

ZOA 1.1.x User Manual

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Contents

Introduction	2
Overview	2
Grid	3
Global Panel	4
Grid Settings	4
Life Settings	5
Playhead Panel	6
MIDI Behavior (Audio Unit)	8
Top Bar (Standalone App)	10
Settings	11
Thanks	13

Introduction

ZOA is a MIDI sequencer for iOS and macOS that generates melodies based on a creative implementation of John Conway's Game of Life. ZOA can run as a standalone app or as an AUV3 plugin.

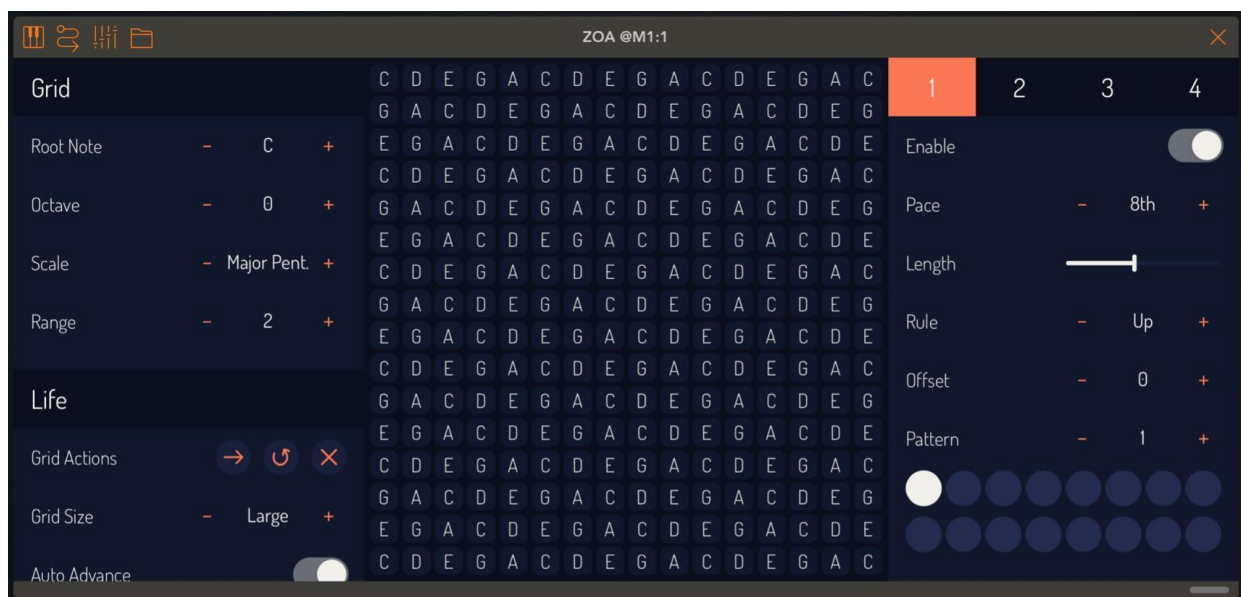
For best results, please check out the tutorials on [YouTube](#). Otherwise, read on.

Note:

The standalone app comes with a toggleable “Sidekick Synth” that lets you experiment with ZOA right out of the box. You can also send MIDI from the standalone app. The AUV3 version of ZOA does not produce sound. Instead, it generates MIDI notes that can be used to “play” other instruments, devices, or apps that can receive MIDI.

Overview

ZOA has three main views, the global panel (left), the grid (center), and the playhead panel (right).

