



## INTRODUCTION

Thank you for purchasing Functions by Ned Rush.

Functions are a suite of “sound transformers” that use a breakpoint function editor to apply modulation to the sound.

Different from many standard audio effects with built in modulation capabilities like LFO’s or envelope generators, the Function allows you to draw in complex custom modulation shapes or multi-stage envelopes, which can then be indexed using a variety of signals, producing linear and non-linear modulations, designed to create interesting forms of movement.

These signals used to index the Function can be synced to Ableton’s tempo to create unusual grooves or at free rate for extremely slow or fast modulations.

All of the devices share the same Function UI concept. Where they differ is which element of the effect the Function is controlling.

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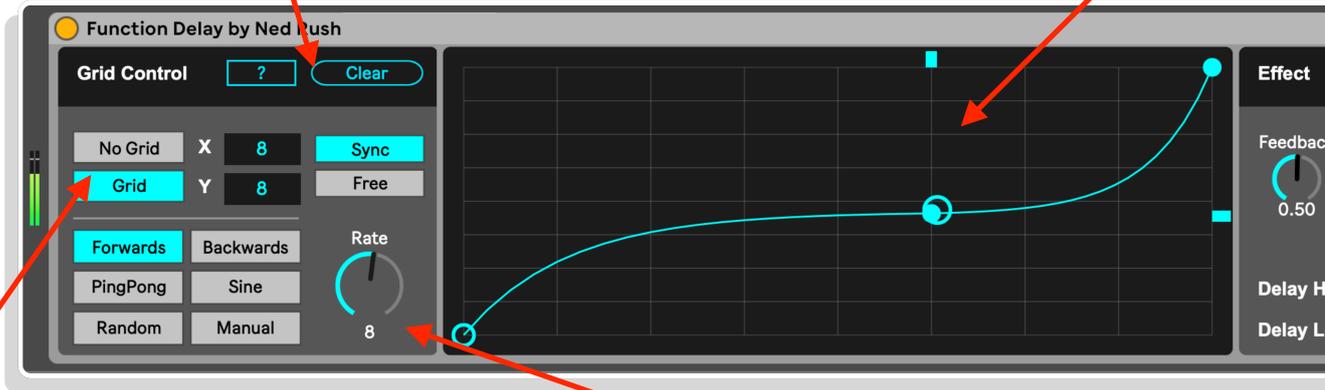
## USING THE DEVICES

Let's use the Function Delay to address the various elements of the Function UI.

The Clear button clears all points allowing you to start over.

X Grid and Y Grid set the grid snapping across the Function

This is the Function UI that is in all devices. Click to add a breakpoint. Click and drag that breakpoint to change its position. Shift+click to remove it. Holding Alt/Option on the line between two points allows you to add a curve to that line.



Grid mode enables breakpoint snapping across the Function. This can be useful if you want breakpoints to line-up with your song's tempo. For example, if the rate in beats is set to 4, and your X grid value is set to 16, you can think of this as a 16 step 1 bar sequencer. With "No Grid" enabled, there is no breakpoint snapping, so points drawn do not line up with any tempo.

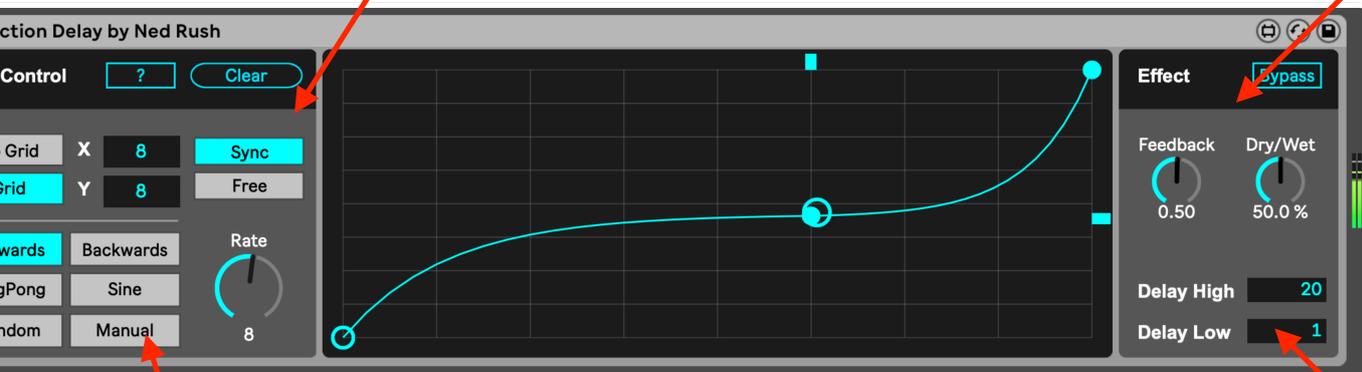
Forwards, Backwards, PingPong, Sine, Random and Manual are the internal signals used to index the Function to create the modulation.

