SISYPHUS

Granular filter

V2

KAONA

Ingenious Instruments for Creative Minds

Presentation

Sisyphus is a Eurorack module that combines granular manipulation with a palette of eight filters developed specifically for granular synthesis. Its “engine” allows up to twenty micro-sequences (grains) to be combined into patterns, each individually controlled by independent filters. As a result, these filtered grains can coexist within a single stereo audio stream.

Developed from the ground up—without relying on any existing filter libraries—Sisyphus features a novel architecture, a highly creative approach, and excellent build quality. It can be integrated seamlessly into a wide range of musical creation processes, covering numerous genres and offering vibrant, evolving soundscapes to enrich your music.

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SPECIFICATIONS

Width: 24 HP

Power Consumption:

+12 V : 200 mA

–12 V : 10 mA

+5 V : 0 mA

Depth: 28 mm

Installation

Connect Sisyphus to a Eurorack power source using the supplied cable. The module is protected against reverse polarity, and the keyed connector ensures proper orientation when plugging it in.

Acknowledgments

Sisyphus is the result of a very long development process and extensive sonic experimentation. Many thanks to everyone who, in one way or another, contributed to this adventure—especially Pierre-Jean and Laurent for their advice, Seungri for his corrections and optimizations on this complex code, Mia for her presence in East Asia and her communication advice, and to the early testers who intensively used various versions of Sisyphus—particularly Yi Jil, whose methodical tests and highly useful improvement requests have been invaluable!

Finally, my gratitude to Jutta, who has supported me for so long.

Gilles de Kaona

OPERATION

General Overview

This filter is founded on a fully granular approach to sound. It is not simply a granular engine followed by a filter; rather, it integrates the filtering process within the formation of each grain. Every generated grain carries the filtering characteristics defined by the user and is combined with other grains according to evolving, customizable patterns.

IN Inputs

Two signals can be processed simultaneously—either a stereo source or two completely separate sources. To convert a mono source to stereo, you can duplicate the signal using a mult or a Stackcable. Each channel includes an attenuator to set the signal's amplitude. Depending on the source and the attenuator setting, saturation may occur. The inputs operate at typical Eurorack levels.

OUT Outputs

The input on IN L corresponds to OUT L, and IN R to OUT R. A potentiometer on each output controls the amplitude of that channel.

Grain Control

The sound is continuously sampled and split into buffers. These segments are analyzed, filtered, and then extracted as individual grains. You can adjust each grain's length, the interval between grains, how they transition, how they are arranged relative to one another, and their density (the number of grains and their influence).

Grain Length

Purpose: Adjusts the size of the audio grains.

Effect: Shorter grains produce a more "granular" texture, while longer grains preserve more of the original sound. If multiple grains are played simultaneously, longer grains create more noticeable echo effects (depending on the selected pattern). Depending on the chosen grain length, its primary cutoff frequency, and its trigger moments, the LEDs around this knob will generally indicate the rate at which grains are renewed.

Grain Interval

Purpose: Determines the time between the start of two consecutive grains (or the probability of automatic triggering).

Effect: Short intervals produce a dense superposition of grains; longer intervals space out individual grains so they can be distinctly heard.

Pattern

The grains are arranged in predefined, customizable patterns.

Purpose: Selects the pattern type from the available options. The LED color around this selector shows which pattern is active.

Effect: Modifies the way grains are organized.

Variability

Purpose: Determines the strength of the effects specific to each pattern.

Effect: Depending on the pattern, raising Variability makes its effect more pronounced. The LEDs indicate the amount of variation, and their color matches that of the current pattern.

Density

Purpose: Sets the number of simultaneous grains and their intensity.

Effect: Increasing this knob's value raises both the count of active grains and their individual volumes. Depending on the pattern, up to twenty independent grains (and thus filters) can coexist at once.

Turn this knob to 0, fully counterclockwise, to hear the sound just before it enters the filter: this is the sound that will then be processed by the granular engine and filtering stages.

Transition

Purpose: Sets the envelope shape applied to grains as they overlap or follow one another.

