9600);
}

void loop() {
  int tmp = analogRead(sensor);    // Read data from the sensor. This voltage is stored as a
  10-bit number.
  float voltage = (tmp * 5.0) / 1024;    // Convert the 10-bit number to a voltage reading.
  float tmpCel = (voltage - 0.5) * 100.0;    // Convert voltage to Celsius.
  Serial.print("Celsius: ");
  Serial.print(tmpCel);
  Serial.println(degree);
  delay(1000);
}
```

Practical 4: Program using Humidity sensors

Aim:

To study the working of Humidity sensors using Arduino

Simulation Environment: TinkerCAD (Free online simulator)

Components: Arduino UNO, Potentiometer (wiper)

Theory:

Potentiometer as a Sensor:

A potentiometer, often referred to as a "pot," is a variable resistor with three terminals.

It consists of a resistive track and a wiper that moves along the track. By adjusting the wiper's position, you can vary the resistance.

In this demonstration, the potentiometer is used to simulate a variable sensor input.

Arduino:

Arduino is a versatile microcontroller platform commonly used for various electronic projects.

It can read analog voltage levels from sensors, including potentiometers, and convert them into digital values for processing.

TinkerCAD:

TinkerCAD is a web-based platform for simulating and designing electronic circuits and Arduino-based projects.

It's an excellent tool for testing and prototyping virtually, even when physical components are unavailable.

Demo Overview:

In this demo, we learn how to connect a potentiometer to an Arduino board in the TinkerCAD environment.

We understand the wiring and connections required to read variable resistance values from the potentiometer accurately.

Programming:

We see how to write the code to read and convert the analog voltage from the potentiometer into digital values and the humidity.

Practical Applications:

While the potentiometer doesn't directly measure humidity, we observe how variable sensor inputs are used in applications like volume control, dimmer switches, and other scenarios where adjustable values are required.

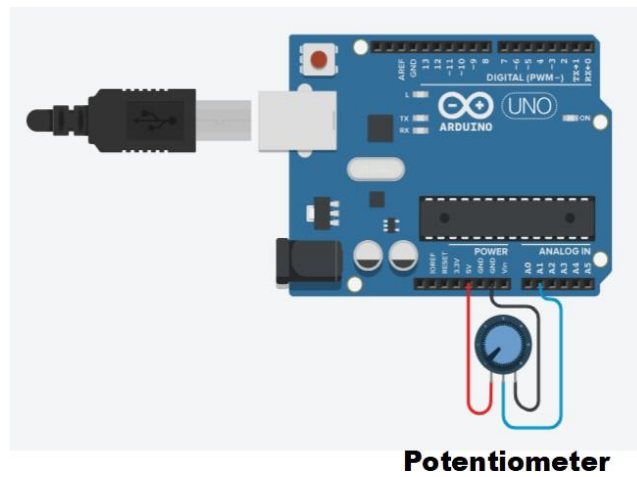
The demo provides hands-on experience in interfacing a potentiometer with an Arduino, which can be a valuable skill for various electronic projects.

Understanding how to read analog values and convert them into digital format is a fundamental aspect of working with sensors and input devices.

The demo serves as a practical example of using a potentiometer in an Arduino project and its potential applications in real-world scenarios.

While the potentiometer isn't a humidity sensor, this demonstration can still be educational and relevant, regarding interfacing variable sensors with Arduino.

Circuit Diagram:



Pin Connections:

Arduino	Potentiometer
5V	Left pin
GND	Right pin
A1	Center pin

Code:

```
const int analogIn = A1; // Connect the humidity sensor to this pin
int humiditySensorOutput = 0;

void setup() { Serial.begin(9600);
}

void loop() {
humiditySensorOutput = analogRead(analogIn);
int humidityPercentage = map(humiditySensorOutput, 0, 1023, 10, 70);

Serial.print("Humidity: "); // Printing out Humidity Percentage
Serial.print(humidityPercentage);
Serial.println("%");
delay(5000); // Iterate every 5 seconds
}
```