Max For Live Package

Final Report

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Abstract

My CSC497 Interdisciplinary Project was the creation of a collection of Max for Live patches designed to work in Ableton Live. The purpose of this project was to create an interesting and useful collection of sounds and effects that I can use in my personal projects, and share with others to use. The Max for Live devices include: A Midi Sequencer, EQ, Reverb, FM Synth, Super Saw Synth and Sampler.

Introduction

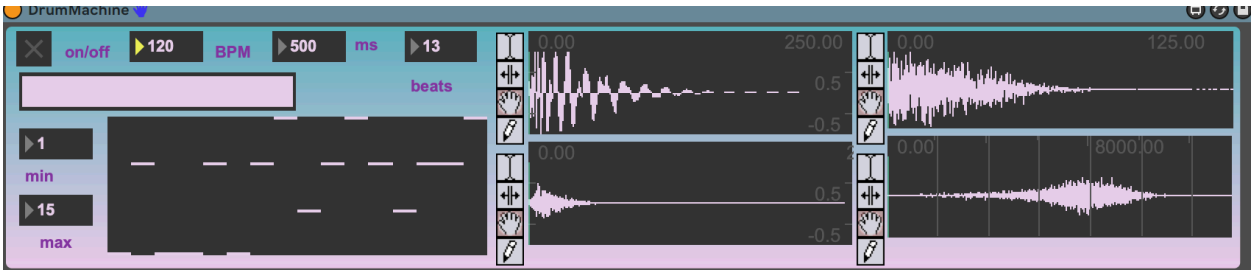
The idea for this project arose after completing my MUS 407 final composition in which I built some synths in Max and performed them in Ableton Live. This sparked my interest in Max for Live and since then I have explored Max for Live patches that others have made and incorporated them into my personal projects. For this project I plan on built on patches from MUS 407, as well as creating several new patches. I also built upon patches I worked on in EAST 362 (Concordia) and incorporated techniques learned in that course.

Materials and Methods

My approach was to first research what kinds of patches I wanted to create. For this step I utilized class resources, online resources and patches found online. The next step was to develop the Max for Live patches. I focused on getting one patch working at a time before moving on to the next. After achieving desirable functionality for each patch I converted them into Max for Live devices with will a simple and intuitive UI to be used within Ableton. Finally, I shared the patches as open source software for other musicians to use on my GitHub at https://github.com/sonjaskagestad/MaxForLivePackage.

Discussion

The drum sequencer is played by dragging 4 drum samples of your choice into the waveform display. Using the b-patcher to the left, the user can select, move and zoom in an area to loop. The multi-slider is used to sequence the drums and each slider references a drum sample. The BPM can be adjusted and the slider can be used to select the range of beats to play, with the max range going from 1-16 for a total of 16 beats. The patch works using is 4 buffers to store each of the drum samples. A select object then takes the value from the multi slider to play one of the 4 samples using a play~ object. Functionality I would like to add in the future is having the ability to play multiple drum samples at the same time. A bug is that the slider indicating the range on the drum sequencer is modified during playback there is a beep sound if played in the middle of a transient.



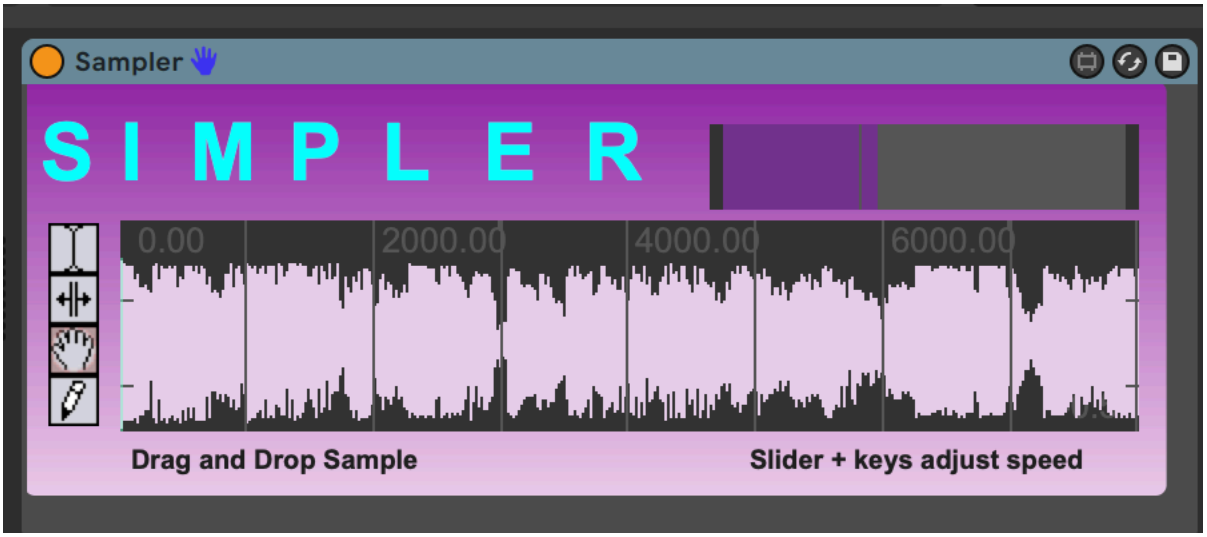
The Sampler is played similarly to the drum machine, by dragging an audio sample into the window and controlling the looping section using the b-patcher to the left. The speed and direction of playback is controlled using midi keys and the k-slider. For every key press, the playback alternates between forward and reverse.

