CS M152A Lab 4

Creative Project

Your Final Project will be an open-ended project in which you will show what you have learned throughout the quarter.

Introduction

For your final project, you will design, implement, and demo a circuit for a project of your own choosing. Your project must utilize the FPGA board and must be approved by your TA. Your TA may add requirements to your project idea to ensure it meets class standards. You will be graded on the initial project idea proposal, the creativity of your ideas, the complexity of the end result, the quality of your design, and the project report.

Project Proposal

Requirement

You are required to write a proposal for the project. The proposal shall have clear description of what you propose to design. Describe its functions and requirements as clearly as explaining to another classmate.

The proposal shall contain a correctness rubric that breaks up the project's demonstration into four parts. Your project will be graded according to the rubric that's agreed by you and your TA.

Feedback and Revision

Your project will be reviewed by the TA(s). You will receive feedback on your project difficulty and creativity. The feedback is relative to your classmates. The TA may decide that your proposal is too easy for the final project. In that case, you have to propose another project. The TA may also give suggestions for improvement on your proposal.

You should revise your proposal accordingly. This is an opportunity for you to improve your creativity and difficulty marks, and incorporate the feedback from your TA. Be advised that by increasing the difficulty of the project, you run the risk of not finishing it on time, or failing the correctness rubric, thereby hurting your final grade.

Project Design

Technical Aspect

The final project should reflect the knowledge and skills you learned in previous labs. Some of the interesting modules to consider are: speakers, VGA (see this demo), PMODs(joy sticks, number pads, see the reference designs), sensors, and all the things we used so far (7-segment display, UART, LEDs, buttons, switches, etc.).

You are also encouraged to check out the Xilinx core generator library (see the Chapter 3, *Creating a CORE Generator Tool Module* in the manual). The library contains many ready built modules that

allow you to access on-chip resources such as RAM, and perform optimized operations such as floating point operation. To access the on-board memory, you need the Adept software from Digilent.

For submodules such as VGA and PMOD, you can use code from external resources. But make sure that you reference the source of the code in your report.

Ideas

This is a non-exclusive list; you are free (and encouraged) to propose ideas outside of this list as long as the proposal is clear, shows creativity, and meets the minimum difficulty requirement.

- Tetris
- Snake
- Pong game
- Blackjack game (Twenty-one)
- Whack-A-Mole
- Dance Dance Revolution
- Slot Machine
- Designing an 8-bit microprocessor with instruction set including Data Transfer instructions, Mathematical operations, Program Flow instructions and Special Operations (NOP, END, WAIT, ...)
- Vending Machine controller

Grading Rubric

This lab does not have a late demo policy. You have to demo whatever you have on the date specified by your TA. The TA may also organize project exhibitions, where groups conduct get to know each other's projects provide peer reviews.

The project grading rubrics are as follows.

Lab Report – 40 points

Lab Demo – 60 points

- Meeting Proposal Requirements– 36 points
- Creativity – 12 points
- Technical Difficulty – 12 points