

Team Project

1. Objectives

Apply the knowledge and skills you acquired in CSCI U210, 310, 321, and 511 (and possibly other courses) to the design and implementation of a project of interest to your team.

2. Project Rules

The exact project topic is largely up to you, but your project must incorporate the following components and capabilities:

- **Interface circuitry.** You should design and build a complete, working circuit that will convert the sensor output into signals that can be handled by microcontroller(s). You have learned the in the past semesters. You should apply your programming skills in the project.
- **Microcontroller/Microprocessor programming.** Your project should be able to respond based on its inputs or algorithm design. You have learned the basic skills of programming. Your project should have more extensive logic and decisions in your programs.
- **Complexity.** Your project must be significantly more complex. The project should typically involve more complicated circuitry, sensors/actuators that you haven't used before (or that are used in more complicated ways), more complicated interfacing between microcontroller(s) and external/internal hardware, more complicated microcontroller programming, and possibly a substantial mechanical component. The complexity of your final, working project will have a substantial impact on your grade.

3. Project Documentation

At least one member of each team (but preferably all) should maintain files documenting your project, including both successful and unsuccessful attempts to design and build the various parts of your project. It may seem strange to document unsuccessful attempts, but those attempts will not show up in your final design, so you will not receive credit for the time and effort if they are not documented. Of course, if everything is successful, that's great, but that's also rare when it comes to designing anything complex.

Project Requirements

Project Proposal: Each team must submit a brief (two page maximum) project proposal in the class. The due date is Tuesday, August 27, 2019 at the beginning of the class. The earlier you turn it in, the earlier you will get feedback and be able to start working.

The team proposal must contain the following:

- Project name and team member names.
- Project description.

- List of parts you will use. Be as detailed as possible, including part numbers where applicable. **For each component, you must specify where you will obtain it: either, personal property, personal purchase (specify distributor and ETA), or another source (which must be specified).**

Mid-project Status Report: Each team must submit a brief (two page maximum), informal status report via BB in MS Word format. The due date is Thursday, October 3, 2019 at 5:00 PM. At a minimum, the report must include **detailed**, bulleted lists of completed tasks and tasks remaining. For tasks that are in progress, indicate the approximate degree of completion as a percentage (for example, if the task is half done, put 50%).

Presentation: Each team must prepare a brief (~15 minutes) PowerPoint presentation for the project. **The presentation will be given during the class session of the semester, and the presentation slides must be turned in via BB at least one day before your presentation.** The presentation must include the following:

- Introduction including your project name and names of team members.
- A description of your project in simple, relatively non-technical terms, including its capabilities and limitations.
- Additional details about your project, broken down into parts in a logical manner.
- Question/answer time.
- Demonstration of your project.

Final Report: Due by 5:00pm on December 5, 2019 via BB. In a single Microsoft Word document, you must include the following items:

- Title page: include project title and names of team members.
- Final project description in simple, relatively non-technical terms. Maximum one page.
- **A team picture with the finished project**
- More detailed descriptions of the various parts of your project and the interfaces between them. Include figures as appropriate to keep the presentation concise but clear. Maximum 3 pages of text, although figures may make it longer.
- Conclusions: What aspects of your project were you happy with, and what would you like to have done better (or what additional functionality would you have added if a little more time was available). Maximum one page.
- References. List any publications and/or websites you have extracted information from, including circuit diagrams, programming code, etc. You must identify what materials you used from those references. It is critical to give proper acknowledgment of the work of others. **Do not present the work of others as your own, as this constitutes academic dishonesty!**
- A table listing estimated hours spent on the project during the week by each team member, and the percentage of overall contribution from each team member. If you cannot agree on this, each team member must submit their individual assessment.

- Appendices: Photo of your project, circuit diagram(s) (if any) with descriptive title(s)/caption(s), code (commented well). I encourage you to take a video of your working project and upload it to BB, but this is not required.

Final Project Grade Breakdown:

- Project Proposal: 5%
- Mid-project Status Report: 5%
- Final Deliverable: 60%
- Final Report: 20%
- Final Presentation: 10%

Sample projects:

- Monitor the system performance in relation to the operating systems concepts of processes, threads, and objects.
- Design a simple contacts database manager that interfaces to a file containing the student's names and information for their contacts.
- Design a programmable breadboard
- Design and develop a multi-core robot
- Performance study of two-level on-chip caches in a fixed area
- An analysis of hardware prefetching techniques
- Implement a microprocessor on the DE2-115 FPGA
- Video gaming via text on a Raspberry Pi
- Profiling Matrix Multiplication Using CUDA