

DrumPerfect Pro - v3.6

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1 Introduction

Welcome to this manual. It will give an overview of the functionality of DrumPerfect Pro (DPP). Moreover, we will discuss some common workflows.

1.1 Concepts

First of all, let's define some basic notions. A **pattern** is defined as a number of measures of a drum score. A **kit** is a collection of 16 multi-sampled instruments. A **song pattern** is a reference to a pattern/kit combination. A **song** is an ordered set of song patterns. A **drum stroke** is a programmed position in the beat grid of a pattern. The beat grid has a number of beats, each of which has a number of sub-beats.

A maximum of 64 patterns can be selected to be available in the **pattern bank**. The pattern bank is visible for pattern selection in a number of views, such as in the initial **Pattern view**. There's no limit to the amount of patterns you can store inside DPP, other than imposed by the finite amount of hardware memory. Patterns in the pattern bank can be saved individually in **Pattern view**. The pattern bank can be saved as a song with pattern references in **Song view**. Reloading such song will reload the pattern bank.

In total there are 9 different views:

- **Pattern** view for programming drum patterns with full control over each individual drum stroke's velocity, timing and probability. Each pattern can have different BPM, time signature and beat subdivision settings.
- **Grid** view which shows all instrument parts in a single screen and allows for editing of velocity and probability per stroke or per instrument.
- **Kit** view offers room for up to 16 different drum kits with 16 instruments each. Every instrument consists of up to 16 different user-selectable audio samples. DPP comes with a number of multi sampled kits already, each of which built up of high quality samples from the public domain, however, users can easily create their own custom kits as well. With the built-in high-quality convolution reverb with send-levels per instrument the drum kits can be convincingly simulated in a large set of different rooms. The dynamics of individual instruments can be controlled in real-time via a dynamic range compressor. Samples can be non-destructively edited via high-quality time-stretching and pitch shifting, via (ADSR) envelopes, and via an 21-band graphic equalizer.
- **Song** view in which a song is built of pattern/kit events. Songs or arbitrary selections within a song can be played in a loop. Patterns within a song

can be grouped to form parts, which facilitates structuring of the song in verses, choruses etc. Also, *random* parts can be created, the song patterns in which are randomly selected during play.

- **Pad** view for live-playing and recording of patterns and songs. The view features 32 velocity-sensitive pads.
- **Mixer** view with many of the kit-related controls in one overview. With real-time peak and average level meters.
- **Export** view which offers an extensive range of options for export of the created patterns and songs. Export as stereo audio, or as mono/stereo stems per instrument. Export in m4a or wav format. Export as midi file. Export to AudioShare or DPP itself. Or to the generic iOS Document Picker or to any other app that supports the audio and midi file format via Open-in.
- **Settings** view for configuration DPP's options. Amongst others, this view hosts extensive midi-in configuration options per port. Several of DPP's functions can be controlled via external midi CC. DPP supports both coremidi and virtual midi input ports.
- **Store** view offers high-quality musical content in different styles and contains patterns, songs and drumkits.

DPP strives to facilitate the creation of realistically sounding drum tracks. It extensively uses the concept of probability to generate variations in how the drums are played. Variations in velocity as well as variations in timing. The latter can have huge influence on how a particular rhythm is perceived (micro-timing). E.g. shifting the snare strokes a few milliseconds to the right on the time line can give the rhythm at hand a laidback feel. Every drum stroke in the pattern score has two velocity values. The probability of the drum stroke influences with which velocity the drum stroke will be played. Probability here is like flipping an uneven coin. Probability of 1 means that velocity VelA, probability of 0 means that VelB is played. Probability of 0.8 means that on average 8 out of 10 times VelA is played etc.

This version of DPP features the same humanization option as before, but in a highly configurable form. The amount of random variation in both velocity and timing can be set by the user.

Drum strokes can be linked in **linked sets**. In default mode, all drum strokes in the set are played with the same category of velocity, either VelA or VelB. The probability of the first drum stroke in the linked set determines the chance of

one of two velocities. Moreover, a linked set has periodicity settings which determine how often and when exactly the set is to be played. Drum strokes can be assigned to multiple linked sets at the time, however, only one of those sets can be played at the time. In case of such overlapping linked sets, a random draw is done out of the linked sets at hand.

New in DPP is the concept of **layers**. Besides the **Notes1** layer for ordinary drum strokes, there's now a second layer named **Notes2**, which is very convenient e.g. for programming snare flames. There are two layers to control the sustain of the instrument samples in the kit, named **Sustain1** and **Sustain2**. The sustain controller in the kit must be turned on first in the instrument effects section. The same holds for the **Pitch1** and **Pitch2** layers that control the pitch shift in cents for the active instrument. The pitch controller is in the kit again and needs to be turned on in the instruments effect section. Finally, there's a **Tempo** layer that allows for in-pattern tempo variations, while leaving the total duration of the patterns unaltered.

