midiLFOs

midi AUv3 modulator plugin

app v3.1, user manual v3.1

Introduction

Welcome to midiLFOs, an AUv3 MIDI modulator plugin for iOS.

midiLFOs generates MIDI control data that it sends to other plugins, music apps or hardware synthesizers. Think of when you twist a knob on a synthesizer; you are controlling the sound of the synth with that physical knob as you move it back and forth. midiLFOs will automatically twist one or more knobs for you, over and over.

What is an LFO?

LFO is an acronym for Low Frequency Oscillator. An LFO is a slow simple oscillating pattern such as a sine wave that repeats over and over. As far as their practical use, you can use these slow modulating LFO patterns to send MIDI control data to a synthesizer or effect and control one of their parameters. For instance, you can use a triangle wave that slowly increases and decreases the cutoff frequency of a synth's resonant filter to make it go wah wah wah wah wah. Trust me, the kids love it.

LFOs are considered "Low Frequency" because they will generally not be changing fast enough to be heard as an audio wave. For instance, the frequency of a very low bass drum sound might be around 50-100Hz, which means an oscillation that repeats 50-100 times a second. That is on the slow side for an audio wave making a sound, but it's pretty fast to use as control data to modulate a synthesizer. Nobody twists a knob on their synth back and forth 100 times a second. So an LFO will usually be slower than that, at its fastest it might cycle a few times a second, and at its slower rates you will get a pattern cycle that can last multiple seconds or tens of seconds.

midiLFOs gives you four separate LFOs, so you can modify up to four different parameters of a synthesizer at once. Or, since you can set a different MIDI channel for each LFO if you like, you could modify a single parameter in four different synths or apps at the same time. You can also make the LFOs modulate each other to create even more complex patterns.

Why isn't midiLFOs making any sound?

midiLFOs doesn't make sounds, it sends MIDI control data to other apps or synths that make the sounds. You connect midiLFOs to a synth plugin, and midiLFOs sends MIDI Control Change messages that change the sound that synth makes. If you switch over to the synth app's interface, you should see the synth's knobs moving in response to the MIDI CC data that midiLFOs is sending. As I keep saying, midiLFOs is basically a glorified, automatic knob twister.

A typical AUv3 setup that makes sound will be an AUv3 sequencer plugin generating MIDI notes which is connected to an AUv3 synthesizer plugin to play the sounds for those notes. The AUv3 midiLFOs plugin will also be connected to that same synthesizer to send it control data. These plugins will all be hosted within an AU host app such as AudioBus or AUM. So that's three other apps (sequencer plugin, synth plugin, host app) you'll use in the most basic setup along with midiLFOs to make noises.

While it can seem complicated at first, it's pretty straightforward once you've got the hang of it and we'll have some further help on getting things set up later in the manual.

Thanks!

Thank you for buying midiLFOs! I hope it helps you make some great music.

midiLFOs Version History

v3.1, CONS and velocity mod source added in AUv3
v3.0, MIDI AUv3 plugin support
v2.0, Ableton Link and Bluetooth MIDI support in standalone app
v1.3, Tap tempo, dot and triplet sync timing options, fast / slow option
v1.2, Now also works on iPhone
v1.1, Added ramp waveform

Setting up midiLFOs AUv3 with Audiobus

midiLFOs is pretty easy to use with Audiobus 3. First make sure you are in the MIDI tab of the AB3 app, look at the bottom left of the AudioBus screen and select “MIDI”.

Next choose a MIDI generator with the “+” square on the left, this is something that will generate MIDI notes to send to a synth app. In the case of the above screenshot I am using a sequencer app of mine called midiDREAMs (the black and orange icon). Next add a MIDI destination with the “+” button on the right, in this case the TAL-UNO synthesizer app. So now you have something sending MIDI notes connected to something listening to those notes and making sounds from them.

Start the sequencer and play some notes to make sure the MIDI connection is working. TAL-UNO should play the notes sent by midiDREAMs.

midiLFOs is going to do its thing in between these two plugins. It will pass the notes from midiDREAMs through, and also add some MIDI CC control data.

So now you want to add midiLFOs as a MIDI AUv3 effect in the middle empty slot. First press the square in the middle with the “+” and a menu will come up.

IMPORTANT NOTE: Make sure you are adding the “Audio Units” version of midiLFOs and not the “Apps” version. At the bottom of the “Select MIDI Filter

Window" pop up you will see the options for these two types of lists. As shown in the screenshot above you want "Audio Units" on the bottom right to be the blue selection so you are looking at MIDI AUv3 audio units.

Choose "midiLFOs" and it will be added to the center slot.

At this point you need to figure out what MIDI control data you want to send to the synth or app destination. In the case of the TAL-UNO plugin, it has a MIDI learn function that I can use to automatically map the default midiLFOs MIDI CC output to a slider, such as the cutoff frequency. Other synths will have default CC#s for each of their parameters, sometimes CC#46 is mapped to cutoff but often times synth's use their own mappings. In this case you will need to read the user manual of the synth plugin or hardware you're using to figure out what CC# you want to be sending from midiLFOs, and then configure midiLFOs to send it. There is more information on how to do this later in the manual.

For now let's assume that the default CC# midiLFOs is sending out (CC#46) maps to something you want to control (such as cutoff frequency) or that you can map it to whatever you want to control like you can with TAL-UNO. midiLFOs will be sending that control data, and the synth should be receiving it and understanding it.

Start the sequence and you will notice that TAL-UNO now receives the notes from midiDREAMs plus the MIDI CC control messages from midiLFOs.

You can also use midiLFOs by itself in the left-most slot. It will work the same and just send the CCs directly to the synth or hardware MIDI output configured in the right hand slot, you just won't have the notes from a sequencer or controller going as well.

