CS152B Final Project Proposal Guidelines

The final assignment for the quarter in CS152B will be a self-proposed project that emphasizes tools, hardware, and algorithms not covered in previous labs. This large project will be the focus of the remainder of the quarter. It is highly suggested that you incorporate hardware, algorithms, and IP cores not covered in the previous lab assignments. Once you formalize a final project idea, it is encouraged that you discuss your idea with the TA.

BASIC PROJECT IDEAS – These modules can be starting points for more ambitious projects.

(1) RF modules

Successfully transmit and receive data wirelessly between two FPGA boards (or one board and PC) using the WiFi or Bluetooth modules available in the lab.

(2) LCD Displays + Touchscreen

Write a device driver for the Microblaze platform for drawing on an LCD display.

Once you have written a device driver, you can use your display to make a game, (ie. with joystick and keypad).

**Note: Several groups have attempted to get the LCD displays working during the last quarter, but were unable to because of a lack of documentation and resources. Keep this in mind if you intend to go down this route. Any group which successfully incorporates the LCD/touchscreen displays into their final project will get extra credit. **

(3) iRobot Platform

Be able to program the iRobot modules to move in a specified path. Once you are able to interface with the iRobot Create, it is suggested to incorporate different sensors and algorithms to make a complete project.

Note that there are three different getting-started guides to help you with this

(4) Camera Platform

Interface between the camera modules and the Microblaze / FPGA platform, and process / iterate through the pixel data through C code. You can then implement a real-time DSP application (ie. edge detection) for your final system.

Getting-started guide is available for this module

(5) Inertial Sensing Platform

You can use the accelerometer / gyroscope boards for applications such as activity recognition and motion detection. For example, a system that can identify different exercises (pushups, walking, squats, etc.).

(6) Other Modules

You can use another *advanced* module as a starting point for your project. You are welcome to bring something from outside, or look through the lab to see what is available. Examples include light sensors, infrared (distance sensors), microphones, Hall Effect sensors, etc.

PROJECT EXTENSIONS

If you finish one of the base projects early, it is recommended that you design a full system around your technology such as a game, or signal processing application. It is also possible to integrate other simpler peripherals such as a joystick, keypad, or microphone, to make your system more interactive.

DEBUGGING AND TROUBLESHOOTING

Depending on the project platform that you choose, it is very likely that you are the only one in the lab with significant experience with your hardware. Conducting research in how your device (iRobot, Camera, etc) operates is an essential part of the lab assignment. You will need to find datasheets, read documentation, and use online resources. This is an essential skill for any embedded systems project. It is expected that your project development be highly self-directed. That being said, if you choose a hardware module and after significant effort are unable to get it working, it is completely OK to change your project.

Feel free to use any public-domain code you find online. However, it is essential to specify this contribution in your lab report.

PRESENTATION

On the last day of class, please give a roughly 5 minute presentation + Demo for the class that covers:

1) Motivation / Application
2) Algorithms and Protocols
3) System Architecture
4) Demo

It is essential that your slides follow the specified format (see template document on CCLE)

GRADING

Category	**Maximum Points**
Complexity of Proposal: Were you ambitious?	40
Completeness (Implementation): Does your proposed project work as expected? Are there any bugs or quirks?	30
Creativity: Is your project application novel? Is it useful entertaining? Or just an example of a working hardware unit?	10
Lab Report + Presentation	10
Presentation Slides	10

LAB REPORT

A brief lab report is required, with your system description, algorithms, and relevant code snippets / waveforms. Please upload a .pdf or .docx file on CCLE (or email) by the last Friday of class. If you have written device drivers for any custom modules (Wifi, Camera, etc), please upload the full project (.c) files. With your permission, these would be valuable resources for future students.

Please submit your presentation slides in a .zip file with the lab report document