EECS3216

Lab 2

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**Problem Statement**

Write a Systemverilog or Verilog that will contain a switch, 8 LEDs and a button. If the switch is in the position 0, then LEDs will start turning ON from left to right every one second. Until all 8 LEDs are ON, then they go all OFF and the whole thing starts over. If the switch is in position 0, the leftmost LED turns ON, two seconds later the next one turns ON, 1 second later, the third LED turns OFF, half a second ON, the next one and so on until all 8 LEDs turn ON, then they go all OFF and the whole thing starts over. The reset button turns off all the LEDs.

**The Demonstration**

<https://youtu.be/DRxSe6nPKCc>

**Design**

My code works as follows:

There is a counter (currentLED) that tracks the led to be lit up. It increments after every second synced with the 50mhz clock on the DE-10 Lite. The counter is set to 25mhz and is not an invariant. There is a variable called toggle that inverts every time the clock counter reset, this is to ensure that the events take place on the first half of the posedge trigger. There is then a case statement that turns on the LEDs based on what the led counzter is on. It then checks the LED counter, if it is less than 8 the counter is incremented, and it sets a register called twoSecondDelay to 1. What the twoSecondDelay is used in the function that divides the counter in half when the switch is set to 0, it ensures that the 2 second delay occurs after the first LED turns on. If the LED counter is currently 8, the LED counter is reset to 0. It then checks to see if the switch is in position 1 and sets it to the clock counter to 25mhz and the twoSecondDelay to 1. If the switch is 0, it checks of the twoSecondDelay is 1 and if the currentLed is 0. If both conditions are true, the clock counter is set to 50mhz else it divides the counter in half. There is a bouncer that limits the amount of reset button inputs to 1 second. When pressed, the reset button turns off all LEDs and resets the counters.