There's a number of other features in DPP that contribute to the realism of the drum track. The **Smart Swing** feature as an example introduces a swing feel in the pattern, in 8th or 16th notes depending on the pattern at hand, while leaving triplets and such unaffected. The **Laidback** option in Pattern view delays the timing of the chosen instruments a bit such that the pattern gets a laidback feeling. The **Buzz** option in Kit view allows to automatically introduce snare rattle by the tap of a button.

In former versions of DPP an instrument was built from 16 samples divided over 2 velocity levels, High and Low, and 2 groups, Left- and Right-handed drum strokes. In this version, the 16 samples can be arbitrarily assigned to one out of 8 **velocity levels** (L1 - L8) and to one out of 10 **sample groups** (Left, Right, 1st, 2nd, 3rd, 4th, Var1, Var2, Var3, Var4). The cross-fade level between adjacent velocity levels can be set per sample group. The sample groups can be used to host multiple variations of the same instrument in a single instrument. Drum strokes in the pattern score can be tied to any of the sample groups by swiping up on the drum stroke. A drum stroke that is tied up to a non-existing sample group will default to the Left sample group. The new version is backward compatible with previously built kits from earlier versions. DPP's probabilistic instrument sample selector will on-the-fly alternate between multiple samples (interpolation mode, **Intp**) for one and the same instrument, which greatly adds to the realism of the sound. As an alternative, the sample group can be used in **Mix** mode, where a set of three samples is randomly selected for the velocity level at hand. Multiple sample groups in an instrument can be assigned to the **Random** group; a drum stroke within any of these sam-

ple groups will be played with a randomly selected sample group. There is one such Random group per instrument.

DPP has some special support for hi-hat emulation. First of all, drum strokes in the pattern score can be muted by programming **choke strokes** in the score (swipe down on a drum stroke). Secondly, one **choke group** per instrument is available. Please note: the instrument to be choked is set in the instrument that chokes, not the other way around! Finally, the open hi-hat instrument can be set in Kit view to become a controller instrument that controls how far the hi-hat is open. Velocity is 0 means closed, velocity is 1 means fully open. The intended closed hi-hat instrument needs to be explicitly set as the closed hi-hat instrument in Kit view. The control signal can also be associated with a midi CC that can be read from an external midi port.

The concept of JAM! has been greatly extended in this version. JAM! already allowed to scale the probability in a pattern in a non-destructive way. Now, besides scaling the probability of the programmed drum strokes, the JAM! range is divided in 3 levels of **JAM! Dynamics**. Per level the user can define a set of rules that remap instruments, mute instruments etc. The JAM! level could be automated in the song or could be changed live over midi.

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In this version, both song tempo and JAM! intensity can be automated in the song.

DPP can run in stand-alone mode using its own clock. Also, an AUV3-compatible player app is included to be used in any AUV3-supporting host app. Extensive options for audio-transfer with other apps are available:

- Live-audio source for other apps via Audiobus and Inter-App-Audio (IAA). DPP supports live-streaming of individual outputs per instrument. Audiobus State Saving and Audiobus Remote supported.

- Audio rendering/upload to AudioShare, Document Picker (iCloud, Dropbox etc.) and Open-in.
- Import of audio samples from Document Picker, AudioShare, and iTunes file sharing.
- Import of audio, midi and backup files (also as zip archive) from other apps via Open-in and Document Picker.
- Solid clock sync via either Ableton Link with Start/Stop, Inter-App Audio as generator and instrument with song pointer and host transport control or Midi-clock input with transport control.
- Midi-in and Midi-out via virtual midi and coremidi (hardware) ports. DPP can be used as a sound module for midi-enabled electronic drum kits. Many of DPP's functions can be controlled via incoming Midi CC.
- Midi file import and export.

The included AUV3-compatible player app can be used as a plugin in host apps such as AUM (kymatica.com/apps/aum). Multiple instances can be used at the same time.The player app syncs to host clock and transport or can be manually started, but always plays beat-aligned. Songs created in DPP are automatically synchronized with the player as a list of AUV3 presets. So, while using DPP (the app) for composing and editing, the resulting song will -once saved- be immediately available in the AUV3 player(s)!

Many of the controls in DPP have a longpress action associated with them: if you keep such control touched for a few seconds a different action is triggered. As an example, most Save buttons now have a longpress functionality that can save to other file locations such as iCloud, DropBox, Files etc.

DPP's internal file system is exposed to iOS' Files app. Besides the flexibility this offers, it imposes the risk of accidentally removing important files from DPP's file area.

