sdmay19-11: MIDI Zeusaphone (Singing Tesla Coil)

Week Report 22
April 4 - April 11

Client/Advisor

Joseph Zambreno

Team Members

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

Summary of Progress this Report

- Successfully tested our full-bridge tesla coil with oneTesla secondary
- Designed and ordered full-bridge PCB
- Continued work on coil case design
- Created plan for constructing secondary coil
- Captive portal work/debugging
- Updated website
- Bootstrap testing

Past Period Accomplishments

- Troubleshot and tested bridge circuit - Jake, Leo, Luke
    - Tested our full circuit with the OneTesla coil
    - Full wall power using a function generator input to test pulse widths
    - Determined pulse width was a problem
    - Also upgraded to a full bridge rectifier and tested with pulse width and duty cycle
    - Issues with noise in the circuit
        - Antenna feedback had extremely bad noise, was not a clean square wave
        - Touching input from antenna to inverter with oscilloscope resulted in clean wave, no noise
        - Determined that the pin was floating - added a pull-down resistor
        - This fixed the design and the circuit worked
    - Duty cycle (vs fixed pulse width) produced a much better result, but not enough time to refactor the transmitter design
- Designed bridge circuit PCB - Jake, Leo
    - Created two versions of the bridge PCB
    - One with our current heatsinks for a larger PCB
    - One with only one large heatsink (for structural integrity and reduced PCB size)
    - Ordered the version with one large heatsink
- Met again with Lee Harker to discuss winding the secondary coil - Jake and Luke
    - Completed shop training to use the ECpE shop equipment
    - Created a plan for a coil winding rig
        - Endcaps and bolts to hold the coil
        - 80/20 extrusion to build rig
        - Drill to spin the coil while someone winds the secondary

        - Same rig can be reused for varnishing the coil
- Finalized coil case design - Luke
    - Verified actual dimensions of the PCBs in the coil
    - Redesigned case to use flange for attaching the secondary coil
    - Changed MOSFET heatsinks to one large, heatsink, which dual-purposes as a third wall for the case
    - Acquired standoffs for the PCBS
- Captive Portal debugging - Gunnar
    - Updated to the newest version of nodogsplash to try a different attempt to get it to work
    - Lots of debugging, but I think I am close to getting it to work.
- Updated team website - Gunnar
    - Status reports and got rid of test web API
- Bootstrap testing / tutorials
    - Learning how to user downloaded libraries so I can make the Web API look better

Pending Issues

- None

Plans for Upcoming Reporting Period

- Continue document work, start poster/presentation
    - Send revised documents to Client for feedback
- Have the secondary coil rig setup and the coil wound
- Have the coil case cut from acrylic
- Finalize design for toroid topload attachment
- If the final PCB comes in, solder it together and test the full PCB stack

Individual Contributions

Team Member	Contribution	Reporting Period Hours	Total Hours
Gunnar Andrews	● Updated website to make it up to date ● Kept working with nodogsplash ○ Lots of debugging with new version FAS ● Did some bootstrap tutorials throughout the week ● Started pulling together repo materials for final documentation	8.5	163
Leo Freier	● Helped test full circuit on perfboard ○ Debugged issues with using OneTesla coil ○ Tested with duty cycle versus pulse width ● Created PCB for bridge circuit with Jake ○ Two versions, going with the large heatsink version ● Documentation work	11	166

Luke Heilman	● Finished laser-cutter training ● Cut the transmitter case ● Met with Lee Harker to get ideas on winding the tesla coil ● Redesigned coil case with flange and new heatsink ● Went through machine shop safety training	20.5	221.75
William Brandt	● Finished draft of safety document ● Reviewed design document	5	144
Greg Harmon	● Revised design documents ● Review updated schematics ● Updated document tracker	7	166
Jacob Feddersen	● Tested perfboard tesla coil driver circuit ● Built and tested perfboard full bridge ● Designed full bridge PCB ● Shop training with Lee Harker ● Designed rig for winding secondary coil	18.5	237.75

Gitlab Activity Summary

None to report