ELEC 291 – Project Module #1
Summer 2022

Temperature Sensing

PART A

1. Measure the temperature in the 0^oC - 50^oC range with a 0.1^oC precision.

   Note: Although we are only testing the temperatures between 0^oC - 50^oC in your demo, you should design your circuit so that it can be used for the maximum range of temperature possible (and 0.1^oC precision). You will discuss your design in your report and explain the maximum range of measurement it can achieve.

2. Test the precision with a thermometer, measuring the body temperature.

3. Display the temperature on the LCD.

4. Make sure that the input voltage to Arduino remains in the 0-5 V range.

   Important: In your tests and demo for high temperatures, consider all the safety precautions and avoid any unsafe situation or practice.

PART B

1. If the temperature goes above 45^oC, turn on a fan (connected to your DC motor).

2. If the temperature goes below 10^oC, turn on an LED.

   Note: This part of the circuit is not connected to the microcontroller and should be controlled separately.

Simulations

- Simulate your sensor circuit in part (A) and the control system in part (B) on MultisimLive. (You can use a variable resistor in place of the sensor).

Report

Your report should cover the following:

- **Research and testing:** Your research on and testing of the NTC thermistor you are using. This may include:

    - R vs. T response.
    - Sensor response vs. time. How long does it take for the sensor reading to become stable?

- **Design and calculations:** Your design for each part of the circuit with schematics. For each circuit, explain clearly how you have chosen the components and their values and justify your decisions with calculations, etc.

- **Maximum Range:** What is the maximum range of temperature that can be measured with a $0.1^{\circ}C$ precision in your design? Show your calculations.

- **Challenges and mitigations:** What were the challenges faced in designing your device and how did you mitigate them?

- **Citations:** Proper citation of any resources used.

- **Appendices:** Any other information or data related to your design (optional).

Deliverables

Deliverables	Due Date	Percentage
Simulations + Code	Tuesday June 7, 11:59 PM	5%
Live Demo	Wednesday June 8	10%
Report	Friday June 10, 11:59 PM	10%
Total		25%