

Sparkle is a tool for advanced spectral hybridizations made of several algorithms that operate on frequency domain. By means of envelope preservation and phase-sync processing it can create high-quality sound transformations.

The basic idea is to transfer the temporal structure of a sound (source) onto another sound (target) of which the spectral properties are preserved.

Simply put, you can take a voice and make it sing a Beethoven's symphony!

To have the magic, it will be sufficient to take a source sound that is very variable in time (such as a voice, a drum pattern or a melody played by an instrument) and a target that is very rich in spectrum (such as an orchestra playing, a synth pad or an environmental sound). Have fun!!!

Important Changes in this Version

1) In this version we have updated the Samplers. This new implementation adds many new interesting features such as Loop Crossfade, Wave Scrubbing, Precise Zoom etc. When you save a new preset, all sampler information (file name, loop-point, start-point) are saved. But since this new update implements our new sampler, the presets saved with the old sampler are no longer available for the loop-points parameter. So we suggest you may need to resave your presets. No changes for the others parameters as file path and scrub position and Play/Pause.

Now, the Sampler is more precise and you can read stereo files

2) The Parametric Filter (of FX Chain) has been replaced from Stereo ECHO. Old presets will not be able to configure properly this FX parameters. You could be forced to overwrite some presets who produce unwanted sound.

3) New Setting for Stereo DSP, greatly improves sound quality. See Settings for more details.

Here is a brief description of the *Sparkle* main parameters:

Tips & Tricks

- Double tap on the **Knobs** to show the options. In the 'Edit' field you can enter the value from the keyboard. Tap '**Random**' to generate a random value, '**Default**' to reset to the factory settings and configure the knobs dragging behavior. Step fine resolution sets how many points of movement

result in a one degree rotation in the knob's position. Only used in the horizontal/vertical slider modes. You can set Knobs behavior from Settings.

- Long Press Tap on the **Toggles** to open Control Manager Assignations.
- When the user presses the Home button, the app goes to the background process and will store the whole status of parameters to reload when next opening the app. See Settings for more explanations.
- Sparkle can play audio in the background and/or mix its own audio with other iOS apps. Sparkle also supports Apple IAA (i.e. Inter-App Audio for iOS 7 or higher) and Audiobus, so you can send and receive audio through applications.
- Swipe gesture (right to left) on a preset or bank to rename/duplicate/delete it. See Presets for more details.
- You can load Presets (current selected bank) by remotely sending a MIDI Program Change message. See MIDI section, below for further details. You can select the MIDI channel where you can receive PC messages. A PC value of zero will select the first preset in the list, a value of 1 for the second etc... The range is from 0 to 127.
- When you are connected in Audiobus or Inter-App Audio as FX, Input Mode will be selected automatically. Every time you will disconnect from AB or IAA, you will turn back in Sampler. A warning message will displayed be in order to prevent dangerous Speaker audio feedback. The same behaviour will occur if you have not attached, in your iPad/iPhone/iPod Touch, an external device as headset or Mic. etc... You can disable this message through the app Settings, see later for more explanations.
- We suggest you to disable the screen rotation, otherwise the accelerometer doesn't work properly.
- **Init** will reset to default values, a reset message will be displayed.
- **Create Random Sound** values for all of the parameters including the FX parameters. The result can be very interesting and wayward.



Enable/Disable Accelerometer X/Y and LFO, see the Control Manager for more details.

 Captures Output stereo signal (post Effects) and creates an audio file *wav* format 44.1 kHz 16 bit in the Documents Folder. Files created by *Sparkle* are saved with an id-name followed by a number, for example:

Output Rec 1.wav, Output Rec 2.wav etc.

Each new file will be numbered with the next consecutive number.

SYNC



The goal of SYNC is to setup a global Metronome (MASTER BPM). This will affect the LFO (Low Frequency Oscillator) and/or the Sampler (or Sequencer etc...) when enabled to receive SYNC.

You can sets the BPM (Beats Per Minute) by scrolling up/down (or left/right) the label value (♩ 120 ←○→) or tap out the tempo.

Single Tap or Long Tap the minus/plus buttons to increase or decrease by 0.25. By default 120 BPM corresponds to 1 Hz frequency for the LFOs.

Ableton Link description

Ableton Link is a new technology that synchronizes the beat, phase and tempo of Ableton Live and Link-enabled iOS apps over a wireless network. It lets you play devices together with the freedom of a live band. Anyone can start and stop their part while others keep playing, and anyone can adjust the tempo and the rest will follow. You can use Link to play with several copies of Ableton Live, with Live and iOS apps, or with iOS apps together – even without Live in your setup.