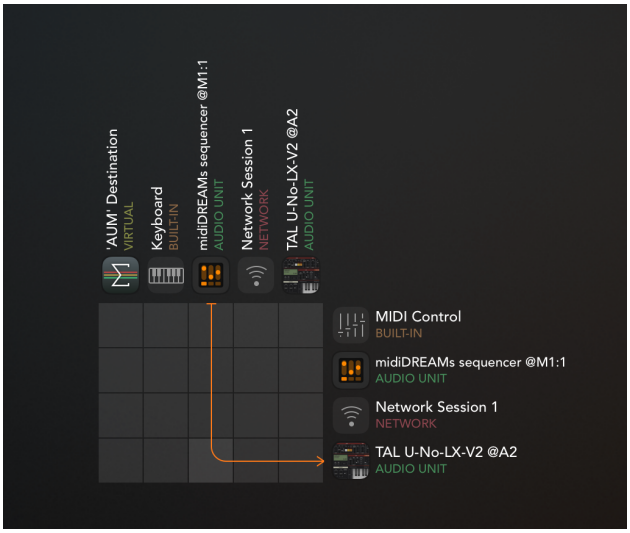
Setting up midiLFOs AUv3 with AUM

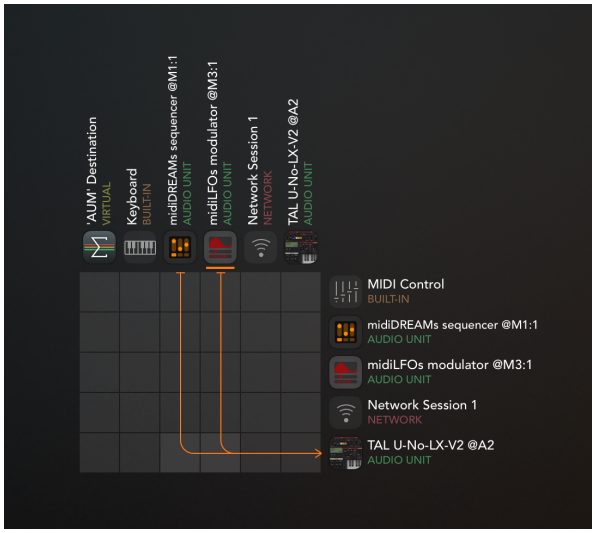
AUM is a flexible, modular AUv3 host that allows you to connect sequencer plugins, synth plugins, and MIDI control plugins like midiLFOs together into interesting combinations. It can be a little complicated to set up at first but once you've figured out how to make it work it's very powerful and a great place to experiment with modular-like song sketches.

This is not a user manual for AUM, so before you try out midiLFOs you will first need to figure out how to set up a basic AUM project where you have an AUv3 MIDI sequencer plugin sending notes to an AUv3 synthesizer plugin.

This involves adding a MIDI plugin and an AUDIO plugin and then connecting them together using the routing menu. Figure this out before you continue.

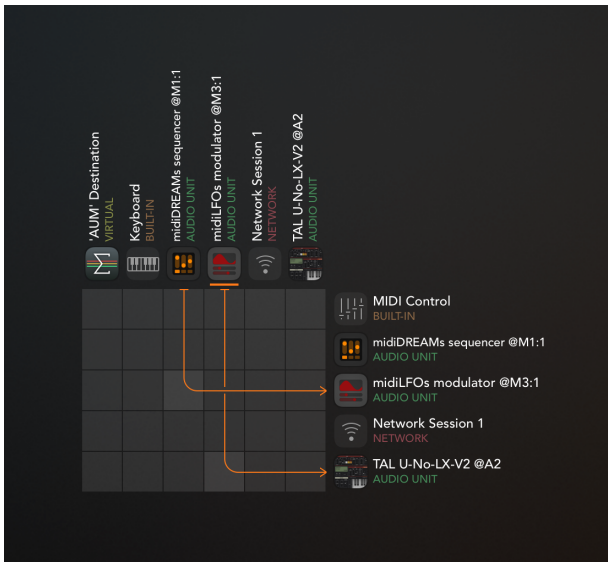
To get to the routing menu, tap the squiggly line icon in the upper right corner of the AUM app. There are three icons there up in the upper right, I'm talking about the middle one.





The routing menu is where you connect different plugins together. In the screenshot on the left you can see I have connected the midiDREAMs sequencer plugin output to the TAL-UNO synthesizer plugin input. This means any MIDI notes sent by midiDREAMs will be routed directly to TAL-UNO.

midiLFOs also wants to send its output to TAL-UNO, so one way to connect it is seen in the second routing screenshot above, with both midiDREAMs and midiLFOs connected separately to TAL-UNO.



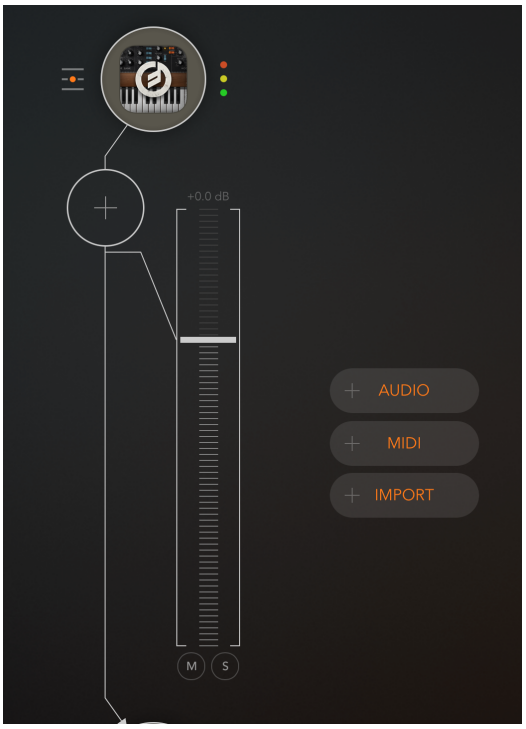
Another way to connect midiLFOs is by routing midiDREAMs notes through it, as seen to the right. Notes from midiDREAMs first go through midiLFOs, then both the notes and midiLFOs control data go to TAL-

