

Experiment 6

Aim: To interface and implement temperature sensing using the LM35 sensor with an Arduino UNO.

Theory:

Temperature sensing plays a crucial role in various applications, including environmental monitoring, climate control, and industrial automation. The LM35 is a high-precision temperature sensor that provides an output voltage directly proportional to the temperature in degrees Celsius ($^{\circ}\text{C}$), with a sensitivity of **10 mV/ $^{\circ}\text{C}$** .

- The **Arduino UNO** features a **10-bit Analog-to-Digital Converter (ADC)**, making it well-suited for reading the LM35's analog output and converting it into a digital temperature value.

• Working Principle

- The LM35 sensor outputs a voltage proportional to the ambient temperature.
- The sensor has a sensitivity of **10 mV per $^{\circ}\text{C}$** , meaning that at **25 $^{\circ}\text{C}$** , the output voltage will be approximately **250 mV (0.25V)**.

• Assemble the Hardware

1. Insert the **LM35 sensor** into the breadboard.
2. Connect the **V_{CC}** pin of the LM35 to the **5V** pin on the Arduino UNO.
3. Connect the **GND** pin of the LM35 to the **GND** pin of the Arduino.
4. Connect the **V_{OUT}** pin of the LM35 to **analog pin A0** on the Arduino.

• Set Up the Software

1. Connect the **Arduino UNO** to the computer via a **USB cable**.
2. Open the **Arduino IDE**.
3. Create a **new sketch** and paste the provided **Arduino code** (refer to Section 7).

• Upload the Code

- Verify and upload the code to the **Arduino UNO** using the **Arduino IDE**.

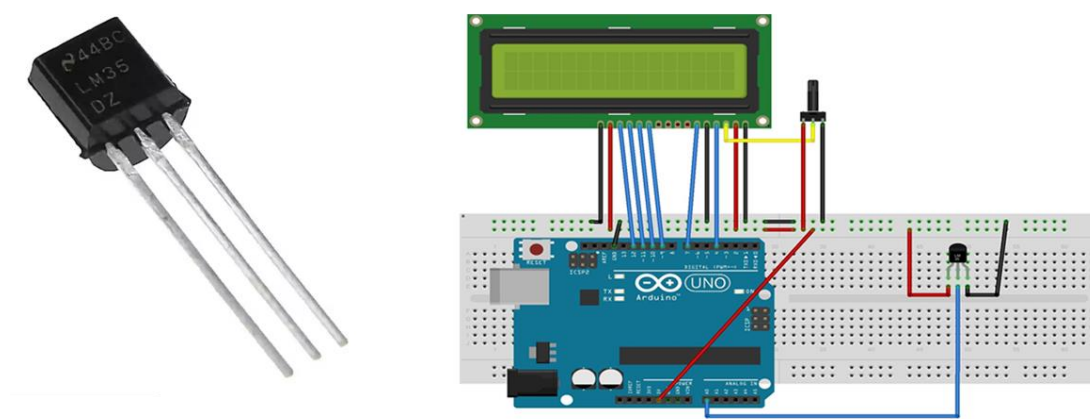
• Observe the Results

1. Open the **Serial Monitor** in the Arduino IDE and set the baud rate to **9600**.
2. Observe the real-time **temperature readings** displayed every second.

• Record and Analyze

- Compare the temperature readings from the **Serial Monitor** with an actual **room thermometer**.
- Observe and note any **fluctuations** or **discrepancies**, considering possible influences like sensor **placement**, **ambient conditions**, or **external heat sources**.

Observations:



Result: The **LM35 temperature sensor** was successfully interfaced with the **Arduino UNO**, providing real-time and accurate ambient temperature readings on the **Serial Monitor**.