# Noise Engineering
Cursus Iteritas Vereor
Dynamically generated wavetable synth
Rack Extension

Cursus Iteritas Vereor is a synthesizer that works from a dynamically generated wavetable. It gives the user spectral-like controls in three different modes based on different conceptualizations of frequency: Fourier, which uses sine waves; Daubechies, using wavelets; and Walsh mode, using the Walsh transform. Cursus Iteritas Vereor parameterizes a wide variety of sounds, but because the sounds are all based off of orthogonal functions, it has a musical tone structure and can produce an extremely wide variety of harmonic sounds.
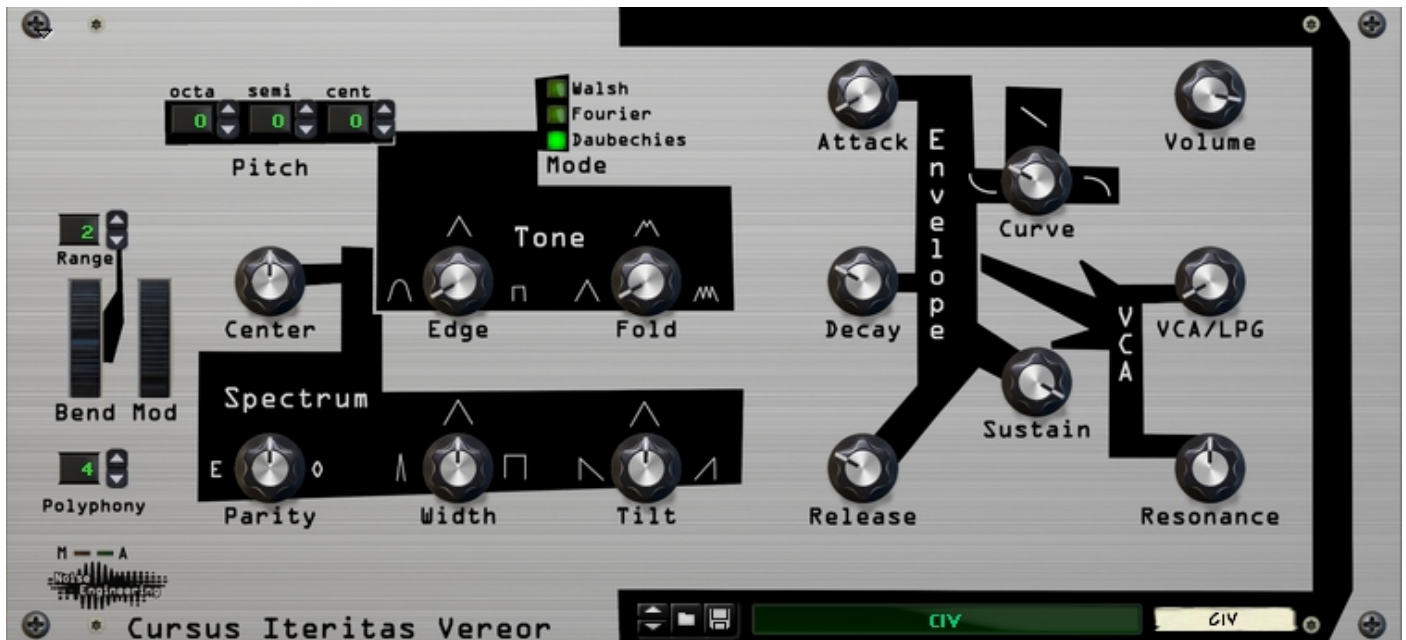
Cursus Iteritas Vereor generates a spectral description based on knob positions. Center, Width, Tilt, structure determine amplitudes for each harmonic. This description is