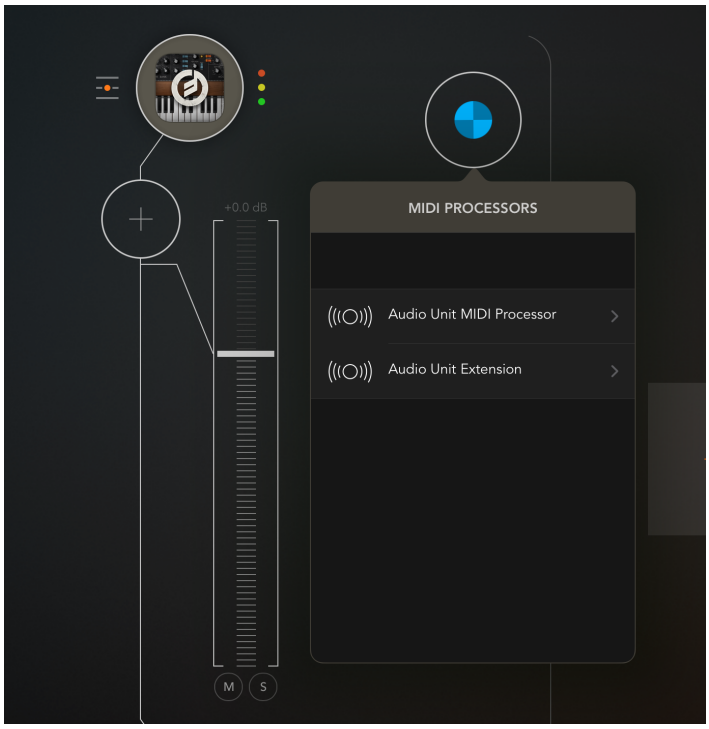
UNO.

We still need to add midiLFOs to the AUM project before we can use either of those routing configurations but this is the basic workflow of midiLFOs: we want to use the AUM routing menu to send notes from the sequencer plugin into TAL-UNO, and we also want to send the output of midiLFOs to the synth plugin.

So again we are assuming you have already set up a project where you have a sequencer like midiDREAMs sending notes to a synthesizer like TAL-UNO. You've connected the two using the routing menu, and you can hear the synth plugin playing notes.

Now it's time to add midiLFOs to the project.



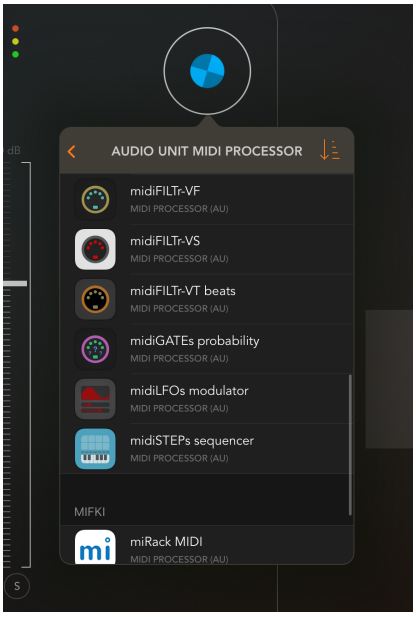


First tap the + circle to add a new track. Choose "MIDI" as the type of track, and "Audio Unit MIDI Processor" as the type of MIDI processor.

Next select "midiLFOs" from the list of Audio Unit MIDI Processors. You should see the red midiLFOs icon load into the circle, and if you tap on it the

midiLFOs user interface will pop up. It isn't doing anything though, since it isn't connected to anything.

We still need to insert midiLFOs between our sequencer and our synthesizer so that it can work its magic. Go to the routing menu (squiggly line icon, upper right of AUM, middle of the three icons there) and disconnect the sequencer app from the synth app, connect the output of the sequencer plugin to the midiLFOs input, and the output of midiLFOs to the synth plugin input. This is shown in the third routing menu screenshot on the right a couple pages back.



Again, we want the flow to be sequencer -> midiLFOs -> synthesizer.

Finally, we need to make sure midiLFOs is sending a MIDI controller message that the synth plugin or hardware can understand. In the case of the TAL-UNO plugin, it has a MIDI learn function that I can use to automatically map the default midiLFOs MIDI CC output to a slider, such as the cutoff frequency.

