

DrumPerfect v1.05

Marinus J.G. van de Molengraft

document version 1.0.5.1

E-mail: Marinus@drumperfect.nl

Contents

1	Introduction	3
2	Pattern editor	4
2.1	Kit selector	5
2.2	Instrument selector	5
2.3	Live pad	5
2.4	Tempo	6
2.5	Time signature	6
2.6	Beat subdivision	6
2.7	Beat grid	7
2.8	Polyphony and CPU monitor	7
2.9	Velocity	7
2.10	Random and linked strokes	8
2.11	Time shift	9
2.12	Humanize	9
2.13	Two-handed	9
2.14	Pattern selector	9
2.15	Export to other apps	10
2.16	Settings	11
3	Grid editor	14
4	Kit editor	15
4.1	Kit selector	16
4.2	Instrument selector	16
4.3	Kit, instrument and master volume	17
4.4	Convolution reverb	17
4.5	Mute and Solo	18
4.6	Hi-hat pedal simulation	18
4.7	Midi map	18
4.8	Filtering samples	18
5	Song editor	19
5.1	Editing a song	20
5.2	Song pointer	20
5.3	Song import and recording	21
5.4	Song tempo	21
6	Cpu Load Control	21
7	iTunes file sharing	22
8	Troubleshooting	22

1 Introduction

DrumPerfect is a drum sequencer for iOS that aims at creating extremely naturally sounding drum tracks for electronic music production.

DrumPerfect features four extensive editors to easily create human-like drum sequences:

- An extensive pattern editor in which each individual drum stroke has its own velocity, timing and probability. Each pattern has its own BPM, time signature and beat subdivision settings.
- A grid editor which shows all instrument parts in a single screen and allows for editing of velocity and probability per stroke or per instrument.
- An extensive kit editor with up to 16 different drum kits with 16 instruments each. Every instrument consists of up to 16 different user-selectable audio samples. DrumPerfect features 9 multi sampled kits: 6 acoustic drum kits, 1 percussion kit and 2 vintage electronic kits, all built up of high quality samples from the public domain. With the built-in high-quality convolution reverb the drum kits can be convincingly simulated in a large set of different rooms.
- An extensive song editor in which a song is built of pattern/kit events.

DrumPerfect exploits an extensive probabilistic scheme to randomly and on-the-fly create both subtle and convincing variations on the programmed patterns. As a result, songs -while even consisting of only a few patterns, can sound as if they are played by humans. Complementary to this, the probabilistic instrument sample selector will on-the-fly alternate between multiple samples for one and the same instrument, which adds a lot to the realism of the sound.

DrumPerfect offers extensive options for audio-transfer with other apps:

- Live-audio source for other apps via Audiobus and Inter-App-Audio (IAA). DrumPerfect supports live-streaming of individual outputs per instrument. Moreover, DrumPerfect offers perfect sync with IAA-enabled hosts. Audiobus State Saving supported.
- Audio rendering/upload to AudioShare, AudioCopy2, SoundCloud, Dropbox and Open-in.
- Import of audio samples via iTunes file sharing and via AudioPaste2.
- Solid clock sync via Midiclock input with midi start, midi stop and midi song pointer control.

- Extensive midi-in support for real-time processing of incoming midi streams via virtual midi or coremidi (hardware) ports.
- Midi file import and export.

Each of the four editors has its own user interface view. In the rest of this document, these views will be our guide in this manual. Furthermore, the Export view and Settings view offer export functions for audio and configuration options respectively. These six views are always accessible from the navigation bar at the top of the screen, which facilitates switching between them. Also, the navigation bar contains a direct link to this help file.

2 Pattern editor



Figure 1: Pattern editor

Fig. 1 shows the Pattern editor which is the startup view. Patterns are the building blocks of a *song*. They can best be interpreted as a single measure consisting of a number of beats, each of which can be subdivided into sub-beats. Each pattern has its own tempo, time signature and beat subdivision. If the number of beats in the pattern is too large to be shown in a single view, navigation buttons will appear to the left and right of the pattern to enable scrolling

over multiple pages. Drum strokes are inserted by tapping the pattern at the desired location. The respective (sub)beat will turn green. Tapping once more will remove the stroke. Swiping from the inside of an existing stroke to the outside will turn the stroke into a right-handed stroke. Left- and right-handed strokes typically play different samples of the same instrument. Swiping once again will return it into the default left-handed state. Below, the various controls in the editor will be explained.

2.1 Kit selector

Select one of the kits by swiping the selector bar and touching the desired drum kit. The selected kit is used during play of the pattern. In total, 16 different drum kits can be loaded at the same time. The maximum number of kits loaded into memory will be limited by the iPad's physical memory. If memory usage becomes too high, iOS will abort the app, so it is good practice to keep an eye on the memory indicator in the *Kit Editor*.

2.2 Instrument selector

Select one of the instruments by swiping the selector bar and touching the desired instrument. The selected instrument gets the focus in the pattern beat grid. Each drum kit can contain up to 16 different instruments. Touching one of the tabs for a short amount of time will turn on the *laid-back* function for that instrument, which will change the feel of the pattern by playing the instrument just a bit later in time than programmed. Experiment with it while carefully inspecting the result by ear. Well-known examples of laid-back sounding drum patterns are the ones where either the snare or the hats are delayed.

in the *Settings* view the laid-back level can be chosen between subtle, medium and strong.

2.3 Live pad

Next to the instrument selector is the Live Pad, which can be used to play the instruments by tapping the pad. The drum engine must be running to activate the Live pad. If the **Record** button is pressed first, the played strokes are recorded into the pattern. The Live pad is velocity-sensitive from left to right. Live strokes inherit velocity, probability and time shift settings from the current slider settings and will be quantized to the beat grid. While connected via Inter-App Audio or Audiobus, the Live pad play can suffer from additional latency as a result from the presence of multiple apps in the audio pipeline. It is recommended to run DrumPerfect as a standalone app during Live pad play.

In the *Settings* view the Live Pad can be configured in **Dual Pad** mode, which will let you play both left-handed and right-handed strokes.

