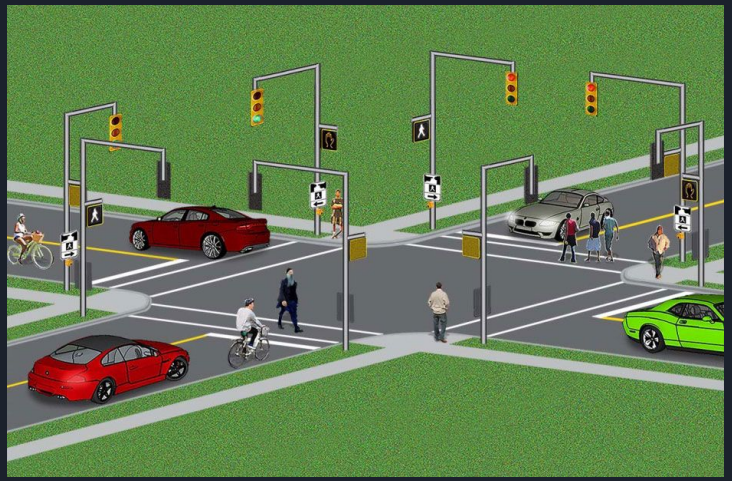
Traffic Light Controller

By: Damion Duemling
Kristi Stefa
Aaron Gott
Andres Manzanares

ECE 2700

Brief Description

- 4-Way Intersection Traffic Light Controller
- Used on a daily basis
- Four different modes (Standard, Rush Hour, After Hours, & Crosswalk)
- We established one street as the Main Road, while the other as a back road
- Used Vivado code & Nexys4 DDR board to control it