Needless to say that the combination of DPP's extended list of features can put a high demand on cpu resources. Luckily, DPP manages to control cpu load by exploiting the effect of masking in psychoacoustics where sounds can become imperceptible due to the presence of another sound. In practice, the number of voices (instances of samples played in the pattern) and with that the computational burden can be reduced when voices get drown in other, louder voices without noticeable effect to the user. Also, the reverb processor offers different options in Settings View to help reduce cpu-load.

We recommend to regularly make backups of patterns, kits and songs. There's a **Backup** function in Settings view that backups all patterns, kits and songs to a backup file. An easy way to restore such file is to longpress Load in Pattern, Kit or Song view and select the backup file.

1.2 Common workflows

- Song building: go to Song view, Clear all, name song by Save As, go to Pattern/Grid view and start programming patterns. Once ready, go back to Song view and insert the patterns in the song.
- Pattern building: go to Pattern view. If a song is currently loaded, make sure to select an empty pattern slot, or otherwise the song will be modified. Or clear up the existing song in Song view via Clear all. First program the basic rhythm of drum strokes that are played every run. Then lower the probability slider and put extra drum strokes on desired locations for variation of the nominal pattern. Turn on the Two-hand option and the Humanize option to make the pattern sound more human. Adding a bit of Swing, even a few percent only, can help to give the pattern a lively feel.
- Kit building: go to Kit view, clear kit, name kit and start filling sample slots per instrument. Sample group and velocity level can be set for each sample. Extensive non-destructive sample editing available (time-stretching, pitch-shifting, equalizing, ADSR envelope with sustain and pitch controller), dynamic range compression per instrument, convolution reverb per kit. Sample files (wav and m4a format) can be dragged and dropped on the sample slots from other apps such as Files app. Multiple files can be imported that way in one go. Wav-files will be automatically converted into m4a-format.
- Create pattern variations: go to Pattern view, Load. The pattern list view offers a few powerful features to create new variations of existing pattern by Merge and Append. One strategy is to first program basic patterns per instrument and combine them later by Merge. Another strategy is to first program smaller part of patterns and chain them later by Append. Another way to quickly produce new patterns is the use of patterns as Groove Templates. Longpress Merge to enter the Groove Template tool. The pattern in the currently selected slot will inherit velocity and timing profile from the selected Groove Template. Any pattern can serve as a Groove Template, but it is quite simple to make a dedicated category and reuse them whenever the template's style is needed.

- Use DPP as a midi sound module: go to Kit view. Check if the instruments/sample groups have been mapped to the proper midi notes. Go to Settings view. Select the proper midi-in port. Longpress to configure channels and commands. Midi learn is available for the commands. Also, DPP's AUv3 player can be used as a midi sound module.
- Use DPP's sequencer to drive the sounds of other apps via midi-out notes. Go to Settings view. Select the proper midi-out port and midi channel. Also, DPP's AUv3 player supports midi-out.
- Export drum tracks to DAW: go to Export view, select Song with tail, separate instrument tracks, possible in mono, m4a as format. Most DAWs will automatically unzip the separate track archive into track files.
- Export midi files: go to Export view, choose midi as format.
- Import midi files: Open-in DPP. Go to Song view. Load, select Midi files.
- Record midi from a source app with Midi clock into Song view. Create a new song via New. Tap Record. Tap the Midiclock button. Switch to the source app and start play.

In the rest of this document, DPP's 9 views will be our guide in this manual. These 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 via the DPP logo. There's also a QuickStart available under this logo.

2 Pattern view

Fig. 1 shows the Pattern view which is the startup view. Patterns are the building blocks of a song. They can best be interpreted as a single bar consisting of a number of beats, each of which can be subdivided into subbeats. 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 or brushing over the pattern at the desired location. The respective (sub)beat(s) will turn green. Tapping once more will remove the stroke. Swiping up from the inside of an existing drum stroke will bring up the sample group menu where the drum stroke can be associated with one of the 10 possible sample groups in the instrument. Right-handed drum strokes are indicated with a white border, and the other sample groups are indicated with a round label. Swiping down will turn the stroke into a red-colored choke stroke which mutes the instrument. For choking strokes, velocity is used to indicate the force of choking between soft (velocity zero)



Figure 1: Pattern view

and firm (velocity one) choking. Below, the various controls in the view will be explained.

2.1 Kit selector

Select one of the kits by scrolling 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. However, be warned that multi-sampled kits can take up a lot of memory, in which case having a few kits loaded at the same time could rapidly fill up the iPad's memory. *If memory usage becomes too high, iOS will silently abort the app.* DPP will issue a warning if the user wants to load a new kit while memory usage is high already. At first startup, 5 slots will be populated with samples, which will be loaded on first use. More kits are available via the **Load** option in Kit view.