2.4 Tempo

For each pattern a BPM-value can be set between 20 and 180. A Tap Pad allows to tap the desired beat rate. Up/down buttons facilitate tuning the BPM-value. The BPM-value can be set for all patterns at once by keeping the Tap Pad pressed for more than three seconds. The tempo of a pattern or a whole song can be synced to a master or host app in two ways:

- Midiclock sync. For midiclock, select "DrumPerfect" in the master app as destination for midiclock. Furthermore, configure the master app to send start/stop en song pointer messages via midi. Press the **Midiclock** button. If incoming midi clock pulses are detected while in Midiclock mode, the Midiclock button will turn green.
- IAA sync. Select DrumPerfect as an IAA-node in the host app. In DrumPerfect, the IAA transport bar will show that will allow to run DrumPerfect in sync with the host, adopting both song position and tempo from the host.

While either of the two external sync modes is active, it will not be possible to change the tempo of a pattern (in Pattern mode) or a song (in Song mode=while inside the Song editor) from within DrumPerfect.

2.5 Time signature

For each pattern a time signature can be set as **num/den** where **num** is a integer number between 1 and 32 and **den** is an integer number from the set {1, 2, 4, 8, 16, 32}. On a change of time signature existing strokes will be automatically remapped to the new grid.

2.6 Beat subdivision

Each beat is subdivided into a number of subbeats. The subdivision can be set per beat as an integer number between 1 and 16. The **Subdiv** parameter can be used to set the same beat subdivision for all beats. On a change of subdivision existing strokes will be automatically remapped to the new grid. For example, this feature can be exploited for programming triplets in a 4/4 beat: first, set the subdivision to 3 and program the triplets, then reset the subdivision to 4. In this process, go from low to higher resolution in order not to loose strokes during remapping.

2.7 Beat grid

The beat grid is shown as a series of bars, each of which represents a sub-beat in the beat grid. Strokes in the beat grid can be programmed by touching a subbeat. The subbeat will turn green. Touching it again will remove the stroke. Each stroke has 3 parameters: velocity, probability and time shift. These parameters have corresponding sliders and edit fields in the Pattern editor. The stroke parameters can be modified by selecting the stroke (**Select** button, stroke will turn blue) and subsequently changing the parameters. Pressing **Select** again will deselect the selected strokes. Multiple strokes can be selected and edited at the same time, even strokes of multiple instruments. The **Select all** button will select all strokes of the current instrument. If strokes have been selected, **Erase** will remove the selected strokes, **Copy** will copy them into memory, and **Paste** will merge them. If no strokes have been selected, **Erase**, **Copy** and **Paste** will apply to all strokes of the current instrument. If the beat grid does not fit the one screen view it will be divided over multiple screens, in which case navigation buttons will show up on the left and right side of the beat grid. Double-touching a beat in the grid will create a red-colored *choking stroke*, which will choke the corresponding instrument. For choking strokes, velocity is used to indicate the force of choking between soft (velocity zero) and firm (velocity one) choking. As for the rest, choking strokes are treated in the same way as normal strokes.

2.8 Polyphony and CPU monitor

The **Voices** label shows the actual polyphony value of the sequencer engine. In the current version, the maximum polyphony is 64 (default 32) voices. If more voices are needed, the most advanced voices will be sacrificed, which will -in most cases- not be audible, as percussive voices tend to decay over time. The CPU monitor shows the app's computational load. DrumPerfect features active CPU Load Control to limit its claim of computational resources. If the cpu-value turns green, the user setpoint for CPU load (see **Settings**) has been reached. On older iDevices such as iPad2/3 it is recommended to not increase the default maximum number of voices due to the limited computational resources of those devices.

2.9 Velocity

Each instrument can use a set of up to 16 samples. Typically, an instrument contains separate samples for high-velocity and for low-velocity, as softly played drums sound quite different from firmly played drums. The high and low samples are linearly interpolated depending on the stroke velocity. There can be up to 4 different samples for the low and for the high strokes. Moreover, instruments support both left-handed and right-handed strokes, which explains the

total of 16 samples per instrument. How to select and tune the samples will be explained in the section about the Kit editor. For choking strokes velocity has the meaning of choking force resulting in a sample decay time between 0.5 s for soft choking (velocity zero) and 0.1 s for firm choking (velocity one).

2.10 Random and linked strokes

Each stroke is given a probability of between 0 and 1 (default). A value of 1 means that the stroke will be played with Velocity A. A value of 0 means that the stroke will be played with Velocity B. Next to the velocity slider, a button allows to switch the slider velocity type from A to B and vice versa. Any probability between 0 and 1 will cause a random draw between the two possible velocities A and B. The closer the probability value is to one, the bigger the chance that the stroke will be played with velocity A. By default, velocity B is set to zero, such that the strokes will either be played (velocity A) or not (velocity B). This two-velocity feature per stroke opens up many opportunities to create interesting variations from a single pattern. As an example, think of a snare roll where both the velocity A and B level of all strokes are set to the same low value. Such pattern -when played- will result in a soft roll. Now, select the strokes where you would like to hear some snare accents every now and then and increase velocity B for those selected strokes. Depending on the value of the probability the roll will now be decorated with less (probability close to 1) or more (probability close to 0) snare accents. In the beginning, a simple strategy would be to program the body of the rhythm with probability 1 and to add decorating strokes with probability <1.

Sometimes, the decorations or fills only make sense if they are either all played or all not played. Or -more general- if they need to be all played with velocity A or all played with velocity B. In that case, these strokes can be linked via the **Link** button. First select the strokes at hand and then **Link** them. The Link button is left-right scrollable to select one out of the ten linked sets. The linked strokes will turn orange to indicate the link. Up to 10 different linked sets can be created, named Link0 to Link9. Strokes can be selected and linked across multiple instruments. So, as long as the **Select** button is shimmering blue-yellow, there may be selected strokes for other instruments than the current one, and which are thus not shown in the current beat grid view! If you want to be sure that no strokes have been selected, first press **Select** twice (deselect and select). To indicate where the string of linked strokes actually starts, touch the objective first stroke while linked (=orange stroke). The selected first stroke in the linked set will turn yellow. The strokes preceding the yellow stroke will be played on the next pattern, unless there has been a change of pattern. The Pattern editor will only show a linked set when it has been selected. Pressing the **Link** button again while it is active will unlink the set of strokes. Touching

the orange **Link** button for a short amount of time will reveal the linked strokes in the currently selected linked set. If the **Link** button is pressed while the linked set is active, the linked set will be deleted, but only after asking for confirmation.