Rate in beats is how fast or slow the internal signals index through the Function, synced to tempo when Sync is enabled.

Sync and Free sets whether the internal signals are synced to Ableton's tempo or running free like an LFO.

Free Rate sets the rate of the internal signals when in Free Mode

Feedback in this example sets the feedback for the delay but again, other parameter options will be available depending on which effect you are using, for example on the Filter you have different filter types.



Manual indexes the Function when the internal signal is set to Manual mode, giving you the option to sweep around the Function with a dial.

Manual Slide applies some smoothing or interpolation between values set with the Manual Dial

Delay High/Delay Low sets the values of the Function when it's at its highest point and lowest point. In the case of the Delay, it sets the minimum and maximum delay time on the X and Y axis.

These will vary across each of the other effects in the Suite.



## PUSH COMPATIBILITY

We've worked through each of the devices to ensure that they have a logical and dynamic layout on the Push Encoders, you'll find the appropriate parameters are displayed when you make changes to your settings.

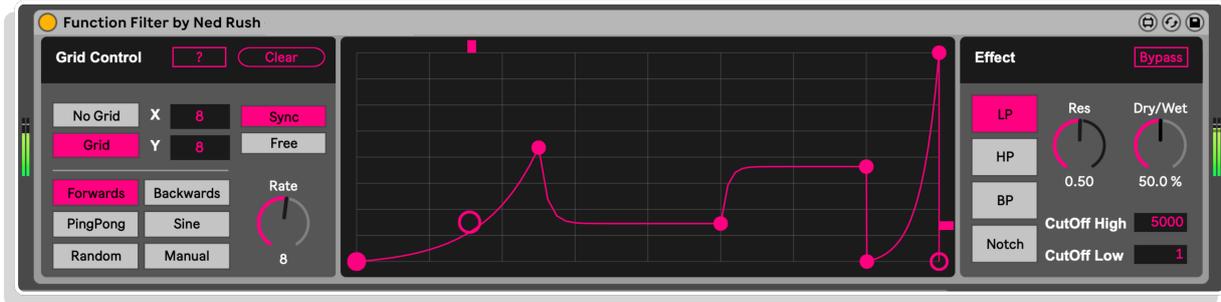
For the first time to our knowledge we've also given full control of editing and adding breakpoints into the Function graph. You can simply select and available breakpoint via the encoders and then edit it's X, Y and curve values, please note that a breakpoint cannot cross over there previous or next points X value.

When selecting the highest Breakpoint number you'll see that a new grid appears on the device which allows you to dial in a new X & Y Value to insert a breakpoint, as soon as it is committed to the main graph the Insert control will revert to allow you to dial in a Curve value.

## DEVICE FUNCTIONALITY

Here is a run-down of the other effects in the suite.

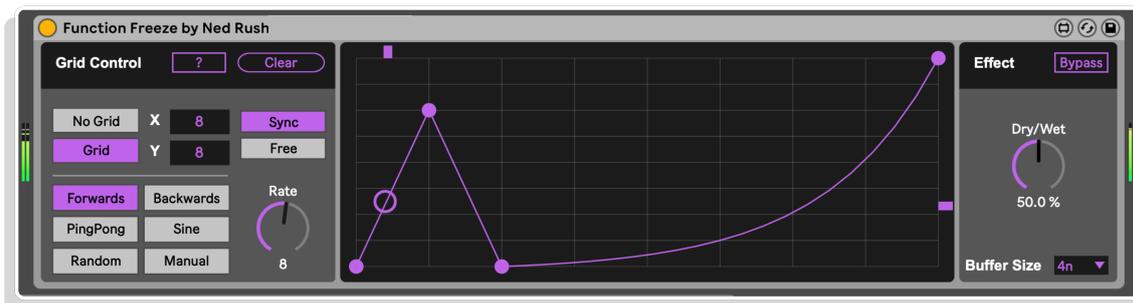
### FUNCTION FILTER



Function Filter is great for complex filter modulations and adding percussive sounds to audio.

