Digital Logic Design Lab #6

Objectives
1) Design and Analysis of Finite State Machines
2) Proficiency in requirement analysis, logic design, implementation and testing processes.

Materials
1) Textbook: Digital Logic Design
2) Course Website: www.EngrCS.com
3) Instruments: Power Supply, Function Generator and Oscilloscope
4) Supplies:
    a) Proto Board (1 unit)
    b) Jumper Wires (as needed)
    c) LEDs (3 red, 3 green, 3 yellow)
    d) 1 kΩ resistor (4 units)
    e) 74LSXX and NE 555 (As needed)

Experiment #1. Delay Circuit
Design and implement a 2-4 second delay using 74LS374 and NE 555. Assuming NE 555 is configured to generate a 2 second clock pulse.


Experiment #2. Intersection Control Signal System with Time Delay
A three way intersection is in need of a traffic signal control system and you have been assigned the task to design and implement the system. Each direction has only one lane and one set of signal control lights (green, yellow and red). Your design should only allow one go or green light at a time. Further, all transitions from green to red should go through an intermediate 2-4 seconds yellow light.

Your deliverables should include:
    a) Sketch of the intersection with variables identified and respective values defined. Clearly describe any additional assumptions or rules you have added.
    b) Document design with tools such as characteristic table, truth table, k-map, state diagram, physical layout, schematic and other as appropriate.
    c) Implement the intersection control signal using LED's to represent the lights and switches to represent arrival and departure of cars.
    d) Demonstrate your final implementation to the lab instructor based on your test plan which you have already used to validate the design implementation.

Hints: There are multiple design options. One option is to use the logic from 3-way intersection control signal design in earlier lab. The output from that design should be use as input to a delay circuit that is described by the following timing diagram to generate yellow and red lights:

Green1

Yellow1 ← 2-4 Sec. →

Red1
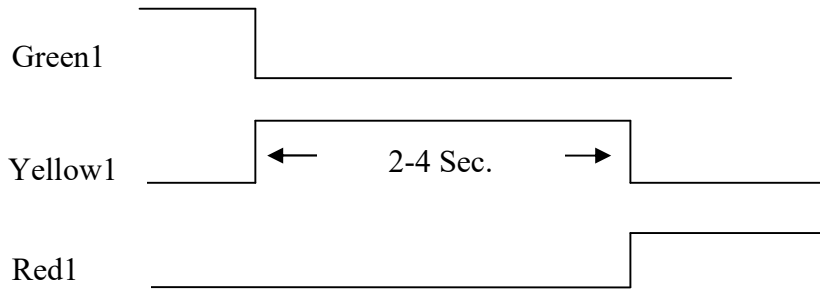
Include the approval signature in your report:

Team Members:	LAB6 Demo Instructor Approval Signature & Date:
• • • •	

Report Requirements

All reports must be computer printed and at minimum include:

For each Experiment

a) Clear problem statement; specify items given and to be found.
b) Identify the theory or process used.
c) Documents resulting system diagram, schematics, tables, timing diagram, schematic and other relevant results.

For the report as a whole

a) Cover sheet with your name, course, lab, date of completion and team members' names.
b) Lessons Learned from the experiments.
c) A new experiment and expected results which provide additional opportunity to practice the concepts in this lab.