Other synths will have default CC#s for each of their parameters, sometimes CC#46 is mapped to cutoff frequency but often times a synth will use their own mappings. In this case you will need to read the user manual of the synth plugin or hardware you're using to figure out what CC# you want to be

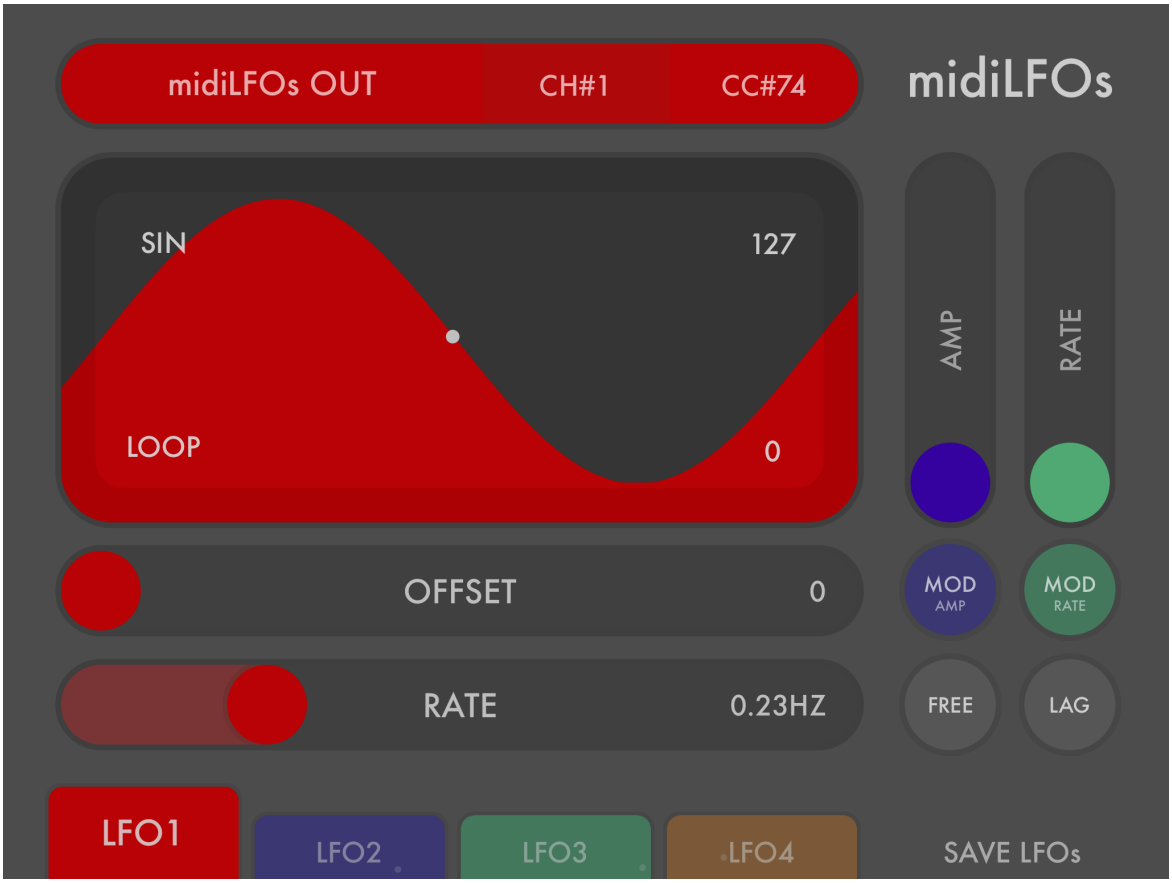
sending from midiLFOs, and then configure midiLFOs to send it. There is more information on how to do this later in the manual.

For now let's assume that the default CC# midiLFOs is sending out (CC#46) maps to something you want to control (such as cutoff frequency) or that you can map it to whatever you want to control like you can with TAL-UNO. midiLFOs will be sending that control data, and the synth should be receiving it and understanding it.

If you start the sequence playing, you should now hear midiLFOs modulating the sound of the synth, while midiDREAMs sends it the melodic notes that the sequencer is playing. Now you're ready to play more with midiLFOs.

Setting up the midiLFOs standalone app

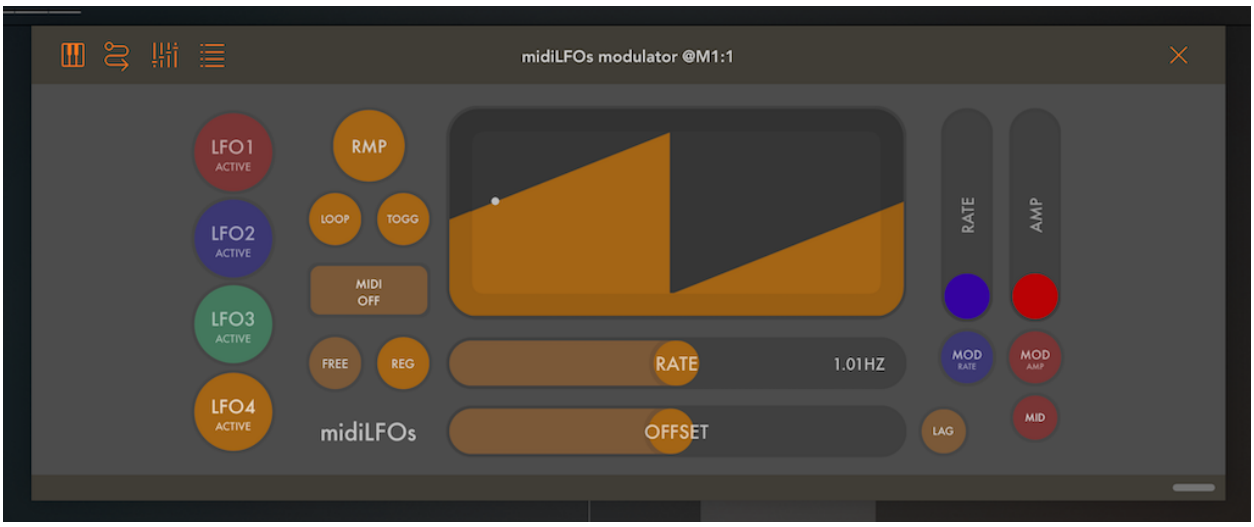
In almost all situations you will want to use the AUv3 version of midiLFOs, it has more features, you can use multiple instances of it, and it has the most recent tweaks and updates.



