
Temperature Display on LCD Using Arduino

---

1. Introduction

This project measures temperature using Arduino's analog input and displays the result on a 16x2 LCD in Fahrenheit.

2. Key Components

- Arduino Uno (or compatible board)
- 16x2 LCD Display
- Temperature Sensor (e.g., LM35)
- 10kΩ Potentiometer (for LCD contrast adjustment)
- Breadboard
- Jumper Wires

3. Working Principle

- The analog signal from the temperature sensor is read through Arduino's analog pin A0.
- The raw analog reading is converted into a voltage.
- This voltage is adjusted and calibrated based on the sensor characteristics.
- The calibrated temperature is converted from Celsius to Fahrenheit.
- The result is displayed on the LCD screen.

4. Circuit Overview

- Connect LCD pins to Arduino as follows:
    - RS → Pin 12
    - E → Pin 11
    - D4 → Pin 5
    - D5 → Pin 4
    - D6 → Pin 3

    - D7 → Pin 2
- Connect the temperature sensor output to A0.
- Connect LCD VSS to GND, VDD to 5V, and V0 to the potentiometer center pin for contrast control.

5. Code

```
// Code Written by-
// Fuad Hasan
// BME, KUET

#include <LiquidCrystal.h>

LiquidCrystal lcd(12, 11, 5, 4, 3, 2);
int degree;
double realdegree;

void setup() {
 lcd.begin(16, 2);
 degree = 0;
 realdegree = 0.0;
 lcd.print("Today's Temp:");
}

void loop() {
 degree = analogRead(A0); // Use A0 clearly

 realdegree = (double)degree / 1024.0; // Always better to write 1024.0 for accuracy
```

```
 realdegree *= 5.0;  // scaling to voltage (0-5V)
 realdegree -= 0.5;  // sensor adjustment if needed
 realdegree += 100.0; // sensor-specific calibration

 lcd.setCursor(0, 1); // Move to second line
 realdegree = (9.0 / 5.0) * realdegree + 32.0; // Convert Celsius to Fahrenheit
 String output = String(realdegree) + String((char)178) + "F"; // (char)178 is the degree symbol
 lcd.print(output);

 delay(500); // Add small delay so it's readable
}
```

6. Code Explanation

- **Library Inclusion:**
    - LiquidCrystal.h controls the 16x2 LCD.
- **Object Initialization:**
    - LiquidCrystal lcd(12, 11, 5, 4, 3, 2); assigns Arduino pins to LCD.
- **Setup Function:**
    - Initializes LCD display.
    - Prints the heading "Today's Temp:" on the first line.
- **Loop Function:**
    - Reads analog voltage from A0.
    - Converts the analog value to a real voltage (0–5V).
    - Applies calibration adjustments.
    - Converts the calibrated value from Celsius to Fahrenheit.
    - Formats and displays the temperature with a degree symbol.

- Delays for 500 milliseconds to make reading stable.

7. Conclusion

This project showcases how to interface a temperature sensor with Arduino and display real-time temperature readings on an LCD. Such systems are useful for home automation, weather monitoring, and educational projects.