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ECET 32900 – Lab 3 Report

2/9/2025

**Lab Goal:**

The goal of this lab was to program an ATMEGA 2560 for temperature measurement using a thermistor and a calibration process.

**Procedure:**

The procedure for this lab was very straightforward. I started with reviewing lab instructions and getting specifications answered by the Lab TA. Afterwards, the hardware for recreation was

selected using an ATMega 2560 microcontroller, a 10kΩ resistor, and a NTC thermistor model 3950 from Adafruit. With components selected, a schematic was drawn to connect each of these items. Once completed, a flowchart was created in preparation for programming the

microcontroller. Then the program was created, and a functional prototype was created. After testing, the system was checked off by Professor Panigraphi.

Lab Results:

The results of the lab are presented on the next page.

Below is the schematic for the system.

A diagram of a measuring device

AI-generated content may be incorrect.

Below is the Flow Chart for the system.

A diagram of a flowchart

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Below is the calibration chart and calibration equation.

A graph with numbers and a dotted line

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Below is the source code used for the system.

A screen shot of a computer program

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A computer screen shot of a program code

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The system works by waiting 15 seconds for the thermistor to adjust to the temperature of the environment. After waiting 15 seconds, 10 ADC measurements were taken and averaged to gain the most accurate measurement. With that most accurate reading, math was done to convert this ADC value to be the temperature measured in Celsius. This normal reading was slightly incorrect when compared to a regular thermometer, so a correction curve equation was calculated and implemented. After this value was corrected, it was displayed to the terminal.

Conclusion:

This lab was useful for learning the process behind designing embedded systems while reviewing fundamentals taught in previous courses. I learned how to use a thermistor and learned the process behind how this thermistor measures the temperature. I also learned an effective process for calculating a calibration for a sensor.

References

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