IBEHS 3P04 – Jeff Suitor – Project Zero

The initial project of IBEHS 3P04 was to measure the temperature of a coffee cup to inform the user about the temperature of their coffee. This project used an iterative design process as the requirements for this project had to be clarified to students on several occasions.

Initially when designing the coffee sleeve the project description reads “The overall goal of this project is to inform a vivid coffee drinker the temperature of the coffee.” This project description reads as though the task is to measure the temperature of the coffee and thus my initial design focused on meeting this requirement. Please see appendix A for sketches and images of the CAD for this initial model. This initial model focused primarily on modularity of the design allowing the user to add various attachments such as the esp32, an LCD screen, and a handle. These attachments allowed the user to create their unique coffee drinking setup which I felt would be important to someone who is willing to pay money for a system such as this one.

Upon revision with one of the TA’s I was informed that the requirement is not to measure the temperature of the coffee but instead to measure the temperature of the insulating cup. This caused me to discard my lid designs because they were no longer needed and to add wire routes to the outside of the sleeve to ensure that the wiring for the thermistor was manageable. I also decided that the thermistor would run the length of the cup and would be placed at the bottom. This was to ensure that the thermistor could make an accurate measurement no matter the volume of coffee consumed.

In terms of the software design it was a relatively simple process of utilizing the equations we were given to calculate the resistance of the thermistor and convert to a temperature in Celsius. However, I noticed that I was getting a float truncation while performing the 1/beta coefficient calculation in the simplified Steinhart-Hart equation. The use of higher precision such as double made no difference. Therefore, I choose to use a multiplier to give me nonzero values. This multiplier was accounted for later in the calculation.