

SERIALSYNTH - Serialism Tool

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Overview

'SERIALSYNTH - Serialism Tool' is a fully functioning three-part serial software created in Max 7, consisting of a serialised SYNTHESIZER, a SERIAL MATERIAL GENERATOR and a SERIAL COMPOSITION GENERATOR. It features an accessible graphic user interface in presentation mode, which is then broken down fully into its components in patcher mode with detailed comments, eliminating any untidiness/confusion in the user interface and allowing opportunity for desired adjustments to be made within the software. The patch is structured so that the three components can comprehensibly communicate with each-other so as to create a diverse output of serialised material and music.

One of the principal features of the software is the QWERTY keyboard/keypad input option, which allows for a laptop running the software to be transformed into a portable synthesiser with no additional MIDI controller required. A KEYPAD LEGEND is provided in the GUI, along with the specific QWERTY keys on the corresponding piano keys in the onscreen keyboard. Also included is both mouse/touchscreen input into the onscreen keyboard and standard midi controller inputs for flexibility. The max patch is intricately designed and built with a focus on fine detail. This includes sliders set to only output the value on the mouse up which prevents sliding pitches, numerous LOADBANG sends to automatically set up the patch when opened so it is ready for use, various GATE and SELECT objects, as well as numerous SEND/RECEIVE objects and several SUB-PATCHES in place of masses of large chaotic Patch Cords, allowing for a clean and well organised machine. The complexity of the software provides the user with a multitude of options within the simply structured interface for detailed and enjoyable music making.

SYNTHESIZER

The synthesizer comprises of 3 major modulation techniques: RING MODULATION, AMPLITUDE MODULATION and FREQUENCY MODULATION, with the option of multiplying two modulation channels together for output, or even simply no modulation at all. Whilst these modulations and their variables can be manually edited, they are able to be serialised and predetermined by the values generated in the SERIAL MATERIAL GENERATION component of the software (as discussed later), by turning on the SERIALISE SYNTHESIZER PARAMETERS button located above the modulation windows.

The desired ADSR envelope and waveforms for both the carrier and the modulators can be selected individually or set to match the carrier by turning off the corresponding 'Ind. Wave On/Off' or 'Ind. ADSR On/Off' toggle, offering full flexibility in the creation of sound. Each modulation channel includes the relevant 'Ratio' and 'Brightness' dials which control the modulating pitch (in relation to the incoming carrier pitch) and its range respectively, as well as displaying the waveform of the signal output to audio. Also included is an additional simple MIDI mode which outputs keyboard entry from a selection of standard MIDI instrument sounds.

There are many additional features available for use within the software. The synthesizer keyboard includes a PITCH BEND slider, and DETUNE sliders controlling 'Depth' and 'Rate'. REVERB is able to be turned on and off at the users discretion, with sliders controlling 'Size', 'Decay', 'High Frequency Damping' and 'Diffusion'. A PRESET function is available, which allows the user to save the current

synthesizer settings and recall them in future (CTRL+SHIFT+CLICK in GUI; see patcher for further options).

SERIAL MATERIAL GENERATOR

The SERIAL MATERIAL GENERATOR is utilised to generate serialised sequences of pitch, chords, rhythm and dynamics, as well as a raw value series for potential use with other parameters within the compositional process. This component of the software begins with either the RANDOMISED ROW GENERATOR, which generates a series of a desired number of values either within a selected octave or elected non-octavation; or the PERSONALISED ROW GENERATOR, in which the user is able to input their desired values using mouse, MIDI controller or keypad input and store them in the desired number slot. The RESET button prepares the generator for new input and the CLEAR button wipes the memory of all stored rows. NON-OCTAVATION can be turned on in order for pitches to be no longer restricted to a particular octave. The input, duration and sound of the input can also be controlled to allow for a more effective creative process.