MIDI Clock description

The clock signal is broadcasted via MIDI to ensure that several MIDI-enabled devices such as a synthesizer or music sequencer stay in synchronization. The iOS implementation is designed to provides precise, jitter-free MIDI clock transmission and robust, error-tolerant MIDI clock reception.

Quantization

When you are connected to an Ableton Live Session, the Play/Stop/Rewind transport will wait until the next sync quantum boundary before starting.

The 'Sync' button waits for the next beat (Tempo Forte) from the MIDI Clock or Ableton Link and resets all phases for LFOs, Sequencer etc.

Send MIDI Clock

Will create a virtual MIDI port for the MIDI Clock Output.

In Play/Stop mode the MIDI Start/Stop Clock messages are sent according to Transport Play/Stop (Sampler, Sequencer etc...). In 'Always' they will not be sent every time, but only at start.

Please note when you are connected to Ableton Link, the incoming MIDI Clock is disabled while you can send MIDI Clock out, converting the Ableton Link to MIDI Clock.

Receive Sync

- 1) Local-Host
- 2) MIDI Clock signal
- 3) Ableton Link.

When the Ableton Link its enabled the Local-Host and MIDI Clock will be disabled and viceversa.

In Local-Host when the app is connected through Inter-App Audio, will receive the Sync from the HOST (if available, i.e. tempo/start/stop) and the current BPM is overridden.

When MIDI Clock is activated, you cannot change the BPM (Slave) since is controlled by the MIDI Clock (Master). Through the 'CLOCK' button you can select a MIDI Clock Source.

Sampler

You can feed *Sparkle* with a stereo sampler or stereo signal from microphone/line or Audiobus/Inter-App Audio when connected.

Touch and drag the waveform to scrub the audio file. The speed of the scrubbing is relative to the position of the finger inside the waveform: higher positions produce faster scrubbing



Tap the symbol to set the loop points. When in "loop edit mode" you can:

- tap and hold inside the selection for the fine regulation of the loop
- double tap inside the selection to select again the whole file

When a loop is set, deselect the (tap again ) to zoom-in into the loop selection.



Reset scanning to the start position.



Waveform Scrubbing Mode, when selected the pointer jumps to the **Absolute** position of the finger that touches the waveform. If unselected (**Relative**) it does not jump but the scrubbing occurs from Sampler position toward finger touch.



Load an audio sample, see Samples Manager for mode details.

 Include/exclude the Sampler state when Presets are loaded. The Sampler state is composed by File Path, Loop Points (Zoom), Play/Pause and selected Input Source. Please note even if it is disabled, the Sampler still saves its current state in the presets.



Switches the Sampler Play function between Ratio and Time Signature mode. When in Ratio mode (blue icon) you can set the play ratio: 1 means play the sound file at the original speed, 0.5 means play at half speed, -0.5 means play at half speed and in reverse and so on. When in Time Signature mode (orange icon) you specify the number of Measures and Quarter per Measure the sound file contains, and the tempo is linked to the general Metronome Tempo; for instance if we specify 2 measures of 4 quarters each, and the general Tempo is 120 BPM, the sound file will be executed in 4 seconds.

N.B. You can disable the Crossfade and change Waveform style from the Settings. See the Settings for more details.

Input - Sampler ~ Source ~ Target Switch

You can choose between the internal sample players or set a live input via Microphone, Audiobus or Inter-App Audio for Source Input or Target.

IMPORTANT NOTE:

When you are connected in Audiobus or Inter-App Audio as FX, Mic-AB-IAA will be selected automatically. Thus, every time you will disconnect from AB or IAA, you will turn back in Sampler. A warning message will be displayed in order to prevent dangerous Speaker audio feedback. The same behaviour will occur if you have not attached, in your iPad/iPhone/iPod Touch, an external device as headset or Mic. etc.

You can disable this message through the app Settings, see later for more explanations.

Hybridization

This is the main parameter for *Sparkle*: it defines the amount of hybridization between two sounds. Put it to the left (0) and you'll get the target sound unchanged; now bring it to the right (1) and you'll listen the source sound magically deformed by the target.

Pitch shift

This parameter can be used to shift the pitch of the output sound, ranging from 1 octave below to 1 octave above the original pitch. The shift is expressed in ratio, where 0.5 means 1 octave below and 2 means 1 octave above.

Stereo/High Processing

Apply the High Precision Sparkle algorithm with Phase syncing for each channels, this is suitable for stereo files and produce very high quality performances. Naturally, the CPU cost is increased.

Formant Move

Formant manipulation in frequency domain. This process corrects the formant error introduced by pitch shifting by superimposing the original formants, thus yielding a sound similar to the original one.

