ECE496 Weekly Status Report
Team GA-5
2016-01-25

Meeting Leader: Ryan Barker

Previous Goals and Progress Toward Those Goals

- Gather initial materials and components [Ryan] – Researched and selected a guitar and pickup for the design. Selected an Epiphone Les Paul Express and PowerGig hexaphonic pickup, which are now both in our possession.
- Research application development [Michael, Ryan] – Began looking at options for creating a wireless application to control the design with. Downloaded Android Studio and found official programming tutorials at http://developer.android.com/training/basics/firstapp/index.html.
- Research ballpark torque requirements for motor and research potential motors [Michael, Duke] – Found necessary force of motor to be 2.5 lb/in. Found servo and stepper motors which meet requirements (See links in unresolved problems).
- Research microcontroller (affordable yet of high performance) that will meet technical requirements [Jules] – Current list of options: Tiva (32KB RAM), Arduino Uno R3 ATmega328p (32KB RAM), Teensy 3.1/3.2 (64KB RAM), and Raspberry Pi 2 Model B (1GB RAM)
- Research amplification circuit and chips we might use [Shane] –TL071P, TL072P, OPA121P, OPA2111P
  Chip details can found at: http://www.ti.com/lit/an/sboa092a/sboa092a.pdf

Goals for the Next Week

- Remove hexaphonic pickup from PowerGig guitar by 1/26/16 [Ryan, Shane]
- Begin amplification circuit design for hexaphonic pickup [Shane]
- Complete Android Studio tutorials [Ryan]
- Research potential motors for final design [Michael, Duke]
- Decide on and order a microcontroller [Jules]
- Identify a specific approach to convert hexaphonic pickup data to Fourier transforms [Jules]
- Assign sections and write the first draft of one section per team member for the preliminary report [All team members]
- Brainstorm and diagram two different methods for connection of the design to the guitar [All team members]

Unresolved Problems

- The PowerGig guitar is held together with plastic screw covers. Ryan is going to remove these with a thin flathead screwdriver, but is open to suggestions for a more effective method. A screenshot of the rear of the guitar is on the next page.
- Discussion and agreement on technical specifications to consider for microcontroller. Specifications to be considered: Input voltage limit, SRAM, flash memory, weight, length, width, # digital I/O pins, etc.
- Small shaft on tuning pegs may prove hard to couple.
- High torque, continuous rotation servo (found here https://www.sparkfun.com/products/9347) does not have angular control.
  - 6 of them will be about $84.
  - Alternative stepper motor: http://www.amazon.com/Bipolar-Stepper-3D-Printer-Extruder/dp/B00THZJWIA
    - Cheaper than servo, angular control, but potentially more difficult to mount.
  - Approximately 2.5 lb/in or 40 oz-in torque needed.

Questions
Are there any other models of microcontrollers besides the Tiva for which ECE department support is available?
What type of shaft couplers (that are small enough) have people used in the past?

Other information
None.

Figure 1. Back of PowerGig Guitar, showing plastic screw caps.