

sdmay19-11: MIDI Zeusaphone (Singing Tesla Coil)

Week 2 Report

September 5 - September 12

Client

Joseph Zambreno

Advisor

Craig Rupp

Team MembersGunnar Andrews — *Webmaster*Leo Freier — *Interrupter/Micro controller Lead*Greg Harmon — *Tesla Coil Construction Expert*William Brandt — *Pulse Width Modulation Expert*Jacob Feddersen — *Communications Specialist*Luke Heilman — *Technical Architect*

Summary of Progress this Report

This week we did a deeper dive into research. Looking up more specific parts of the project and how they will be constructed. We continued looking at more safety aspects of the tesla coil. We started synthesizing music using square waves (GitLab). We started experimenting with a raspberry pi to see what it could do for us. Lastly we started looking through what open source software is available that could help us.

Pending Issues

- Determine specific parts required
 - Purchase commercial kit to reverse engineer?
 - Build custom coil and circuit from scratch?
- Find open source software libraries
 - Read MIDI files
 - Interface with MIDI keyboard, etc.
- Choosing microcontroller
 - Raspberry Pi - capable of more functions, might be overkill
 - Arduino - less overhead from operating system
 - Other options? Research

Plans for Upcoming Reporting Period

- Gunnar
 - Experiment with open source software to see what we would need to write ourselves versus what is already out there.
 - Work with WinTesla or another tesla coil simulator to learn how it works.
- Leo
 - Be able to turn data representing a note into unique analog outputs on the Pi
 - Possibly look into real-time waveform conversion from MIDI to analog
- Jacob
 - Write a program capable of synthesizing MIDI music from input file
 - Find open source library for MIDI file parsing
 - Begin developing an emulator for the driver layer of our architecture
 - Output to sound file, for easier testing of application layer without actual tesla coil hardware
- Greg
 - Look into the WinTesla, Tesla coil modelling program and other possible modelling programs.
 - Get certain requirements regarding input voltage and how it can affect size and cost.
 - Research how a Solid-State tesla coil functions and what is additionally needed in order to construct versus a spark gap tesla coil.
- Luke
 - Create architecture diagram of whole system
 - Create diagram for each modular component - to be drilled down in the future
- William

- Continue to research tesla coils, especially in the area of the spark gap circuit
- Start working towards a parts list

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Gunnar Andrews	<ul style="list-style-type: none"> ● Researched and experimented with available MIDI software ● Researched available software for Raspberry Pi ● Updating report section of website 	4	7
Leo Freier	<ul style="list-style-type: none"> ● Briefly looked at more tesla coil circuits ● Researched overall structure focusing on microcontroller ● Set up and started experimenting with a Raspberry Pi 	4	7
Greg Harmon	<ul style="list-style-type: none"> ● Researched commercially available singing tesla coil kits to estimate what's possible with a given budget. ● Brainstormed different safety measures to be taken when Tesla Coil is in operation. 	4	8
William Brandt	<ul style="list-style-type: none"> ● Researched common types of tesla coils, and how to construct them. ● Investigated the spark gap circuit 	2	5
Jacob Feddersen	<ul style="list-style-type: none"> ● Found an open source library to save .wav files in C ● Wrote a program to synthesize two square waves of given frequencies ● Helped develop a software architecture for the project ● Began researching MIDI file format 	7	11
Luke Heilman	<ul style="list-style-type: none"> ● Created basic architecture layout ● Researched Bluetooth format and connections ● Researched MIDI format 	4.5	7.5

Gitlab Activity Summary

Action: pushed to, Tue Sep 11 2018
Author: lheilman
Title: Create documentation folder with brief project overview

Action: pushed new, Tue Sep 11 2018
Author: lheilman

Action: opened, Mon Sep 10 2018
Author: Jake Feddersen
Title: WIP: Generate tones, Type: MergeRequest

Action: opened, Mon Sep 10 2018
Author: Jake Feddersen
Title: Experimenting with Square Wave Music, Type: Issue

Action: pushed to, Mon Sep 10 2018
Author: Jake Feddersen
Title: Two waves combined

Action: pushed to, Mon Sep 10 2018
Author: Jake Feddersen
Title: Rename batch scripts

Action: pushed new, Mon Sep 10 2018
Author: Jake Feddersen

Action: pushed new, Sun Sep 09 2018
Author: Jake Feddersen

Action: joined, Wed Sep 05 2018
Author: Imfreier