Effect: Influences how smoothly grains transition (attack/release can be sharper or smoother). Higher Transition values yield gentler overlaps, while lower values make transitions more abrupt. With certain filters and near-resonant or high-feedback settings, precise adjustment of this parameter can help prevent unwanted saturation or artifacts.

Granular patterns

The Pattern parameter selects one of the 14 available granular organizations.

Each pattern combines, in a different way:

- grain length;
- the interval between grains;
- the cutoff of each voice;
- and possibly detune, pitch changes, reverse playback, phase offsets, or chords.

In most patterns, the first grain remains a stable continuous voice (though still influenced by the filter effects: cutoff, resonance, feedback, variations, etc.), while the other voices add granular texture.

The Variability parameter acts as a control for intensity, dispersion, or complexity. The higher it is, the more the voices diverge from one another.

Pattern 1 — Red

A random granular cloud that still sounds fairly natural. The secondary voices vary in size, interval, cutoff, and slight pitch, around a stable main voice. With long grains, the Delay effect is very pronounced.

Variability increases:

- the random spread of grain lengths
- the random spread of intervals
- the dispersion of cutoff values
- a slight detune between the voices

Grain length / interval:

- voice 0 keeps the base grain size
- the other voices receive random lengths and intervals around the base values

Pitch / detune:

- slight smoothed detune per voice
- no marked harmonic change
- no reverse

Pattern 2 — Green

A rich, lively stereo pattern with a lot of controlled randomness. Ideal for large moving pads.

It combines:

- grain-length variations
- very audible interval variations
- small left/right pitch differences
- stereo phase offset
- occasional reverse playback
- mirrored left and right cutoff values

Variability strongly affects:

- the amount of grain-size variation
- the spread of intervals

- the intensity of the stereo pitch effect
- the probability of reverse playback
- left/right phase offset
- the width of the cutoff ranges

Grain length / interval:

- the higher Variability goes, the more sizes and intervals diverge between voices
- some voices become faster, others more spaced out

Pitch / detune:

- small stereo pitch differences between left and right
- no fixed chord
- occasional reverse on some voices

Phase / stereo:

- intentional L/R offset
- a highly animated stereo image

Pattern 3 — Blue

Progressive widening of the grains and a very marked asymmetry between left and right.

Variability increases:

- the grain size of the secondary voices
- the difference between intervals
- the opening of the cutoff

Grain length / interval:

- the grains become longer and longer on the secondary voices
- the intervals gradually lengthen
- the left and right channels do not use exactly the same sizes

Pitch / detune:

- no detune
- no pitch change
- no reverse

Pattern 4 — Yellow

Layering of transposed voices. Some voices are played one octave higher, others one octave lower. The grains can collide and produce granular beating, crash-like effects, and impacts.

Variability affects:

- the opening of the cutoff values on the transposed voices
- the depth of the rhythmic phase offset between voices

Grain length / interval:

- sizes and intervals vary in a smoothed random way
- a slight time offset between voices

Pitch / detune:

- voices 3 and 4: +1 octave
- voices 5 and 6: -1 octave

Pattern 5 — Magenta

An unstable, shifting granular texture, with grains redefined between each event. The result is more unpredictable than Pattern 0, and the delay can be very pronounced.

Variability increases:

- the random spread of sizes
- the random spread of intervals
- the dispersion of cutoff

Grain length / interval:

- each voice receives lengths and intervals recalculated over time
- the higher Variability goes, the more the voices spread apart

Pitch / detune:

- no imposed pitch
- no structural detune
- no reverse

Pattern 6 — Cyan

A very wide stereo pattern, with cutoff differences, micro left/right timing offsets, L/R pitch differences, and sometimes reverse playback. It is a very spatial pattern, with micro-chorus effects.

Variability increases:

- stereo width
- the interval difference between even and odd voices
- the pitch differences between left and right
- the Haas effect (stereo delay)
- the probability of small rhythmic “accidents” and reverse events

Grain length / interval:

- odd voices tend to speed up
- even voices tend to slow down
- grain sizes also evolve with Variability

Pitch / detune:

- small opposite pitch offsets between left and right
- sometimes reverse playback
- no fixed chord

Phase / stereo:

- very strong spatialization
- audible L/R timing offsets

Pattern 7 — Amber orange

An evolving harmonic pattern. The voices gradually move toward musical pitch ratios, with a few occasional accidents. The first voice remains continuous, with no granular effect.