2.2 Instrument selector

Select one of the instruments by scrolling 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 Laidback 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. The amount of time delay used in the laid-back function can be set in the Settings view

In Settings view the laidback level can be configured 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. 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 DPP as a standalone app during Live pad play. Also, for minimum latency choose the lowest possible buffer size in Settings view.

In Settings view the Live Pad can be configured in **Dual Pad** mode, which will let you play two selected sample groups at a time.

2.4 Tempo

For each pattern a BPM-value can be set between 20 and 340. 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 after keeping the Tap Pad pressed for more than three seconds. The tempo of a pattern or a song can be synced to a master or host app in three ways:

- Ableton Link. Enable Ableton Link in the Settings view. DPP will now automatically connect to other active Link-enabled apps, either locally or via the network. Link will ensure that the connected apps play in sync, that is with the same tempo and beat-aligned. DPP will handle the beat-alignment as follows. On **Play**, DPP will wait for the first beat out of *num* beats where *num* represents the number of beats in the current pattern. Once DPP is playing, beat alignment will be on a single beat basis as the history of patterns since start is not tracked. If you want to re-align with the number of beats, e.g. after a series of pattern or tempo changes, *Stop* and *Play* again.

- Midiclock sync. For midiclock, select "DrumPerfect Pro" 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 **Midi-**

clock button. If incoming midi clock pulses are detected while in Midiclock mode, the Midiclock button will turn fully orange.

- IAA sync. Make sure Ableton Link is switched off in Settings view. Select DrumPerfect Pro as an IAA-node in the host app. Make sure that at least the *All instruments* port is connected. Then, in DPP the IAA transport bar will show that will allow to run DPP in sync with the host, adopting both song position and tempo from the host.

While either the IAA or MIDI external sync mode 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 Song view) from within DPP. In Link mode, the tempo *can* be changed and will be adopted by connected apps.

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. **Longpress** of the **Time sig** label will turn the time signature field in global mode (red label) where the time signature can be set for *all* patterns at once.

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. **Longpress** of the **Subdiv** label will turn the **Subdiv** field in global mode (red label) where the sub division can be set for *all* patterns at once.

2.7 Beat grid

The beat grid is shown as a series of bars, each of which represents a subbeat 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 Pattern view.

2.8 Layers

On starting up, by default the Notes1 layer is selected. Tapping the **active layer** label right of the pattern score will bring the layer menu up where the active layer can be selected. Notes1 and Notes2 are for regular drum strokes. Sustain1, Sustain2, Pitch1 and Pitch2 are controller layers for the kit's sustain and pitch controllers per instrument and per sample group. The Tempo layer is for in-pattern tempo changes. Tapping the **active layer** label again will close the layer menu.

2.9 Pattern editing

Pattern view features an extensive drum stroke editing feature. The **Instr** and **Layer** buttons determine the mode of operation during editing. **Instr** on means that only drum strokes of the active instrument can be selected. **Layer** on means that only drum strokes in the active layer can be selected. Drum strokes can be selected in different ways:

- Tap the **Select** button and subsequently tap the drum strokes to select or swipe over the strokes to be selected. The selected drum strokes will turn blue. Changes in velocity/probability/time shift will apply to all the selected strokes. Selected strokes can be copied and pasted elsewhere.
- Start swiping left to right in the bottom bar just under the pattern score. If you start at a position where no stroke is present, all strokes will be selected. Otherwise, the drum strokes that are swiped over will be selected and automatically copied (=prepared for pasting). By double tapping the bottom bar at a desired location, the selection of drum strokes is copied to that location.

The bottom bar has yet another function: single tap will start/stop playback starting from the tapped location. If Select is on, the selection will playback as a loop. The looped selection will adapt on-the-fly if other drum strokes are selected.

If drum 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. Next to the stroke editing buttons are the **Undo** and **Redo** buttons which allow to undo and redo the recent editing actions. If **Instr** is off, drum strokes can be selected in multiple instruments at a time. This can be confusing in Pattern view, as there is no overview of all selected strokes. If in doubt, the user can switch to Grid view where all selected drum strokes in the active layer are visible. For instance, swiping the

bottom bar will select drum strokes in all instruments and editing will apply to all of them. If **Layer** is off, drum strokes can be selected in multiple layers at a time (cross layer). These *cross* modes are powerful features, but use them with care. Luckily, there's the Undo option in case anything went wrong. if **Select** is on and **Instr** is off, by default drum strokes in *all* instruments are selected. By double tapping an instrument button a selection of instruments can be made that will take part in editing. Selected instruments show a small LED light.

