ECE474/574 - Lab 4

Introduction

We will be building upon Lab 3 to use 3 digits of the LED display to show an event count. All the digits will be visible at once since we will use time division multiplexing. We will also use pulse width modulation (PWM) to increase or decrease the brightness of the LED display. There are many ways to do this. I will help you get started but the final implementation will be up to you.

Assignment

For this lab you are required to have 3 digits (left-most, MSB digit not used) display a count that the user can increase or decrease by using a quadrature encoder. The displayed count will range from 0 to 999. Incrementing the count beyond 999 results in a count of zero. Counting backwards from zero yields a count of 999. You will also implement leading zero suppression. For example, a count of 23 would not be displayed as 023.

The brightness of the LED display will be controlled by a push button. Holding the button will cause the brightness to increase until maximum brightness and then start back at minimum brightness. It will increment levels at approximately 2 second intervals. There should be at least 16 distinct levels of brightness but you can do more if you would like. You need to be able to easily see the difference in brightness.

Checkoff

You will need to upload your code and a block diagram to TEACH along with getting it checked off in person. Program the FPGA in front of a TA and demonstrate the working code.