fed into the inverse transform for the current function set to produce the time-domain wavetable. The wavetable is normalized to reduce amplitude variations across spectral changes. Oversampling of the wavetable depends on pitch: lower octaves have higher oversampling since the sample rate. The Edge control interpolates the oversampling from point sampling to a cubic-spline interpolation. As the period of the full length of the wavetable always evenly divides the sample rate, the additional aliasing is largely harmonic in nature. Fold controls the signal wavefolding. In many places in the signal path, there are soft clipping stages to mimic analog-style clipping to give more warmth and complexity to the sounds generated.
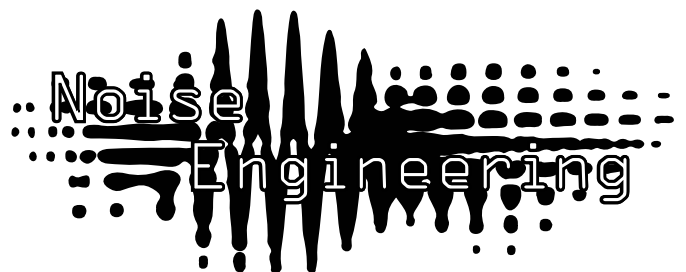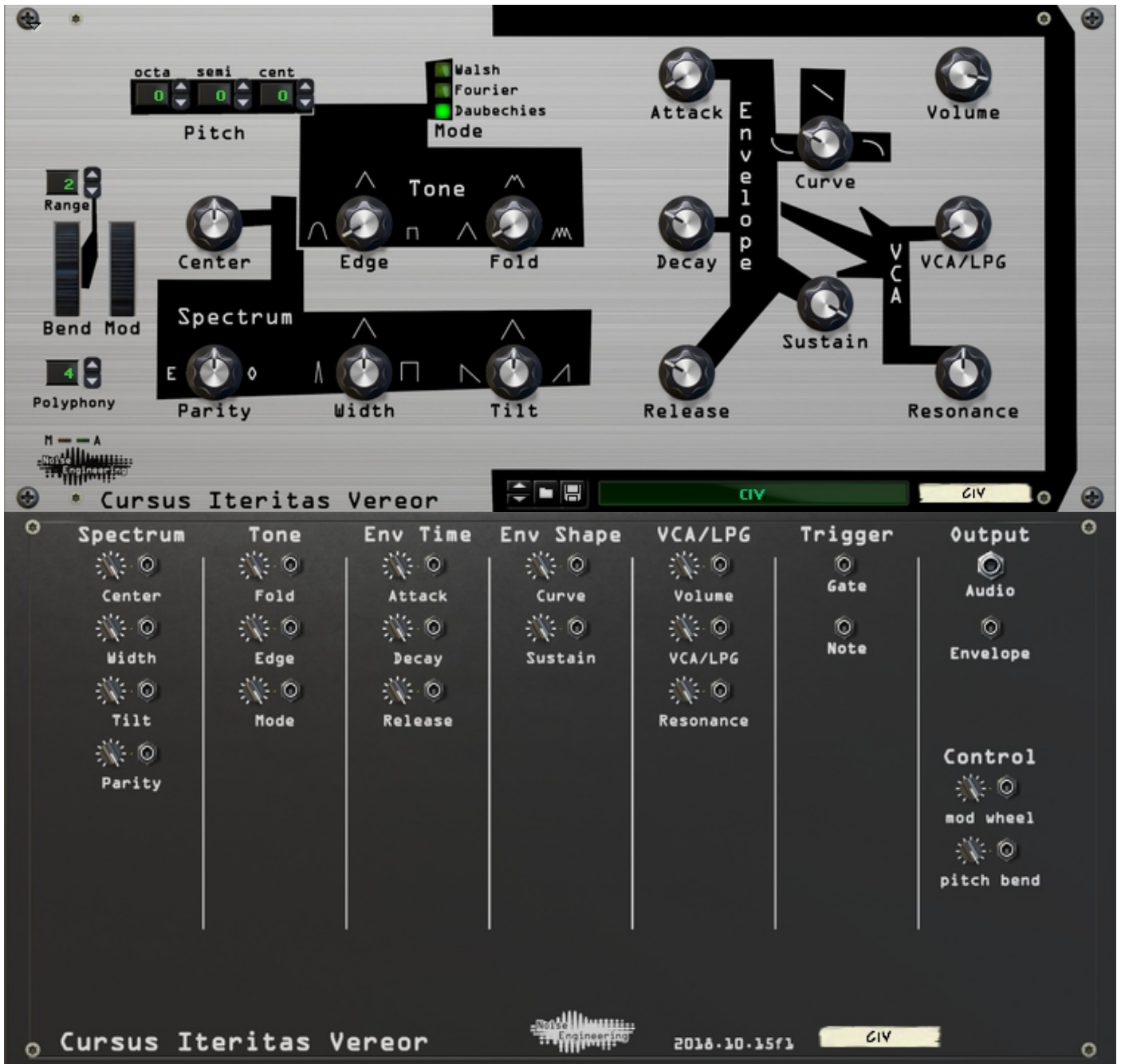
Front and Back Panel Controls