Each linked set can be assigned a period in bars and the position in the period where the linked set needs to be played. A common use-case would be to play a drum fill every four bars at the fourth bar (*Every 4 At 4*). The bar counter for this feature is relative to the pattern that contains the link. So, in a song, the fourth bar would mean the fourth occurrence of the pattern at hand, even if there are occurrences of other patterns in between.

2.11 Time shift

The timing slider allows each stroke to be shifted in time with +/- half of the sub-beat length. In this way, strokes can be placed at every possible time instance in the pattern. The only restriction is that the strokes have to stay within the bounds of the pattern, which means that a stroke on the first (sub)beat cannot be moved forward in time.

2.12 Humanize

A human drummer will inherently suffer from small variations in timing and velocity during play. DrumPerfect mimics this by imposing small random variations on timing and velocity via the **Humanize** button, which turns coloured on activation. In the current version, the maximum random variation in timing of the strokes is +/- 100 samples (2.3 ms). The maximum random variation in velocity is +/-15% on a velocity scale from 0 to 1. The Humanize option is saved in the pattern.

2.13 Two-handed

A human drummer only has two hands and two feet. DrumPerfect mimics this with its **Two-handed** option. When turned on, the drum engine will select at most two hand-played and two foot-played strokes out of the set of coinciding strokes. In the current version, DrumPerfect assumes separate strokes to be at least 100 ms apart. Strokes that are closer together will be treated as if they take place at the same time instance. Linked strokes have priority over non-linked strokes and will be played as much as possible, counting from Link0 and up. The Two-handed option is saved in the pattern.

2.14 Pattern selector

Select a pattern slot to program the pattern. Up to 64 different pattern slots are available. Patterns form the building blocks of a song, which can be composed

in the Song editor via the **Song** button. Patterns can be cleared (**Clear** button), loaded (**Load** button), saved (**Save** button) and renamed and saved (**Save as** button). Patterns can also be copied and pasted/merged to and from other patterns (**Copy**, **Paste** and **Merge** buttons). When merging a pattern with a different time signature than that of the target pattern, the target pattern will be leading and the strokes of the merged pattern will be automatically remapped to the time signature of the target pattern. As an example, the **Merge** function could be especially useful for creating new patterns from a standard set of separate kick, snare and hi-hat patterns.

2.15 Export to other apps

DrumPerfect supports both Audiobus v2.1 and Inter-App-Audio for sharing its output with other apps in real-time. In Audiobus, one of the 17 outputs can be selected in the audio input slot. The first output is the combined mix of all instruments. The remaining 16 outputs represent the individual instruments in the active drum kit. Presets can be saved, loaded and shared via the Audiobus state saving protocol. In IAA, DrumPerfect shows up an audio source in the host program. When a connection with the host has been established, the **IAA** button with host logo will show up, which allows for fast switching to the IAA host (only if Audiobus is not active). If the host supports it, also the IAA transport bar will show, which will let you control the host (Rewind/Play/Record) . If the *All instruments* IAA-output is selected in the host, DrumPerfect will automatically inherit the tempo of the IAA host and run in perfect sync with it.

A typical use case would be to record the individual instruments of a DrumPerfect song into a DAW. First assign the individual outputs to the DAW's input tracks. Also, assign the combined output to one of the tracks. The latter is needed solely for the purpose of syncing and can be muted. The individual outputs can be either Audiobus or IAA. Then, the DrumPerfect song can be live-recorded into the DAW with separate instrument tracks and in perfect sync with the DAW.

A second, non-real-time option for sharing audio is available via the **Export** button. Audio can be rendered and exported to AudioCopy2, AudioShare, Soundcloud, Dropbox and Open-in. Midi can be exported to Dropbox and Open-in. You can chose between pattern and song rendering. In case of pattern rendering, the number of patterns can be set, which is especially useful in case of probabilistic strokes, as each realisation of the pattern will be slightly different. In case of song rendering, you can chose to include a 10 s tail to make sure that all decaying voices at the end of the song are included. Before rendering to Dropbox, make sure you have granted DrumPerfect access to Dropbox via the Settings view, which has to be done only once.