Variability increases:

- the spread of intervals
- the importance of transpositions
- the dispersion of cutoff values
- the probability of small accentuated events

Grain length / interval:

- rather short, nervous grains
- the intervals become more contrasted with Variability

Pitch / detune:

- progressive interpolation toward several pitch ratios: unison, second, fifth, octave, descending fourth, descending octave
- slight random instability around these ratios
- occasional octave jumps

Pattern 8 — Light blue

A pattern based on a Gaussian-type distribution of grain sizes. The voices are distributed across different lengths, with a swarm-like organization and very little sequencing.

Variability mainly affects:

- the influence of the grain distribution
- the reduction of intervals
- a slight agitation of the cutoff

Grain length / interval:

- the sizes follow a Gaussian distribution
- the interval also depends indirectly on grain size
- the higher Variability goes, the tighter and more mobile the whole becomes

Pitch / detune:

- no detune
- no transposition
- no reverse

Pattern 9 — Pink

Progressive interval compression as Variability increases, along with a rise in cutoff and, at the end of the chain, a brightness effect and a comb filter to add a specific metallic / filtering resonance.

Variability increases:
- the apparent density
- the reduction of intervals
- the opening of the cutoff
- the intensity of the pattern's resonant character

Grain length / interval:
- grain size depends directly on Variability
- intervals decrease as Variability increases
- the result becomes more compact and tighter

Pitch / detune:
- no detune
- no transposition
- no reverse

Pattern 10 — Violet / blue

Layering of grains offset in time, like several starting points distributed across the cycle. A sense of staggering or propagation, with lots of Delay and movements in stereo width and placement.

Variability increases:
- grain size
- the phase offset between voices
- the opening of the secondary cutoff values

Grain length / interval:
- the grains become slightly larger with Variability
- the interval remains controlled so the grains do not disappear
- each voice is shifted in time relative to the others

Pitch / detune:
- no detune
- no transposed pitch
- no reverse

Pattern 11 — Orange

A swing / alternation type pattern. Odd and even voices do not share the same timing behavior.

Variability increases:

- the difference between fast and slow voices
- the slight cutoff variation
- the sense of rhythmic swing

Grain length / interval:

- every other voice is faster
- the others are slower
- small size differences appear between left and right

Pitch / detune:

- no transposed pitch
- no structured detune
- no reverse

Phase / stereo:

- a slight start offset between voices

Pattern 12 — Turquoise

A random-pitch-per-grain pattern. Each secondary voice can take on a new pitch between two grains, across a wide range. The first voice, however, stays at its original pitch.

Variability increases:

- the possible range of pitch changes
- the timing offset between voices
- the opening of the cutoff linked to pitch

Grain length / interval:

- the grains become shorter on the higher voices
- the interval remains common but is kept within musical limits
- the starts are offset between left and right

Pitch / detune:

- at the end of each grain, the pitch can be redefined
- range up to ±1 octave
- the cutoff values follow this pitch, which reinforces the harmonic effect

Pattern 13 — Dark red

A harmonic pattern designed to transform granular material into harmonic pads or moving chords.

Variability action:

- from 0 to about 50%: detune intensity
- above that: selection and intensity of a chord
- the higher Variability goes, the more defined the chord becomes

Grain length / interval:

- slightly shorter grains on the secondary voices
- stable and clean global interval
- a slight phase offset between voices

Pitch / detune / chords:
Two zones:

- Lower Variability zone
  progressive detune up to about ±1 octave
  a harmonic dispersion effect
  Higher Variability zone
- chord selection:
  major, minor, maj7, m7, dominant 7, maj9, m9, sus2 / add9, sus4, fifth

Pattern 14 — lavender white

A highly animated pattern in which the grains are organized as a swarm that gradually shifts from almost stable movement to more skewed, reversed, phase-shifted motion, with octave jumps, micro-delays, and very uneven grains.

