Week 4 homework (revised: spans two weeks)

Due date reminder, etc.

Please email your completed assignment to the course TA by Thursday, 5 pm of ***week 6*** (not week 5). Assignments that are late by at most one week will receive at most 50% of full credit. We will not grade anything submitted more than one week late.

When your homework submission includes one or more Arduino code files, please use the template **p398dlp_template.ino** as the starting point for your code. (I have it posted to the course homeworks web page.) Please fill in ***all*** of the fields shown in the template file.

In addition, your homework submissions—code, cell phone photos, etc. must include enough identifying information for us to tell who you are!

Status of your project, as I imagine it to be by the end of class, week 5

I want you to be at this point in your projects by the end of week 4's class:

- Group 1, piano: all four breadboards can record several seconds of audio from a musical instrument, and you are all able to run a python program that will generate a frequency spectrum by taking an FFT of your audio recordings and plot the result. You are able to identify the fundamental and the first few harmonics and are able to determine the relative power in each of them.
- Group 2, LED vs. incandescent lamps: you can generate (and plot) spectra for various light sources. For dimmable bulbs you are able to use the variac to investigate color changes vs. AC voltage.
- Group 3, drone navigation: you have integrated data collection from a GPS, DPS310s, BME680, and LSM9DS1s into your DAQ and are studying the issues associated with integrating the accelerometer information to produce a position and altitude estimate. You'll do this with your breadboards, but not with PCBs mounted on the drone yet.
- Group 4, bus vibrations: you are combining GPS, BME680, and accelerometer data into records you write to an SD file and are doing initial field tests outside. You are also able to display your data and graph it using python.
- Group 6, paper production: you are reading multiple BME680s using an I2C multiplexer, can control a motor-driven paper agitator and are able to record audio from agitating a sheet of paper. Using python, you can display the environmental data, as well as generating the frequency spectrum of the paper audio. You have a Tinkercad design for the gears, etc. of your paper agitator, which I'll print for you.

Problem (only one)

Prove to us, through submission of various screen shots, cell phone photos, and program listings that you have accomplished, in their entirety, all the tasks described above.

