EE 231 Prelab 7

Sequential Circuits:
How Fast Are You?

In this lab you will design a sequential circuit to test your reaction speed. The basic idea is that you hit a switch as soon as you see an LED light up. The amount of time you took to react will be displayed on two 7-segment displays. Figure 1 shows the overall circuit that you will design and build. You will use a clock (*clk*) to drive a two-digit counter; the *w* signal will be a pulse that lights the LED. The LED will turn off as soon as you hit the switch, and the signal *Reset* can be used to reset the counters, the display, and get the circuit ready to start over.

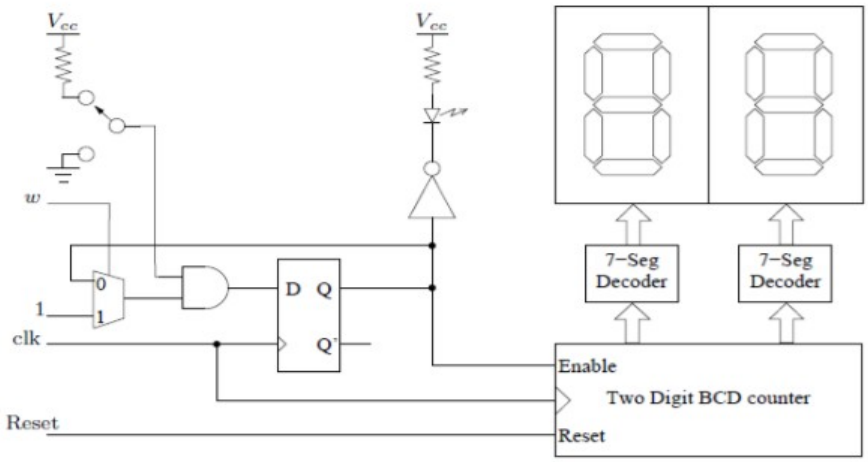

Figure 1: Circuit for Testing Your Reaction Speed

1.Prelab

1.1.We want a minimum resolution of measuring your reaction time to be 1/100 of a second, but your board has a 50MHz clock. **How can you use a counter to generate a clock with a frequency of 100Hz?**

1.2.Now that you have a 100Hz clock, you can use that to count the time it takes you to press the switch after the LED goes on and display that on two 7-segment displays. To accomplish this you will need to write a code that will increment the least significant digit and every time it reaches the number 9 you reset it and increment the most significant digit. Write a Verilog code to implement the two digit BCD counter as shown in Figure 1.

1.3.Write a Verilog code to implement the entire circuit as shown in Figure 1. Use one of the LEDs on your board.