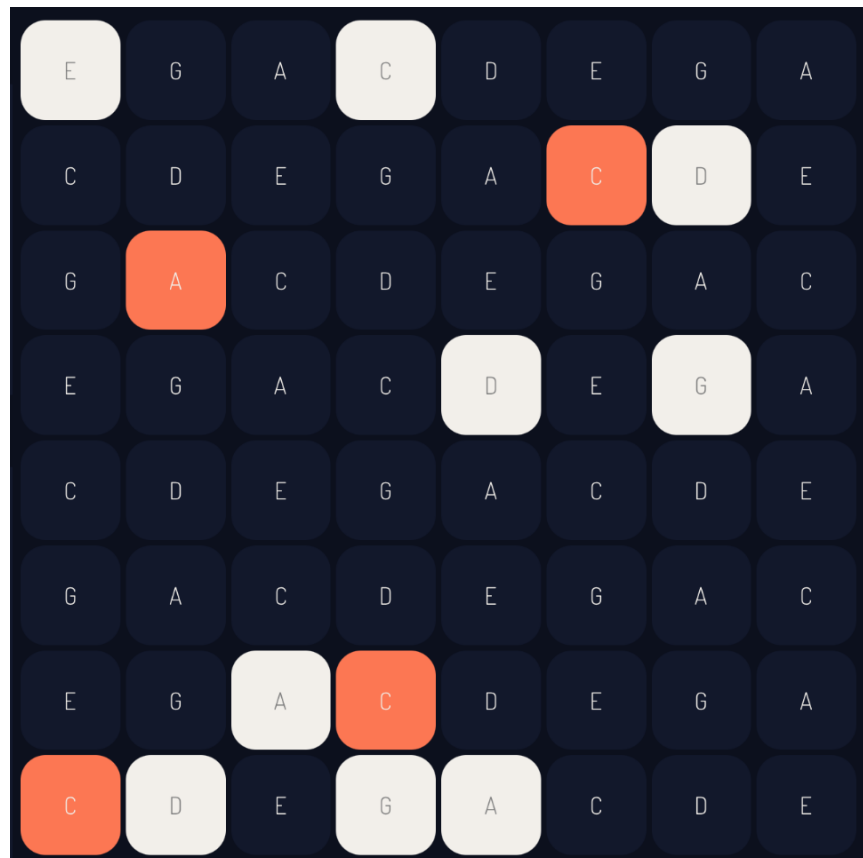


Grid

In the center of ZOA's window is a two-dimensional grid of cells. Each cell has the ability to play a note, which is displayed in the center of the cell. The bottom left cell is the lowest note. In general, as you move up and to the right, the notes get higher. (See Global Panel for details.)

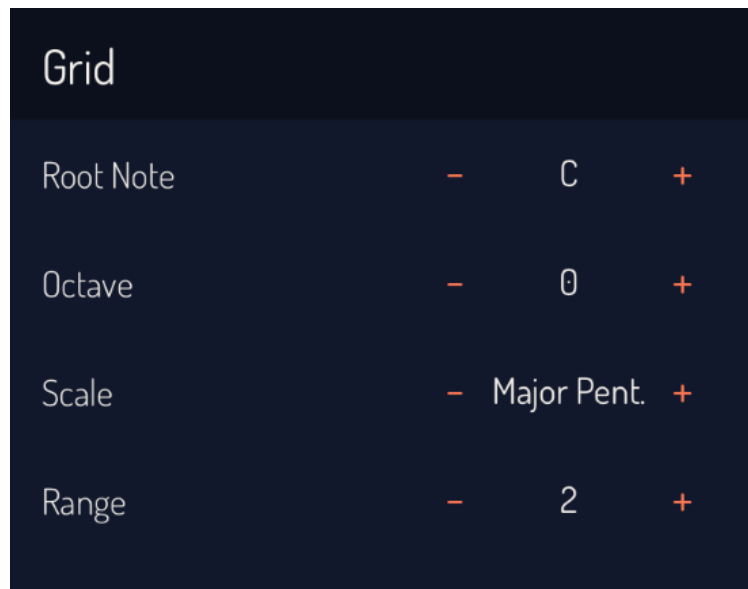
Cells can be either alive or dead. Dead cells are blue, and alive cells are white. You can toggle a cell's state by touching it.

ZOA has four “playheads” that can move through the living cells based on various rules and play their notes. Notes that are being played are orange.



Global Panel

The Global panel contains two banks of settings: the “Grid” settings, which control how the grid behaves musically; and the “Life” settings, which control how ZOA’s Game of Life simulation works.



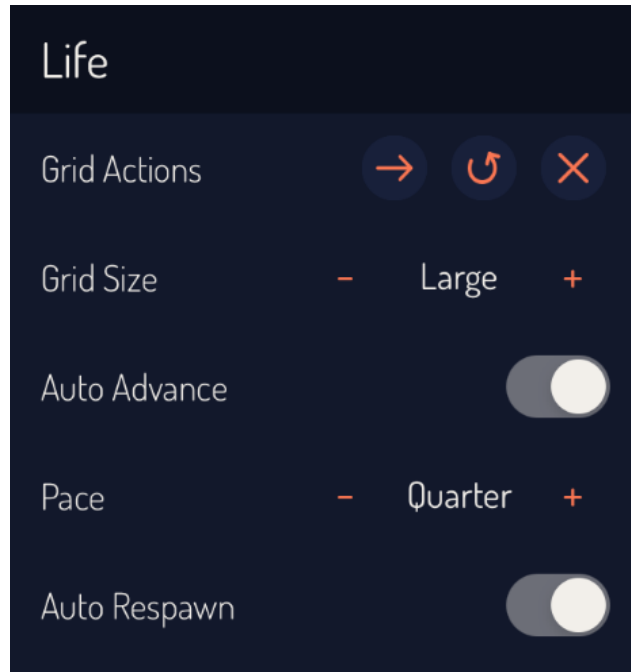
Grid Settings

Root Note: Sets the identity of the bottom left note. This will be the root note used by the scale setting. *Range: C to B*