Envelope

This parameter express the quality of the timbre preservation for the target. If 0 there is no preservation and the hybridization does not work, if 120 there is probably too much preservation and the hybridization works strangely. A good value could be between 80 and 90; nonetheless you can sweep the parameter over time, to obtain strange effects.

Denoise

This parameter affects the output by removing spectral components that are below the specified value. It is a sort of denoising algorithm that can be used for special effects: try to set it to values higher than 0 and you'll get it.

The keyboard

You can use this area to control the amount of pitch shift: imagine that no shift will be applied if you play the central C. Then if you play the lower C you'll get 1 octave lower (0.5) and if you play the higher C you'll get an octave higher (2). **The keyboard can be controlled by Note On MIDI messages.** See MIDI Manager for further explanations.

Presets

Preset Manager will collect all the **Banks** (*i.e.* *.sparkle suffix*) and **Snapshots**. A *Snapshot* is a simple "photo" of the parameters in the UI (*i.e.* User Interface). Both the Matrix and Keyboard/Sequencer are included but they can also be excluded, see the Settings for more details.

So, once you find an interesting sound you can take a snapshot (*i.e.* save this new preset) by touching the 'plus' icon and this new preset will be added to the selected Bank. The top four elements of the Snapshots list are assigned for 'HV Snapshot Pad', you can then sort or delete the Snapshots in the List by tapping the 'List Icon'. You can even share the selected Bank you can restore the factory Built-In Banks from the 'Cloud' icon.

Backup



Factory preset-banks (Excluded from iCloud back up)



Library preset-banks (if available as In-App Purchasing) (Excluded from iCloud back up)



User preset-banks (Included in iCloud back up)

If you delete, overwrite, rename or save new presets in factory/library banks, the icon will change as User preset-banks, being backed up.

Snapshot banks are located in Documents folder, you can access files via iTunes Sharing, see 'Samples'.

 You can add new files by copying in the app's documents (through iTunes or from another app) and refresh the list from there.

 Load a preset, randomly from the banks list.

 Delete all Presets for a selected bank. A warning message will be displayed.

The Snapshots bank file is a kind of Property List format (*.Sparkle*), you can edit as text and modify the values just rename in *.plist*

Swipe (right to left) on a preset or bank to rename/duplicate/delete it.



The purpose of the unique **Snapshot Pad** is to obtain intermediate values between four snapshots (corners). You can change snapshots assigned in the corner through the Snapshots list (see above).

The Snapshots Pad performs complex interpolations between four snapshots on a two-dimensional space. By scrubbing your finger on the Snapshots Pad a temporary new snapshot will be created by mixing the four snapshots depending on distance. Thus you can modify hundreds of parameters with a single touch, this is also called *Hyper Vectorial Synthesis*.

Snapshots Pad can be resized on fullscreen for detailed controls (left bottom icon).

N.B. Snapshot Pad have no effect on Switches and Sampler.

Samples

Samples manager can read/write in the Documents folder, you can also share files through AudioCopy, Document Picker (iCloud, Dropbox etc...) and AudioShare. Samples manager can also read the Built-in files, but you cannot rename or delete them. Touch on a file in the list to show the actions popup. Here it is possible to **Load** a file in one of two Samplers (i.e. Sampler Ch.1 and Sampler Ch.2), Open In... contains all system actions over the file, according to file type. For example you can send files as an e-mail, open file with a listed app etc...



You can rename files in the Documents Folder, if you omit the file extension then Samples Manager will fill the original audio file extension for

you. N.B. Samples manager shows only audio files supported, the other files in the Documents folder will not be seen.



You can pre-listen to the samples before you load them.



Starts audio capture from the microphone immediately and saves new stereo audio file in wav format 44.1 kHz, 16 bit in the Documents Folder. Files created are composed by id-name followed by a number, for example:

Input Rec 4.wav, Input Rec 5.wav etc...

Every new file will be numbered with the next consecutive number.

N.B. You can record a mono or stereo file in wav format 16 bit 44.1 kHz according to the iDevice channels. Even if the Sparkle is connected to Audiobus or IAA, the Grab Audio will record always from iPad microphone/line



You can import files from AudioCopy, Music Library, Document Picker (iCloud, Dropbox etc...) and AudioShare.

Access to the iPod library, this allows the application to read user's songs, audio books, and audio podcasts. The file can be converted in .wav (PCM 16 bit 44.1 kHz) or .caf formats and stored in the local app Documents Folder. If the file exist at path then progressive number will be attached to the file name.

