EE 491 WEEKLY REPORT 4

Date: 2/20/17
Group number: 1712
Project title: Sound Effect Devices for Musicians
Client &/Advisor: Professors Geiger and Chen
Team Members/Role: Jake Asmus/Team Leader, Joseph Brown/Team Communicator, Daniel Peterjohn/Team Webmaster, and Jiangning Xiong/Team Key Concept Holder

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- **Weekly Summary**
  - This week we met together to discuss the functionality of the octave circuit that we built since the previous week. Jake Asmus found a circuit diagram for adjusting the frequency of a circuit by a factor of 2, mainly using BJT's, resistors, and capacitors. Jake also built a model using PSPICE and proved the functionality worked as we intended. Although after our advisor meeting we readjusted our view on the circuit to use, mainly due to a lack of understanding of the analog circuit we had found. We feel that we will keep this circuit in our back pocket until we can better understand its manipulation of the input signal. As a group, we plan to look into A/D converters and then adjusting the signal digitally, by the advice of our advisor Professor Geiger. Joseph Brown spent time this week looking into parts for use in the pedal mat, with a basic use of power from the Arduino going through a momentary switch to send a pulse of voltage to communicate to the Arduino the adjustment for the pedal. Daniel Peterjohn looked into specific microcontrollers to use to communicate certain functions between the pedal mat and pedal. He recommends trying to use the Teensy, based upon size and the number of inputs we might need.

- **Past week accomplishments**
  - Jake Asmus: worked on a circuit that doubles the input frequency and proved its functionality in PSPICE.
  - Joseph Brown: found a few examples for a frequency multiplier circuit, mainly with the use of digital circuit elements, but isn't sure if digital would work with our circuit.
  - Daniel Peterjohn: narrowed down his selection for microcontrollers down to the Teensy and another Arduino microcontroller.
- **Pending issues (if applicable)**
  - Jake Asmus: is going to look for different frequency multiplier circuits, and gain a better understanding of how they will function in our pedal.
  - Joseph Brown: is going to be looking at the different digital circuits that will halve the input frequency. Also, looking into some parts to fulfill the needs of the pedal mat, and narrow down a selection of different A/D converters.

- **Individual contributions**

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NAME	Individual Contributions	Hours this week	HOURS cumulative
Jake Asmus	Frequency modulation circuit using BJT's, Successful testing of a circuit in PSPICE	4	11
Joseph Brown	Researched parts and circuits for use in the pedal mat, came up with a basic circuit plan for pedal mat	3	10
Daniel Peterjohn	Planning the microcontroller and pedal mat	1	7
Jiangning Xiong	Research on analog frequency designs	1	7

- **Plan for coming week**
  - Jake Asmus: will be focusing on designing a frequency multiplier circuit, testing a circuit diagram in PSPICE, and possibly constructing a test circuit depending on how comfortable we are with our circuit. He will also be comparing the analog circuit vs. the digital circuit to see the tradeoffs.
  - Joseph Brown: will be focusing on acquiring the basic parts to start building the pedal mat circuit, also looking into the frequency multiplier circuit using d flip-flops to halve the input frequency, and comparing A/D converters to see which one will best suit our needs.
  - Daniel Peterjohn: sketching, designing and researching components and materials for the pedal mat. Also, looking into options for communication between the pedal mat and the microcontroller to have less wires.
  - Jiangning Xiong: is going to research more on analog frequency modulation to understand more.
  - As a group: we will be meeting to finalize our initial draft for our project plan.

- **Summary of weekly advisor meeting**
  - This week we met with our advisor, Professor Geiger, where we showed him our circuit diagram demonstrating the frequency doubling from the input signal. He agreed that the circuit seemed to demonstrate the basic functionality, but wanted us to use a different circuit that we could better explain how it works. He showed us some examples using non-linear circuits to square the input sin wave, with the resulting wave = $\frac{1-\cos(2x)}{2}$, where we would have to use some op amps to adjust the gain of the output signal. Professor Geiger thinks that our digital circuits could work nicely with an A/D converter and then adjusting the frequency digitally. After the meeting, we decided to branch out with the possibility of using more digital circuits to accomplish the octave jumps.