The **Separate tracks** option will let you save individual instrument tracks to

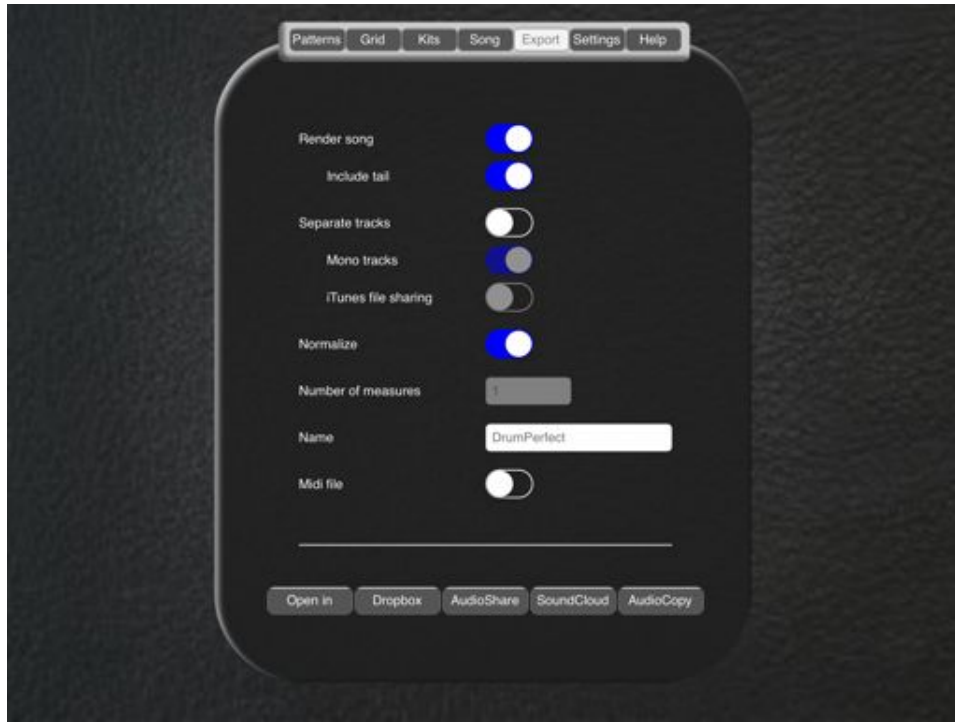


Figure 2: Export view

separate files. The track files get both an *instrument* and a *track* suffix to their name and are optionally stored in the */rendered* directory in the iTunes file sharing directory. At the same time, a combined mono or stereo track is created in which each of the instrument tracks is separated by a one period 2205 Hz pure sine period as a visual marker. The latter is directly exported to one of Audio-Copy/SoundCloud/AudioShare. In case of export to Dropbox, separate track export will save an individual track file to Dropbox for each active instrument. The *Normalize* function will normalize the audio level during rendering, which will prevent the rendered track from clipping at the cost of some more computational effort.

2.16 Settings

The **Settings** view allows to set a number of parameters:

- Maximum number of voices, which limits the amount of used voices during play. On iPad2/3 devices, values above 32 are not recommended. Higher values are likely to overload the CPU.

- Dual Live Pad mode, which splits the pad in two: one part for left-handed strokes and one part for right-handed strokes.
- CPU Load Control (CLC) power switch and maximum CPU level. The maximum CPU level serves as the setpoint for the CLC. During play, CLC will try to realise a cpu load that is lower than the specified maximum level.
- Flush, which will clear the sample cache. The /cache directory stores any pre-filtered samples that have been used as a result of the low-pass filter settings in the Kit editor. Pre-filtered samples will automatically be generated again once they are needed.
- Background audio switch, which allows to switch off background audio in case the app goes into the background. While either Audiobus or Inter-App-Audio is active, background audio will automatically be on.
- Sample name edit on paste, which will allow to choose a different name for samples that are loaded via AudioPaste.
- Dense pattern grid, which doubles the amount of strokes on a single page.
- Dropbox allow, which grants DrumPerfect permission to use the user's Dropbox account.
- UI theme load, which let the user choose a theme. Currently, three themes are included: wood, blue and classic.
- Laidback level, which let the user choose a level for the laid-back function.
- Metronome option, which let the user configure a kit/instrument for both the first beat and the subsequent beats. Also, the metronome volume can be set.
- Midi sources, which show a list of available and/or previously used midi-in ports. Tap a port to activate it. If the port is on-line, it will turn green, otherwise it will turn red. To configure a port, touch it for a short amount of time. Now, the desired midi channels can be activated. Also, the controller messages can be set that this port should listen to in order to control the commands in the list. Touch one of the commands for a short amount of time to map the command to a particular controller message. The controller message map can also learned via the midi-in port: tap *Learn* and select the desired command. It will turn red. An incoming midi controller message will now be mapped to the selected command. If all commands have been configured, it is a good idea to save the port configuration to file via *Save* or *Save as* for later re-use, possibly for other ports.

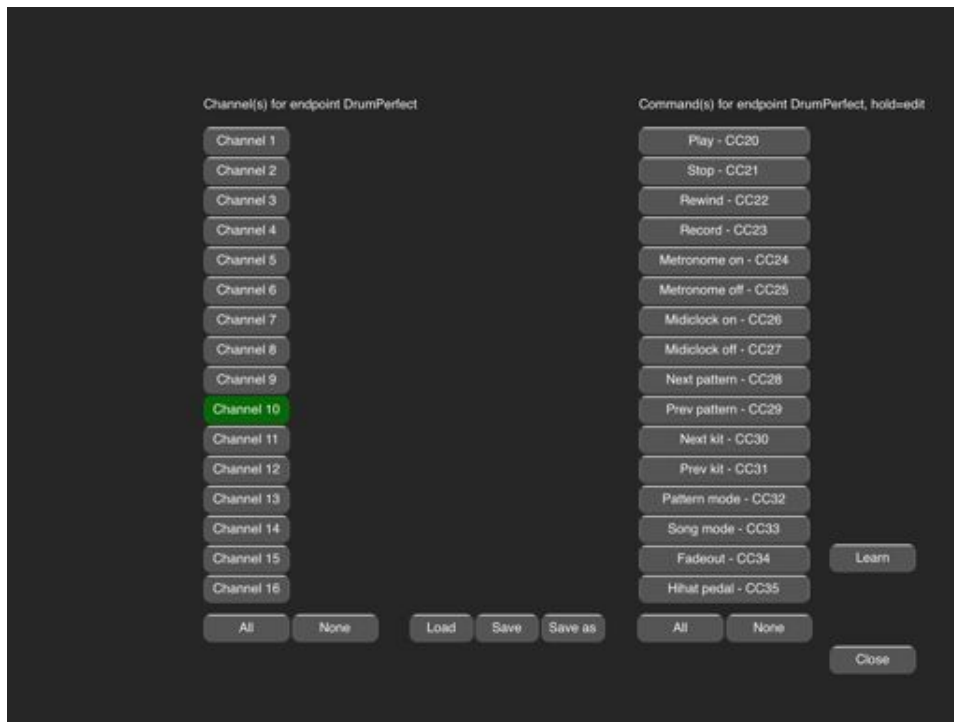


Figure 3: Midi map editor

- Midi destination, which represents the virtual midi endpoint for DrumPerfect. Tap to activate and it will turn green. Configure in the same way as the midi-in ports.