2.10 CPU Control

DPP features active CPU Load Control (CLC) to limit its claim of computational resources. DPP will automatically manage CPU Load by sacrificing voices that are likely to be not audible in the presence of other voices. If that is not enough, the convolution reverb can be tamed by turning to a short impulse response in Settings view.

2.11 Velocity

Each instrument can use a set of up to 16 samples. Typically, an instrument contains separate samples for multiple velocity levels, as softly played drums sound quite different from firmly played drums. The samples of adjacent velocity levels are linearly interpolated depending on the stroke velocity. The amount of cross-fading between samples can be set per sample group. How to select and tune the samples will be explained in the section about the Kit view. For choking strokes velocity has the meaning of choking force resulting in a longer sample decay time for soft choking (velocity zero) as compared to firm choking (velocity one).

2.12 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 during play 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 16 available slots. The linked strokes will turn orange to indicate the link. Up to 16 different linked sets can be created, named Link1 to Link16. Strokes can be selected and linked across multiple instruments. Linked sets can be built incrementally by subsequently selecting strokes and tapping the Link button: if the strokes was already in the linked set it is removed, otherwise it is added. 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 instance of the pattern, unless there has been a change of pattern. Pattern view will only show a linked set when it has been selected. Longpressing the **Link** button 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. Drum strokes can be member of multiple linked sets. Only one of those sets will be played if they are to be played at the same time, in which case a random selection is made.

Each linked set can be assigned a period in bars and the position in the period where the linked set needs to be played or needs not 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. There is a reset option in Settings view that will make the bar counter reset every time the pattern has changed to a different one. Also, a linked set can be set in *Triggered* mode where its occurrence is triggered by an external midi command.

If it is not requested that all drum strokes in a linked set are being played with the same velocity type (A or B), the user can longpress the *Link type* button. The button will turn yellow to indicate that the drum strokes in the linked set are all treated as individual strokes, but still with the periodicity settings of the linked set.

In this version, if a linked set has a tail to be played in the next pattern, the tail will play even after the active pattern has switched to another one.
Longpress of the **A<->B** button will bring up a number of options at the location of what previously was the velocity slider. **A=B** assigns velocity B values of the existing drum strokes in the current instrument to velocity A of those strokes. **A=0** sets the velocity A values to zero. **A=1** sets the velocity A values to 1. **A=rand** sets the velocity A values to randomly chosen values. Similar function buttons are available for velocity B. Tapping **A<->B** again brings back the velocity slider.

2.13 Time shift

The timing slider allows each stroke to be shifted in time with +/- half of the subbeat 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.

2.14 Humanize

A human drummer will inherently suffer from small variations in timing and velocity during play. DPP mimics this by imposing small random variations on timing and velocity via the **Humanize** button, which turns coloured on activation. Longpress this button for customizing the settings. By default, all instruments receive the same amount of random time shift at a particular time. This is to prevent phasing artefacts between similarly sounding instruments. If you want the timing variations between instruments to be independent from each other, longpress the timing **Enable** button. A small green LED indicator lights up to indicate that the timing variation is now on a per-instrument basis. The Humanize configuration settings are saved in the pattern.

2.15 Two-handed

A human drummer only has two hands and two feet. DPP 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 this version, DPP assumes separate strokes to be at least 100 ms apart. Strokes that are closer together will be treated in the analysis 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.

2.16 JAM!

The **JAM!** button turns the probability slider per drum stroke into a global probability slider for *all* probabilistic strokes, i.e. strokes with a probability <1. In the left position, all probabilistic strokes will be played with velocity B, whereas in the right position, all probabilistic strokes will be played with velocity A. A possible scenario would be to control the JAM! slider via a midi-controlled footswitch to intensify the probabilistic variations during a live performance. When JAM! is active, the probabilistic strokes themselves will not be shown; only the drum strokes with probability equal to 1 (velocity A) will be shown.

2.16.1 JAM! Dynamics

Longpress **JAM!** to enter the JAM! Dynamics view. In this view rules can be programmed to create up to three different dynamic levels of expression of the respective pattern: *soft*, *normal* and *loud*. The rule types are:

- Remaps to: map the selected instrument to another instrument,
- Is muted: the selected instrumented is muted,
- HH closed: if colored green, a closed hi-hat is emulated in the pattern. If colored red, hi-hat emulation is not active in the kit,
- HH half-open: if colored green, a half-open hi-hat is emulated in the pattern. If colored red, hi-hat emulation is not active in the kit,
- HH open: if colored green, an open hi-hat is emulated in the pattern. If colored red, hi-hat emulation is not active in the kit,
- Is excluded: the selected layer is excluded from playing.