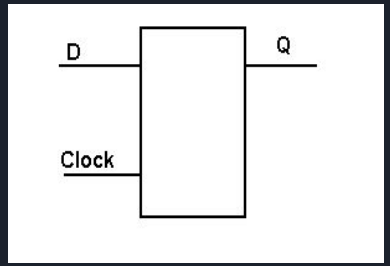


Modes

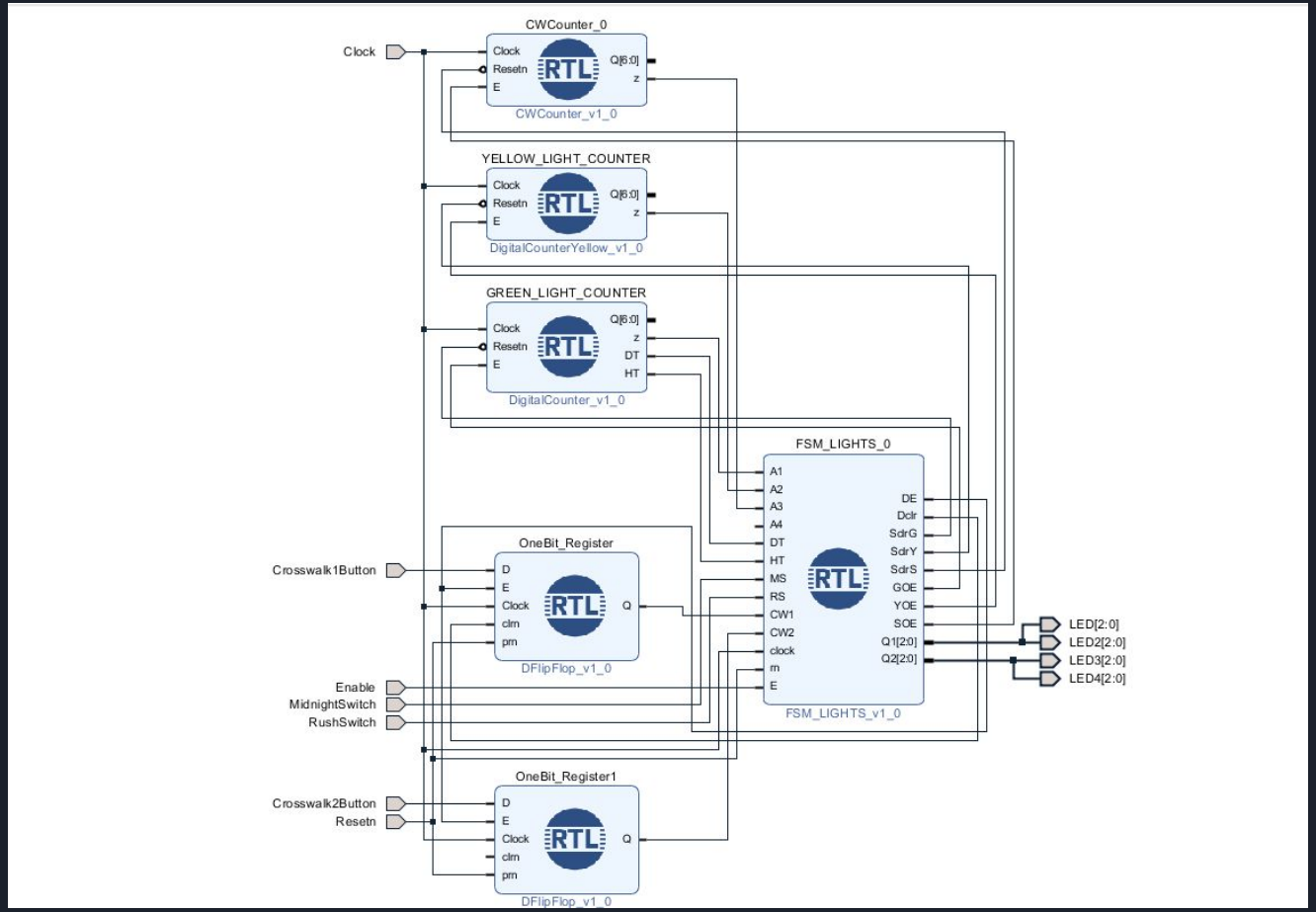
1. Standard Mode- traffic light will typically be in this mode during the day.
2. Rush Hour- this mode will activate in the afternoon when people get off work. The green light for the Main Road will stay on for longer, while the green light for the back road will stay on shorter.
3. After Hours- will activate usually at midnight and will make the main road's light blinking yellow and the backroad blinking red.
4. Crosswalk- if either of the crosswalk buttons is pressed then the traffic light will turn red within seconds allowing the person to cross the road.

