ECE 153A, Friday @ 4:00pm
Lab #1B

Bharat Kathi
bkathi@ucsb.edu
Lab Partners: Joshua Thomas

PART 1

We were able to make our timer count every 100th of a second, the limiting factor was actually the fact that the display will just shine red at a 1000th of a second.

PART 2

Since the only thing in our loop is our display update, our display should be updating at clock speed. Because we are refreshing at clock speed, the refresh rate should be at a crisp 100Mhz (accounting for other operations, probably a little slower).

PART 3

Our grand loop actually only updates the display, functionally, polling the buttons in our grand loop should be no issue. All we would need to do is just check for button pushes, then update the values. Due to this increased loop time though, there would be a noticeable drop in our timer's refresh rate, potentially making it stutter. But we can also improve our refresh rate by adding multiple instances of the display function in our grand loop so that after every step the display is refreshed. This, however, will likely add more timing complexities, potentially having the program miss button pushes if the period of the respective button poll is too great.

PART 4

The button that was pressed first gets registered.

PART 5

The inputs are the 5 push button gpio inputs giving the instructions, and the output is the 7-segment display.

PART 6

We had a couple of print statements for our timer interrupts that gave us a flag every time an interrupt was thrown, but we had an issue where the display was stuttering. Initially, it didn't

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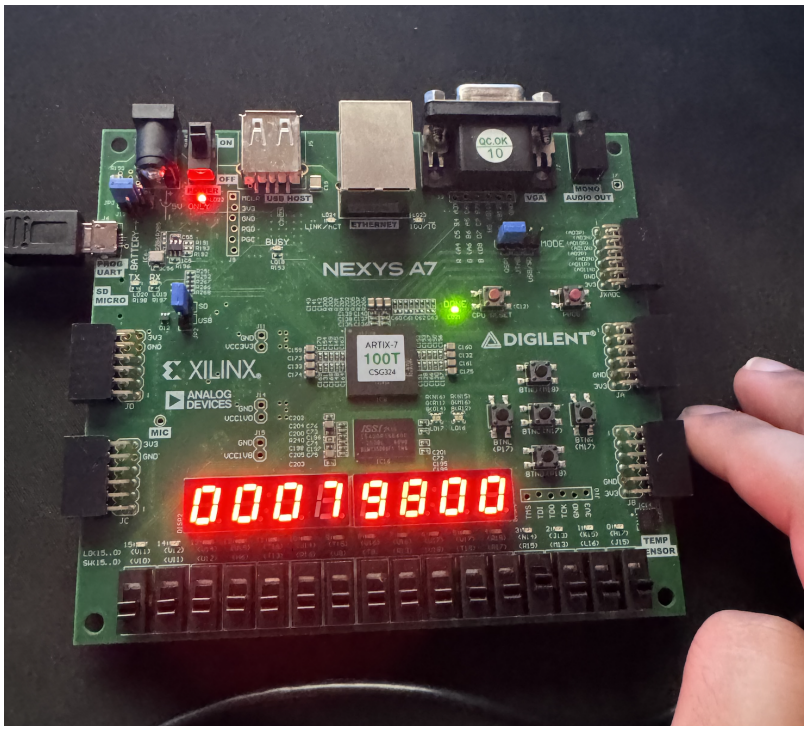
make sense why since the only thing in our grand loop was the display, but after a while, we figured out that when an interrupt was called, the time it took for the print statement to execute was so long it would cause a visible stutter. The last main issue was to do with how we were populating the seven segment display. Originally, we had a single counter variable that we increment to decremented. The way that we were calculating the digits to show on each display was too slow and resulted in a lot of display stuttering. So, we ended up going with an array of integers that each mapped to one of the seven segment displays. This solution allowed us to update the display a lot faster with little to no stuttering.

PART 7

Here's a picture of the timer while it is running.



Here's a picture of the timer while paused.

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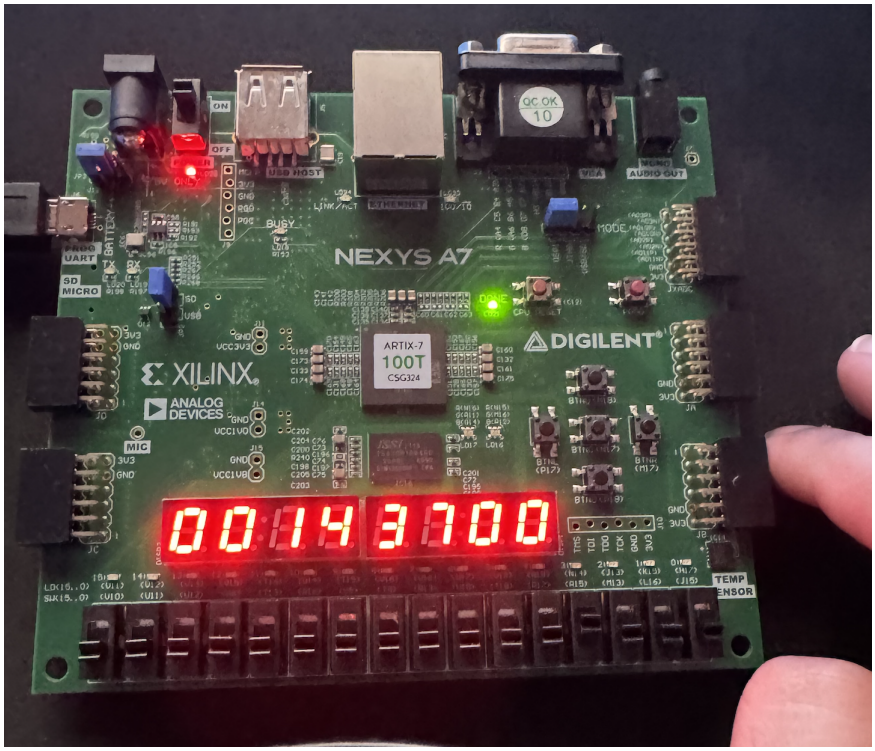

Looking at the stopwatch in real time, it looks like the hundredths place favors the number since. The illumination of the digits are relatively consistent with the photo taken while the timer is counting and when the timer is paused, maybe a little dimmer when the timer is counting though.