In the Filter, the Function controls the Cut-Off Frequency with its range set by the High and Low values. Other options include Filter type and resonance.

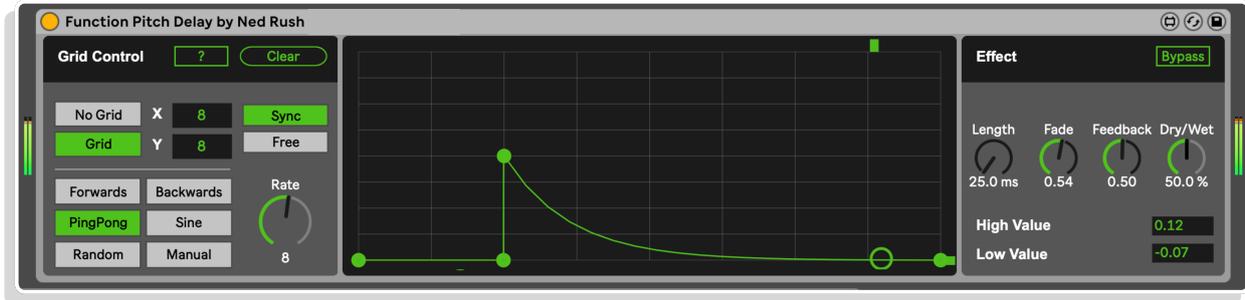
### FUNCTION FREEZE by NED RUSH & HEARING GLASS



Function Freeze is great for time stretching, spectral textures, and also great for turning anything into a ride cymbal.

Function Freeze is an FFT freeze delay buffer. The Function indexes around the start position of the currently frozen buffer. You can select how much audio you record into the buffer using the Buffer Size drop down menu. The buffer gets updated on each pass of the buffer size, so think of it like an FFT tape loop.

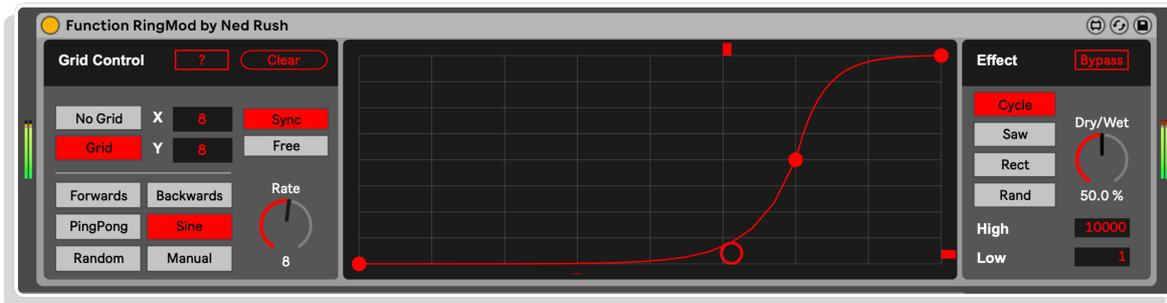
FUNCTION PITCH DELAY



Function Pitch Delay is great for anything from grungy pitch shifting to cosmic delays similar to 80s digital units.

The Function in the Pitch Delay modulates the pitch of the delay set by the high and low values. Length is the time of the delay in milliseconds. Fade applies an amplitude window to the delay looping.

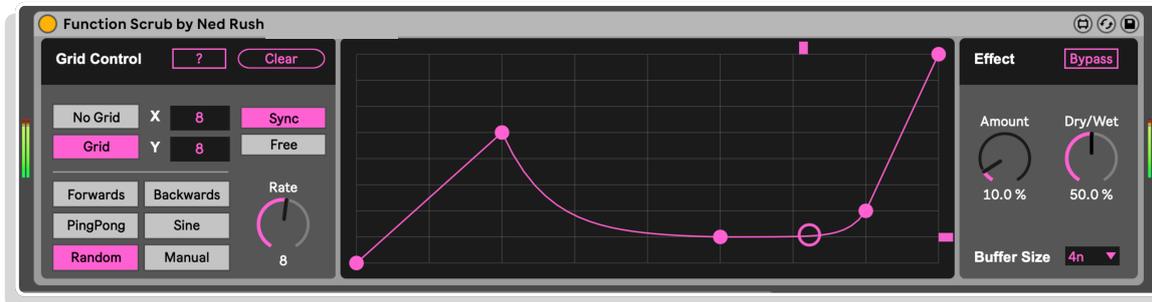
FUNCTION RINGMOD



Function RingMod is great for turning sound into metallic or robotic textures.