If you want to, however, you can use midiLFOs in its original standalone app mode.

The user manual for the original app is preserved here:
http://artkerns.com/midiLFOs-manual-old.pdf

Using midiLFOs

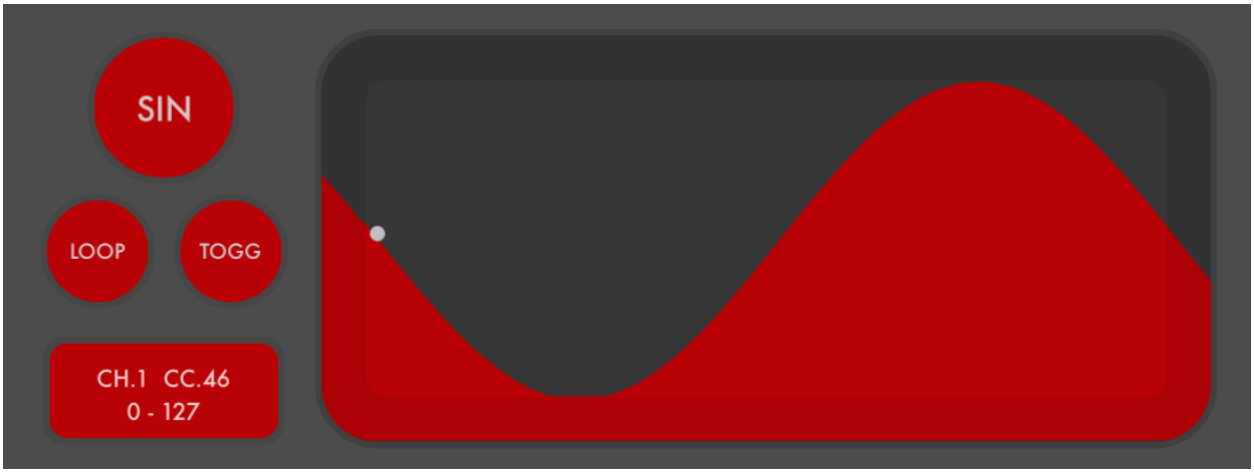


LFO Selection Buttons

The multi-colored circular LFO selection buttons on the left side of the plugin allow you to choose which LFO to edit. Choosing the active LFO is as easy as pressing the appropriate button, and the display will change its colors and controls to reflect the new currently editable LFO.

In the picture above we're editing LFO4, which we selected by pressing the bottom yellow/orange LFO4 selection button.

LFO Waveform Display



The LFO display gives you a real time display of what the LFO is doing. The colored waveform represents the ideal shape of the waveform, and the white dot represents the current value of the LFO as it moves in time and sends out MIDI CC messages.

Tapping the waveform button will toggles the LFO on and off when you are in Toggle mode. In Trigger mode tapping it will restart the LFO.

Waveform Toggle Button

Tap the large circular button that lists the current waveform shape (SIN, TRI, etc) to toggle through the six types of LFO waveforms: sine, triangle, sawtooth, ramp, square, or sample and hold.

LOOP / ONCE Button

The Loop / Once button determines whether the LFO will keep repeating the same LFO shape continuously (LOOP), or if it will stop after it goes through one LFO cycle (ONCE). By default this is set to on, and the text LOOP will be

displayed in bright white, so that the LFO repeats over and over. You can toggle it off if you prefer and the LOOP text will fade. The LFO will then behave like an envelope and only go through once.

This can be useful in particular if you also set the LFO to TRIGger when it receives a MIDI note. This will cause the LFO to cycle through once every time it sees an incoming MIDI note. If you are playing a synth, and send all played MIDI notes to both midiLFO and the synth app it controls, midiLFO can be used as an extra pseudo-envelope at the beginning of the note.

TOGGLE / TRIGGER Button

The Toggle / Trigger button determines whether midiLFOs turns off and on when you tap the waveform display (TOGG), or whether it restarts its LFO cycle (TRIG).

This button also determines how incoming MIDI notes affect the LFO cycle. In Toggle mode, incoming notes are just ignored. In Trigger mode, if the LFO is off then incoming notes start the LFO running. If the LFO is already on, the LFO cycle is restarted.

RATE Slider

The rate slider is used to change the speed of the LFO. When the LFO is not synced to the AU host tempo and is set to Regular speed, which is its normal state, it has a range of 0.02Hz (one cycle every 50 seconds) to 4.0Hz (four cycles a second). Moving the slider changes the LFO speed between those values.

If you press the SYNC button, the LFO can sync to the AU host tempo. The slider then has a range of one cycle every 16 bars at the slowest and 16 cycles per bar at its fastest.

FREE / SYNC Toggle Button

Tapping the FREE/SYNC button allows you to sync your LFOs to AU host tempo. You can then use the rate slider to set the rate of the LFOs in relation to the incoming clock tempo.

REG / FAST / SLOW Toggle Button

Tapping the REG/FAST/SLOW button changes the range of the RATE slider. By default, midiLFOs uses the REGular speed range of 0.02Hz to 4.0Hz. If your desired LFO speed it outside that range, you can choose the FASTer or SLOWer ranges.

OFFSET / LAG Slider

The offset slider allows you to choose the phase of the LFO, that is to say the point in the waveform where the cycle will start. This is most useful in two situations: if you are using a synced LFO you can sync the highs and lows of the waveform to a particular timed spot in the AU host's timeline. Or, if you have LOOP turned off so the LFO only does one cycle at a time you can choose where the waveform starts and stops.

