CprE 492

Date: 03/23/18 – 04/06/18

Team: 39

Title: Sound Effect Devices for Musicians

Advisers: Dr.Chen & Dr.Geiger

Team:
Tom Kimler – Team Lead
Virginia Boy – Power Lead
Ben Reichert – Test Lead
Dan Kroese – Embedded Lead
Garrett Mayer – Software Lead

Weekly Summary:

Built a sum of harmonic sine waves model based on varying frequencies and voltages. Model is acceptable, but needs to be refined to have parameters that are more in the range that makes sense. Determined, more data I needed in the common audio range of instruments. A power analysis is needed to validate that the model is capturing most of the signal. Lastly, we are starting to work on the final poster & document as the semester comes to an end.

Past Two Weeks Accomplishments:

Data – Ben, Tom

- Further refined data collection into the main region of interest. This region of interest, as identified in the group meeting prior to these tests, was determined to be the full 7 octaves of a piano (From C(0)->C(7)) - these frequencies capture the dominant musical range in most pieces of music, and as such, this data set served to greatly increase the fit resolution in this pertinent range.
- Data was collected in an iterative procedure, much like last time. Since we required more entries for frequency, we swept through all amplitude requirements at each frequency (rather than the other way around).
- In the same fashion as the previous data capture, input amplitude was swept at a family of frequencies. After consulting with our advisors, the input amplitude range was narrowed to values that ensured "soft clipping" of the output signal, as this is the dominant tube characteristic our model faithfully represents.

Model – Garrett

- Built sum of harmonics model of tube data for each frequency and voltage input. The data fits our model for the tube amplifier very well. Our goal is now to extract a continuous model over varying voltages and frequencies. We are looking to target more middle audio frequencies in future data

Data Formatting– Ben, Tom

- After data capture, files (.csv) saved were formatted such that the model algorithm could automatically step thru the data without user interference. Formatted data was then pushed to git for Modelling
- Assisted in coefficient extraction from data set. Considerations such as amplitude coefficient polarity and phase corrections were applied, as needed.

Power Analysis – Dan

- Analyzed synthesized outputs energy vs real tube amps energy. Also, cleaned up code on breaking up input signals into sections with linear fits for both.

Documents – Virginia

- Started working on final report and poster.

Pending Issues:

Title – Name

- Description

Individual Contributions:

Team Member	Contribution	Weekly Hours	Total Hours
Ben Reichert	Data, Data Formatting	13	60
Tom Kimler	Data	10	65
Garrett Mayer	Model	15	63
Dan Kroese	Power Analysis	6	38
Virginia Boy	Documents	5	38

Comments:

N/A

Plan for Next Two Weeks:

Model – Garrett

- Refine model and provide further analysis of the data.
- Make continuous model over voltages and frequencies

Data – Ben & Tom

- Get any data needed for model

Power Analysis – Dan

- Do power analysis of harmonics to see how much the signal is being captured in our model.
- This is to make sure we are not missing power in a different harmonic or signal

Documents – Viriginia

- Begin creating document and poster to be ready for the rest of the team to use and complete as we get closer to the end of the semester

Summary with Advisors:

We looked at the parameters of the model and decided on the next course of actions. First, we are getting more data in the ranges on a piano and doing an analysis on that range of data. Next, we also want to do a power analysis to confirm our model is accounting for most of the energy in the signal. Lastly, refine the model to avoid negatives and large phase shifts in the model parameters.