The Function modulates the frequency of the ring modulation set by the high and low values. Other options include the oscillator type that is applying the modulation; Cycle, Saw, Rect and Random.

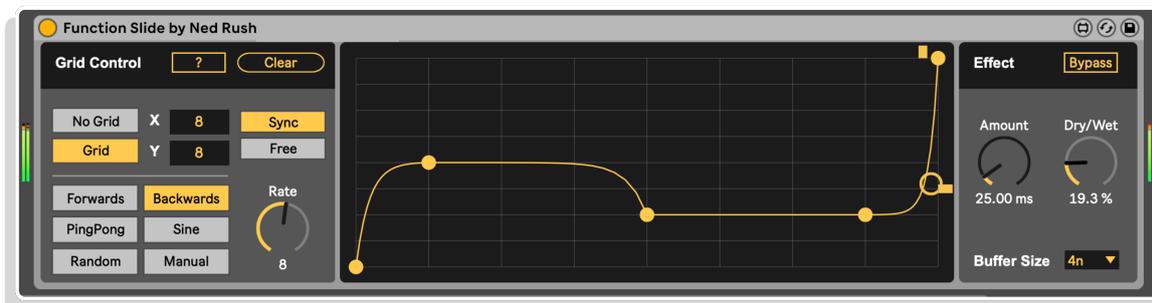
FUNCTION SCRUB



Function Scrub is great for dj style scratches, timing interferences and pitch modulation of audio.

The Function scrubs through the start position of the recently recorded audio stored in the buffer. The amount of audio stored is set by the Buffer Size. Again, think of this like a tape loop. You can dial in how much of the buffer you want to scrub through with the Amount dial.

FUNCTION SLIDE

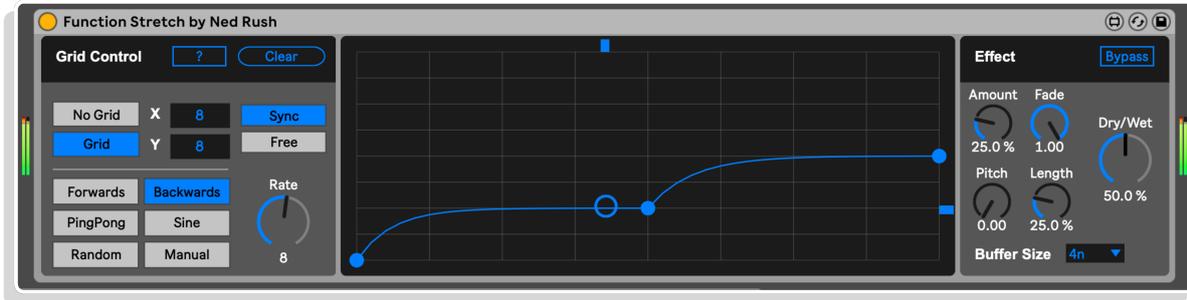


Function Slide is great for off the grid percussion, bouncing ball sounds or robotic glitches of audio.

The Function modulates the loop size of the recently recorded contents of the buffer set by the Buffer Size. The Amount dial selects how big the loop size is to modulate.



