sdmay19-11: MIDI Zeusaphone (Singing Tesla Coil)

Week 1 Report
August 29 - September 5

Team Members

Gunnar Andrews — *Webmaster*
Jacob Feddersen — *Communications Specialist*
Luke Heilman — *Technical Architect*
William Brandt — *Pulse Width Modulation Expert*
Greg Harmon — *Tesla Coil Construction Expert*
Leo Freier — *Interrupter and Microcontroller Lead*

Summary of Progress this Report

- Created Roles
    - Assigned roles to all team members
    - Discussed what responsibilities each role would have and how they would interlace
- Research
    - Individually researched how tesla coils work
    - Individually researched how other people have made singing tesla coils to give us ideas on how we want to create ours

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Pending Issues

- We need to look into the exact parts that we will need to construct our prototype tesla coil.
- We need to get a better understanding of each piece of the project and how they actually interact.
- We need to start developing the control software for the coil.

Plans for Upcoming Reporting Period

In the upcoming week, we plan to continue detailed research into relevant areas for the tesla coil development, as well as begin experimenting with technologies that could be used toward the prototype tesla coil.

- Luke
    - Develop specific overall design
    - Create APIs for each of the layers of the project (the coil, the interruptor controller, and the software). Make sure the layers will be able to communicate with each other
- Jake
    - Research MIDI music format: file input and device input
    - Begin writing a program to synthesize music from a MIDI file using square waves
    - Research feasibility of using Fast Fourier Transforms to isolate melody from music, to allow any song to be played (not just MIDI files)
- William
    - Continue research in safety areas, and begin research into circuit for interrupter.
    - Look into usage of PWM for the circuit
- Gunnar
    - Start testing code that can find and play MIDI
    - Research microcontroller options and reviews
    - Update website with our first weekly report
    - Work with the website so I can get comfortable with customizing it
- Leo
    - Get a better understanding of what the interrupter needs to do to the coil.
    - Look at more completed projects and see how the pieces fit together.
    - Possibly start work on actually programming the microcontroller
- Greg
    - Research more in depth on the theory and safety of Tesla Coils.
    - Research commercially available coils to gain a grasp on price and parts.
    - Create a list of potential hazards and safety needs in accordance to workplace guidelines.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Gunnar Andrews	Researched how to ground tesla coils safely. Also did some investigating into what kinds of microcontrollers have been used in projects similar to this one.	3	3
Jacob Feddersen	Researched musical tesla coils in general and what their capabilities and limitations are. Began research into how music could be produced on the coil - midi music and Fourier transforms.	4	4
Luke Heilman	Researched basics of the tesla coil - including how the “singing” is controlled by a power interruptor. Also looked into different ways to communicate with the coil - whether via an app or predetermined music, etc.	3	3
William Brandt	Researched tesla coil, especially in the area of safety concerns, and how other people who have made tesla coils ensure safety.	3	3
Greg Harmon	Looked at other hobbyists’ websites in order to learn about how tesla coils work and to compare the different constructions. Started asking questions on what guidelines for safety must be followed. (OSHA, NFPA 70E) Made suggestions for the meetings on how the project might be able to expand past the bare minimum deliverable.	4	4
Leo Freier	Viewed videos and research done by others. Some individual research on singing tesla coils in action. Participated in meetings by making suggestions on how we should organize communication and documentation of the project.	3	3

Gitlab Activity Summary

Nothing to report.