The generated row is then able to be transformed into chord, rhythm, dynamic and raw series, and the user is able to generate various matrixes of these values (including 12, 6, 4, 3 and 2 note chords, rhythm and dynamic series), opening the corresponding sub-patch for further information and variation opportunity in the compositional process. This information is sent to the relevant locations in the other components in order to serialise the values of the SYNTHESIZER and generate the content for the COMPOSITION GENERATOR.

SERIAL COMPOSITION GENERATOR

The SERIAL COMPOSITION GENERATOR produces an automated free contrapuntal composition for up to three-voices based on serialised *pitch, rhythm and dynamics*. The generated rows from the SERIAL MATERIAL GENERATOR are stored as pitch, rhythmic and dynamic series which are recalled through the COLL (collection) object for each voice. The user can select from a list of MIDI INSTRUMENTS for output, as well as a CUSTOM synthesised sound either manipulated by the values of the series, or manually adjusted. The component is designed with MASTER controls for the setting/adjustment of the parameters of all voices simultaneously, including instrument sound, the desired row and number of values for each pitch, rhythmic and volume collections, the tempo and duration of the notes, waveforms and ADSR envelopes of both the carrier and modulation frequencies, modulation type and their ratio and brightness. These can also be individually adjusted within each voice for unique output.

The entry of each voice can be controlled individually; so as to select just one, two or three voices; or actioned through the MASTER on/off switch, whereby VOICE 1 enters first and is followed by VOICE 2 and VOICE 3 after a specified duration, ranging from immediately (0 seconds) to 4 seconds. Utilising three of the same instruments creates a homogenous sound, for example, three voices on a solo piano or a string trio, or a much more diverse output of sound such as a trio of bagpipes, marimba and recorder, or 3 alternatively customised synthesizers. Combining this with the same pitch, rhythmic and dynamic collections utilised across all 3 voices or set individually - the possibilities are truly endless! For a full list of more technical explanatory comments, please see inside the patcher.

Not only does this tool generate a complex diversity of sounds and create effective musical compositions in its own right; its material generation can provide the foundations for more extensive compositional work.

Instructions

1. Open the Max patch 'SERIALSYNTH – Serialism Tool_Connor Hutchinson_CMPN1632 Final Assignment_460323929' (automatically set to presentation mode).
2. Adjust window ZOOM to fit screen size.
3. Adjust MASTER VOLUME to desired output (recommended 50% of slider).
4. Turn on KEYPAD INPUT if desired, and set to DATA ENTRY.

SERIAL MATERIAL GENERATION

5. GENERATE RANDOM series of values in desired octave/non-octavating collection with selected number of pitches. Be sure to select a new storage number to ensure new rows don't overwrite previous rows, and/or
6. Input PERSONALISED row of values in desired octave/non-octavating collection with selected number of pitches and click STORE. Be sure to select a new storage number to ensure new rows don't overwrite previous rows. Adjust input settings as required, with input via keypad, MIDI controller or mouse input.
7. Use RESET button prior to new series input, and CLEAR button to clear stored rows if desired.
8. NON-OCTAVATION can be turned on in order for pitches to be no longer restricted to a particular octave.
9. GENERATE MATRIX as desired for CHORDS, RHYTHM and DYNAMICS, using the RAW VALUES button to toggle between precise and raw values.

SYNTHESIZER

10. Change KEYPAD INPUT to SYNTHESIZER; set MIDI instrument and duration before you play.
11. Turn on SERIALISE SYNTHESIZER PARAMETERS to set synthesizer variables based on the previously generated series. With this toggle on, the synthesizer variables will be controlled by any successive rows generated.
12. Select CUSTOM as the MIDI instrument and use keypad/controller to play synth.
13. Modify variables from serial values if desired and explore the various CARRIER, RING, AMPLITUDE AND FREQUENCY MODULATION techniques, with varying WAVEFORMS and ADSR envelopes, REVERB, PITCH BEND and DETUNE.
14. *EXAMPLE: CUSTOM SINE wave, RING MOD multiplied by FREQ MOD with SAWTOTH wave, individual ASDR envelopes.*
15. Save settings at any time as PRESETS with CTRL+SHIFT+CLICK on blank space, and click on occupied space to recall settings.