The **Gain** knob scales the velocity of the respective instrument. Rules can be configured to be active only for certain sample groups. The *sample group* matrix maps each sample group on the vertical axis to another one on the horizontal axis. Empty means that the sample group does not take part in the rule. Therefore, each row in the matrix has no or one element. Each column can have more than one element checked at the cost of other columns (multiple sample groups mapped to the same sample group).

JAM! Dynamics settings can be copied and pasted between different levels and different patterns via the **Copy** and **Paste** buttons. For that purpose, the pattern selector is also part of this view. The **Clear** button clears the dynamics settings of the active level. The level will change during play with the value of the JAM! slider in Pattern view. The levels are arranged as:

- Soft: JAM! between 0 and 0.33,



Figure 2: JAM! Dynamics view

- Normal: JAM! between 0.66 and 0.67,
- Soft: JAM! between 0.67 and 1,

2.16.2 AutoJAM!

AutoJAM! is a live JAM! mode where intro, outro, and fills can be automatically inserted and where instruments for timekeeper, beat and backbeat strokes can be easily switched. The interval for fill insertion can be set, as well as the length of the intro. The tempo of the outro can be either straight or slowed down. AutoJAM! can be used in both pattern and song mode. If the song already contains a fixed intro this can be indicated in the AutoJAM! panel, in which case no intro will be inserted. AutoJAM! is also supported in the AUv3 player. The AutoJAM! commands can be externally triggered via midi.

2.17 Smart Swing

The **Swing** function automatically determines which strokes will be played in a slightly delayed fashion to create swing in the rhythm. Swing can vary between 50% (no swing) up to 75% (music school swing). Depending on the style and tempo of the rhythm different swing percentages give a different feel. Even a very subtle swing percentage can already have a huge impact on how the rhythm is perceived. When the rhythm is programmed in 1/8 notes , swing will be applied to those. When the rhythm is programmed in 1/16 notes, swing will be applied to those. The swing function is *smart* in the following sense:

- In a 4/4 bar with a subdivision of 4 where only 1/8 notes are used, swing will be on the 1/8 notes.
- Deviating subdivisions in a beat such as triplets are excluded from swing.

2.18 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 Song view 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). Also, patterns can be appended via **Append**. 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. The merge function is also part of the pattern library that is accessed via **Load**. Here, it is amazingly easy to create new patterns from existing ones: tap **Merge**, then select the patterns that you want to merge, then tap **Close** to finalize. The edit functionality in the pattern library is available through drag and drop: just make your selection of patterns and drop them on one of the chosen editing buttons. The functionality is available via tapping the buttons as well with the difference that a question for confirmation will show up to safeguard against accidental tapping. The merged pattern will inherit the name of the first pattern selected with *_M* added as a suffix. Longpress **Merge** inside Pattern view will open the Groove Template view. In this view you can select any pattern to serve as a template for the currently active pattern. The active pattern will inherit the velocity and time shift values of the selected template pattern. In absolute mode the velocity and time shift values of the template are used, in relative mode a linear combination of the pattern's own values and the template's values will be used. The gain buttons per instrument amplify/reduce the values. The template's control layers for pitch, sustain and tempo can also be adopted by the active pattern via the **Control layers** switch. Finally, the **Lock knobs** switch let the user set all gains in sync. Only the gain knobs for the active instruments in the template are enabled.

2.19 Export to other apps

DPP supports both Inter-App-Audio and Audiobus 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 Pro shows up both as a Midi instrument and as an audio generator 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, DPP 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 DPP song into a DAW. First assign the individual outputs to the DAW's input tracks. Also, assign the combined *All instruments* 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 DPP song can be live-recorded into the DAW with separate instrument tracks and in perfect sync with the DAW.

3 Grid view



Figure 3: Grid view

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 setting the velocity and probability levels via a single slider, where the mode is selected by a

button. Tapping one of the instrument names will make the instrument the active one for selection. Longpressing of an instrument name will take you to Kit view. Also in Grid view, strokes can be selected after tapping **Select**. Tapping the name label of the active instrument when **Select** is inactive will audition the corresponding instrument. Left and right part of the instrument label will audition a left-handed and right-handed stroke respectively. Double-tapping one of the instrument labels when **Select** is active will select all strokes of that 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. Tapping a beat number above the grid will allow to set the beat's subdivision. The **Save** button will save the active pattern.

Grid view features the same drum stroke editing facilities as Pattern view. As an extra feature, selected strokes in a single layer can be copied via drag and drop: first select the strokes to copy, then double click one of the strokes and drag it to the desired position in the grid (if you drag to the left and right of the actual view, the view will automatically scroll through the pattern). Also, linked sets can be created in much the same way as in Pattern view. The Pat/Kit button brings up a handy, movable panel for quick pattern and kit selection. The yellow arrow buttons right of this button bring you to the previous and next pattern respectively.

