Subtractive synthesis

‘Electronic music is usually made using a computer, by synthesising or processing digital audio signals’ (Puckette, 2007, pg. 1). For the module 7MU009, it was decided to create a simple three oscillator synthesizer with one sine waveform, one sawtooth waveform and one square waveform.

Within my patch, which was created in pure data, the Fourier theory was considered, and the patch therefore consisted of multiple harmonic partials played by a keyboard. The patch not only had control over a sine wave but also a square and sawtooth wave. The waves could be added together using fader controls to alter and create new sounds, ‘This method of generating a complex sound is often called Fourier synthesis’ (Reid, 2010). The sawtooth wave also had a delay unit installed on to it, changing the numbers in the patch allowed this to be activated. The patch is controlled by an ADSR envelope which is the main component of most synthesisers.

The design was kept basic to allow non-musical based individuals to create simple melodies and allow them to interact with a design that can emulate a real-life instrument, ‘subtractive synthesis is based around the idea that real instruments can be broken down’ (Russ, 1996). The simplicity of the design allows my target audience to control the synthesiser with little or no musical knowledge whatsoever. The synthesiser that was created was a basic subtractive synthesiser, despite not having a filter to alter the timbre of the sound, it allows individuals to attenuate partials of the audio signals. The most common type of filter in a subtractive synthesiser is a low pass filter which carves out unwanted frequencies from the upper harmonic content. The low pass filter can be created in PD by using the *lop* object as explained by Puckette in the theory and technique of electronic music (Puckette, 2007, pg. 200). Despite not being implemented in my patch, research was conducted in to this technique, used for this type of synthesis.

‘The major problems with using subtractive synthesis are the fundamental limitations of the technique – the filtering is often a simple resonant low-pass filter; and there is a limited set of source waveforms’ (Russ, 1996). The combination of these problems lends itself to my brief of creating an uncomplicated synthesiser for non-musical individuals. During the build, disadvantages of my interface were recognised. VST based subtractive synthesisers were researched such as the *Retrologue* by *Steinberg*, *One* by *Fabfilter* and *ASynth* by *Antti*, these are simple analogue sounding subtractive synthesisers. My synthesiser lacks that analogue sound, making it hardly possible to authentically imitate real life analogue synthesisers.

Research was also conducted in to a synthesiser by *Native Instruments* called *Massive*. This synthesiser is a wavetable software plugin which utilises several wavetables and oscillators in the creation of synthetic timbres. Even though I did not create a wavetable synthesiser, the massive plug in gave you the option of selecting different waves over three oscillators which was of course something that was used in my creation. The general idea was to create a synthesiser to create complex and fun sounds controlled by an ADSR to further allow user creation by controlling how a sound would change over time.

To conclude, the brief that I set out to meet was fulfilled, however there could’ve been further implementation in the patch of different effects and modulators, the filter being the most important implementation. There could’ve also been research conducted in to different input mediums as I only really looked in to keyboard inputs.

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