In virtual midi, there are two ways to create a midi connection between apps:

1. Connect the receiver app, in our case DrumPerfect, to the virtual midi source of the sender app. The sender app must be configured to send midi to its virtual midi source port. *Some iOS apps do advertise a virtual midi source, but do not actually send midi data to it.* The advantage of this type of connection is that there's only a single sender using it.
 2. Connect the sender app to the virtual destination endpoint of the receiver app, in our case DrumPerfect. The virtual destination endpoint must be enabled. The sender app must be configured to send midi to DrumPerfect. A possible disadvantage of this type of connection is that multiple sender apps may -even by default- send their midi data to DrumPerfect's virtual destination endpoint.
- Clock source, which let the user select the midi clock source of choice.

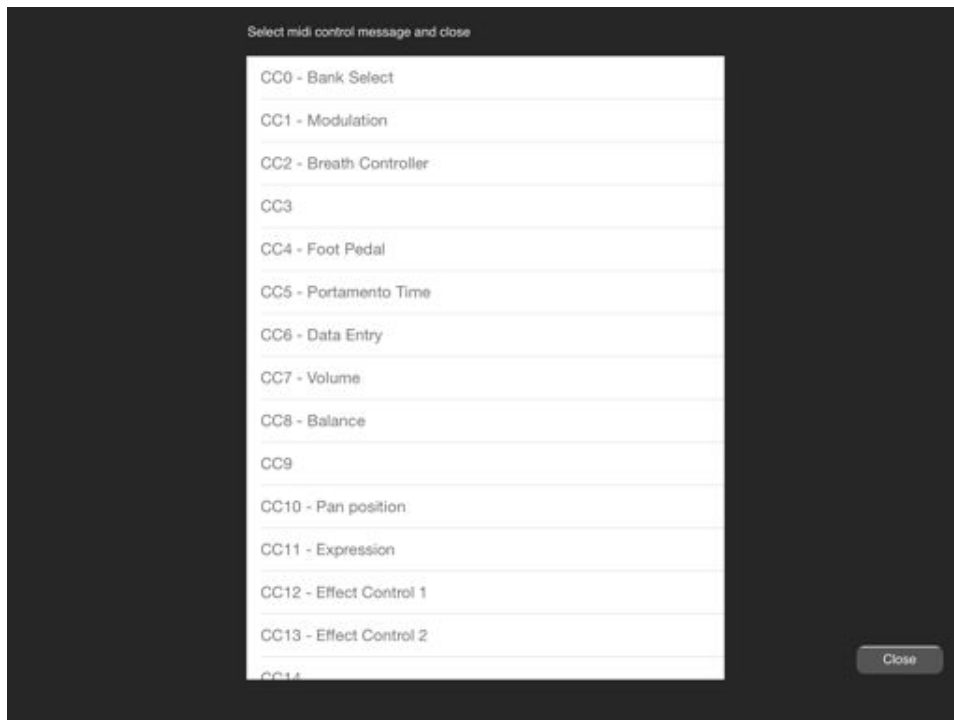


Figure 4: Midi controller message list

This control is scrollable and contains all coremidi and virtual midi-in ports that are of have been on-line, as well as the virtual destination endpoint. There can only be one clock source at the time.

3 Grid editor

To facilitate easy setup of the basic part of a pattern the **Grid** button will bring up a grid view with all 16 instruments. The Grid view supports choosing between four levels of velocity and probability. Tapping one of the instrument names will return to the Pattern editor with the instrument selected. Also in Grid view, strokes can be selected after tapping **Select**. Tapping one of the instrument names when **Select** is active will select all strokes of the instrument. **Erase** will remove the selected strokes from the beat grid. In the **Settings** view, the grid can be set in **Dense** mode, which effectively doubles the amount of strokes that are shown on a single page. In the dense grid, time shifts are *not* shown anymore. Instruments can be muted/solo-ed by the **Mute** and **Solo** buttons, respectively. Furthermore, the Grid view features a **Play** and **Stop** button.

