

Project Assignment

EE 3752 Fall 2017

Synopsis: The project is an assignment to be completed by each team of students that is of the students' own unique topic and design. The project size should be approximately the work effort and code size of two or three of the course lab experiments, but may vary based on the topic and implementation. Each topic and scope must be approved by the lab instructor by the topic due date.

The goal of the project is to not only gauge the knowledge of material learned throughout the semester, but to gauge the ability of the student to build upon that learning by taking it and applying it to other topics or areas that might not necessarily fit inside of the scope of this one class. The ability to choose a topic, flesh it out, create and implement a design, write about that design, and present it to an outside party are all skills that will be further developed and utilized well beyond the scope of this course and the student's college career.

Certainly, the project should be both educational and fun. Working on a project you enjoy is much easier than one you do not, so when choosing a topic, try not to limit yourself to what you already know or are comfortable with, but rather something you know you would want to work on even if not for credit.

Important Dates

November 14 – Project topic approval deadline – any project topic not approved by this date will receive a 5% deduction.

November 28 and November 30 – Project demonstration during regular lab session

December 1 – Project report and code due

Grading

Out of a possible 100 points:

5 points – topic approved by deadline

50 points – project demonstration

45 points – project report

Topics

While much of the course centers around the ARM7TDMI architecture and ARM processors along with Keil IDE, students can work on projects outside of that scope. Topics and implementations are flexible as long as they can be tied back to microprocessors in some way and are of the appropriate size.

Some sample projects from students in past semesters are listed below. Note that these are not chosen because they received the best grades, but rather help represent the variety of choices available.

- Raspberry Pi interfaced with garage door opener to implement 2 step authentication for entry
- Automatic garden watering system using Arduino
- Choose your own adventure game written in ARM assembly
- Gameboy Snake game written in assembly

- Calendar software written in ARM assembly
- Guitar tuner
- Alarm clock (alarm set, snooze, interface with digital display, etc.)
- Morse code decoder
- 4-way traffic light system
- Tic Tac Toe game using LEDs and buttons
- Breakout game using ARM assembly
- Programmable tone/music generator with LED lighting pattern matching the tones
- Simon game using ARM assembly
- Temperature controller for UHV lab

Project Demonstration

Teams will be scheduled to demonstrate their projects during the lab period in the last week of the semester. Each team must conduct a 10-12 minute demonstration of their project to explain their work effort and show the completed work to the lab instructor. Topics that should be discussed during this demonstration include: initial design concept versus final design implementation, obstacles faced and solutions to those obstacles, and applicability to ARM architecture. Students should be able to successfully answer any and all questions from the instructor as well as explain any design decisions. Students are also expected to show and explain their code design during this time.

Project Report

Along with a demonstration, the project must have a report completed. This report will contain full details of all aspects of the project. It will have no minimum length, but should adequately explain the design. It should be written assuming the reader has no prior knowledge of anything pertaining to the project. Visual aids should be included wherever necessary or helpful for reader understanding.

Sections that should be included (not limited to these) are:

Introduction – What is the project topic? Why is it important? How does it apply to what we've learned or are learning?

Background – What information is necessary to understand this project? What background or research did the students have to complete before attempting this project? What materials were required to complete the project? Why were they chosen?

Method – What was the design process like? What was the thought process during project conception? What obstacles were faced that caused the design to change? What is the final design?

Testing – How did the implementation perform? What does it look like? How did it compare to expectations?

Conclusion/Future Work – How does the team feel the project came out overall? How would they improve upon it or add on to it over time?