

EE183DA (Winter 2017)

Design of Robotic Systems I

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Lab assignment 3

Due 2pm Thursday Feb. 16, 2017

1 Lab Overview

1.1 Objectives

The goal of this lab is to continue with electromechanical hacking, this time by adding sensing to the system. You will start with your ESP8266-based “musical instruments” from last lab and incorporate sensors to measure and respond to the state of other instruments and users, forming a “jam band”.

You will be working in your project teams. You will be responsible as a team for dividing the various tasks of this project between all members. Your grade will be based both on team and individual performance.

1.2 Deliverables

There will be two deliverables for this project — one team and one individual.

As a team, you will create a webpage documenting and demonstrating your band, linking to the individual instruments. Be sure to add details and videos of the new sensing subsystems, and instructions for how users can interact with your robots. As a reminder: just as in the last lab, the webpage should contain everything necessary to recreate your system. Be sure to include your code, wiring schematics, and a bill of materials, as well as pictures, videos, and text descriptions of the construction and operation.

As an individual, you will compile your individual contributions to the project into an academic poster, presenting all the key methods and results in a visually compelling format. Upload a .pdf of your poster on CCLE by 2pm Thursday Feb. 16, 2017. Include on the poster any relevant links webpages.

Submissions that are up to 24 hours late will be accepted for a 10 percentage point reduction in final grade. No submissions will be accepted more than 24 hours late.

2 Lab specification

2.1 Sensing

You will be given a collection of sensors with which to extract data from the environment. They generate a variety of digital and analog electrical signals. You must choose (at least) two different kinds of sensors to include in your robotic system; they can be connected to any of the instruments. You may of course choose to use other sensors if you’d like.

As a part of your team writeup, generate figures demonstrating the relationship between the sensed quantities and the sensor output. This could take the form of a graph, a timing diagram, a table of values, or some other representation. It should be populated with actual data gathered from the use of your sensors.

2.2 Multi-robot collaboration

The sensor measurements are to be used by the system to allow the instruments to complement each other. Come up with a behavior for your system that includes all of the instruments performing in harmony. The collective result should clearly be collaborative; be sure to come up with a demonstration clearly displaying their interaction.

2.3 User interface

Similar to the last lab, your band was controlled through a web-based user interface. Extend or create a web interface to control band-level behaviors.

2.4 Demonstrations

Be sure to record a live performance and include it on your webpage!

3 Resources

3.1 Hardware

You will be provided a variety of sensors. If you need additional hardware, you can check with me to see if I have extras. I may also have limited additional components such as breadboards, jumper wires, and LEDs. You are free to use any additional components, found or purchased, as you wish.

3.2 Computing infrastructure

Feel free to use any web services you'd like. If you'd rather not use such resources and would prefer locally served space to host your website, videos, or code repository, come talk to me.