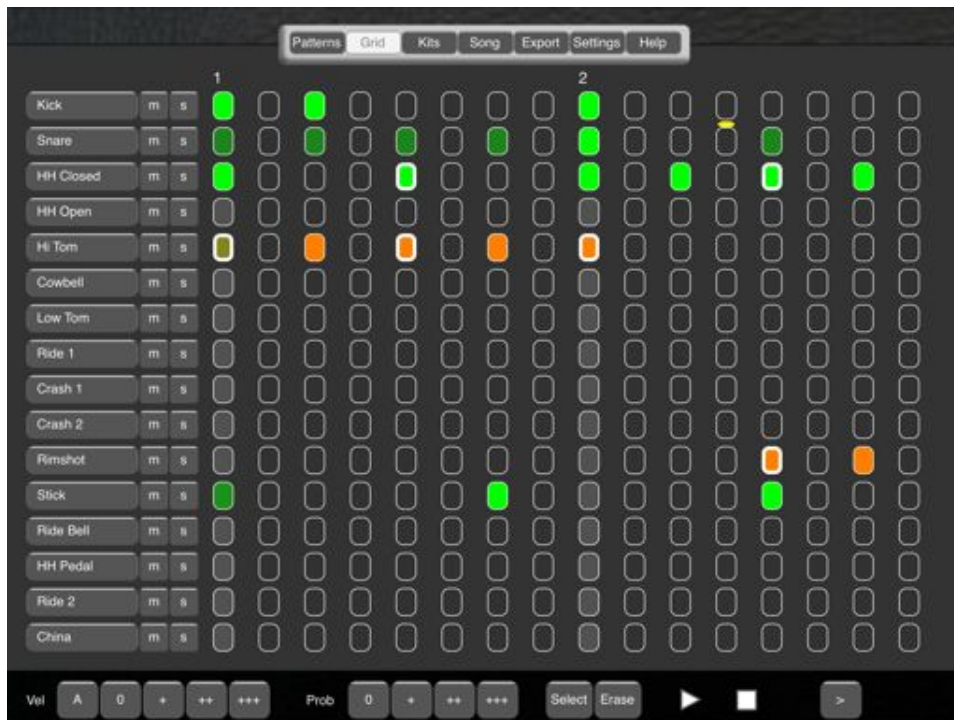


Figure 5: Grid view

4 Kit editor

Each instrument contains up to 16 user-loadable samples divided over 4 regions, i.e. high-velocity/left-handed, low-velocity/left-handed, high-velocity/right-handed and low-velocity/right-handed samples. When **Select** is off, active samples during play will turn green. Let's take a left-handed stroke as example. Assume that 4 high-velocity and 4 low-velocity samples have been loaded for this stroke. During play, the sequencer engine will randomly select one sample from both categories and mix them according to the stroke velocity. A sample can be selected by touching it in the Kit editor. The list of samples shows all wav-files that are in the /samples directory the iTunes file sharing directory. Optionally, the list will internal samples that are used in DrumPerfect's standard kits, which samples all come from the public domain. Samples are automatically auditioned on tapping. Also, samples can be imported via AudioPaste2 (AudioPaste button). For this option it is advised to install the free AudioCopy app by Repronoms, as this will drastically enhance the pasteboard capabilities. Samples can be 16-bit or 24-bit wav-files. To the right of the list of samples the selected sample slot is indicated. The < and > navigation buttons next to the slot name can be used to quickly fill a whole bank of samples: select a slot,



Figure 6: Kit editor

touch a sample, select the next slot etc.

4.1 Kit selector

The Kit selector is also part of the Kit editor. The amount of memory used is indicated on screen. DrumPerfect will issue a warning if the app uses too much memory. Drum kits can be cleared to free up memory (**Clear** button). After editing, the modified drum kit can either be saved (**Save** button) or renamed and saved (**Save as** button).

4.2 Instrument selector

Again, the Instrument selector allows to easily switch between instruments. The selected instrument shows its samples in each of the 4 categories. Instruments can be rearranged in the kit via the navigation buttons (< and >) next to the **Rename** button. Moreover, instruments can be copied and pasted to and from other kits. In this way, instruments can be easily reused in multiple kits.

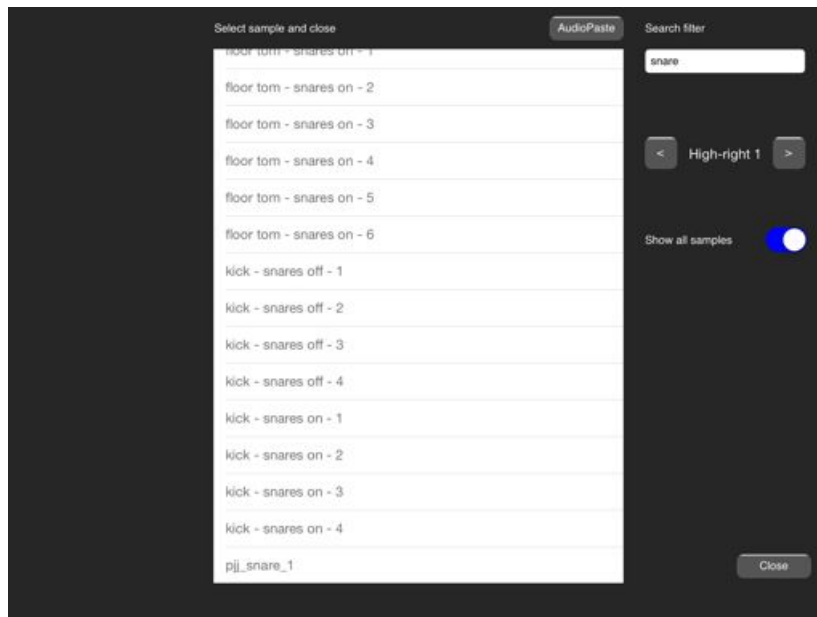


Figure 7: Sample list view

4.3 Kit, instrument and master volume

The Kit volume slider sets the kit's volume between 0 (silent) and 1 (loudest). Next to this global volume setting, each instrument has its own volume setting within the kit, again between 0 (silent) and 1 (loudest). Besides volume, each instrument has its own pan setting indicating the instrument's position in the stereo image (-1 means left, 1 means right). The master volume sets the overall app volume between 0 (silent) and 4 (loudest).

4.4 Convolution reverb

Each kit can be placed into a chosen room. An impulse response can be chosen from a list of different rooms (the *Room* button). The convolution of the drum kit sound with the room response will produce a high-quality reverberation effect (convolution reverb). Due to the fact that reverb processing is cpu-intensive, older iPad2 and iPad3 models will use shorter versions of the room response and in mono sound. iPad4 models will also process the reverb as a mono signal. More recent models apply the effect in stereo. Still, especially while using Audiobus and IAA, cpu usage can become too high, in which case DrumPerfect will issue a warning and will automatically turn off the reverb effect. In that case, the user can try to increase the allowed percentage of cpu usage (in the Settings view) or increase the audio buffer size (e.g. via buffer settings in Audiobus or host DAW). The mix of dry and wet signal can be controlled via

the *Reverb* slider.

4.5 Mute and Solo

When an instrument is muted by touching the **Mute** button, it will not play on the upcoming strokes. Strokes that are being played will still continue. When an instrument is solo-ed by touching the **Solo** button, all other instruments will be muted on the upcoming strokes. **Unmute all** will let all instruments play again.

4.6 Hi-hat pedal simulation

Many electronic drum kits feature a controller pedal for hi-hat emulation. The pedal will not trigger a hi-hat open sample, but set a controller value somewhere between 0 (closed) and 127 (open). DrumPerfect offers a similar option, where two instruments can be linked via the **Pedal** controller. In the Kit editor, assign one instrument to “Closed” and one instrument to “Open” via the scrollable Pedal control. From now on, the velocity of strokes with the “Open” instrument will be interpreted as the pedal level (0 is closed, 1 is open). The “Closed” instrument will account for the pedal level and take a pedal-dependent mix between the open and closed samples. Hi-hat instruments are of course an obvious choice for linking, but other use-cases could be interesting as well. As an example, the pedal controller could be used to simulate position-dependent strokes on a snare drum where two different instruments would contain snare samples from different sides of the drum head.