Pitch - adjusts the pitch of the fundamental oscillator. Define octave, semitone, and cent.

Center - selects the center harmonic used to build the wavetable.

Edge - controls the oversampling filter of the wavetable. Turn knob to the right to add musical overtones.

Fold - wavefolder. Enough said.

Parity - allows selection of harmonics included in the output. In the center position, all harmonics are included. Fully left only even harmonics; fully right, only odd.

Width - controls how many different harmonics are used to create the wavetable.

Front and Back Panel Controls, Continued

Tilt - weights the spread of harmonics. In the middle it is symmetric; at left, lower harmonics are louder while at right, higher harmonics get more volume.

Mode - selects which orthogonal function set us used to produce the wavetable.

Bend Range - adjusts the maximum pitch-bend range in semitones.

Bend - visual indicator of MIDI pitch-bend wheel.

Mod - visual indicator MIDI mod wheel. Mapped to 20% Fold and 100% Tilt.

Volume - adjusts the level of the Rack Extension.

Preset Load/Save - click the folder button to open a preset. Use the arrows to toggle through presets. Use the disk button to save a preset.

Polyphony - sets the maximum number of voices. When maximum is set to 1, portamento is enabled.

Envelope/VCA Controls (Front and Back)

Envelope/VCA

VCAs and LPGs are devices common in the hardware world but aren't presented in the same way in software. A VCA (voltage-controlled amplifier) controls the amplitude of a signal. Most often, they are used in conjunction with envelopes to control the volume of a sound. In this synth, it is controlled by the ADSR envelope; when a note is triggered, the envelope rises through the Attack stage, opening the VCA and letting the sound generated by the oscillators through. As the note is held down, the envelope then cycles through the Decay stage down to the level set by the Sustain, holding the oscillator at a specific amplitude. When the note is let go, the envelope closes at a speed set by the Release, closing the VCA and silencing the oscillators.

A LPG (Low Pass Gate) is a combination of a VCA and a low pass filter. Combined, they control both the amplitude and harmonic content of a sound. The filter behaves similarly to the VCA and follows the envelope, opening and closing as the envelope cycles.

Attack - adjusts the envelope rise time.

Decay - adjusts the envelope decay.

Sustain - sets the level decay falls to.

**Release -** sets the latency before the envelope falls when a note is released.

Curve - adjusts the curve of the envelope stages from exponential to linear to logarithmic.

VCA/LPG - mixes between a clean VCA and low pass gate. While useful at the two extremes, delicate harmonic shaping can be achieved with the right mix of VCA and LPG.

Resonance - adjusts the resonance of the LPG. This parameter will not affect the sound of the synth if the VCA/LPG mix knob is set fully to VCA.

All front-panel knobs act as offsets that sum with CV inputs.

All back-panel knobs act as attenuators.

3
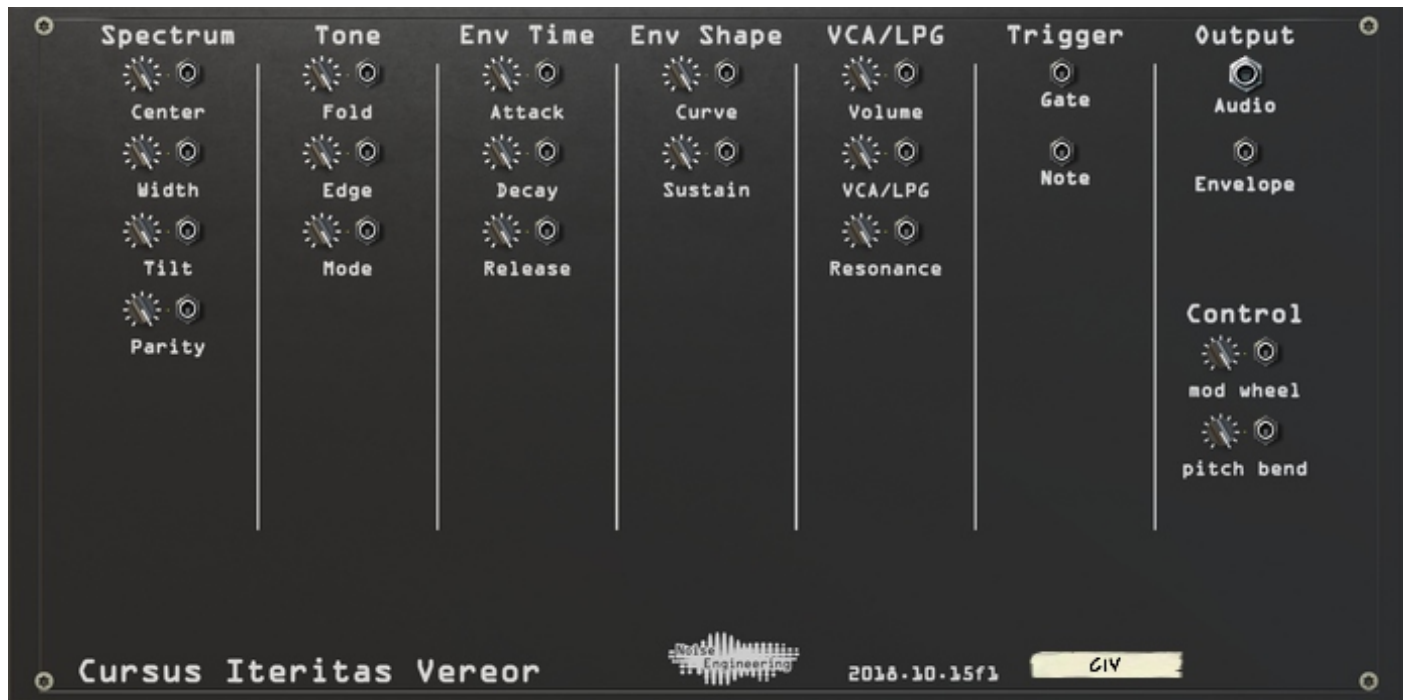
Back Panel Only:
Trigger: Gate - input to trigger the module.

Trigger: Note - CV input to specify note.

Output: Envelope - a CV output that tracks the current envelope level.

Output: Audio - monophonic output.

Special Thanks

Our Beta testers improved the look, feel, and function immensely and we are in their debt.

Beta testers for Synth Bundle 2 include
Markus Cancilla
Mattias Haggstrom
Alan Strahsburg
Paul Rostill
Navi Retlav
Akos Botos
Craig Stanton
Nils-Erik Johansson
Michael Gorman
Kirk Markarian
tl3ss