Sound Synthesis Project Report

Exam No. - Y3859110

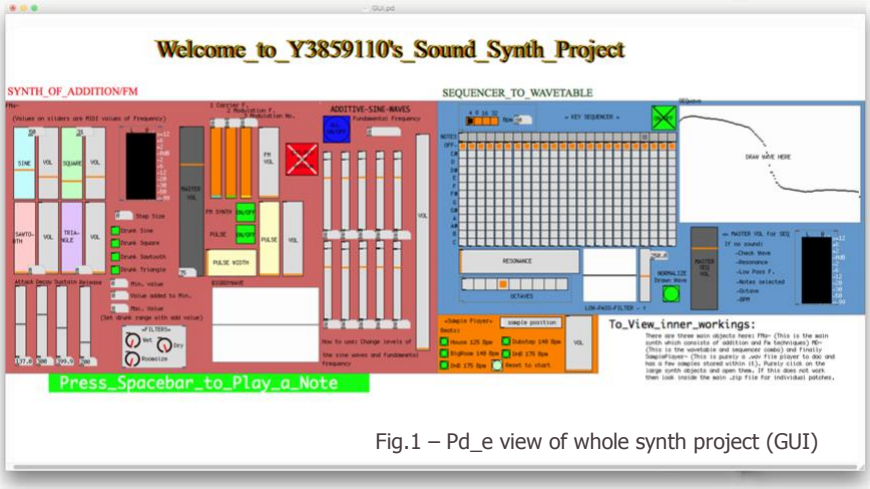


Fig.1 – Pd_e view of whole synth project (GUI)

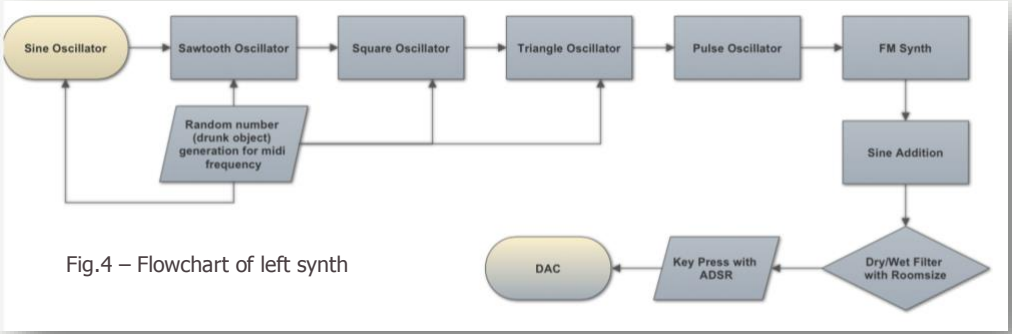


Fig.4 – Flowchart of left synth

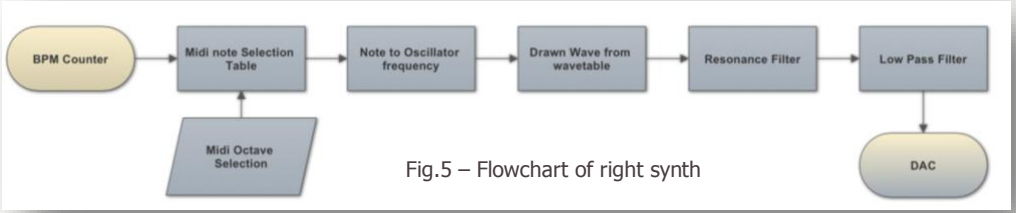


Fig.5 – Flowchart of right synth

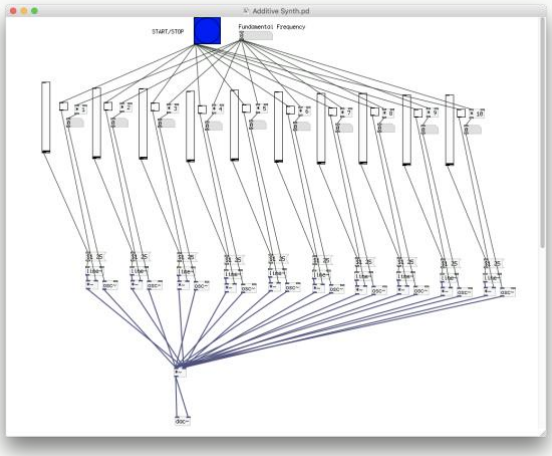


Fig.6 – Additive Synth displayed more clearly

USER INTERFACE (GUI)