In existing patterns that were designed with a drum kit without pedal simulation you will typically notice the absence of an explicit pedal-close command, which *is* necessary in case of pedal simulation to close the pedal again.

4.7 Midi map

Each instrument in a kit can be mapped to a specific midi note according to the standard General Midi map. Multiple instruments can be mapped to the same midi note. Midi notes are used to map incoming midi notes to the right instrument and also to import and export standard midi files. Midi notes can be learned by first tapping the **Learn** button, which will turn red. Then, any incoming midi note within the GM map will be taken as note for the current instrument. By simply selecting a next instrument, the whole drum kit can be learned quickly. When ready, the learn button needs to be tapped again.

4.8 Filtering samples

Samples can be pre-filtered by a low-pass FIR filter with tuneable cut-off frequency. The cut-off frequency slider can be set between 0 (0 Hz) and 0.5 (half

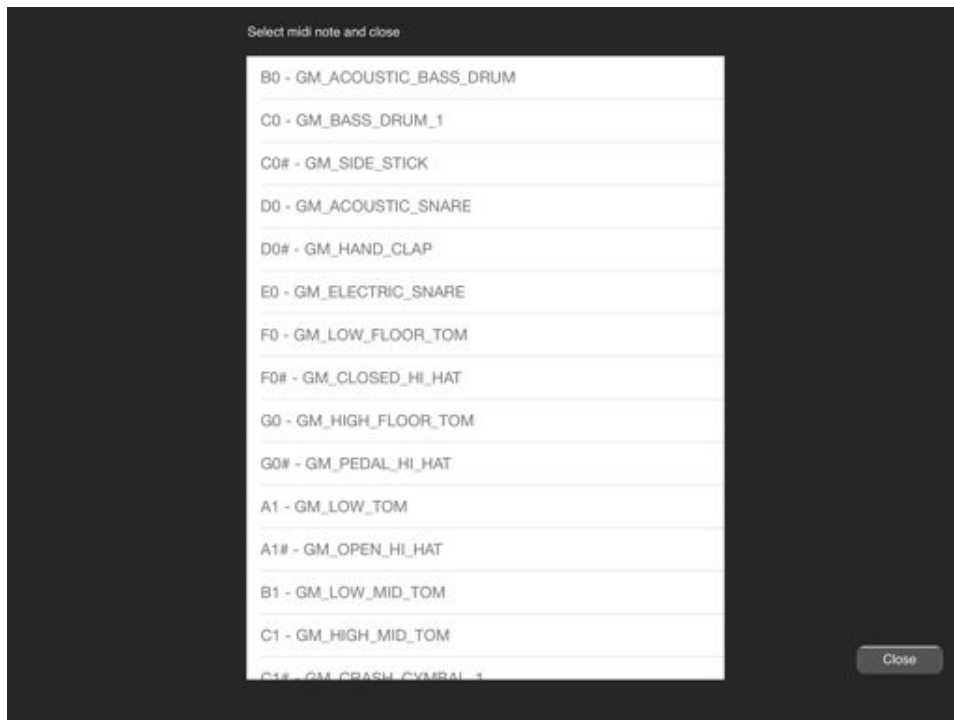


Figure 8: Midi note list

the sampling frequency). The filter can be used to mimic velocity-dependent strokes in case there are no separate samples available: soft strokes typically show less high-frequency content than loud ones. Pre-filtered samples are stored in the /cache directory and can be cleared via *Settings* (gear icon) in the Pattern editor. The filtering can be set per sample. Individual or multiple samples can be selected via the **Select** button. Select samples by touching them in the list. Selected samples will turn blue. Changes in the **Sample low-pass** slider will affect all selected samples. **Select low** will select all present low-velocity samples at once. **Erase** will erase the selected samples. **Erase all** will erase all samples in the selected instrument.

5 Song editor

Fig. 9 shows the **Song editor**. A song is a set of ordered patterns that together form the rhythmic track of a piece of music. Extended kit and pattern selectors facilitate fast composition of songs. The building block of a song is the *song pattern*, which is a reference to a combined pattern/kit event.



Figure 9: Song editor

5.1 Editing a song

To add a pattern to the song, first stop the audio engine (press **Stop**) and then select a position in the song by touching it. Next, select a kit and a pattern, both by touching them in the corresponding selector. By pressing either **<Insert** or **Insert>** a *song event* is inserted in the song, before or after the selected song position respectively. Existing song events can be erased, copied and pasted after having been selected by the **Select** button. Selected song events will turn blue. **<Paste** will paste copied song patterns before the current song pattern, **Paste>** will paste after the current one. Pasted song patterns will always be contiguous, even though the selected song events may have been scattered over the song.

5.2 Song pointer

Touching the song bar with song events during play will reset the song pointer to the touched position. **Rewind** will reset the song pointer to the start of the song. When **Midiclock** is active, DrumPerfect will listen to midi song pointer messages from midi hosts. Whenever a midi pointer message is received, the song pointer will be set accordingly. As an example, apps such as Auria and Cubasis can combine midi clock messages with song pointer messages, which facilitates the use of DrumPerfect as a midi slave. When DrumPerfect's *All Instruments* output is used as a node in an IAA host, and AudioBus is *not* active

the IAA transport panel will appear that allows to start/stop/record the host synchronously with DrumPerfect at the song pointer position of the host. Also, DrumPerfect will automatically adopt the tempo of the host. The **Loop** button will put the song in loop mode. The **Overwrite** option allows to overwrite the selected kit in a song pattern, which can be convenient in a scenario where the kit selection is to be controlled via an external controller via midi.

Tip for Cubasis users: as Cubasis (tested with 1.7.1) will immediately send a midi start message on Record and start sending midi clock after the count-in, insert an empty pattern in the DrumPerfect song with the length of the count-in.