Octave: Sets the octave shift of the root note. *Range: -4 to +4*

Scale: Sets the scale used to fill the grid with notes. *Range: Major Pent., Minor Pent., Major, Dorian, Phrygian, Lydian, Mixolydian, Minor, Locrian, Blues, Whole Tone, Harm. Minor, Mel. Minor, Chromatic.*

Range: Sets the range of the grid in octaves. As you move up and to the right, notes get higher, but once the end of the range is reached, if there are still notes in the grid, then the range wraps back around to the beginning. *Range: 1 to 8.*



Life Settings

Grid Actions: Provides buttons for advance, respawn, and clear grid actions.

Grid Size: Sets the size of the grid. *Range: Small (8x8) to Large (16x16).*

Auto Advance: Sets whether the Game of Life simulation advances according to the pace setting.

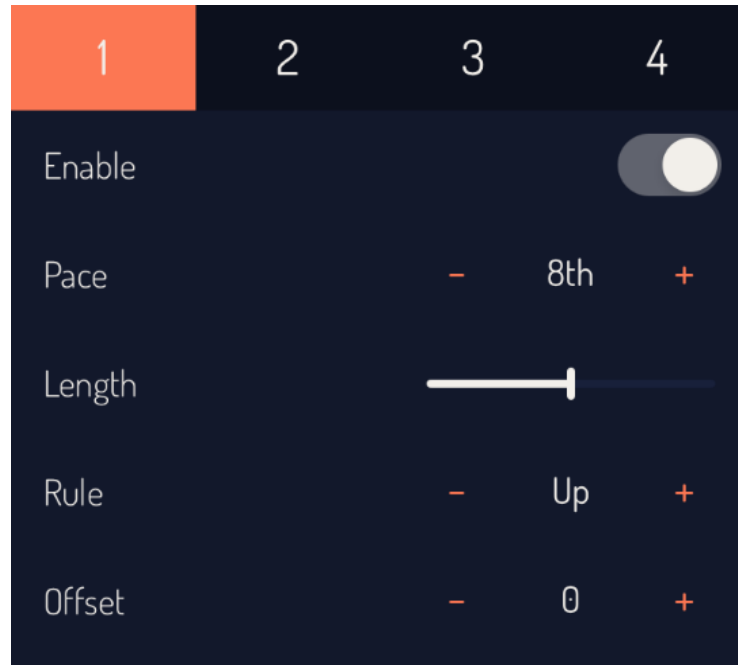
Pro Tip: You can turn ZOA into something more like an arpeggiator than a sequencer by disabling Auto Advance.

Pace: Determines the speed at which the Game of Life advances to new generations. This happens in units of beat time based on the host clock. *Range: 16 bars to 32nd T.*

Auto Respawn: Sets whether Game of Life simulation automatically respawns. With this switch enabled, ZOA will respawn if 1) All cells are dead, or 2) the next generation of cells is the same as the current generation.

Playhead Panel

ZOA has four playheads that can independently move through and play the living notes in the grid. You can select and edit a playhead by tapping on it's number at the top of the panel.



Enable: Sets whether or not the playhead will produce notes.

Pace: Determines the speed at which the playhead will play notes. This happens in units of beat time based on the host clock. *Range: 16 bars to 32nd T.*

Pro Tip: ZOA has six irrational playhead paces based on the golden ratio: golden whole, golden half, golden quarter, golden 8th, golden 16th, and golden 32nd. The golden notes are longer than their standard note by a factor of ~ 1.618 . This makes them a little slower than dotted notes.

Length: Sets the gate length of played notes as a percentage of the pace. Gate length is how long between “note on” and “note off” events. Moving the slider to the left makes the notes sound shorter and more staccato, moving the slider to the right makes them sound longer and more legato. *Range: 10% to 100%.*

Rule: Sets the rule the playhead uses to choose new notes (from among living cells).

- Options:
 - **Up**, go right to the end of the row, then move up to the next row.
 - **Down**, go left to the beginning of the row, then move down to the next row.
 - **UpDown**, start at the bottom, do Up until the top, then do Down.
 - **DownUp**, start at the top, do Down until the bottom, then do Up.
 - **First**, always play the first (most bottom-left) living note.
 - **Last**, always play the last (most top-right) living note.
 - **Random**, randomly choose a note.
 - **Walk**, randomly play the same note, the next note right, or next note left.
 - **Rise**, start at bottom, follow pattern up 2, down 1.
 - **Fall**, start at top, follow pattern down 2, up 1.

