

GrainLoop v1.0 by NOISS COKO

GrainLoop is a real time audio recording device that uses granular synthesis as an alternative for the old classic and traditional linear playback. This sample based technique triggers a continuous stream of sound particles, that rearranged in time, reflect a rather mangled and often fractured version of the original loop.

Just like Ableton's native Loper device, this Max for Live audio effect is designed to overdub and accumulate an unlimited number of sound layers as the recording process is repeated, but applying a variable degree of unpredictability to its playback phase, derived from the granular synthesis unique and characteristic nature.



RECORDING & PLAYBACK

Before getting into the specifics of every parameter and function, it's very important to understand how the recording and playback stages are implemented in the context of this audio device.

GrainLoop doesn't play its recordings in a linear or traditional manner, since it continuously shuffles these audio particles, applying a variable degree of unpredictability to its behaviour. That's basically granular!

As a consequence of this particular nature, the recording/overdub process doesn't occur on the same buffer that is also being used for playback. GrainLoop jumps between two complementary buffers, following a very simple principle: one records while the other plays back. This avoids all sort of clicks and unwanted noises that will otherwise result from the process of reading before the recording's finished.

Only **three simple steps** you need to follow!

- Turn **on** the **Rec** toggle.



Now the buffer starts recording all the signals it receives. You'll see the waveform being displayed in real time, but yet it won't be heard. Remember! This device records in one buffer, while the other's still playing.

- Turn **off** the **Rec** toggle.



Once the recording process stops, the buffers will crossfade and then a new layer is ready for playback. The transition time between both depends on the [Play Fade](#) parameter.

- Turn **on** the **Freeze** or **Play** toggle.



Finally! GrainLoop will start playing a continuous stream of grains, made of small fragments and pieces of audio. Actually, this step could be followed at any time, before, during or after recording.

As this process is repeated, sound layers will be overdubbed, not overwritten! The buffer could also be emptied at any time by simply clicking over the [Clear](#) button.

Rec

Starts/stops recording the input signal. When this toggle's turned off, both buffers will crossfade and only then the new layer will be ready for playback. The [Play Fade](#) parameter adjusts how long the transition takes.

Play

Starts/stops the loop playback, allowing the grains to develop their position in time and scan through the buffer in any possible direction.

Only while this toggle is on, a [Playback](#) dial will be displayed instead of [Point](#), allowing the playback speed to be adjusted. The time this toggle takes to fade the loop signal in (when turned on) and out (when turned off) is also defined by the [Play Fade](#) parameter.

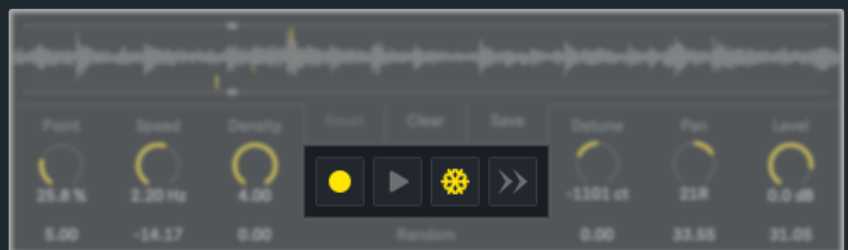
Freeze

While the Freeze toggle is on, small fragments from the loop will be played back as usual, but here staying over a fixed location in the timeline. The [Point](#) dial could still be used to scan through the sample manually, as well as the two modulation sources that GrainLoop integrates.

Notice that Play and Freeze could never stay active at the same time. One will always stop whenever the other is turned on.

Playback Direction

Switches between forward and reverse playback direction. In this case, not only the loop scanning process will run backwards, but also each grain will be played back in reverse. However, this is also affected by the current [Reverse](#) value.



Rec Level

Adjusts the recording signal amplitude, independently from the [Level](#) and [Dry Level](#) values.



Dry Level

Sets the direct input signal amplitude, having no effect over the one that's being recorded. This for example allows to mute or unmute the source signal during or after the recording phase.

Length

Defines a buffer size or loop period between 1 and 30 seconds.

Careful! Setting a new length value will immediately clear the buffer and all its previous recordings.

GrainLoop's behaviour could be easily adapted by setting a specific position, pitch, duration, amplitude and stereo location for each single grain, together with the introduction of different modulation sources that enable an even more interesting and unpredictable nature.

Playback / Point

Depending on the current playback function, this section could actually display two different parameters:

- While the [Play](#) toggle is on, grains will scan in circles through the buffer. The Playback dial sets a rate or period for this cyclic progression.
- While the [Freeze](#) toggle is on, the Point dial assigns a default starting position and offers a specific location for these grains to stream.