5.3 Song import and recording

Tapping the **Load** button will bring up a list of available songs. The **Show midi files** switch includes the installed standard midi files in the list. Midi files can be installed in two ways: via iTunes file sharing and via Open-in from other apps. All midi channel 10 notes will be imported, the kit instrument midi map being applied. If the midi file contains notes that are currently not mapped in the drum kit, a message will show the unmapped notes. Remap the instruments in the drum kit if desired and reload the midi file. The midi file will be read as DrumPerfect patterns, which together constitute the song. Sometimes, a number of the imported patterns are identical. Use the **Pack** button to remove redundant patterns from the imported song. After the midi file has been imported, song and patterns need to be explicitly saved. Of course, the imported patterns can then be further edited to benefit from DrumPerfect's humanizing features!

The **New** button creates a new, empty song for the purpose of live recording via midi. Next, press the *record* button and configure one or more of the available midi-in ports to receive midi notes. Use Midiclock or IAA sync to sync to the source app or use the metronome to keep time. Start recording by tapping **Play**.

5.4 Song tempo

The **Song tempo** slider sets the tempo of the song between 0.5 and 2 times the original tempo. BPM differences between the different patterns in song events will be maintained. **Reset** will reset the song tempo to the original tempo of 1.

6 Cpu Load Control

The real-time audio engine of DrumPerfect has been completely programmed in C for maximum performance. Still, dealing with all audio in real-time on the

current iPad hardware is a real challenge. To reduce its cpu resource claim, DrumPerfect implements CPU Load Control (CLC), which exploits the fact that humans cannot perceive weak sounds in the presence of louder ones and the fact that percussive sounds are mostly transient impulses that decay. It works as follows: the user sets a desired cpu load level (See **Settings** in the Pattern editor) and CLC automatically reduces the number of voices by smartly removing the weaker sounds. In many cases, humans will not be able to tell the difference between the CLC-on and CLC-off case. CLC will enable more apps to be used in parallel with DrumPerfect.

7 iTunes file sharing

The app uses a number of directories to store its data:

- */cache* - stores low-pass filtered sample files.
- */kits* - stores kit preset files in XML-format.
- */pasted* - stores pasted sample files.
- */patterns* - stores pattern preset files in XML-format.
- */rendered* - stores rendered files from export function.
- */samples* - stores user sample files.
- */songs* - stores song preset files in XML-format.
- */state* - stores app state data for internal use.
- */themes* - stores app theme data for internal use.
- */undo* - stores undo data for internal use.
- */irs* - stores impulse response data for reverb effect.

In the list views for loading patterns, songs, kits and samples, files can be removed by the usual *swipe-left* gesture, followed by *delete*.

Kit, pattern, song and sample files that are copied to the iTunes file sharing directory root, will be automatically installed in the proper directories on first restart of the app. The above directories can be saved to your local computer via iTunes file sharing. It is highly recommended to make regular backups of these directories to avoid data loss in case of calamities.

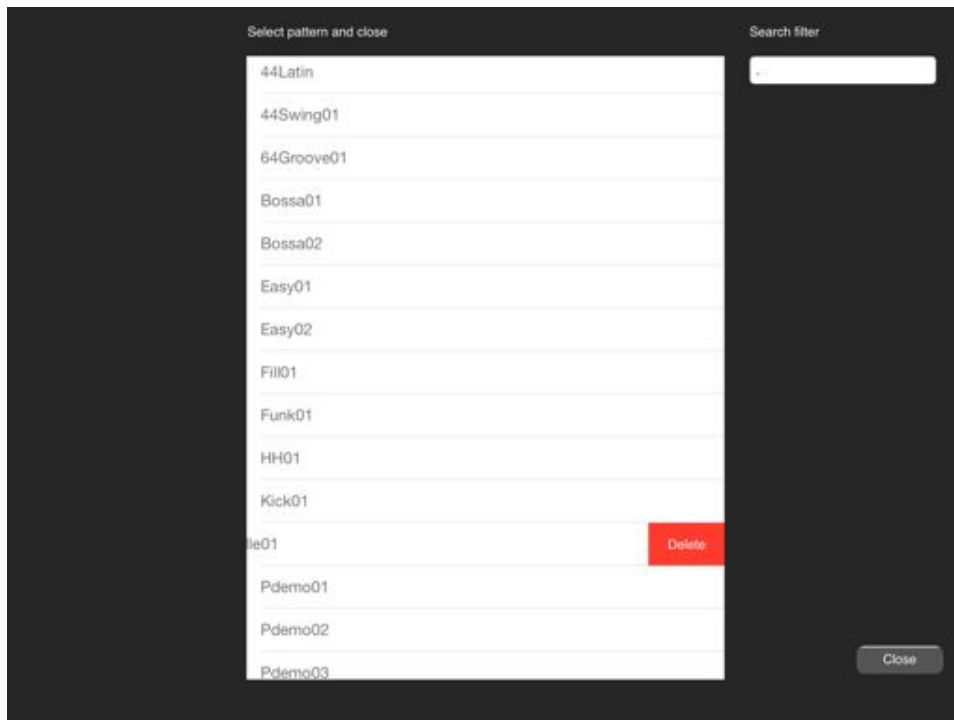


Figure 10: Left-swipe and delete

8 Troubleshooting

In case the app crashes or locks, shutdown the app by double clicking the home button and swiping it away. Then, restart the app. If the problem still remains, chances are that the same problem has been discussed already at the forum at drumperfect.nl. If not, please prepare an accurate description of the problem and the sequence of actions that leads to it and send it by email to Marinus@drumperfect.nl.

In case the app keeps refusing to start, please try to remove and reinstall the app. *Before doing this, make sure to backup the app's directories via iTunes file sharing.* In order to make a backup, first select your iDevice in iTunes, then select the **Apps** tab, and select **DrumPerfect** in the File sharing apps list. Then the *DrumPerfect Documents* directory list will show, from which directories can be selected and copied to the local computer via **Save as**. Especially, the *kits*, *patterns*, *songs* and *samples* directories are of interest, as they contain your sound and music files.