PROJECT - ECE 287

### Instructor: Peter Jamieson

## Description:

You will be defining, proposing, and building a project of your choice for Digital System Design. This document describes the type of projects you are expected to do and how the project will be evaluated. In addition, the deliverables are described, and I’ve provided some tips/thoughts to consider as you build your project. The project is worth 30% of your final mark in the course.

## Projects types:

You have the choice of participating in the predefined project or building an open ended project of your choosing. Regardless, the project is your own proposal with you and your lab partner for implementing some design. The project must broadly fit under the following categories:

* **A digital design built** on the DE2 board (or equivalent board) that uses aspects of digital design including: FSMs, combinational logic, and arithmetic operations. Purely combinational projects (unless highly complex) are insufficient projects. Here are some examples of open ended projects:
  + Build a Pong game with NES controllers (100 hours of work)
  + Build an 8-bit processor that executes a program. In the past someone built a PIC processor (this took over 100 hours of work)
  + Implement a video game on the DE2 board. In the past, someone built a maze game using the VGA out port (this took over 70 hours of work)
  + Build a digital design that corresponds to some real-world problem and helps solve that problem.
  + Generate an IP core for a GroundHog 2009 benchmark. In the past, people built a DES encryption core (this took over 100 hours of work and one group failed)

## Evaluation and Procedures:

The following deliverables are part of the project:

1. An oral proposal of your project to me that I will either accept or reject. A reject means you need to come up with another proposal or modify your existing proposal to meet a suitable standard (.5%). **Done by Date PA**
2. One page proposal and plan based on an orally excepted proposal (.5%). **Due Date PB**
3. Demonstration of working project (19%). **Due week of PC to PD**
4. Project wiki (10%). **Due PE.**

**Note: PA, PB, PC, PD, and PE are listed in the syllabus.**

#### Oral Proposal (1% of 30%)

The oral proposal is essentially a meeting with me and your lab group where you explain your idea for a project. I will ask what your basic plan is, evaluate how difficult the project is, and make suggestions for your written proposal and plan. The condition of continuing to step 2 is that you need me to accept that this is a reasonable project choice, and I’ve checked you off my list giving you the 1%.

#### Written Proposal and Plan (1% of 30%)

The written proposal and plan is a formal description of your project and a preliminary plan of how you are going to achieve a successful project. The proposal should be made on your course wiki. This document should provide you with a direction on what steps you will need to take, what features you will include, and how you might divide the work up.

#### Demonstration (18% of 30%)

In the final week of class, you will need to show a running version of your project. I will then ask questions to find out how much you both understand of the project. I will then mark the submission based on how it compares to other projects in the class, and how successful you were in achieving your goals. At a minimum for 10 out of 18 you need to have an FSM with 10 states and interface with at least one peripheral that is more complex than the LEDs and switches. A non-working project will result in 0 out of 18.

#### Project report (10% of 30%)

The final deliverable is a project wiki with report or your own external web page/blog/etc. This report should include most of the following sections (if they apply to your project):

* A high-level description of the problem
* A relevant background information to understand the problem and to get more information on the problem
* A description of your design in a form that people who aren’t familiar with the work can understand how the design was achieved. Imagine one of your classmates was to use your project and extend it. What would they need to know about how you built your project
* A presentation of any results. This can include some metrics in terms of your design and how you improved it, results generated by your design, etc.
* A conclusion summarizing the project and what was presented in this document
* Pictures or movies of your system and design process
* Your design files

Length of the document is not how it will be evaluated, and instead the report will be evaluated on communication quality (1%), quality of problem description and design description (3% and 4%), and finally, overall usefulness and ease of use (2%). Take a look at <http://www.users.muohio.edu/jamiespa/teaching.html> for ECE 387 and 287 examples.

## Comments, Thoughts, and Tips:

Some ideas to consider for this project are:

* Last year only 100% of the open projects were successful. These people put in on average about 30 hours beyond the lab time. Preset projects have been created to help you see a prototype that you can expand from. Unless you and your partner are in the A/A+ range, I will recommend that you do the preset project. Even if you are in the A/A+ range, I still recommend doing the preset project because it is still open ended, but has a more focused aspect.
* A high-quality project is great to use in your portfolio of work when you go to a job interview or other types of demonstrations. Use this project time to be a starting point of your portfolio by making sure to create a propose a project you are interested in, a quality design that you would show to others, and a professional report that communicates well. Videos are a great way to document your system.
* Remember to make and follow some sort of plan on how to develop your project. Don’t expect to build something and then debug. Instead, develop small pieces of the project, test that they are working, and then add more complexity (backing up each stage in case you need to backtrack or demonstrate some working pieces). This is called the spiral model.
* A “complete engineer” is an engineer who can start from start to finish and present a finished product. These people are highly regarded and desired by employers. In many school projects you don’t have to be a “complete engineer” and students tend to deliver what they’ve done so far. This doesn’t work in the real-world, and you should start now in becoming a “complete engineer”.
* Finally, I’ll be glad to give out letters of recommendation for your future careers. These letters will reflect the following two criteria where B is weighted more heavily for job recommendations and A and B are weighted almost equally for academic recommendations (especially the communication skills in B).
  + A) how you did in the course
  + B) what your project was like in terms of implementation and presentation