Course Name: EMBEDDED SYSTEMS I / III
Course Number and Section: 14:332:493:03
Year: Spring 2021

Lab Report #: Lab1
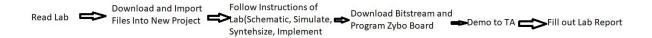
Lab Instructor: Philip Southard

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Date Submitted: 2/25/21

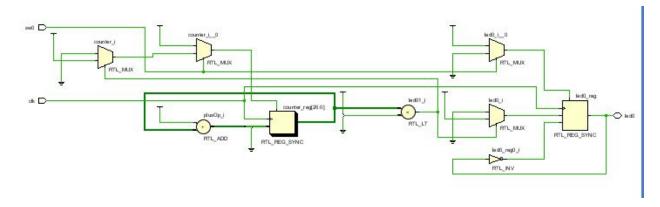**GitHub Link**: https://github.com/felix-shames/Embedded-Lab-1/tree/main

Purpose/Objective: To make a clock divider, buttons, and a counter work together in a circuit.

Theory of Operation:

Read Lab ⇨ Download and Import Files Into New Project ⇨ Follow Instructions of Lab(Schematic, Simulate, Syntehsize, Implement ⇨ Download Bitstream and Program Zybo Board ⇨ Demo to TA ⇨ Fill out Lab Report

Vivado Schematics: <Note: If there are multiple parts of the lab, submit the required **Schematics** and Utilization **Table** for each part of the lab.>

a) Vivado Elaboration Schematic

The clock, switch, and LED were in the constraint file

Answers to Additional Questions and Extra Credit:

Question 1.1: How much do we need to divide our input by to get from 125 MHz to 2 Hz?

62.5M

Question 1.2: How many bits are required to store a counter that can count up to the value obtained in Q1.1?

Question 2.1: What is the value of the button when it is pressed for the Zybo?
1

Question 2.2 (optional): If it were the other value when pressed, would we have to alter our debounce design? Why or why not?
No because the button will still debounce when let go

Question 2.3: If we want our debounce time to be 20 ms, and our system clock is 125 MHz, how many ticks do we need a steady '1' to be read for it to count as a '1'?)
2,500,000 ticks

Question 2.4: How many bits are required for a counter that can go that high?
22

Conclusion: From this lab I learned how to properly use counters and clock dividers.

Follow Up: I have underestimated the lab once again and procrastinated too much. I need to start much earlier on the lab and read the book more about buttons and how to use entities together. Also how to properly use testbenches.