

sdmay19-11: MIDI Zeusaphone (Singing Tesla Coil)

Week Report 9

October 24 - October 31

Client

Joseph Zambreno

Advisor

Craig Rupp

Team MembersGunnar 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

- More driver program updates
 - Researched schematics and assembly of the OneTeslaTS
 - Updated website with status reports and attempted to reach out to authors regarding HTML formatting
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Past Week Accomplishments

- Wave Program Update - Leo
 - Continued to work on the wave program by trying some different strategies for multiple channel emulation.
 - Cleaned up the code with Luke, Jake, and Gunnar. Also commented some more on my own and more importantly modularized some parts of the code in case we switch libraries.
 - Code Testing - Luke Heilman
 - Used RtMidi library to generate virtual MIDI messages
 - Ported virtual MIDI messages to keyboard app for testing purposes
 - Website Updating - Gunnar Andrews
 - Updated status report section
 - Tried to reach out to HTML author to get website formatting fixed
 - OneTeslaTS research - Gunnar Andrews
 - Watched videos on tuning and programming OneTeslaTS
 - Created Demo - Gunnar, Luke, Jake, Leo
 - Recorded a video of the wave/sound output so we could show client and classmates
 - Raspberry PI GPIO Testing - Jake Feddersen
 - Set up a circuit and peripherals so I can perform GPIO testing and experiment with various timing mechanisms
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Pending Issues

- Changing Format of team pictures on website so the don't look distorted?
 - What I think I need to edit I'm not sure if I should be editing
- Timing is inconsistent for waveform generation on the Raspberry PI
 - Investigate more precise timing solutions, real-time solutions

Plans for Upcoming Reporting Period

- Gunnar Andrews
 - Finish updating team bios on website
 - Try making a web API to run our wave scripts
 - Continue to learn about OneTeslaTS and its software
- Leo Freier
 - Continue to learn more practical knowledge on building the OneTesla.
 - Continue some experimentation on simulating multiple channels.
 - Study our current circuit designs more.
- Greg Harmon
 - Read the ANSI Standards about EM Exposure
 - Formulate an equation to determine the Field strength at a given distance away from the Coil.
 - Research the effects of EM waves on pacemakers and other life-supporting devices
 - Simulate the driver circuit
- William Brandt
 - Design test cases
 - Work on design for control circuit
 - Work with Greg on calculating EM fields
- Jacob Feddersen
 - Study circuit schematics from Greg to understand how the electronics will work
 - Create test implementations for precise waveform generation - possibilities:
 - Disable interrupts for more precise sleep timing
 - Use interrupts instead of thread sleeping
 - Real-time library solutions
- Luke Heilman
 - Implement test cases in the new test framework
 - Meet to go over circuit design interrupter

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Gunnar Andrews	<ul style="list-style-type: none"> ● Cleaned up GPIO output code with Leo, Luke, Jake ● Recorded demo for lightning talk ● Updated website ● Looked into potential web API's and started experimenting 	6	46.5
Leo Freier	<ul style="list-style-type: none"> ● Modularized and cleaned up the wave program code ● Continued attempts to simulate multiple 	6	46

	channels for the program unsuccessfully		
Luke Heilman	<ul style="list-style-type: none"> Started virtual keyboard implementation for testing Began studying OneTesla interrupter circuit 	7	52
William Brandt	<ul style="list-style-type: none"> Researched driver circuits 	7	41
Greg Harmon	<ul style="list-style-type: none"> Created test cases for: <ul style="list-style-type: none"> Ensuring the oneTesla device works Ensuring our implemented interruptor matches the waveform of the interrupter circuit Began looking at where to acquire testing instruments. Found ANSI and IEEE standards of exposure to EM waves. 	6	52
Jacob Feddersen	<ul style="list-style-type: none"> Soldering workshop/practice Setup and test GPIO wave output locally Begin studying tesla coil driver circuits 	6	53

Gitlab Activity Summary

commit f04f1addfeb44feba0214d91cf635d83aacdedbb (HEAD -> make-tests, origin/make-tests)

Author: Jake <jtfedd@iastate.edu>

Date: Wed Oct 31 00:40:10 2018 -0500

Create midiout_test.cpp to emulate MIDI messages from keyboard

commit 0823d29400bea88006b3c215d1b2dcdb97a8b1d1 (origin/pi_generate_wave)

Author: Leo Freier <lmfreier@iastate.edu>

Date: Sat Oct 27 17:51:49 2018 -0500

Changing mid files

commit e2bae6780ef1e7d34f432c9ea886dd48a7a9ba90

Author: Jake <jtfedd@gmail.com>

Date: Sat Oct 27 17:42:22 2018 -0500

Add single channel version since we don't have multiple channels yet

commit ee2f51e3333c30768881c86f901aa3dcb9c8e6d4

Author: Leo Freier <lmfreier@iastate.edu>

Date: Sat Oct 27 17:39:59 2018 -0500

...skipping...

commit f04f1addfeb44feba0214d91cf635d83aacdedbb (HEAD -> make-tests, origin/make-tests)

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Date: Wed Oct 31 00:40:10 2018 -0500

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Extra songs and rest functionality