# UCR EE/CS 122A
# Final Project

**Introduction**

You will work by yourself or with one partner to implement a custom project on the **ATMega1284** microprocessor. You are encouraged to be inventive and unique in your design! Try to solve an everyday problem, or make a convenience item you, your friends, and family could use at home. You can use components from previous labs and/or new components. Buying a new component does NOT get you a better grade and is NOT required to get an 'A'. As much as possible, your implementation should involve concurrent synchSMs implemented with no variations from the structured techniques in PES (task scheduler, etc.). Your project MUST utilize the USART or SPI functionality in a non-trivial way. You may either have your two microprocessors talk to each other, or your microprocessors may communicate with your partners microprocessors if you choose to work with a partner.

**Final Project Complexity**

This project represents the culmination of what you have learned during this class coupled with your individual creativity and the amount of time you are given to complete it. Because of this, we expect to see a project that both highlights what you have learned in this course, as well as what you are capable of as an upper division engineering student. This means that your project should not be a combination of only what you have learned in this course, but should go above and beyond the course teachings. Because these complexity requirements are hard to quantify, you will be required to submit **and present** a project proposal and receive approval from your TA before beginning.

**Final Project Timeline**

Below is an overview of the final project components as well as a timeline for their completion. There is a section that goes into more detail for each piece below.

- Project Proposal (PDF due November 2nd)
- Project Milestone (November 16th)
- Final Demonstration (November 30th)

**Project Proposal**

Your project proposal should consist of the following sections (this document should be typed and will be submitted).

- Project Title
- Your Name(/Partner's Name)
- Short project overview (3 - 5 sentences)
- List of complexities

    - complexity description
    - progress completed for milestone
- Timeline for milestones
- Use of USART/SPI for communication
- High level FSM illustration of your system

In addition to this written proposal you (and your partner) must prepare a 3 slide presentation (30 seconds to a minute in length) that you will present to the class during Week 6. The slides you must have include:

1. Title slide
    a. Project title
    b. You and your partners names
2. Description of the project
3. Project Timeline

**You must submit your slides by11:59pm the night before your scheduled presentation. A sign up link will be provided on ilearn.**

**Project Milestone**

We wish to encourage an iterative design approach, as such, the project will be demo'ed first as a milestone and then as a final finished version. Your project milestone should be a relatively functional version of your final project, and your proposal should state what functionality your project will be in at the milestone. You must meet or exceed this level to get full credit for your milestone. Functionality is the goal here, and bugs in a milestone are to be expected.

In order to facilitate allowing everyone to demo, you will be given a specific time slot (during your assigned lab) during which you can demo. You will be given very little time to demonstrate your milestone, so you MUST practice your demonstration BEFORE your assigned demo time. Your TA may have questions about your project after your demonstration you should be prepared to answer. You will be required to demonstrate all the functionality that you agreed to have finished in your proposal.

**Final Demonstration**

You will give your final demonstration during your final lab of week 10. The final demonstration will be very similar to the milestone demonstration. You will be assigned a very short period of time to demo with a short Q&A with your TA afterwards.

**Tip**: Practice what you want to say about your project before the event and organize your thoughts. Also avoid negative connotation, every quarter we hear people start off their demo with, *"It's very simple ....", "It's kinda dumb but...", "This is all I have working...."*, etc. You put a lot of time and hard work into this! **Be proud of your work**! Even bugs and mishaps are part of the learning experience, highlight them through that lens.

**Final Submission**

**Demo video**

Prepare a 90-150 second video (no shorter, no longer) of your final version. Upload to YouTube with the EXACT title format:

"UCR CS 122A Fall 2014 -- *Firstname Lastname* (with *PartnerName*) -- *Custom lab title*"

*Your video needs to be publicly viewable and the description should summarize functionality.* The video should demo the functionality of your custom lab, adding captions/annotations (YouTube provides the ability to add those items) to describe/highlight important features. While the video should have sound (for speaker sounds, your voice explanation, or background music), *the video should be fully understandable without sound*. (When searching for jobs, considering linking to this video from your resume/web-page/facebook-page/etc.).

Tip: If recording on a phone, you will want to record in landscape mode. Portrait mode causes the black bars to appear on either side of the video.

**Custom lab folder and submission**

Create a Google doc folder
Make sure the folder is sharable with the link (no login required).

Idea is to create something you can link to from your personal homepage, for future job searches.

Add to the folder a 1-page gdoc custom lab summary named REPORT_cslogin.

- High level description of custom lab (derived from your proposal).
- User guide (Rules, controls, and any special considerations).
- Technologies and components used in custom lab (AVR Studio 6, ATmega1284, etc.).
- Link to demo video.
- Link to each source file and few-word summary of file's purpose.
- Add to the folder image/drawings explaining how components were connected to the microcontroller (e.g. which pins you used).
- Add to the folder a sub-folder with all source files (.sm, .c, .h).
- Be sure to cite sources, include IEEE and Internet found code.
- Submit *URL* of custom lab folder on iLearn as a link.

**Grade breakdown:**

- Proposal: 10%
- Milestone: 10%
- Final Demo: 65%
- Video: 5%
- Report: 10%