The sampler takes input from the slider and converts the midi to frequency. The frequency is then divided by the frequency value of middle C, so that when middle C (C4) is played the value will be 1 (C5=2, C3=0.5). These values relate to how fast the sample is played back, the larger the absolute value of the number, the faster it will be played. The slider is set up to play samples either forwards or

reverse, depending on if the value is negative or positive. A g-switch object alternates setting the maximum and minimum value of the k-slider, and ensures the min is negative by subtracting the value from 0. Each key hit on the k slider alternates between setting the minimum (negative) and the maximum (positive) value of the slider.

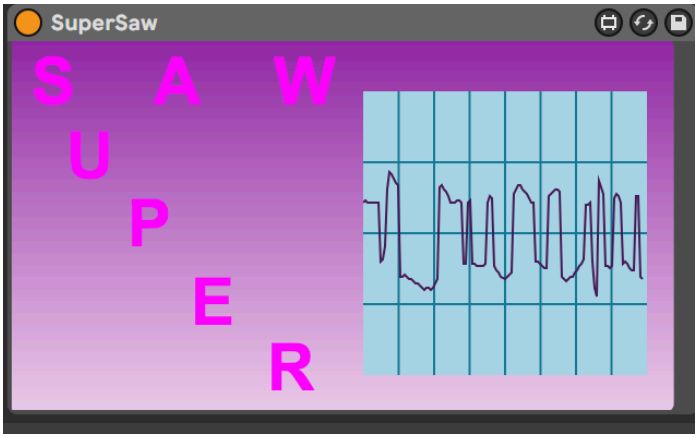
The new min or max is set and the opposite value is adjusted based on the stored range between the previous max and min. For example, pressing C4 would set the maximum value to 1, then pressing C4 again would set the negative value to -1. Pressing C5 then would set the max to 2 and the min would be adjusted to 0. If the slider is in the positive range the sample will play forwards and in the negative range it will play backwards. The bottom of the slider will play the sample quickly in reverse, and the top of the slider will play the sample quickly forwards. Going closer to the middle will cause the slider to slow down.

The speed is sent from the slider to the groove objects which plays the sample back in a loop, and receives the min and max values set by the waveform object setting the looping area. The trapezoid~ object applies windowing so the loop does not click upon playback. In order to have multiple instances of the Sampler in an Ableton Live project, I had to name the buffer~, groove~ and every send and receive with then unique identifier '—-_'

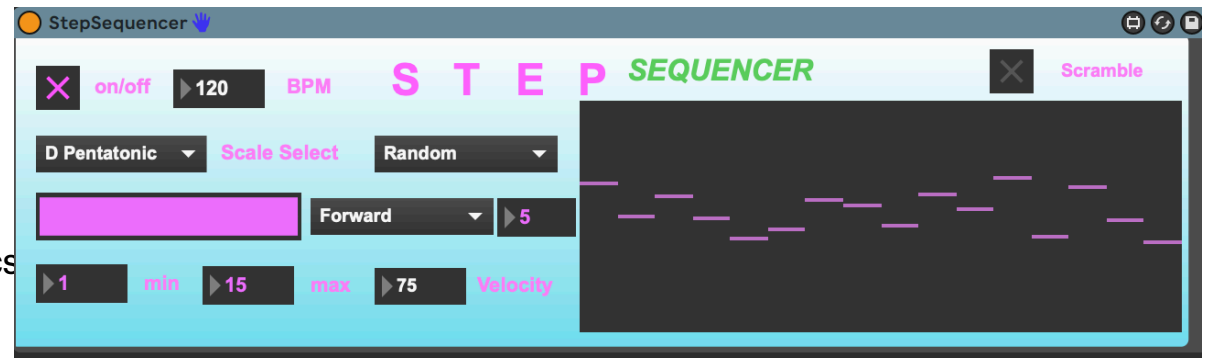


For the super saw synth I used poly~ containing a sub-patch to make a very thick polyphonic saw sound. Inside poly~, the buffer~ sawwup holds the saw data with values between -1 to 1. Midi information can be entered by using the k-slider or connecting a midi keyboard with midiin. The “synth_voice” max patch needs to be in the same folder as the supersaw.amxd.

The zl rev reverses the arguments of velocity, frequency so that velocity comes first. The adsr~ applies an envelope to the sound, and the pitch is then passed to gen~. The pitch param passes the midi not value to a mtof which passes the frequency to a phasor object. As the phasor goes between 0 and 1 the cycle outputs values read from the buffer (Fred in gen~ references buffer sawwup from the main patch). The phasor is copied 4x with each additional phasor at a higher frequency and alternating being above and below (*1/-1) the original pitch. All of these phasors are added together for the output.