Offset: Sets the pitch offset of the notes played by the playhead in semitones. *Range:* -24 to +24.



Pattern: Sets whether the playhead actually plays a note or waits as it moves according to its pace. Use the stepper to set the pattern length from 1 to 16 and then tap on the circles to set whether those notes play. White means play, dark blue means wait. Light blue means those circles are not in the pattern.

Pro Tip: Use patterns of different lengths for each playhead to create complex, evolving polymeters.

Velocity: Sets the velocity of the notes played by the playhead. *Range:* 1 to 127.

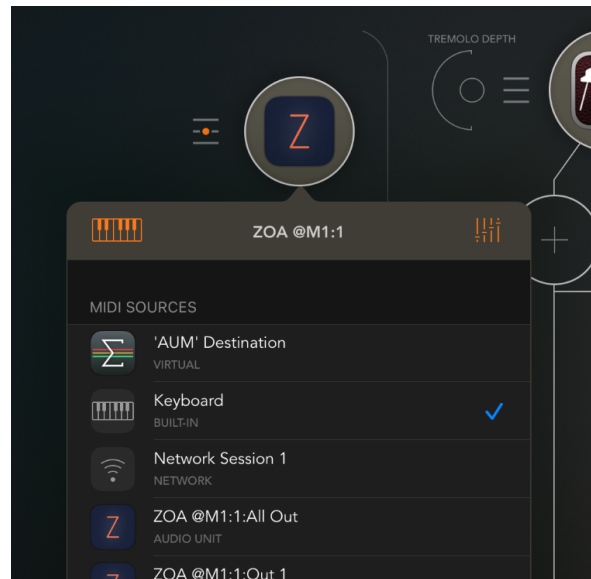
Channel: Sets the MIDI channel the playhead sends its notes on. *Range:* 1 to 16.

MIDI Behavior (Audio Unit)

ZOA is a MIDI Processor type audio unit. It must be loaded on a track that is able to load MIDI Processors. (Ex. ZOA must be on a MIDI track in AUM.)

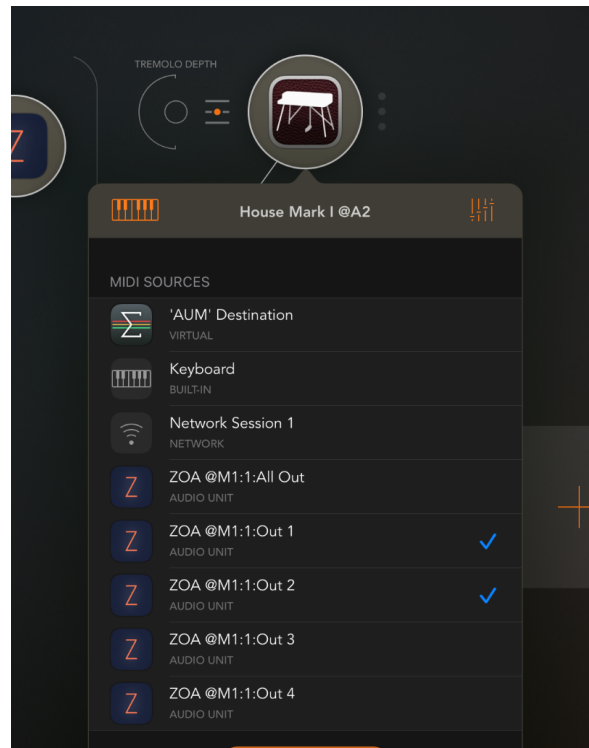
Once loaded in your host, ZOA can both receive and send MIDI.

MIDI Receive



MIDI receive is limited to note messages, which are used to set the root note and octave settings. This is useful for changing keys on the fly.

MIDI Send



ZOA has five MIDI outputs for sending note messages. One for all the playheads together and one for each playhead alone. This allows you to use ZOA to play multiple instruments simultaneously.

Note that in version 1.1, additional logic has been added to ZOA's "All Out" output so that the note stream will be unambiguous to MIDI receivers.

How it works:

- If two playheads attempt to play the same note (same channel and note number) at the same time, only one "note on" event will be sent.
- If a playhead plays a note that is already being held (same channel and note number), then an implicit "note off" message is sent immediately prior to playing the new note.
- When multiple playheads are holding the same note, the final "note off" message is not sent until the last playhead releases the note.