Variability strongly influences grain behavior across its whole range:

- slight stereo offset to radical left/right offset
- very little reverse to increasingly frequent reversals
- almost neutral pitch to clearly audible offsets
- aligned cutoff or mirrored L/R cutoff
- grain sizes clearly pull apart
- some voices become short and nervous, others remain long
- the appearance of "breathing" intervals, very different between even and odd voices
- a few occasional "impulses": sudden tightening of intervals + reduction in size

Summary table of patterns

Pattern	LED color	Sonic character	Main Variability action
1	Red	Organic granular cloud with gentle variations between voices	Increases the random variations in grain size, interval, cutoff, and a slight detune
2	Green	Stereo granular texture with stereo pitch, occasional reverse, and phase offset between left and right	Accentuates grain and interval differences, stereo width, reversals, and pitch dispersion
3	Blue	Asymmetrical left/right structure with grains that gradually stretch out	Increases grain size and the difference between the left and right channels
4	Yellow	Layering of transposed grains (upper and lower octaves)	Accentuates cutoff differences and phase offset between the transposed voices
5	Magenta	Unstable texture with frequent grain recalculation	Increases variations in size, interval, and cutoff
6	Cyan	Very wide stereo pattern with micro-delays, stereo detune, and occasional reverse	Increases stereo width, pitch differences, and the probability of irregular events
7	Amber orange	Harmonic texture with musical pitch ratios (fifth, octave, etc.)	Accentuates transpositions and interval variations

8	Light blue	Granular cloud based on a Gaussian distribution of grain sizes	Strengthens grain dispersion and gradually tightens the intervals
9	Pink	Dense texture with compressed intervals and comb resonance	Increases density and the resonant effect of the comb filter
10	Violet	Cascade of grains offset in time	Increases the time offset between voices and grain size
11	Orange	Rhythmic alternation between fast and slow voices	Accentuates rhythmic contrast and differences in grain size
12	Turquoise	Random pitch per grain, with unpredictable transpositions	Increases the range of pitch variations and harmonic motion
13	Dark red	Detune mode followed by granular chords	From 0 to 50%: progressive detune; above that: chord selection (major, minor, 7, 9, etc.)
14	Lavender white	“Fractured” texture with fast and slow grains, reverse, and wide stereo	Increases the fragmentation of the granular cloud, reversals, pitch differences, and stereo phase offset

Filter Control

Purpose: Sets the filter’s cutoff (or center) frequency, ranging from 10 Hz to 20 kHz.

Effect: Depending on the chosen filter, cutoff defines the frequency region being filtered.

Lowpass and Ladder: Lower cutoff produces a darker sound.

Highpass: Higher cutoff yields a brighter sound, removing low frequencies.

Bandpass, Notch, Peak: Defines the center frequency of the effect.

Comb: allows exploration of the filter’s distinctive resonances.

Karplus: Defines the resonance frequency (this can function as a “note”).

Follow

Purpose: Automatically modulates the cutoff frequency based on an estimation of the input signal's pitch and spectral content.

Effect: At its maximum setting, the cutoff frequency control is replaced by spectral analysis. The results vary in prominence depending on the filter and the input signal.

Resonance

Purpose: Boosts frequencies near the cutoff frequency, from a mild hump to near self-oscillation.

Effect: Higher resonance levels create a more pronounced peak that can whistle or self-oscillate. Use caution with the Ladder filter, whose resonance—while intentionally constrained—can be quite intense.

Feedback

Purpose: Feeds the filter output (or a portion of it) back into its input.

Effect: Allows for complex resonances, drones, saturation, or controlled sonic chaos.

Variations

Purpose: Introduces instability in the cutoff frequency, resonance, or feedback, depending on the selected filter.

Effect: Adds a more "organic" character, reminiscent of certain analog filters. With the Comb filter, this control yields unique resonances during the first half of the knob's range and more global resonance thereafter.

Filters

The Filter selector chooses which filter is applied to all grains. Each filter's impact depends greatly on the incoming signal. All of Sisyphus's filters are custom-designed and each has its own unique "color."

Lowpass
Principle: Attenuates high frequencies above the cutoff while letting lows and lower mids pass. (12 dB/oct)

Effect: Darker sound, reduced treble.