The interface was the most important feature of the synth and has been labeled in order to help a new user to use. Shown in Fig. 1

ADDITIVE/FM SYNTH (RED)

OVERVIEW

This synth is designed to perform additional synthesis along with a wide range of waves types, including frequency modulation.

DESIGN

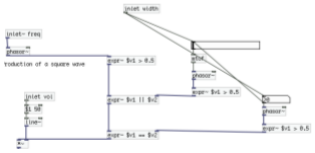
The signal flow of the synth can be seen in Fig. 4.

The wave types produced were sine, sawtooth, triangle and square. Sine and sawtooth already existed as objects in Pd-e. Thus, are easy to produce. In order to form a triangle wave form:

Fig.2 

See Fig. 2 and the explanation in patch (FMa~ [pd triangle]).

Next, in order to produce the square and pulse waves, similar methods are used:

Fig.3 
See Fig. 3 and the explanations in the patch (FMa~ [pd sqaure] and [pd pulse])

Combining these formed an interesting timbre of waveforms. However, the sound could easily become very raucous. This is due to some constructive interference between the signals. Therefore, it needed something to add some harmony to the overall sound. The frequency modulation unit and ADSR are present to produce a better range of timbres. The ADSR allowing change of note/signal characteristics when triggered by the set key. Finally, the additive synth. The additive synth is constructed from my own previous project (Fig. 6). Simply, by taking ten sine oscillators (each oscillating at a factor more than the next) and constructively combing them at different levels to form ranging soundscapes from a fundamental set frequency. I chose to incorporate both FM and Additive in this one overall synth. This is because I believe they produce some riveting sounds when combined.

The [SamplePlayer~] is inspired after listening to the synth mixed with lyrics and a beat. I wanted the synth to be able to be used with sample files, allowing mixing and instantaneous comparison with the synth sounds over the top of a sample.

WAVETABLE SYNTH (BLUE)

OVERVIEW

The signal flow of the synth can be seen in Fig. 5

This synth is designed to utilize a user drawn wavetable, which is played through a sequencer. The user can then produce twenty-four note melodies. Characteristics of the wave and note sequencer can be changed to produce different overall tonalities.

DESIGN

The beats per minute which plays through the sequencer is set in [bpm]. This bangs across the twenty-four arrays, where the notes are selected. The note selected is added to a number from [pd octave]. The addition of the two numbers forms a final midi note from the user selected note and octave. The midi note converts to frequency and passes through the drawn wavetable. Producing an oscillating wave (which has been drawn by the user) at the desired frequency from the midi note conversion. A resonance filter is also multiplied to the wave to produce a funky end result. In the higher frequencies, large amounts of resonance can produce sharp unwanted sounds. Therefore, a variable low pass filter was added to make the listening experience more pleasant.

AUDIO DEMO

The audio demo was primarily designed to show off some of the main features of the synth. The main idea behind it was to use the left synth to create a suspense buildup of tension and then awaken the right synth into a musical piece. The FM Synth starts off the piece, followed by the pulse. Then, the right synth is initiated into a bassline. The [SamplePlayer~] patch brings it all together and adds to the effect by suddenly producing a kick and snare. Overall, the two synths are combined with melody using mainly frequencies of the keys E, F and G. Wet and Room size filters are also used to add character.

CONCLUSION

On the audio demo side, next time I would definitely bring in use of the random frequency generator to produce some ranging melodies. To change the synth design, I would experiment with some pre-set operators for the FM synth. Furthermore, maybe even combining the sequencer and wavetable to the FM synth to produce some very unique sounds.