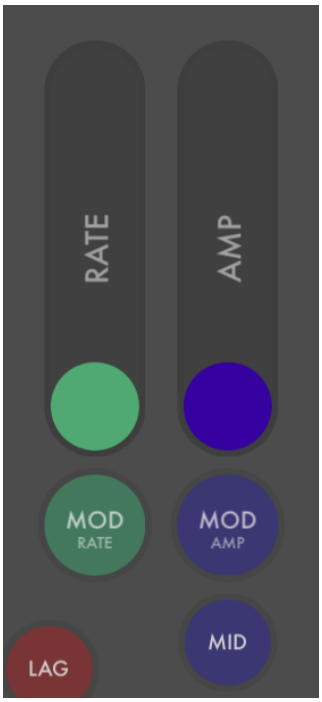
By tapping the LAG/OFFSET toggle button this slider can alternately control the amount of lag, which allows you to add a certain amount of, you guessed it, lag to the LFO control values. Think of lag as sort of a resistance to change, with larger lag amounts the LFO will not make quick transitions but will instead slowly move towards the new values. This will be most evident in the waveforms that make abrupt changes: the square, sawtooth, and sample and hold waves. Adding some lag helps smooth out otherwise abrupt

changes and can also just be used to make the output waveforms a little more interesting.

LAG / OFFSET toggle button

The LAG/OFFSET toggle determines whether the bottom slider display and sets the LFO Offset amount or the LFO Lag amount, both described above.

MOD Section



midiLFOs makes it easy and quick to set up simple LFOs that send MIDI data in basic, classic LFO waveform shapes. Sometimes though, you want to make the shapes a little more interesting. midiLFOs allows you to do this by modulating the rate and amplitude of one LFO with the other LFOs.

To do this, midiLFOs provides a button and slider for both amp and rate. Tapping the button allows you to choose which of the other LFOs to use as the source of the modulation, then you choose the amount of modulation using the slider.

MOD AMP Slider

MOD AMP controls the modulation of the current LFOs amplitude. When you look at the LFO waveform display, amplitude corresponds to the vertical position of the dot. Tap the MOD AMP button to choose which LFO you want to use to modulate the current LFOs amplitude.

You also have the option to choose between MIDDLE and BOTTOM. These correspond to two different ways of mathematically representing the LFO

when it is multiplied with the modulating LFO: with MIDDLE the current LFO is considered to go from a minimum of -1 to a maximum of 1, with BOTTOM the current LFO is considered to go from 0 to 1. The modulating LFO is always considered to go from 0 to 1.

The practical effect of choosing MIDDLE is that large modulation amounts will bring the LFO closer to the mid-point of the display, conversely choosing BOTTOM will bring the LFO closer to the bottom of the display meaning it will always stay in the red (for LFO1). If this doesn't make sense, choose an LFO mod source and BOTTOM and crank up the AMP slider to see the effect on the LFO display. Then change to MIDDLE without changing anything else and notice the alternate effect.

MIDDLE can be useful when your LFO is controlling a parameter such as cutoff frequency, since the "sweet spot" of the filter will usually be in the middle of the range you have set, so you want to keep the output spending most of its time around there.

BOTTOM can be useful when controlling volume or using your LFO as an envelope. For example, if you have a slow sawtooth wave, you can then modulate that with another LFO that is set to a faster sine wave. This will give you a fast sine wave that slowly decreases in overall amplitude.

The AMP slider controls the amount of modulation, you can set it low to add a little touch of something interesting to an otherwise boring waveform, or set it high to completely alter the resulting waveform shape.

MOD RATE Slider

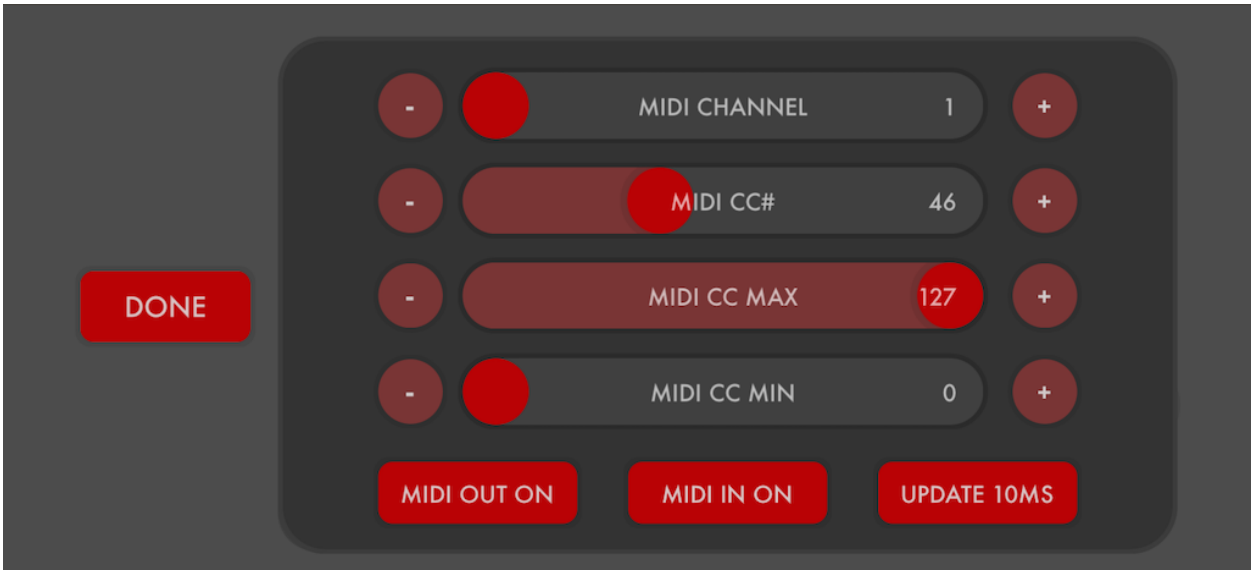
MOD RATE works similarly to MOD AMP, affecting the rate of the LFO rather than the amplitude. When you apply a large modulation amount, you can see the speed of the LFO display dot changing from faster to slower and back.

