EE209AS (Fall 2016)
Robotics: Design, Manufacture, and Control

Prof. Ankur Mehta
mehtank@ucla.edu

Lab assignment 2
Due 6pm Friday Oct. 21, 2016

1 Lab Overview

1.1 Objectives

The goal of this lab is to get started with electromechanical hacking. You will build an internet-enabled "jam band" consisting of (at least) two ESP8266 microcontrollers driving electromechanical "musical" instruments. They will respond to stimuli through electromechanical sensors, and be commanded through an internet-based web interface.

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. This 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. N.B.: Github contains a number of tools to share your designs and documentation amongst your team and with the world.

As an individual, you will write up your individual contributions to the project in the format of a lab report: your paper should contain an introduction, methods, and results sections. Indicate in your report who you worked with, and for each person including yourself estimate an aggregate percentage of the total work done. Submit a .pdf of your report via email by 6pm Friday Oct. 21, 2016. Use the subject heading "EE209AS Lab 2 report: " + your name. Include in the email a link to the project webpage.

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 Getting Started with the ESP8266

Each member of the team will be given an ESP8266 microcontroller with a motor breakout board. A quickstart guide for using this hardware can be found on the course website here:
   http://ucla.mehtank.com/class/esp8266-12e-quick.pdf
   Follow the instructions to learn how to program the board and interface to it using an internet based webpage.

2.2 Making noise

You will be given servos to use as actuators; these will probably need to be augmented with some mechanical devices to create "music". You may also choose to use other actuators if you'd like. Feel free to get creative!

2.3 Sensing the environment and users

You will be given a choice 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 sensors to include in your robotic system; they can be connected to one or both microcontroller boards. You may also choose to use other sensors if you'd like.

2.4 User interface

Your band will interact via a web-based user interface. The interface may be hosted on a microcontroller, or on a separate server with links to command the microcontrollers. You are free to decide what options to provide the user. It can involve simple commands such as start and stop, more detailed options such as select song and set tempo, or full control involving programming the music.

2.5 Demonstrations

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

3 Resources

3.1 Hardware

You will be provided one ESP8266, one motor control board, and one servo per team member. Your team can also select from an array of sensors. If you need additional microcontrollers or servos, 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 electrical or mechanical components, found or purchased, as you wish.

3.2 Computing infrastructure

Your code, website, and videos should all be hosted on your Github project page. If you would rather not use Github, and would prefer locally served space to host your website, videos, or code repository, come talk to me.