EENG 260 Lab 5 Report

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(Note: I very much apologize for this being turned in so late, I had gotten it done a while ago and got so wrapped up in the exam and other homework and exams in other classes that I completely spaced on turning it in, and Canvas wasn’t properly notifying me that I had a missing assignment like it normally does.)

This lab was a lot of trial and error. It felt like it was gonna be relatively simple since a lot of the setup work was like the previous labs, with the configuration of pins, inputs and outputs, etc. However, configuring the timers ended up requiring a lot of scouring the library documentation to make sure I was setting them up properly with the right interrupt handlers, timer values, making sure interrupts were doing their jobs, etc.

What took the most tinkering though was the display functions. I started off doing the naïve approach of just displaying all the digits that were needed when the timer interrupt fired, but that quickly resulted in just the first digit being bright enough to see. I had to then split the function into 3 parts with a digit tracker so that I could call the function 3 times as often, with each call displaying a different digit if it was needed.

Another tricky parameter was the actual timer value for the displaying of the values. I tinkered with several things, even going so far as to make it a 1ms delay, which caused the buttons to only work once for the whole program run and never be run again because the detection got out-prioritized by the timer interrupt. It worked, but a little too well. I finally got to a large enough value that I could do some proper debugging, but there was still a little inconsistency with the brightness between the digits.

I ended up settling on a value of “88888”, which when converted to instructions per second, ends up being 180. The reasoning behind this is that each display call happens 180 times a second for 3 digits, or 60 times a second for each unique digit. This value matches what I believe is the standard frequency of outlets in the US and the frequency that many cameras have as an anti-flicker for lights operating on said frequency, and I ended up with a very consistent brightness across all 3 digits that didn’t hinder any other program operations.