The MOD RATE button allows you to choose the source of the rate modulation. You can use the same source as you did for AMP or a different one. Note that there is no MIDDLE or BOTTOM button, with rate the

modulation is always centered around the current rate set in the rate slider of the current LFO.

The RATE slider works identically to the AMP slider. Keep the slider low and add a little interesting variation to the rate, or crank it high to noticeably distort the speed of the LFO.

MIDI Configuration Menu



The MIDI configuration menu allows you to set up which MIDI control messages get sent by this LFO, what MIDI channel they get sent on, the range of values they can send, how often they are sent, and whether you send them at all. You can also enable or disable MIDI input to the LFO.

This menu is brought up by tapping the colored rectangular button to the bottom left of the Waveform display on the main interface page, which will be labeled something like “CH 1 CC46 0-127” or “MIDI OFF”.

Tap DONE when you are ready to go back to the main midiLFOs interface.

MIDI Channel

MIDI Channel can be set between 1 and 16 and, as you’d expect, determines what MIDI channel the outgoing control messages for this LFO are sent on. This is less important if you are connected to a synth AUv3 plugin (leave it at channel 1), but if you are controlling an external hardware synthesizer you will want to make sure the channel number you send on matches the channel number the synth is listening to.

MIDI CC#

MIDI CC# can be set between 1 and 126, and determines what MIDI controller number is used to send the outgoing control data for the LFO. You want to make sure that this CC# matches the parameter you want to control in the plugin or external hardware synth you are sending the control messages to. You will need to look in the user manual of the plugin or synth for a chart that lists the MIDI map of parameters and the CC numbers they are mapped to. The default value of CC#46 sometimes maps to cutoff frequency in analog synths. Sometimes it doesn't! Again, you will need to look up what controller numbers the synth is looking for.

MIDI CC MAX and MIN

These sliders control the range of values that are sent in the outgoing control messages. For example, if MAX is 100 and MIN is 50, then midiLFOs will be sending control messages that set values between 50 and 100. When you are looking at the waveform display in the midiLFOs interface, when the white dot reaches its lowest value it will be sending a 50, at its highest value 100.

If you are controlling a synthesizer parameter like cutoff frequency there is often a sweet spot range of values that sound interesting, and a bunch of other values that are not so interesting. You can hear this when you are turning the physical or virtual knobs on the synth, some of the range sounds good and some of it you just don't want to use at all. You can constrain the range of values that midiLFOs sends so that it always is moving things inside the sweet spot with these sliders.

Remember there are three numbers for each MIDI controller message: the channel it is sent on (sometimes important for hardware synths, otherwise 1 will usually be fine), the controller number that determines what parameter is being controlled (for instance, CC#46 may control the cutoff frequency), and the value you are setting that parameter to which will be between the max and the min (for example, you may set the cutoff frequency to 60).

Three numbers: the channel tells you which synth you're sending to , the control number is which knob you are turning, the control value is how far you are turning that knob from left to right.

MIDI OUT ON/OFF

The MIDI OUT toggle button allows you to turn MIDI output for the LFO on and off. This is different from toggling the LFO itself off and on, because when MIDI is turned off the LFO keeps running and you can watch it in the waveform display, it just doesn't send out any MIDI control messages. One practical reason to do this: if you are using LFO3 to modulate LFO1, you might want to turn LFO3's MIDI output off (it is only being used to modulate LFO1 inside midiLFOs, it is not being used to control anything else, so you don't need to send any messages to the synth) while keeping LFO1's MIDI output on.

MIDI IN ON/OFF

The MIDI IN toggle allows you to listen to MIDI input or ignore it. For example, if you use TRIGger mode, incoming MIDI notes will restart the LFO. If you don't want them to do that turn MIDI IN off.

MIDI THROTTLE

The MIDI THROTTLE button will limit the amount of control data that an LFO sends out. Particularly when you use hardware synths, sending too much data (for example, all four LFOs sending control data at a very fast speed) can saturate the MIDI connection or even crash a hardware synth. If you know you will be sending lots of control data and are having problems with MIDI timing or the synth to which you're sending the data is acting weird, try setting a higher throttle value so less control data is sent.

Troubleshooting

midiLFOs should be working but doesn't seem to be working? The following suggestions may seem obvious but these are problems I've run into myself at one point or another, got mad at my own dumb app for not working right, then realized there was an obvious or not so obvious answer. Here's a few ideas on things to look for when things go wrong:

AudioBus 3 "Apps" Mode in iOS 14 Doesn't Work

If you are using midiLFOs in AudioBus 3, and your device is using iOS14+, be sure you are using the Audio Unit version of midiLFOs rather than the Apps version. When you add midiLFOs to the project, you will see a list of "Audio Units" (good!) or if you have a different tab selected "Apps" (bad!). This is the blue selection in the bottom tab of that menu. You want to be looking at "Audio Units".

Audio Units allow you to add multiple copies of midiLFOs to your project, has additional features and tweaks, and is the preferred way to use midiLFOs moving forward. The AUv3 version is better in every way.

The app version is still included for compatibility with old projects but is buggy and not recommended otherwise. Avoid it when possible, but especially within AudioBus and iOS14.