The document picker feature lets users select documents from outside your app's sandbox. These include documents stored in iCloud Drive and documents provided by a third-party extension. Users can open these documents directly, editing them in place. This access simplifies sharing documents between apps and easily enables more complex workflows.

Use iTunes to share files between your computer and your device

- 1) Open iTunes on your Mac or PC.
- 2) Connect your iPhone, iPad, or iPod touch to your computer using the USB cable that came with your device.
- 3) Click your device in iTunes.
- 4) In the left sidebar, click File Sharing.
- 5) Select an app to see which files are available for sharing in that app on your device.

Control Manager



MIDI



Accelerometer X



Accelerometer Y



LFO

After selecting **MIDI**, *Sparkle* enters into "learn mode" i.e. it "hears" incoming MIDI Control Change messages. It's then possible to send messages with MIDI hardware, Virtual MIDI and Network MIDI. Flashing screen means the association between the parameter and the MIDI message has been successful and displays the corresponding control Change and Channel. Alternatively you can enter direct CC and MIDI Channel number through number keyboard. You will also receive an additional setting: 'Widget Range' that allows you to resize the range of action on the parameter. This is because you can use all 128 steps MIDI to control precisely particular part of the parameters.

Accelerometer X and **Y** are used to control the parameters through the horizontal or vertical inclination of the device.

LFO, Low Frequency Modulation is a table look-up oscillator with seven built-in shapes. The frequency of LFO is expressed in Hz and BPM (Beats per Minute). You can get the period time by dividing $1/\text{freq}$. The LFO Frequency value is converted in BPM (Beats Per Minute), you can adjust this value through the minus/plus buttons, these will replace current value with the integer BPM (previous/next) or you can TAP to set your own Tempo.

- ϕ Will reset to zero the phase of current LFO.
- Φ Will reset to zero the phase of ALL LFO actives.



Enabling the Link symbol, you will disable the 'Low Frequency Oscillator in Hz' Slider, so the value of the current LFO is sampled from the global 'MASTER BPM'. You can adjust the BPM value from SYNC view. When the MIDI Clock or Ableton Link is enabled (see MIDI Manager and SYNC) the BPM value will affect all LFO enabled for SYNC mode. The goal of the 'SYNC Subdivision' Slider is to rescale the 'MASTER BPM' from SYNC according to the relative symbol (abbreviate musical note time values):

Normal : 1/1, 1/2, 1/4, 1/8, 1/16, 1/32, 1/64
Triplets : 1/1T, 1/2T, 1/4T, 1/8T, 1/16T, 1/32T, 1/64T
Dotted : 1/1D, 1/2D, 1/4D, 1/8D, 1/16D, 1/32D, 1/64D

Where 'D' is a **dotted** note and 'T' is **triplet**.

With 1/4 (Default), the BPM follows the 'SYNC BPM' or 'MIDI Clock' BPM when enabled, i.e. 120 BPM corresponds to 1 Hz.

- 1/4 - each step is a quarter note (or BPM), e.g. 60 BPM is 0.5 Hz
- 1/4D - each step is a dotted quarter note (or 1.5 x BPM),
- 1/4T - each step is a triplet quarter note (or 0.5 / 3) etc.

♪ Reset default value (1/4 = 120 BPM)

MIDI

You can enable/disable the incoming MIDI signal from all the physical, virtual and network ports available. The MIDI Clock is managed by SYNC, see the SYNC section for more details.



If the Core MIDI Network is connected a wifi symbol will appear in the Network port cell.

Channel sets the input channel for the selected port, the Piano Keyboard will receive the Note On/Off messages in OMNI (from all 16 channels) or, one of the 16 channels.

Configure Bluetooth LE MIDI

With the release of iOS 8 and OS X Yosemite, sending and receiving MIDI data is supported using Bluetooth Low Energy connections on any iOS device or Mac that has native Bluetooth Low Energy support. All established connections are secure which means that pairing is enforced and connections cannot be made to your devices without your explicit consent. After a connection is established, it simply appears as an ordinary MIDI device that any MIDI application can communicate with.

Enable NRPN

NRPN stands for "Non-Registered Parameter Number" and is part of the MIDI specification for the control of electronic musical instruments. NRPNs allow for manufacturer-specific or instrument-specific MIDI controllers that are not part of the basic MIDI standard.

Unlike other MIDI controllers (such as velocity, modulation, volume, etc.), NRPNs require more than one piece of controller data to be sent. First, controller 99 - NRPN Most Significant Byte (MSB) - followed by 98 - NRPN Least Significant Byte (LSB) sent as a pair specify the parameter to be changed. Controller 6 then sets the value of the parameter in question. Controller 38 may optionally then be sent as a fine adjustment to the value set by controller 6.