Drum strokes can be programmed via tapping or swiping over the grid. Swiping-up of a programmed drum stroke will change the articulation of the stroke (= sample group). Swiping-down will turn the drum stroke into a choking stroke. The slider in the left bottom corner switches between velocity, probability/JAM! and time shift mode by being tapped.

4 Kit view

Each instrument contains up to 16 user-loadable samples divided over at most 10 sample groups. Sample groups are named: *Left*, *Right*, *First*, *Second*, *Third*, *Fourth*, *Var1*, *Var2*, *Var3*, and *Var4*. These names are just labels. However, they were given with the following notions in mind. *Left* for left-handed drum strokes, *Right* for right-handed strokes, *First* to *Fourth* to indicate a temporal relation of occurrence, and *Var1* to *Var4* as variations of the instrument sound. The user is however completely free to assign a different meaning to the sample groups. The sample group names serve in the assignment of programmed drum strokes



Figure 4: PatKit

in the pattern to a specific sample group. When **Select** is off, active samples during play will turn green. A sample group can support up to 8 velocity levels. During play, adjacent velocity levels are interpolated to accommodate a continuous velocity range between 0 and 1 (*Intp*-mode). Velocity levels are defined to be adjacent if there are no samples in the group with a velocity level in between. The amount of crossfading between the interpolated samples can be set per sample group in the *Sample group panel* that opens on tapping one of the *sample group labels* behind the sample names. In the alternative *Mix*-mode, a set of three samples in the sample group is randomly chosen and mixed. The sensitivity of the sample dynamics in interpolation mode can be adjusted from low to high via the Dynamics knob. Despite the fact that the number of sample groups and the number of velocity levels in a sample group can be as high as 10 and 8 respectively, the total number of samples in an instrument cannot be higher than 16. On one end of the spectrum, an instrument could have a single sample group with 8 velocity levels, and two randomly selected variations for each velocity level. On the other end of the spectrum, an instrument could consist of 10 sample groups, where 6 groups would have 2 velocity levels and 4 groups would have only one. Finally, multiple sample groups can be assigned to be in the *Random* set, from which set a sample group is randomly selected whenever a drum stroke in the pattern score plays one of the member sample groups.

Let's take a left-handed drum stroke as example. Assume that 4 high-velocity (Le-L2) and 4 low-velocity (Le-L1) samples have been loaded for this stroke. During play, the sequencer engine will randomly select one sample from both

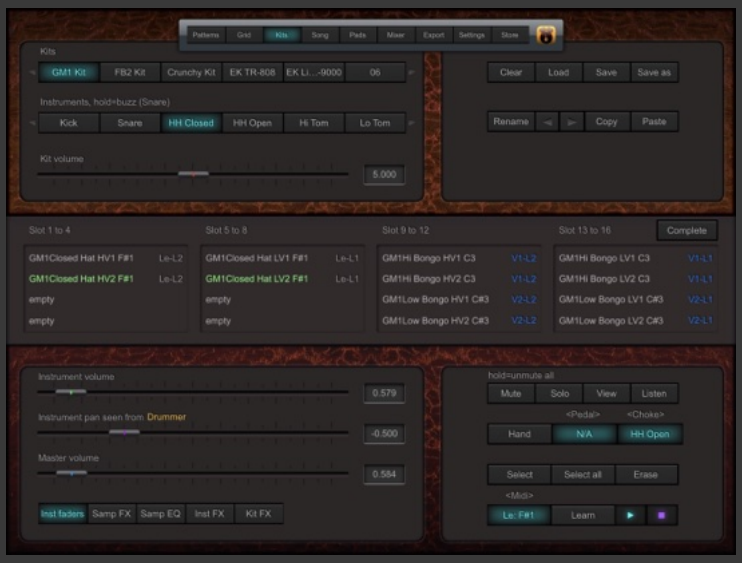


Figure 5: Kit view



Figure 6: Sample group panel

categories and mix them according to the stroke velocity. A sample can be selected by touching it in Kit view (**Select** button off). The list of samples shows all files that are in the /samples directory. Optionally, the list will also show the internal samples that are used in DPP's standard kits, which samples all come from the public domain. Samples are automatically auditioned on tapping in the list. Also, samples can be imported via either Document Picker or AudioShare. 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, touch a sample, select the next slot etc.

The **Complete** button will complement existing samples in the sample groups with automatically generated random variations. If the user only assign sam-

ples to the *Left* group, *Complete* will add a *Right* group with a slightly different pitch than the samples in the *Left* group.