Check MIDI connections, channels and the CC#

If you are using an AUv3 host, make sure there's a virtual connection between midiLFOs and the input of your synthesizer plugin. Very basic I know but lots of times I load midiLFOs and the other plugins and forget to do this, or accidentally midiLFOs connect to the wrong destination, and wonder why it isn't working. Also make sure any sequencer pattern you're playing has notes in it, the synth plugin is on a patch that makes noise, that its audio channel isn't muted, that your headphones are plugged in, etc.

Also make sure midiLFOs is sending on the MIDI channel that the synth is expecting to see, and that the MIDI CC# it is sending is the correct one that controls the parameter you want to control.

MIDI connection (virtual or physical), MIDI channel number, MIDI CC#. All three have to be right for it to work.

Other things to check: is the LFO set too slow, so it isn't changing? Are the min/max values for the LFO in a range that makes sounds?

If things still aren't working, take midiLFOs out of the equation and just play with the sequencer/keyboard and the synth. Make sure that's working before trying to debug the midiLFOs part.

Examples

Simple MIDI-synced LFO

Here we just want a simple, regular LFO that is synced to MIDI clock. Do the following:

1. Tap on midiLFOs in the upper right corner of the app to go into the Settings menu, then tap the MIDI IN tab.

2. Select the MIDI input port the clock is to be received on, ALL also works. MIDI Clock does not use the channel # so you don't need to worry about that setting. Make sure the CLK button is active and colored bright red. Dismiss the settings menu.

3. Start sending MIDI clock to the midiLFOs app. This could mean switching apps and pressing start on a drum machine app such as FunkBox, or if you are using an external MIDI device with a clock, starting that. Make sure the drum machine is sending the MIDI clock to a port that midiLFOs is listening to, as you set things up in step 2.

4. Press the FREE button to the right of the RATE slider, which should turn into a bright red SYNC button.

5. If you are properly receiving MIDI clock, the RATE slider should display the incoming tempo and the clock bar division you are using, for example RATE would be 1 BAR, 135.1BPM. If the slider says "NO MIDI CLOCK" then you need to go back to steps 1-3 and make sure you are sending clock to the MIDI port that midiLFOs is listening to.

6. Move the RATE slider to change the clock bar division, from slow synced tempos on the left to fast ones on the right. You can also change the OFFSET slider to change the phase of the LFO in relation to the beat.

Smooth Random LFO using S+H plus Lag plus Rate Mod

Our goal with this example is to get a semi-random but smooth LFO.

1. Bring up the WAVEFORM popup menu for the current LFO by tapping on its current setting (SIN, TRI, SAW, etc) in the upper left corner of the big rectangular LFO waveform display.

2. Now choose S+H from the popup menu. You should see a random steppy waveform in the LFO waveform display, and see the current value jump at regular intervals from one value to the next.

3. Press the LAG button, which will bring up a popup with a LAG slider. Move the slider all the way to the right for full LAG. Looking at the LFO waveform display, you should see the current value jumping much more smoothly from random value to value, but still at regular intervals

4. Modulate the RATE of the current LFO by choosing another LFO as a modulation source using the MOD RATE button and popup menu, and then increasing the amount of RATE modulation by moving the MOD RATE slider up.

5. The resulting LFO should now look pretty random. By tweaking the rate and waveform of the other LFO that you chose in MOD RATE you can make the rate variations more or less random.

Complex LFO Waveform Using Amp and Rate Modulation

1. Start looking at LFO1 with a simple SIN waveform, rate about a third from the slowest point, no LAG or MOD.

2. Look down at the LFO selection tab on the bottom left, and glance at the LFO2 and LFO3 tabs. You should be able to get an idea of their current shapes and rates by looking at the current value dot display in the tabs background.

3. You want LFO2 to have a rate that is faster than LFO1. If it isn't faster, tap its tab and adjust its rate, then come back to LFO1.

4. You want LFO3 to have a rate that is a little slower than LFO1, with any waveform other than S+H. If you need to adjust it, tap the LFO3 tab and adjust its parameters, then come back to LFO1.

5. Tap on the MOD AMP button, and in the popup make sure it is set to LFO2 (blue) and MIDDLE. Dismiss the popup and move the MOD AMP slider to the top (maximum modulation).

6. Look at the current red LFO waveform display and note how the dot no longer follows the curve of the default waveform, it jumps around it. Move the MOD AMP slider up and down and see the effect on the red LFOs waveform over time.

7. Tap the MOD RATE button to bring up its popup, and make sure that LFO3 (green) is the active LFO rate mod.

8. Bring the blue MOD AMP slider all the way back down, and move the green MOD RATE slider all the way up. Notice in the current red LFO waveform display how instead of steadily moving across the default waveform, the dot speeds up and slows down as it moves left to right.

9. Adjust the MOD AMP and MOD RATE sliders to taste, if both are on full modulation you will see the dot take a crazy, complex path around the

waveform. If they are lower they will make the path a little more interesting, but keep close to its basic shape.

AU Parameters

midiLFOs has extensive AU parameter support, allowing your AUv3 host to map or automate all aspects of the plugin through AU parameters.

The following AU parameters can be set for each of the LFOs (LFO1, LFO2, LFO3, LFO4):

LFO1 Active
LFO1 Synced
LFO1 Clock Sync Multiplier
LFO1 Rate
LFO1 Offset
LFO1 Speed
LFO1 Shape
LFO1 Mod Source
LFO1 Mod Amount
LFO1 Mod2 Source
LFO1 Mod2 Amount
LFO1 Sync Division Type
LFO1 Lag Amount
LFO1 CC Max
LFO1 CC Min
LFO1 MIDI Channel
LFO1 MIDI CC Number
LFO1 Trigger Type
LFO1 Mod Type