EE313 Digital Systems
Final Design Projects

Group Projects: Each group of two or three midshipmen will choose a design project from the list shown below. Each group will maintain a formal lab notebook documenting the daily work accomplished on the design project will prepare and give an oral presentation of their project. The oral presentation should focus on teaching us (i.e. go through the procedure, objectives, problems, conclusions) and should culminate with a demonstration of your project. The presentation should be 7-10 minutes in length.

1. Design a dice game with the ability for a user to play against the computer (DE2 board). Use the 7- segment display to show the results of the roll of the dice and develop a score keeping system.

2. Design a simple version of the card game blackjack. Allow a user to play against the computer (DE2 board) with the 7-segment display showing the cards. Develop and implement a score keeping system.

3. Design a four-way traffic light control system. The system should illuminate green, yellow, and red LEDs in the proper sequence to control an intersection with North/South and East/West traffic patterns.

4. Design a combination lock that allows the user to configure a 4 decimal value sequence password and then provides access control based upon that sequence. The lock should not allow more than three attempts for a user to input the correct combination.

5. Design a system that will turn on the light as the first person enters a room and turn off the light as the last person leaves. Assume that there is a single door and only one person can enter or leave the room at a time. Use photocells (or similar sensors) to detect a person entering or leaving the room.

6. Design a Morse code decoder. The received code should be displayed continuously on a LCD display on a DE2 board. Ask your instructor for more information.

7. Design a simple processor that supports all of the operations listed in the table below.

Operation	**Description**
A ← Number	Load an 8-bit number to register A
B ← Number	Load an 8-bit number to register B
A ← B	Transfer B to A
B ← A	Transfer A to B
Inc A	Increment A (signed number)
Inc B	Increment B (signed number)
Dec A	Decrement A (signed number)
Dec B	Decrement A (signed number)
A + B	Signed addition
A - B	Signed subtraction
A * B	Signed multiplication

8. Design a project of your own interest. Special projects must have a clearly outlined proposal and receive approval from your instructor.

NOTE: ALL PROJECTS MUST BE UNIQUE!
YOU MAY NOT COPY OR DUPLICATE THE WORK OF OTHER OR PRIOR PROJECTS!
DOING SO WILL RESULT IN A 0 FOR THE PROJECT PORTION OF THE GRADE AND AN HONOR OFFENSE VIOLATION.

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Requirements:

1. A one page formal description of your project.
2. A formal presentation (7-10 minutes per group).
3. A demonstration of a working project.
4. A lab notebook documenting the daily work performed on your project. The lab notebook shall be maintained in accordance with established guidance contained on the EE313 website.

Deliverables:

1. A hard copy of the formal project description.
2. The lab notebook illustrating the daily work performed on your project (Requirement 4).
3. A CD that contains:
    a. The formal description of your project file (Requirement 1).
    b. A project folder including your Quartus design.
    c. A formal presentation file (Requirement 2).
    d. A "readme.txt" file that explains how to set up your project step by step.