Components

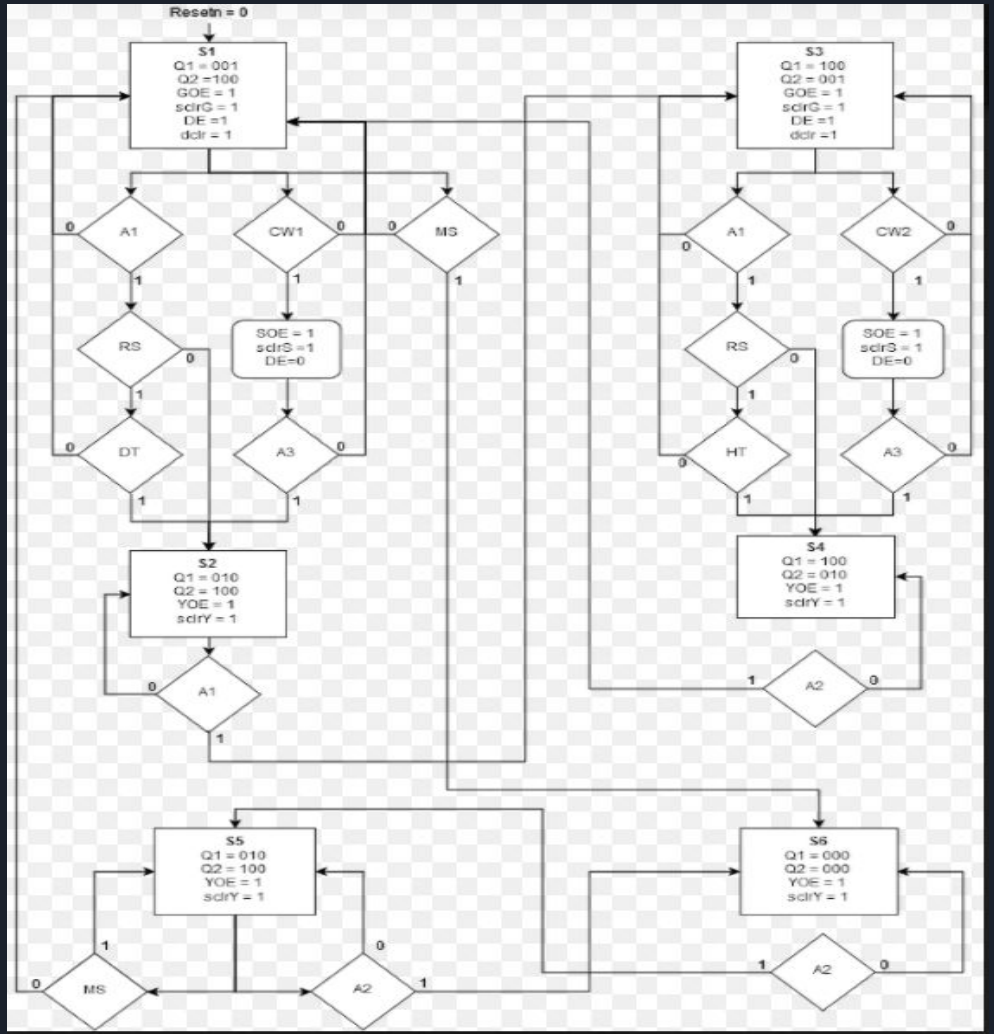
- **3** Counters: Green light, Yellow light, & Crosswalk
- **2** D Flip-Flops: one for the crosswalk button in the Main Road and the other for the crosswalk in the back road.
- **1** Finite State Machine: handled all the States of the traffic light controller