Speed

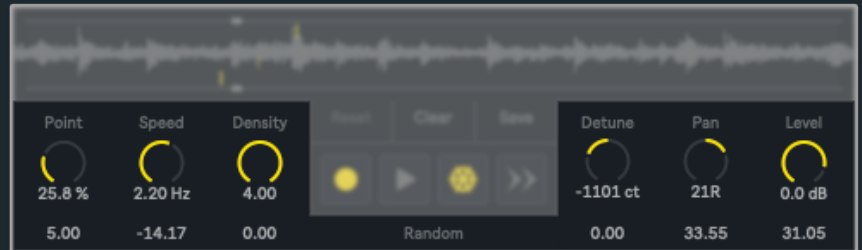
Controls the stream rate or frequency, meaning how fast the grains are being triggered. This as well holds a direct relation with each grain size. Slow rate values will stretch all grain durations, while the opposite applies for higher frequencies. Grains will then get contracted or expanded from the current Point location as the Speed value changes.

Density

GrainLoop's playback system is based on a stream of four grains that are basically running at different phase degrees. By changing their starting phase, Density decides the amount of grains (between two and four) that may be overlapped or simultaneously reproduced.

Detune

Global detune amount set in cents, within a total range of ± 2400 ct (or ± 24 st). As well as in the Speed parameter, grains pitch hold a direct relation with their actual length (every octave doubles or divides each grain period by a half).



The two small arrows placed on both sides of this parameter allow to jump up (right) or down (left) between octaves, always considering the current value as a point of reference. These buttons become momentarily disabled whenever Detune's position is less than ± 1200 ct far from any of both extremes of the range.

Panning

From left to right, this dial specifies all grains default location in the stereo field.

Level

Sets the loop playback output level.

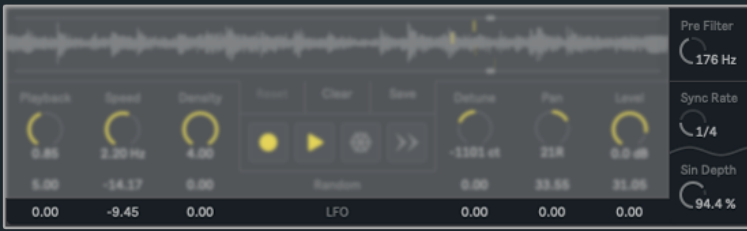
GRAIN MODULATION

Besides their default state, these parameters could also be affected by two different kind of modulation sources. All six dials have their own individual control over the modulation amount that is applied.

Randomise Amounts

Each grain can randomly add or subtract a certain value to its dials current position. Most number boxes offer a range of both positive (0 to 100) and negative (0 to -100) values, but their implementation varies according to each parameter:

- **Point:** in the context of a granular device, this could also be known as a spread function, which simply randomises the grains starting point across the loop. As the amount approximates to its extremes, grains get more and more spread out from the Point dial default position.
- **Speed:** each grain adds or subtracts a random number to its current Speed position. Negative values will slow down the stream from its point of reference, while the opposite is implied by the positive half of the range.
- **Density:** negative numbers will randomly push this dial position towards its lowest values, while the opposite happens with modulation amounts on the positive spectrum.
- **Detune:** assigns a random pitch to every grain that's being triggered. Depending on its values, the amount will define two different behaviours. Positive numbers mean that grains could take any other pitch, without any sort of interval or scale limitation. On the other hand, negative values will only stay within \pm one octave from its default position.
- **Panning:** defines the way in which these fragments could be randomly distributed along the stereo field. Every time a grain is triggered, a new individual location is assigned to it. They will get more and more spread out from left to right as the amount reaches its maximum value.
- **Level:** numbers within the positive side of the range produce a random fluctuation over each grain amplitude. Negative values determine the odds for each grain to be triggered or not. If the amount is set to 0%, grains will always be triggered, while the same could only happen half of the time if the number is close to -50%. Any other alternative between a range of 0% and -100% will produce more or less unpredictable variations within the sample playback.



LFO Amounts

These individual amount controls define how much each one of the six fundamental parameters are affected by the LFO signal. Except over the Pan parameter, all LFO modulations are implemented as a unipolar signal, meaning that every default value will function as a point of reference, either being the lowest (0 to 100) or the highest (0 to -100) extreme of the modulation range.

MODULATION SOURCE

Pre/Post Filter

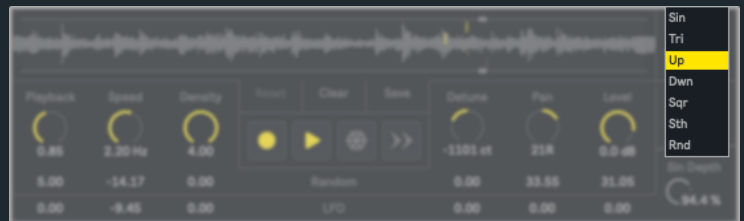
A simple yet helpful lowpass filter. Parts of the sound spectrum below the cutoff frequency will get filtered out from the original signal. This process could simply affect the dry signal, before the recording phase (Pre), or only the signal after playback (Post). Clicking over the "Pre/Post Filter" title switches between the two.

