TO: ME 2171 Instrumentation Lab Instructional Staff   March 25th, 2025

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SUBJECT: Weekly Project Update 3

Last week, we mainly worked on connecting our thermistor to the DAQ board as we had never done that before. After a lot of thinking, we decided to create a voltage divider to calculate the resistance of the thermistor. The first end of the circuit is connected to the 5V source on the DAQ board, the 5V source was connected to a resistor of known resistance (we used a 68-ohm resistor), the resistor was then connected to one of the analog input ports of the DAQ board. The same port of the DAQ board is connected to the thermistor and then connected to the ground.

The next step was calibrating the thermistor. We took resistance at temperatures 22, 80 and 90 degrees while using 0 degrees as our reference temperature. We plotted the graph and determined value of β. We created a LabVIEW vi to convert the voltage to the temperature using these equations.

$$\frac{V_{out}}{R_t} = \frac{V_{in} - V_{out}}{R_k}$$

Where:

V_{out} = the voltage determined by the DAQ board

R_t = resistor of thermistor

V_{in} = 5V known source on the DAQ board

R_k = resistance of known resistor (about 68 ohms in this case)

$$\frac{1}{\beta} \ln\left(\frac{R}{R_0}\right) = \frac{1}{T} - \frac{1}{T_0}$$

We tested the thermistor and our vi against our known temperatures of 0, 22, 80 and 90 degrees and it was very accurate.