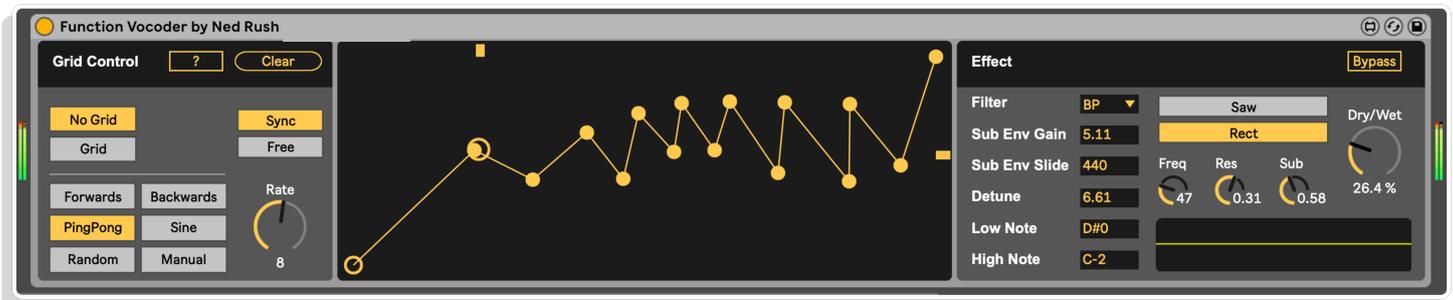
FUNCTION STRETCH



Function Stretch is great for old school time stretching, glitch textures and pitch shifting.

The Function modulates around the start position of the recently recorded buffer set by the Buffer Size. This creates the classic grungy time-stretch sound. Amount sets how much of the buffer the stretch through. Pitch allows you to shift the pitch of the playback up. Fade applies an amplitude window to the playback. Length sets the size of the playback window.

FUNCTION VOCODER

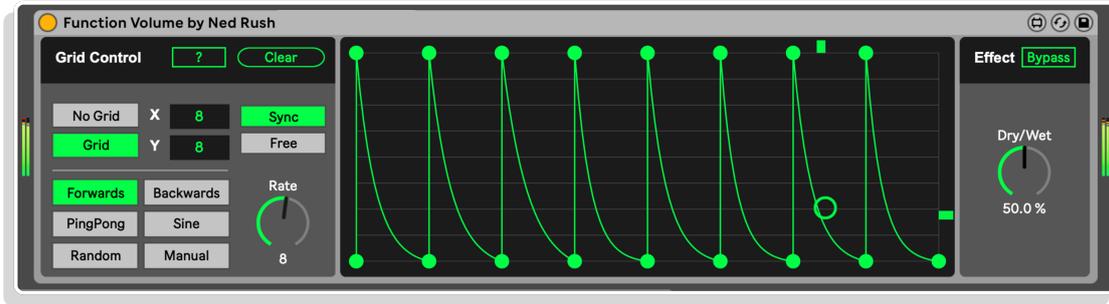


Function Vocoder is great for turning audio into synth lines like basses and leads.

The Function modulates the pitch of the internal synth oscillators used as the modulator for the Vocoder set by the High and Low note values. You have options here to choose between Saw and Rectangle, to Detune the synth in stereo, apply a filter with controls for frequency, resonance and filter type, and also apply a sub oscillator with a built in envelope follower with controls over the downward slide of the envelope and gain.



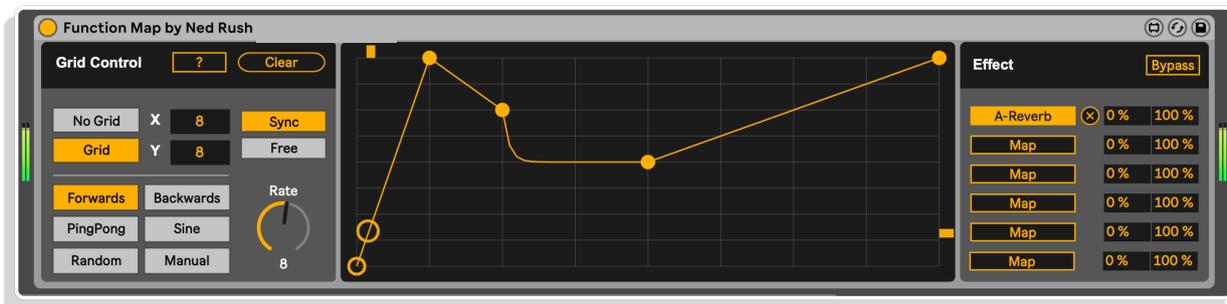
FUNCTION VOLUME



Function Volume is great for volume automation, applying percussive sounds, or creating your perfect side chain pump curve.

The Function applies volume modulation to the incoming audio between 0 and 1 at unity gain.

FUNCTION MAP



Function Map is the final device and came to life when creating the Push Compatibility. If you've enjoyed the inbuilt effects of the Function Suite then Function Map allows you to extend that further to control other parameters in Live with the same set of controls.

We hope you enjoy Functions by Ned Rush. Please tag @mrnedrush and @isotonikstudios if you upload any of your experiments or jams to social media.