LFO Rate

Controls the low frequency oscillator speed. Values could be expressed using two different unit styles, Free (0.01 to 3.5Hz) or Sync (1/16 to 8 bars). The latter will only start running if the Live play button is already active. Clicking over the "Free/Sync Rate" title switches between the two.

LFO Depth

Even though each grain parameter has its own individual control over this modulation source, Depth adjusts the LFO original amplitude. If this dial is set to 0%, no parameter will be affected by the LFO, regardless of their individual and current amount configuration.



LFO Waveform

Selects one of the seven alternative waveforms for the LFO: sine, triangle, up saw, down saw, square and two different sample & hold functions, smooth (transitions from one value to the other) and random (jumps between values). Clicking over the default "Sin Depth" title opens the waveform menu.

GLOBAL

Rec Fade

Every time a new recording starts or ends, the input signal gets smoothed out while is being sent into the buffer. This parameter adjusts the time that in both cases will be applied.



Play Fade

This parameter has in fact two different applications. First it represents how long it takes to fade the output level in and out every time the Play or Freeze toggles turn on and off. It's also the time both buffers need to crossfade after the Rec toggle is turned off.

Reverse

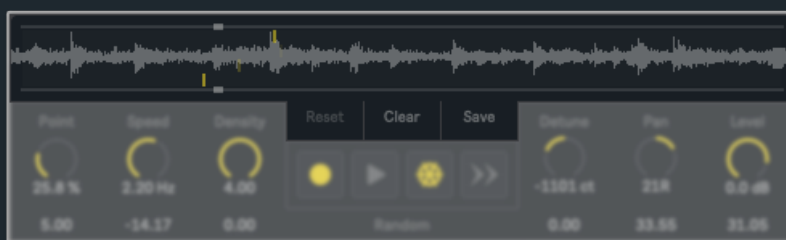
Sets the chance for each grain direction to be different from the one represented by the Playback Direction toggle. A 50% amount means that half of the grains will be played forward and the other half backwards, regardless what the toggle position is at that moment. If set to 100%, all grain directions will be exactly the opposite of the one defined by their toggle.

Window

An envelope or waveform each grain amplitude follows from start to end in order to fade its signal in and out. Even though this window is only based on a simple sine function, different curves are applied as the window factor varies. Higher numbers will compress the window shape towards its center or peak value.

Display Selection

It's possible to isolate a specific loop section by clicking over the waveform display and dragging the mouse to the left or right in order to define a new start and ending position. The Point dial will then adapt its range to that specific segment and only keep the playback function within those same limits. The Reset button quickly recovers the original selection.



Reset

Restarts the waveform display default selection. The Reset button is only enabled if a different fragment from the loop was previously selected.

Clear

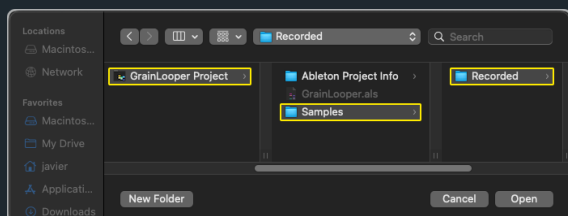
Clears the buffer and all its content. Once the Clear toggle is active, both **Now** and **Next** buttons will be momentarily displayed, enabling two different implementations.



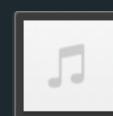
When **Now** is pressed, all previous recordings are immediately erased. If **Next** is selected instead, the last recording still remains available for playback until a new layer takes its place. In both cases, the previous waveform won't be displayed anymore.

Save

Since by default no sample file gets written on your hard drive, **buffer recordings will be lost every time the Live session's closed**. However, the Save button allows to choose a specific folder for every new recording to be automatically exported and recalled when the Live session is reopened.



The most logic thing would probably be to select the "Samples/Recorded" path inside each single Ableton Live project. Once a path is assigned, a different sound file will be exported every time a new layer is added to GrainLoop's buffer.



GrainLoop_7 25
2022 14 19 15.wav

All these automatically saved sound files will start with the title "GrainLoop", then followed by a unique sequence of numbers that represent the specific date and time when they were originally saved.

It is also very important to notice that this path will be broken if the assigned folder name or location is manually changed or deleted. GrainLoop will then be unable to find any previously saved file. It is recommended to define a route once the Ableton Live project (or any other folder of your preference) is found on a safe and definitive place on your hard drive.

If GrainLoop's already inserted on a track and the **global sample rate** is changed from Live's audio preferences afterwards, reload GrainLoop or even save and reopen the current Live session. Only then its internal buffers will adapt to those new settings.

If the sample rate is changed after a loop has been recorded and saved, some parameters will be offset and the loop global frequency will also be affected (same happens with Ableton's native Looper device). As a general rule, **always use the same sample rate as the original file**. Otherwise, change your preference settings, reopen the session or reload the device and record a new loop.

ABOUT DEVICES

GrainLoop v1.0

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