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| ksuBlackLogo.jpg | Computer Engineering Dept.  College of Computer and Information Sciences  King Saud University | CEN 317: Logic Design Laboratory-II  Prepared by: Eng. AbdulMAlik Rahhal |

**Experiment 5: Traffic Light Controller**

**Objectives**

The purpose of this Exercise is to design and implement a traffic light controller, we will system using FSM digram tool in ACtiveHDL or you can write code.

**Preparation**

• Review finite state machine design.

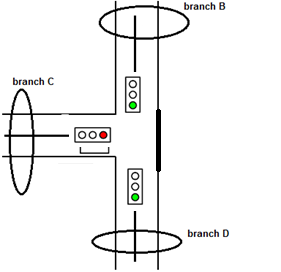
**Equipment Needed**

• ActiveHDL, Quartus II, and Altera DE1 Board.

**References**

•Altera DE1 Board user manual and Exercises.

**Background**

Consider the problem of controlling a traffic light at the intersection of T streets, so there is three branch, B,C,D. At each light signal there is connected camera, so there is three cameras B,C,D. The regular cycle for each signal is 30 second green and 90 second is red. There is no yellow light.

In case current active camera shows there no car in active branch traffic light controller should make current light signal red and move to next branch.

In other word: system has four inputs (counter, camera B, camera C, camera D), also it has four outputs (one traffic light signal is green and all other is red).

**Lab Assignments**

**Select one of your Design alternatives and implement it on the DE1 board as follows:**

1. Create a new Quartus II project for the FSM circuit. Select as the target chip the Cyclone II EP2C20F484C7, which is the FPGA chip on the Altera DE1 board.

2. Write a Verilog code or use FSM diagram tool that represent the circuit and use the toggle switch SW0 on the DE1 board as an active-low synchronous reset input for the FSM, use SW1, SW2, SW3, SW4 as the *camera* input. Use the green light LEDG0 as the output of green light signal, LEDR0,LEDR1 and LEDR2 as the output of red light signal..

3. Include the Verilog file in your project, and assign the pins on the FPGA to connect to the switches and the LEDs, as indicated in the User Manual for the DE1 board. Compile the circuit.

4. Simulate the behavior of your circuit.

5. Once you are confident that the circuit works properly as a result of your simulation, download the circuit into the FPGA chip. Test the functionality of your design by applying the input sequences and observing the output LEDs. Make sure that the FSM properly transitions between states as displayed on the red LEDs, and that it produces the correct output values.

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