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Final Project Proposal
March 19th, 2018

Initially for my final project, I wanted to create a simulation of the delay-reverb effect of the echo chamber at the Canadian embassy. With open walls, this echo chamber creates an unusual dream like delay effect due to sound bouncing between the curved reflective ceiling, and the reflective floor below. To add to this project, I thought it also may be interesting to find other unusual sounding locations similar to this echo chamber, and create a collection of reverb presets. As an end result, I hope to have created a pd patch that simulates the delay of the canadian embassy echo chamber, simulates various other unique sounding rooms and spaces, while also allowing the user to experiment and create their own room simulations (whether they are based off of a pre-existing space, or are completely fictional).

To think about how I will execute this project, I first have to consider convolution reverb, algorithmic reverb, the pros and cons of both, and the differences between the two. Convolution reverb is a way of simulating the reverberation of a room using an impulse response to capture the way sounds behave in a room. An impulse response (IR) is a recording of a loud sound with a quick attack and decay (impulse), followed by the reflections and reverberations the room produces in response to that impulse. This sample is then used through a computer program to recreate the reverberation effects of the room the impulse response was captured in and depending on the quality of the IR, can simulate the room fairly accurately. While convolution reverb is a great way to accurately recreate the sonic conditions of a room, a good IR needs to be recorded under quiet conditions with a relatively loud sound source, and can take a lot of computing power to simulate the room afterwards.

On the other hand, algorithmically created reverb can all be created mathematically within the computer without the need for an impulse response, and requires a lot less computing power. Mathematical equations and numbers representing the distances between walls and the sound source are used to compute what the reflections of sounds may sound like. Arbitrary numbers can be picked to aid simulation, or distances and measurements recorded from real spaces may be used to recreate the sound of a room. This method of simulating reverb in some ways may be easier to implement and require less computing power, however the results this method produces are often less realistic than those produced with convolution reverb methods.

For my project, I want to make a patch that uses a hybrid of both convolution and algorithmic reverb to make a comparison between the two, and to give the user more options when using the patch. For each location that I recreate, I want to take both an impulse response and a collection of distance measurements to create a convolution reverb version of the space, and an algorithmic reverb version of the space. In addition to a couple simulations of real spaces, I want to incorporate some imaginary room settings for the algorithmic reverb component, and use some unusual sounds to create presets for the convolution reverb. There will also be a section for the user to import their own IR's for the convolution section, and sliders to allow the user to pick different dimensions for the algorithmic reverb.
In the end, the patch will have:

1. A convolution reverb section
    a. Three presets using impulse responses to simulate real unusual sounding spaces (one being the canadian embassy echo chamber)

   b. Five presets using weird ‘impulse-response-like’ sounds to create weird reverbs
   c. A section for the user to import their own impulse response

2. An algorithmic reverb section
   a. Three presets using distance measurements to simulate real unusual sound spaces (one being the canadian embassy echo chamber)
   b. Five presets using distances not based off of a real space, that I think produce interesting reverbs.
   c. A section with sliders (maybe something other than sliders), giving the user a way to control numeric values being used to simulate reverb.

There will be a way of switching between convolution or algorithmic reverb, and I would also like to give the user a way to save settings they create with the algorithmic reverb. I’m also considering creating a way to give the user the ability to blend between two reverbs (one convolution and one algorithmic).

Bibliography

Tarr, Eric. "Convolution vs Algorithmic Reverb." *Pro Audio Files*, 1 July 2013, theproaudiofiles.com/reverb-comparison-convolution-vs-algorithmic/.