SERIAL COMPOSITION GENERATOR

16. Set MASTER settings: MIDI instrument sound, Tempo, Voice Entry, Duration, Carrier and Modulator Waveforms and ADSR Envelopes, as well as the desired row and number of values for each of the PITCH, RHYTHM and VOLUME parameters.
17. Turn on MASTER control to play, and following VOICE 1, VOICES 2 and 3 will enter after the specified ENTRY DELAY.
18. Turn off MASTER and the MASTER Midi instrument sound to CUSTOM. Set the MASTER Modulation Type and corresponding Ratio/Brightness, as well any adjustments to Tempo, Duration, Carrier and Modulator Waveforms and ADSR Envelopes, and the desired row and number of values for each of the PITCH, RHYTHM and VOLUME parameters.
19. Turn on MASTER control to play. Turn off when finished.

20. Experiment with the values of each voice, turning them on/off individually as desired to create an exciting composition.
21. *EXAMPLE: VOICE 1 CUSTOM (SINE wave, AMP MOD with TRIANGLE wave, Pitch 1, Rhythm 2, Volume 3), VOICE 2 CUSTOM (SINE wave, FREQ MOD x AMP MOD with SINE wave, Pitch 2, Rhythm 3, Volume 1), VOICE 3 CUSTOM (SQUARE wave, RING MOD x FREQ MOD with SAWTOOTH wave, Pitch 3, Rhythm 1, Volume 2).*
22. *EXAMPLE: VOICE 1 TROMBONE, VOICE 2 SAXAPHONE, VOICE 3 MARIMBA or VOICE 1 VIOLIN, VOICE 2 CELLO.*
23. Turn on SERIALISE SYNTHESIZER PARAMETERS to set MASTER VOICE variables based on the previously generated series. With this toggle on, the synthesizer variables will be controlled by any successive rows generated.
24. Repeat and modify above steps/processes to explore full potential of software in creating exciting new music.

I hope you enjoy making music and exploring the endless possibilities of serialism, 'material thinking', modulation and sound in 'SERIALSYNTH - Serialism Tool'.

SERIALSYNTH - Serialism Tool

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CMPN1632 Assignment 3 -
Final Project

1. SYNTHESIZER

MASTER VOLUME

MODULATION SELECTOR

MIDI INSTRUMENT: NONE ONLY
 RING MODULATION
 AMP MODULATION
 FREQ MODULATION

Multiply Modulation by:
 NONE
 RING MODULATION
 AMP MODULATION
 FREQ MODULATION

SERIALISE SYNTHESIZER PARAMETERS

CARRIER (NO MODULATION)

Carrier: Sine Triangle Sawtooth Square

Attack: 5.00 ms, Decay: 250 ms, Sustain: 100%, Release: 500 ms

Waveform:

RING MODULATION

Modulator: Sine Triangle Sawtooth Square

Ratio: 0.50

Attack: 5.00 ms, Decay: 250 ms, Sustain: 100%, Release: 500 ms

Combined Waveform:

AMPLITUDE MODULATION

Modulator: Sine Triangle Sawtooth Square

Ratio: 0.50, Brightness: 0.50

Attack: 5.00 ms, Decay: 250 ms, Sustain: 100%, Release: 500 ms

Combined Waveform:

FREQUENCY MODULATION

Modulator: Sine Triangle Sawtooth Square

Ratio: 0.50, Brightness: 0.50

Attack: 5.00 ms, Decay: 250 ms, Sustain: 100%, Release: 500 ms

Combined Waveform:

KEYPAD INPUT

MIDI Instrument: Acoustic Grand Piano, MIDI Note Duration (ms): 500

On/Off: ON OFF

PITCH BEND: OFF ON

DETUNE: OFF ON

REVERB: OFF ON

Size: Decay: High Freq. Damping: Diffusion:

2. SERIAL MATERIAL GENERATOR

GENERATE RANDOMISED ROW GENERATOR

Number of Pitches: 12, Octave: 4, Storage Number: 1

STORE

PERSONALISED ROW GENERATOR

Number of Pitches: 12, Octave: 4, Storage Number: 1

GENERATE MATRIX

INPUT SETTINGS

VOLUME: Non-oscillating

MIDI Instrument: Acoustic Grand Piano

MIDI Note Duration (ms): 500

CHORD GENERATOR

6-Note Chords, 4-Note Chords, 3-Note Chords, 2-Note Chords

RHYTHM GENERATOR

RESET:

RESET:

DYNAMICS GENERATOR

RESET:

MATRIX GENERATOR

RAW VALUES: 67 69 68 70 64 69 65 62 65 61 63 66 71

DOUBLE CLICK TO VIEW: p dynamics matrix

DOUBLE CLICK TO VIEW: p rhythm matrix

3. SERIAL COMPOSITION GENERATOR

MASTER VOLUME

MIDI INSTRUMENT SOUND: CUSTOM

TEMPO:

PITCH: Select Row, Select Row, Select Row

RHYTHM: Select Row, Select Row, Select Row

VOLUME: No. of Values: 12

DURATION: No. of Values: 12

VOICE ENTRY DELAY:

ADJUST MASTER PARAMETERS

Carrier: Sine Triangle Sawtooth Square

Attack: 5.00 ms, Decay: 250 ms, Sustain: 100%, Release: 500 ms

Modulator: Sine Triangle Sawtooth Square

Ratio: 0.50, Brightness: 0.50

Multiply Modulation by: NONE RING MODULATION AMP MODULATION FREQ MODULATION

VOICE 1

MIDI INSTRUMENT SOUND: CUSTOM

PITCH: Select Row, Select Row, Select Row

RHYTHM: Select Row, Select Row, Select Row

VOLUME: No. of Values: 12

DURATION: No. of Values: 12

ADJUST PARAMETERS: NONE RING MODULATION AMP MODULATION FREQ MODULATION

VOICE 2

MIDI INSTRUMENT SOUND: CUSTOM

PITCH: Select Row, Select Row, Select Row

RHYTHM: Select Row, Select Row, Select Row

VOLUME: No. of Values: 12

DURATION: No. of Values: 12

ADJUST PARAMETERS: NONE RING MODULATION AMP MODULATION FREQ MODULATION

VOICE 3

MIDI INSTRUMENT SOUND: CUSTOM

PITCH: Select Row, Select Row, Select Row

RHYTHM: Select Row, Select Row, Select Row

VOLUME: No. of Values: 12

DURATION: No. of Values: 12

ADJUST PARAMETERS: NONE RING MODULATION AMP MODULATION FREQ MODULATION

Patching Mode

The screenshot displays the SERIALSYNTH - Serialism Tool interface in Patching Mode. The main window is divided into several functional areas:

- Top Left:** A blue header bar contains the title "SERIALSYNTH - Serialism Tool" and the author "by Gernot Hoffmann 49332623". Below this is a piano keyboard visualization and various control buttons.
- Top Right:** A white text box provides "COPYRIGHT INFORMATION" and "LICENSE INFORMATION".
- Middle Left:** An orange panel titled "SERIAL MATERIAL GENERATOR" features a grid of colored buttons and a list of parameters for generating serial material.
- Middle Right:** A green panel titled "SERIAL COMPOSITION GENERATOR" contains a complex arrangement of buttons and sliders for composing serial structures.
- Bottom Right:** A dark grey panel titled "SYNTHESIZER" shows a detailed view of the synthesis process with multiple sub-panels and controls.

Connections between these panels are indicated by arrows, showing the flow of data and control signals. A small printer icon is also visible in the top right area.