**Design specifications**

* Initial value of NTCLG100E2 ( = 10kΩ () (because = 0 @ )
* INA if and if

**Assumptions**

* Initial voltage of Wheatstone bridge is 0V
* Powered by an Arduino UNO, (5V)
* Gain of instrumentation amplifier was maximized considering (V)

Task A5 consists of designing a temperature-to-voltage converter for a thermistor-based measurement system. The temperature range for this application is . The thermistor used in this application is the NTCLG100E2. According to the datasheet, the range of this thermistor is , this means that it will work for this application as it is within the required range.

The temperature-to-voltage converter that was built consisted of a Wheatstone bridge and an instrumentation amplifier. The initial output voltage of the Wheatstone bridge is 0, with changing temperature the thermistor changed resistance. The instrumentation amplifier calculated (analogue arithmetic) the difference between the voltages in the two branches of the bridge, the output was then tabulated, and a graph was made showing the resulting output voltage with changing temperature.

A design specification for the temp-voltage converter was that temperatures above must give a positive output voltage while the temperatures below must give a negative output.

One initial assumption made was that the temp-voltage converter was controlled by a microcontroller, specifically, an Arduino UNO. The output voltage from any pin of the UNO is 5V. The gain of the instrumentation amplifier was also assumed, based on the 5V coming from the Arduino, the output by definition could not be greater than 5V or less than -5V; a gain was used that accommodated the maximum and minimum output voltages of the bridge