This shouldn't result in any audible difference to the user, but it should make ZOA play more nicely with external synths and MIDI recorders.

Top Bar (Standalone App)

When running ZOA as a standalone app, there are some additional settings and controls that are available in the top bar view.

Manual button: Display this manual.

Presets button: Displays a simple menu for saving, loading, and deleting user presets. Tap the “save button” to save. Tap on a preset to load. Swipe left on a preset to delete.

Note that user presets are shared with the audio unit, this means that if you save a preset from a host like AUM, it will be visible in the standalone. Likewise, if you delete a preset in the standalone, it will no longer be visible to host apps like AUM.



Transport button: Start and stop ZOA’s internal clock.

Tempo control: Set the tempo of ZOA’s internal clock. Touch and drag to set quickly. Tap “+” and “-” to increment by 0.1. Double tap to round. Long press to type in a value.

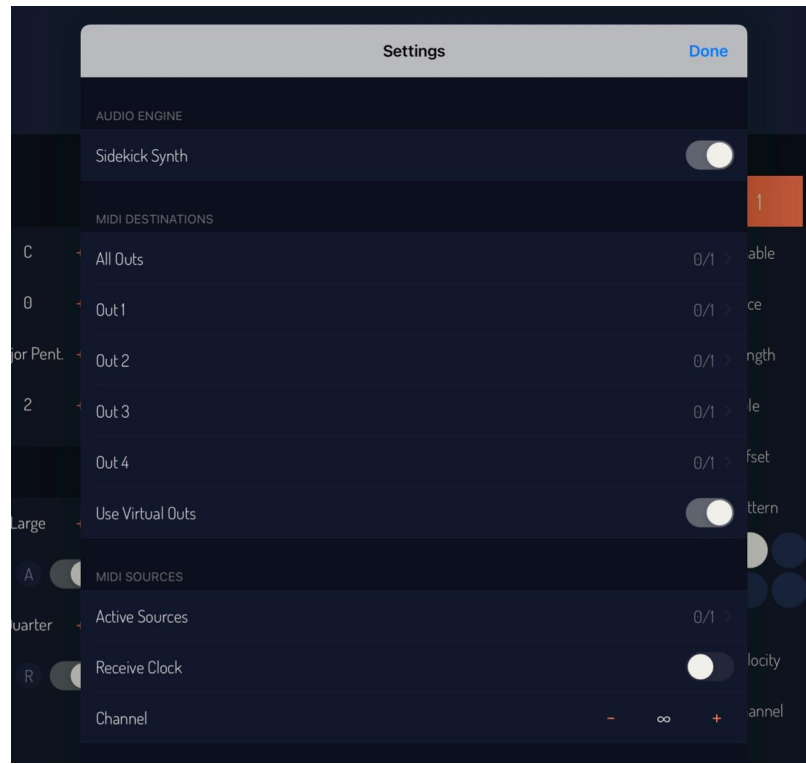
Link button: You can sync ZOA’s clock to other devices and apps using Ableton Link. Tap on this icon to display the Link settings. Orange when enabled, dark blue when disabled.

Important: ZOA’s audio engine will stay on in the background whenever Ableton Link is enabled AND the “Sync Start/Stop” switch is enabled. This will cause increased battery usage! It is recommended only to enable Ableton Link when you are using it.

Bluetooth MIDI button: Displays a menu for connecting to Bluetooth MIDI devices.

Settings button: Displays the settings menu.

Settings



Audio Engine:

You can enable and disable the bundled synth with the “Sidekick Synth” switch. ZOA’s MIDI engine will still work when this switch is turned off.

MIDI Destinations:

ZOA has five MIDI outputs. One for all the playheads together, and one for each playhead by itself. You can set the MIDI destinations for each output by tapping on the appropriate cell and selecting where you want the MIDI to go.

Note that in version 1.1, additional logic has been added to ZOA’s “All Out” output so that the note stream will be unambiguous to MIDI receivers. See “MIDI Send” above for more details.

The “Use Virtual Outs” switch determines whether ZOA sends MIDI on its virtual output ports.

MIDI Sources:

You can select a MIDI input for ZOA by tapping on the “Active Sources” cell and choosing an input.

You can sync ZOA’s internal clock to an external MIDI clock by enabling the “Receive Clock” switch. *Note: ZOA can only sync to whole BPMs as of version 1.0.x.*

Set the MIDI receive channel with the channel stepper. Infinity is omni mode.

Thanks

ZOA makes use of the open-source library AudioKit. Just want to give a huge thanks to all the developers who maintain it and their supportive online community!