

Lab 5: Create your own lab

Important update regarding ABET assessment

Since we'll be using this lab for the ABET assessment, the lab report deliverable has been modified and the newly added deliverable is highlighted with the bold font. We'll be looking for exhaustive documentation on the following things in your lab 5 report. We appreciate your close attention to this requirement.

- The steps you take to address a problem: how you identified a specific problem, what experimentation is conducted, how you interpret the data generated from the experiment, what engineering judgment you use to draw a conclusion.
- Describe how you apply engineering design to produce solutions that can be fit to specific needs, consider public health, safety, and welfare as well as global, cultural, social, environmental, and economic factors.

Introduction

Lab 5 is the final lab ECE/CSE 474. It's a lab just like any other, except this time, it's up to you to decide for yourself what you would like to work on. It's an opportunity to use everything you've learned and apply it to a project of your choice. We'll give you some general requirements and advise, and the TAs will be available to help, but otherwise, everything is in your hands.

The goal of the project is to use the TM4C123G LaunchPad to do something interesting. What is interesting? That's up to you! Be creative and think of something that is appealing to you. With that being said, it's important that you make sure that your choice is reasonable. You don't have a lot of time, and the end of the quarter will be here sooner than you realize.

Assignment

For this lab, you are permitted to work in groups. Each member of the group is expected to be responsible for at least one new module - hardware/protocols that we didn't cover in labs or homework.

Modules you could implement for this lab include, but are limited to, the following:

- External modules used as sensors, system inputs, or system outputs
- Front-end software interfaces (android app, web server)
- Direct memory access (Datasheet page 585)
- Communication protocols, such as I2C (Datasheet page 997)
- Pulse width modulation (Datasheet, page 1230)
- Real-Time Operating System

While each member of your group is responsible for their own module, you should work together as a team, especially when it comes to integrating each module as a single system. Each team member should contribute equally.

For an example of what this should look like, a group of two students could consider using an analog thumb joystick for player input and an external sound system to play sounds to create a game on the LCD Display.

Note that, in this example, your group would require an extensive amount of integration between different systems and they would need to acquire components outside of what is provided to you in this course. Also note that this example would likely prove to be very difficult! Be mindful of how much time you have remaining in the quarter.

Lab Demonstration

Demonstrate your work to the TA.

Submission

Submit a short lab report that includes the following sections:

1. Procedure
 - Describe how you approached the lab and include any relevant diagrams, schematics, etc.
2. Results
 - Describe the results obtained in the lab. Give a brief overview of the finished product, as it relates to what you set out to do.
 - Include any relevant images, screenshots, etc.
3. **Problems Encountered and Feedback**
 - **Describe any issues you had while completing the lab, and how/if you were able to overcome them. Provide exhaustive details on how you identified the issue, what experimentation did you conduct, how you interpret the data generated from the experiment, and how you use engineering judgment to draw conclusions.**
 - Include any feedback you have about the lab, or any tips and tricks that you learned that may be useful to students in your position in future quarters.
 - Include how many hours you spent in completing this lab.
4. **Conclusion**
 - **Describe how you apply engineering design to produce solutions that can be fit to specific needs, consider public health, safety, and welfare as well as global, cultural, social, environmental, and economic factors.**
5. Appendix
 - In your Appendix, include any code you wrote in the lab. This should be **formatted and commented**.

A good resource for formatting code for Word documents is found here:

<http://www.planetb.ca/syntax-highlight-word>

Additionally, submit your commented .c and .h files.

Grading

Your grade for this assignment will depend on the following:

- Lab demonstration: **50%**
 - o Your lab demonstration will be graded based on your completion of the lab, your ability to answer questions, and your understanding of the course material.
- Lab report: **20%**
 - o **Your lab report should include all the sections and be exhaustive in addressing the ABET requirements.**
- Code comments: **30%**
 - o Comment your code! Your code should have function comments and in-line comments where appropriate.