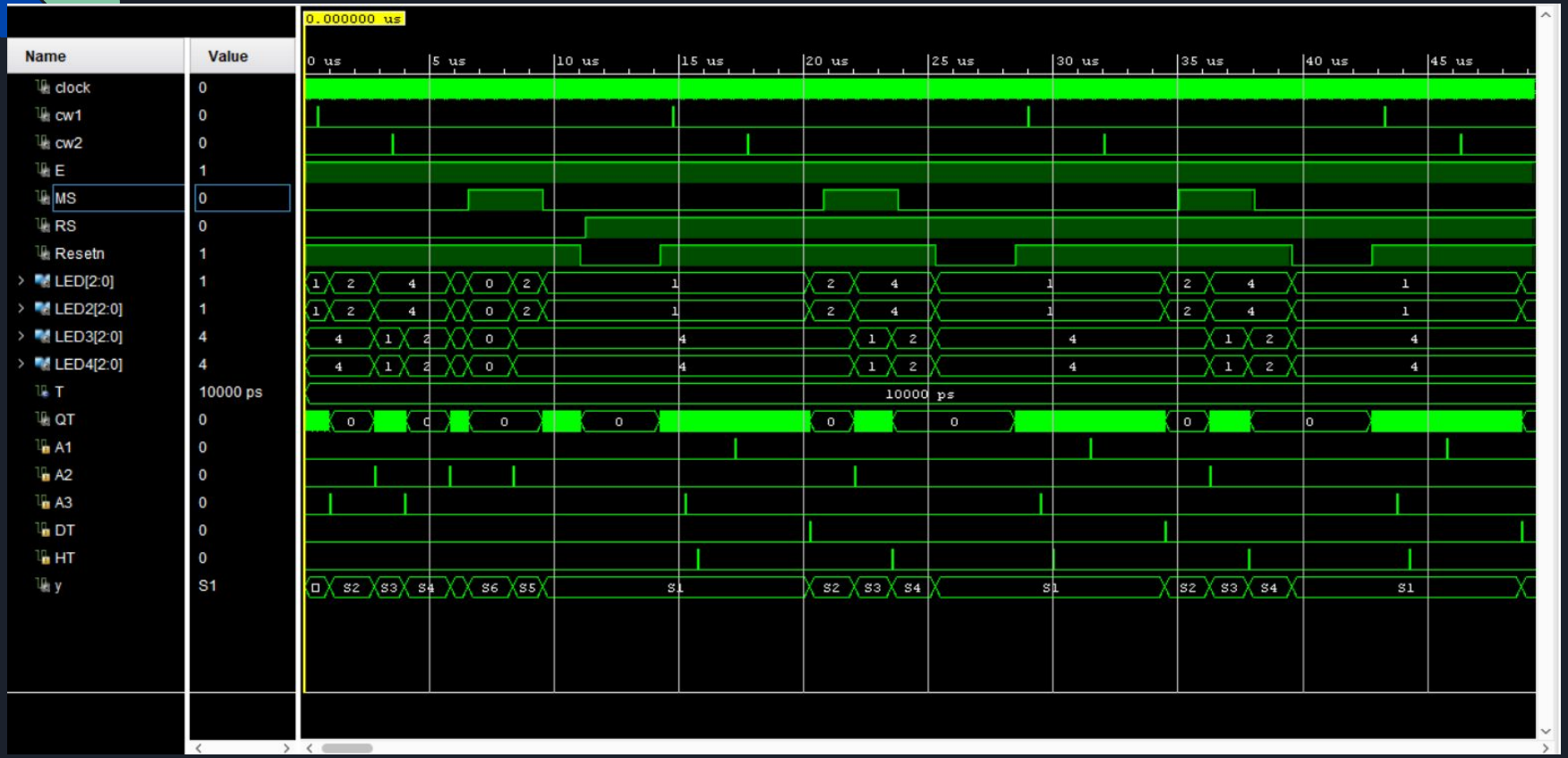
Block Diagram



State Diagram



Timing Simulation

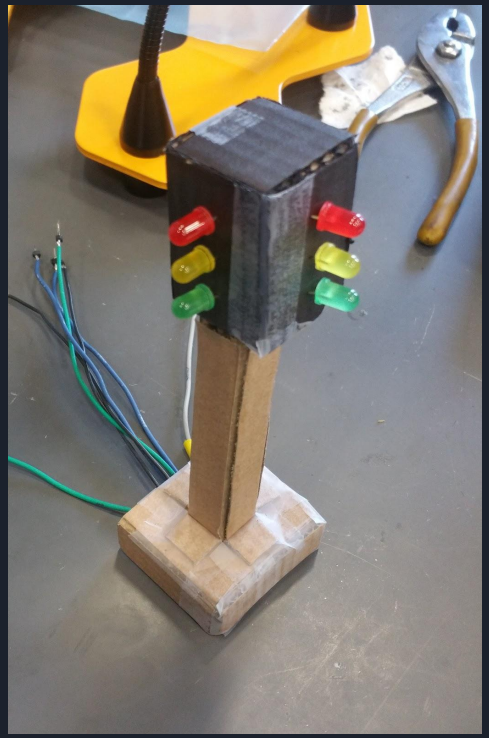


Model Description

- The traffic lights are connected to the Nexys-4 FPGA through the PMOD headers.
-We used LEDs, wires, one 100 Ω resistor, Nexys-4 FPGA and bread board.

-Our LEDs are controlled by a 3-bit output for each traffic light.
000 --*All OFF*
001 --*Green ON*
010 --*Yellow ON*
100 --*Red ON*

Original Model



Problems/Improvements

Problems we encountered

- We had one main problem with the Rush Hour Mode; the traffic light would stay in State 1 at all times unless we pressed the crosswalk button.

Future Improvements:

- Put induction-loop sensors to see if there's any cars waiting for the traffic light to change.
- Add a camera to each light to snap a picture of a car's license plate if they cross on red.