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DSP Programming for Music/Audio
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Independent Study Project Proposal

Objective

To design an Overdrive effect (using ChucK) that is customized for the sound of my bass guitar:

Goals

- The effect will be sensitive to the dynamics of my playing, so softer notes will be clearer, and harder notes will have more distortion.
- I will be splitting the signal of my bass upon input, and manipulating the lows and highs differently. Typically, the highs will have more a gritty overdrive sound, while the lows will come through more cleanly so it still sounds like a bass guitar.
- The effect will be tailored to the EQ of my bass, and to the exact overdrive tone I am looking for.
- My main goal is to understand how all of the unit generators in my program are manipulating the audio samples, and to understand why each manipulation modifies the sound in a particular way.

Solution

I am hoping to achieve these goals by creating a few smaller projects to tackle each of them, and then bringing all of the techniques together in the end.

Synth Generator

I am planning on creating a sort of synth generator, where the envelope of the synth is determined by the analysis of the envelope of my bass signal, and this will provide me with the tools for implementing the envelope-sensitivity in my overdrive effect.

Splitting Signal

I will design an effect that manipulates desired frequency ranges of an input signal independently, and combines them together upon output.

EQ

I will experiment with various filters (in various parts of the signal chain) in order to determine which parameters will provide me with the tone I am looking for.

In the end I am hoping to have designed the perfect overdrive effect that I have always wanted, and to understand thoroughly how the program is manipulating the audio signal. If time allows, I will also research ways to make this effect portable, maybe make it run on a linux kernel on a small micro controller, although I am not too familiar with the electrical engineering side of things.