Highpass
Principle: Removes or attenuates low frequencies below the cutoff, letting higher frequencies pass. (12 dB/oct)

Effect: Brighter sound, thins out lows, can help clarify a bass-heavy mix.

Bandpass
Principle: Passes only the band of frequencies around the cutoff (center frequency). (12 dB/oct)

Effect: Emphasizes a specific range—useful for nasal or percussive tones.

Notch (réjection de bande)
Principle: Cuts or dips frequencies around the cutoff, letting the rest pass.

Effect: Removes a specific frequency band.

Peak (peak / filtre en cloche)
Principle: Boosts the band around the cutoff, while letting the rest of the spectrum pass largely unaffected.

Effect: Highlights a particular formant or range, providing strong coloration in that zone.

Comb
Principle: Creates a series of phase cancellations and resonances (like a comb), based on an internal delay and feedback.

Effect: Flanger/chorus/harmonic resonances—ideal for metallic or shimmering textures.

Karplus (Karplus-Strong)
Principle: Simulates the vibration of a string or a resonant loop by blending a short delay, feedback, and damping.

Effect: Adjusting cutoff changes the "string tension," enabling playable notes or lively percussive textures.

Ladder
Principle: Inspired by Moog-style analog filters with four cascading stages. The steep slope (24 dB/oct) and distinctive resonance can approach self-oscillation.

Effect: Delivers a classic "fat" sound with saturation from mild to aggressive, offering an organic, analog-like behavior.

CV Inputs

Four CV inputs let you control Sisyphus via other Eurorack modules. These accept standard Eurorack voltages (0–8 V); negative voltages are ignored.

CV signals do not replace the module's controls but rather complement them.

Depending on the input signal and the selected pattern, the Grain Length CV input might not always produce an audible effect. Often, a slow envelope will have more impact than a fast LFO.

Hacking Sisyphus!

You can customize the module's parameters via an external file on an SD card.

Use a Class 10 SD card of 4 to 32 MB capacity (other classes or capacities might still work, but this format is recommended). The card must be formatted in FAT32, commonly used for lower-capacity cards on the market.

Power off the module (recommended).

Carefully insert the card into the slot on the back of the module—the keyed design prevents incorrect orientation.

When the module restarts, it will write a PARAM.TXT file to the card. You can edit this file to change how Sisyphus operates.

To revert to factory settings, either remove the card or delete the PARAM.TXT file.

Possible Modifications

Use any text editor (e.g., Notepad in Windows, TextEdit on Mac) to enter values different from the defaults.

The file initially looks something like this:

```
LED brightness: 0 (off) to 10 (max)
10
-------------------------------------------
Assignment of CVs: 0=grain length, 1=interval, 2=density, 3=reso-
nance, 4=feedback, 5=transition, 6=variability, 7=follow, 8=cutoff,
9=pattern, 10 variation, 11 reset Grain
-------------------------------------------
CV1 base:
0
CV2 base:
2
CV3 base:
8
CV4 base:
3
-------------------------------------------
Range of CVs (1-8V): 1=mini to 8=max
-------------------------------------------
CV1 range:
8
CV2 range:
8
CV3 range:
8
CV4 range:
8
-------------------------------------------
Version:
Sisyphus 1.38
```

You can change the following:

LED brightness
Ranges from 0 (LEDs off) to 10 (maximum brightness).

CV1 to CV4
Each of the four CV inputs can be assigned to any control:

0 = Grain Length / 1 = Interval / 2 = Density / 3 = Resonance / 4 = Feedback / 5 = Transition / 6 = Variability / 7 = Follow / 8 = Cutoff / 9 = Pattern / 10 = Variation / 11 = Reset Grain (which, upon receiving a

gate, immediately restarts all active grains)

CV range (1 to 4)
You can set each CV input's voltage range to suit your equipment. Even if you send a higher voltage than specified, you won't damage Sisyphus; it will simply reach the maximum value of that control sooner.

If no SD card is present, Sisyphus will revert to factory defaults at startup.

Check www.kaona.fr to see if a newer version is available and for instructions on updating. Also, join us on Facebook (Kaona modular music) for news and developments.