This fine adjustment is part of the conventional MIDI controller specification, where any of the first 32 controls can be optionally paired with a control offset 32 higher. This is the rare 14-bit Continuous Controller feature of the MIDI specification, and NRPNs simply take advantage of that existing option in the same way offering 16,384 possible values instead of only 128.

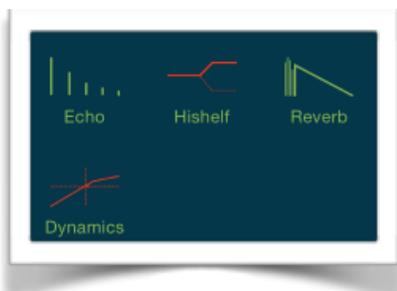
(<http://en.wikipedia.org/wiki/NRPN>)

When you enable NRPN, you should not employ CC 99 and 98 as the normal CC in order to avoid an undesired overlap. An NRPN message must be sent with this order: CC 99 98 6 38 where the first couple is the CC number and the second couple is the data. You can MIDI learn as for the normal CC, and NRPN works for all knobs and parameters. Although an NRPN CC number can be greater than 127, you will not be able to learn CC beyond 127.

Program Change for Presets Selection

You can select Presets (current selected bank) by remotely sending a MIDI Program Change. You can select the MIDI channel where you can receive PC messages. A PC value of zero will select the first preset in the list, a value of 1 for the second etc... The range is from 0 to 127.

Post Processing Effects



After the *Sparkle*, you can change the output sound using the FX chains. We have: *Stereo Echo*, *High Shelf Filter*, *ClassicVerb* and *Dynamics Processor*. The first effect of the chain is an **Echo** which receives signal from the **Sparkle**. If enabled, the processed signal will pass to the next effect or bypass if disabled.

The amazing ClassicVerb is a classic reverberation based on an high-quality algorithm is also provided. It is possible to control, independently, the early-reflections and the reverberation tail.

Special thanks to **Carmine Cella**.

www.sonic-pad.com

Dynamics Processor

After the *Sparkle*, you can change the output sound using a conventional compressor and expander effect.

This is used to either reduce or expand the dynamic range of an audio signal. The Dynamics Processor controls set high (compression) and low (expansion) threshold volume levels. When the incoming audio is between these levels, it is left unchanged. Audio that rises above the upper threshold is cut in volume to bring it back down to that level (compression). Audio that falls below the lower threshold is cut in volume to make quiet sounds even quieter (downward expansion).

Additional controls adjust the attack and release time for the plugin's volume envelopes, the expansion ratio, the compression headroom, and a master gain to boost or cut volume on the Dynamics Processor's output.

Threshold: when the signal is above the threshold it is compressed

Headroom: upper limit for the compressor, a limiter prevents the signal to go above this threshold

Attack and Release: activation and de-activation times for the compression when it is above the threshold

Exp Threshold: when the signal is below the Exp Threshold it is backward expanded

Exp Ratio: expansion ratio

Settings

Buffer Size set the Audio Device latency. When you run *Sparkle* from **Audiobus**, or **Inter-App** this value will be taken from **Audiobus** or **Inter-App Host**. Warning! When an app runs first and keeps running in the background, the Sampling Rate and Buffer Size will impose for the whole iOS while running.

FFT Size

This is the Fast Fourier Transform Size expressed in samples.

It must be a power of 2 such as 512, 1024 or 2048 (to give a few commonly used values).

For example, if your FFT size is 2048 samples long, the FFT analysis gives you 1024 equally-spaced frequency bins from 0 Hz to Nyquist.

A value of 4096 is suitable for high quality manipulations but very expensive in CPU terms.

FFT Overlaps

The basic algorithm is known as a Short Term Fourier Transform (STFT) which is a set of overlapping "windows" of input and output data. This kind of setup is necessary to reduce unwanted modulation on input to the FFT and allows us to modify the FFT data without unwanted overlap-add artefacts on output. You can experiment with NO overlap in order to hear the windowing modulation between FFT frames. A good value for *Sparkle* is 4 (default).

Snapshot Pad Resolution Update sets the time interval for the interpolations, from about 15 to 350 milliseconds. Short times for higher resolution but higher consumption of CPU.

Save/Restore the Last App Setup, when you exit from the application, save the status (all *Sparkle* and Fx Parameters) and reload when next opening the app.

Knobs Interactions Mode

Use this to configure the Knobs dragging behaviour. Step fine resolution set's how many points of movement result in a one degree rotation in the knob's position. Only used in the horizontal/vertical slider modes.