SANTA CLARA UNVERSITY

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Laboratory #2: Design Capture and Simulation

For lab sections Monday-Friday Oct. 5 – Oct. 9, 2020

I. OBJECTIVES

- To familiarize yourself with the Altera Quartus II design program.
- To design a schematic, and simulate the circuit in the Altera Quartus II design program.

PROBLEM STATEMENT

You are to design the controller for a light that functions both as an ordinary light and also as a motion activated light and alarm.

- If the manual switch S is on, then the light L is on.
- Besides the manual switch, there is a motion detector, M1, which activates this light.
- If motion is detected but the light is already on because S is on, then a second output A, an alarm, is turned on.
- The disable switch, D, **disables the motion activated light and alarm** but still allows manual control operation of the light using switch S.

II. PRE-LAB

(i) Read the problem statement and clearly identify the inputs and outputs for the circuit you are designing.

(ii) Create the truth table for this system; include the light, alarm, switch, disable, and the motion sensor.

(iii) Draw a schematic of this system.

(iv) Read the references below which have information needed to implement your circuit. In the lab your TA will demonstrate the implementation, and it will be much easier to understand the details if you have read the documentation in advance.

a. Quartus Prime Introduction Using Schematic Designs (the file is called Quartus_II_Introduction.pdf) p 1 - 36:

III. LAB PROCEDURE

Design and simulate your motion circuit with the disable feature in Quartus II:

- Use a procedure similar to the tutorial to create the schematic from your pre-lab in the Quartus II program. Take a screen shot of the schematic for your report.
- Follow the procedures from the tutorial to run a simulation of motion circuit with the disable feature. Be sure to test all possible input combinations. Save screen shots of the simulation waveforms. This should match pre-lab tutorial.
- Demonstrate your circuit to your TA, and answer any questions the TA may ask of you.

IV. REPORT

Write a short introduction and include your prelab.

Describe the procedures your group took to design and simulate the schematic.

Include your schematic and simulation results.

Summarize the questions that the TA asked you about your design.