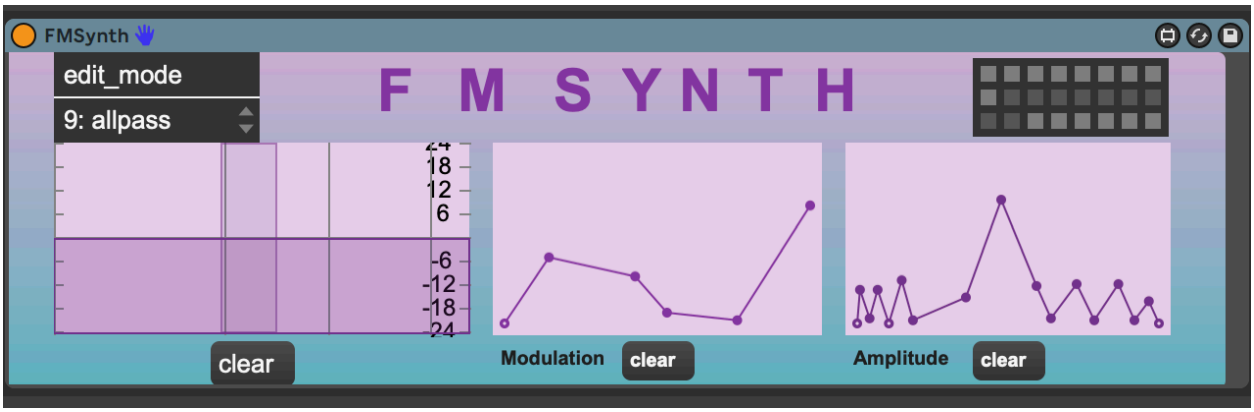


The Step Sequencer is a midi effect that can automate the playing of notes. The sequencer can select which notes to play using the multi slider. The notes can be played forwards or backwards and there is a scramble function that randomly scrambles the notes. Additionally, the speed of the notes can be set in BPM or ms and there are 4 different scales to choose from including Lydian, Dorian, Phrygian and Pentatonic. The notes can be played randomly or in steps

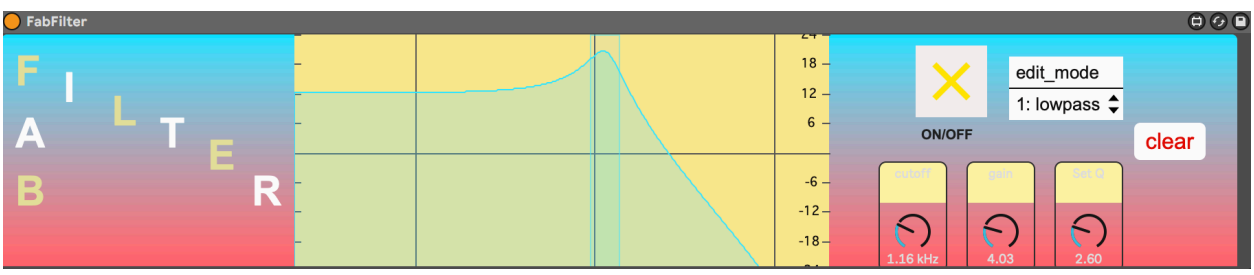


The FM synth can be played using the presets, or by manually creating the envelopes for the modulation and amplitude. There is also an EQ built in to shape the sound.

The FM synth works by sending a bang to the modulation and amplitude envelopes when a midi note is played. The modulation envelope controls the modulation index which allows for timbal change over the duration of the envelope. Line~ puts the envelope points into a line where they are then scaled using the modulation index which controls the maximum amount of modulation across the envelope. The modulation values are then multiplied by the original frequency*modulation ratio. Each signal has a different modulation ratio and index, and they are all added together with the original signal, multiplied by the amplitude envelope. Overdrive~ adds some distortion and there is a biquad~ filter that can be used to adjust the sound.



The EQ contains 3 dials that set the parameters of the cutoff, gain and Q, respectively. These values are then passed to a filtergraph~ which can be set to 10 different EQ settings and biquad~ which applies the filter. The gate~ passes the signal to be filtered through output 2 if the toggle is on (gate is closed) or output one if the toggle is off (gate is open).



Conclusion

Overall I am pleased with the Max for Live devices I created, and I will be using them in my own projects in the future, and I hope others can use them as well. The final part of my project was to create a short performance piece using the plugins I created.

Materials

Max MSP, Ableton Live (Suite), Midi Keyboard

References

Cooper, D., 2020. *Max/MSP improvisation - glitchy samples and generative drums*. [online] Youtube.com. Available at: <https://www.youtube.com/watch?v=SOazZz1_9ks&t=41s&ab_channel=DavidCooper> [Accessed 12 November 2021].

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