

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 a 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 to 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(joysticks, 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 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 onboard 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

Here is a list of ideas for your reference. 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
- Blackjack game (Twenty-one)
- Snake
- Pong game
- Vending Machine controller
- Whack-A-Mole
- Dance Dance Revolution
- Slot Machine
- Space Invader
- Machine Learning Accelerator

Note that your TA may decide to ban certain project from the list. Please choose a project wisely as it has a huge impact on your grade and workload.

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 to 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

- Calculation of demo score:
 - Peer review score will be normalized to a coefficient between 0.8-1.0.

-
- TA will be grade the demo based on completeness, difficulty, and the soundness of the design.
 - Final demo score = coefficient * TA score.