

Client/Company/Organization: Randall Geiger Senior Design

Submitter Name: Randall Geiger

Email: rlgeiger@iastate.edu

Project Contact: _____

Email: _____

Project Title:

Sound Effect Devices for Musicians

Project Abstract:

This project will involve the design and testing of a special effects device targeting use by live entertainment musicians. There are numerous sound-effects devices available that provide interesting and creative effects. These include wah-wah, fuzz, overdrive, phasing, flanging, chorus, vibrato, tremolo, rotary speaker, octave dividers, and a host of others. These devices usually have an input coming from a guitar or some other musical instruments. A large number of these devices have emerged over the years but the demand exists for other devices that produce effects that are more interesting or novel than what is available or are easier to use and integrate. A somewhat dated issue of Guitarworld magazine (Nov 30, 2015) reviewed 50 such devices that have been used over the years.

The specific sound effects device that is targeted will depend upon the interests and innovation of the students but two devices that might be considered are:

Device 1: "Super-tube amplifier"

One electronic device that receives a lot of attention is the "tube amp". In their natural form, tube amplifiers use vacuum tubes rather than transistors and op amps to build the power amplifiers. Though tubes introduce distortion and are both more expensive and less reliable than transistor-based amplifiers, some people think they sound better and actually like the type of distortion that they cause. So the project could take the path of designing a "super-tube" amplifier whereby the goal would be to actually enhance the distortion that makes a tube amp appealing and come up with a type of amplifier using transistors or other solid-state devices that is even more appealing than an actual tube amp.

Device 2: Looper

One particularly interesting effect is produced by a looper. With a looper, a sample of a signal is recorded and then added back into the real-time signal path in a recirculating manner. For example, a sample 4 seconds long might be recorded and then added back in each 4 seconds until the musician decides to stop the looping. Variants of the looper that automatically grab the looping signal from the beat of the music, that have it fade out, that reverse the order of the looping, that alternately loop forwards and backwards, etc. would be investigated to obtain a new effect device that is hopefully of interest to musicians.

Expected Deliverables:

Design and fabrication of a prototype device along with test results and assessment of interest in the device by musicians that are not a part of the design team. Flexibility on this project is intentionally broad to allow individual creativity and interests to dictate the direction of the project.

Specialized Resources Provided by Client:

Anticipated Cost: _____

Financial Resources Provided by Client: _____

Preferred Students for the Project:

- Electrical Engineering
- Computer Engineering
- Software Engineering
- Cyber Security Engineering

- Other:

Other Special Skills: Only students that are interested in exploring their creativity in the audio arena or that have ideas that they would like to bring to the prototype level should consider this project. Experience as a performer or performing tasks associated with those of an audio engineer would be most useful but are not required

Anticipated Client Interaction (estimate):

- 1 meeting per week
 - In person, Over the phone, Web / video conferencing
- 1 meeting per month
 - In person, Over the phone, Web / video conferencing
- 2 or more meetings per month
 - In person, Over the phone, Web / video conferencing
- 1 meeting per semester
 - In person, Over the phone, Web / video conferencing

Meeting ABET Criteria

Please rate the following statements as they relate to your proposed project:

0 – Not at all 1 – A Little 2 – Somewhat 3 – A Lot 4 – Completely

On this project, students will need to apply knowledge of mathematics, science, and engineering	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 4
This project gives students an opportunity to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 4
This project involves students from a variety of programs, i.e., CprE, EE, and SE	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
This project requires students to identify, formulate, and solve engineering problems	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 4
This project gives students an opportunity to use the techniques, skills, and modern engineering tools necessary for engineering practice	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 4

Project Approval – for use by ECpE Senior Design Committee

- Approved: sdmay24-proj055
- Project Assigned: _____
- Advisor(s) Assigned: _____
