EC311 – Introduction to Logic Design
Laboratory 3 (Lab 3)
Combinational/Sequential Logic Design: Designer's Choice!
Due 10/30

Introduction

In this laboratory, you will build on your Lab 2. This lab is flexible and hence will rely on a much stronger demo aspect of your lab since all teams will not be doing the same thing. You must modify your design based on the following options:

Input/Output (choose 1):

- **Change the input mechanism** for your design. This can include using combinations of pushbuttons and switches.
    - This may require sequential logic design elements. For example, you might push a certain button repeatedly to "count" up to a certain number. This would require a counter and "memory".
- **Change the output mechanism** for your design. You can use the 7-segment display in new ways, LEDs, or any combination. Feel free to provide other output mechanisms (for example if you want to push yourself, figure out how to hook a speaker up to the board. You could then output specific sounds if you like).

Design (choose 2):

- **Modify your ALU**. You can add more modes, more bits, etc. You could add a comparison module or multiplier for example.
- **Modify your Decoder**. You can add extra functionality as you like. More instructions for example.
- **Add a sequential logic element**. Examples include:
    - Counters
    - Memory
    - State Machines
- **Add a new peripheral**. If they help with I/O you can double count them. These include (but are not limited to):
    - Mouse
    - Keyboard
    - Speakers
    - Camera

Surprise (choose 1):

- Do one thing not covered previously. Ideas include:
    - Networking
    - VGA display
    - Use Temperature sensor to display room temperature on 7-segment display in ^{o}F or ^{o}C
- Any other idea ??

Approval Process

Once you have decided on what you are going to do, email both Prof. Densmore and your TA your list of features. The subject of your email should be "EC311 Lab 3 Proposal – <Team Member 1> and <Team Member 2>". For example, "EC311 Lab 3 Proposal – Homer Simpson and Bart Simpson". You should format the mail as follows:

Input/Output Changes - <list>

Design Changes - <list>

Surprise Changes - <list>

Summary Paragraph

We will then approve the lists and provide feedback. DO NOT proceed with your design until you have gotten approval. Save the approval mail in the event that there are any grading or communication issues in the future.

What to turn in (ZIP 1-3 together):

1. A README.txt file that explains your submission, its organization, and includes both team member's names and UIDs. **You also need to add a jointly approved contribution statement with both team member's signature.** Also, provide a link to your YouTube video. Feel free to include any other comments you want your TA to see that will be relevant while they are grading the assignment.

2. Verilog files (.v) for all of your design. Again, make sure this is explained in the README file. Zip these together in an organized way and use good naming conventions.

3. Testbench files. There is not an exact amount required. Include those that show that you thoroughly tested your design. Explain your thought process in your README.

4. **Create a 4-5 minute DEMO video.** You need to show the following in your video:

- **~2-minute code overview**. USE SCREEN CAPTURE SOFTWARE. Don't just scroll through your code. Pick 2-3 interesting snippets and discuss them. BOTH partners should contribute to this discussion
- **~2-minute overview of the design running**. Be sure to clearly film what is happening. IF YOU CAN'T DO THIS IN THE LAB, then film the simulation using screen capture software. Then schedule this portion of the demo virtually with your TA at another time.
- **~1 minute discussion of why you did what you did for the lab.** Talk about successes and failures. Both partners should be part of this.

A YouTube channel will be provided for you to upload your videos. The link will be posted to Piazza.

Help

Post your questions on Piazza.