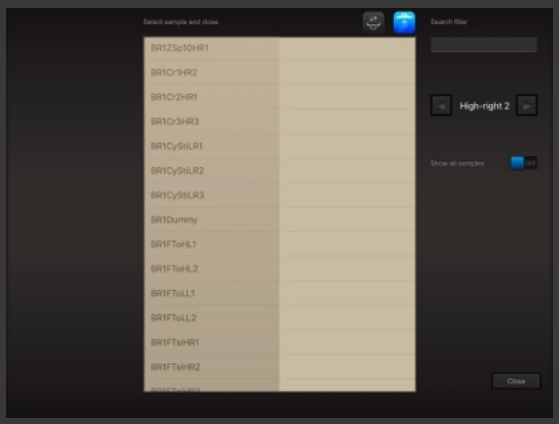


Figure 7: Sample list view

4.1 Kit selector

The Kit selector is also part of the Kit view. Drum kits can be cleared from the selector by the **Clear** button. After editing, the modified drum kit can either be saved via the **Save** button or renamed and saved via the **Save as** button. Longpress **Save** will ask to save the kit to an external location.

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.

Pressing an instrument for a short amount of time will put it in *snare buzz* (bleeding) mode, where each stroke of the instrument will also excite a bit the snare rattle of the snares. That is, the default buzz instrument is the snare (second instrument), but a longpress of the buzz instrument will let you define a new *buzz source*. Repeated longpress of an instrument will cycle along three levels of buzz-strength: weak, medium and heavy. In a typical scenario where the snare drum is the buzz instrument, the kick drum and toms will be set to cause the buzz.

4.3 Kit, instrument and master volume

The Kit volume slider sets the kit's volume between 0 (silent) and 10 (loudest). Next to this global volume setting, each instrument has its own volume setting within the kit, again between 0 (silent) and 10 (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 10 (loudest).

4.4 Sample, instrument and kit FX

DPP offers a number of non-destructive FX processors, such that the actual sound of the drum kit can be greatly varied. In the left bottom part of the screen in *Kit view* a number of FX buttons is located.

4.4.1 Inst faders

The **Inst faders** button reveals volume and panning settings for the instruments, as well as a master volume slider. Panning can be switched between Drummer and Audience perspective by tapping the yellow label, indicating which side of the drum kit we are listening at.

4.4.2 Samp FX



Figure 8: Sample FX panel

The **Samp FX** button shows the sample time-stretching and pitch shifting controls. DPP has a proprietary high-quality time stretching algorithm based on harmonics/percussion separation combined with a state-of-the-art phase vocoder. The **Perc** button puts the algorithm in separation mode and the **Crisp** button puts more emphasis on transient preservation while in *Perc* mode. The **Vocals** button puts the algorithm in *formant preservation* mode, which is especially suitable for samples with human vocal sounds. The **chain** symbol between the time-stretching and pitch shifting text fields can be turn on to switch to a plain resampling method where the amount of pitch-shifting and time-stretching are reversely proportional to each other.

In order to use the *Samp FX*, first tap the **Select** button and select a number of samples or put the Kit view in *waveform* mode by tapping the **View** button. When no samples are selected and *View* is on, the effects will apply to the current sample only. If not in *View* mode and if no samples are selected, the effect controls will do nothing.

Auto TS is a mode where DPP can semi-automatically adapt the tempo of loop samples once the original tempo of the sample is known. First, turn on **Auto TS** for the sample(s) at hand and fill in the original *Sample BPM*. Then, fill in the *Target BPM*, possibly via the *Get* button. Then, tap **Go!** to perform the necessary amount of time-stretching. Again, *Auto TS* can be applied to a selected group of samples or to an individual sample (in *View* mode).

The processed samples are placed in cache, such that they can be quickly reused. If the cache is cleared, first time loading of a drum kit can take more time again due to the required processing. Every time the settings of the sample effects are changed, processing starts with the original samples for best quality.

4.4.3 Samp EQ



Figure 9: Sample EQ panel

Samp EQ shows a 21-band graphic equalizer with a range of +/- 24 dB. A equalizing graph can created by brushing over the controls or by individual sliding of the controls. The **Copy** and **Paste** buttons are there to facilitate copying settings from one sample to the other. The actual processing takes place on **Go!**. Of course, if a group of samples is selected, the effect applies to the whole group. The **Reset** button resets the controls.

4.4.4 Inst FX

Inst FX contains a dynamic range compressor with the usual controls: threshold, compression ratio, knee width, attack time, release time and make-up gain.



Figure 10: Instrument FX panel

The compressor works in real-time and is also applied during export of individual instrument channels during Audiobus and IAA sessions. **All** can be used to copy the compressor settings to all instruments in the drum kit. The **Copy** and **Paste** buttons facilitate copying settings between instruments. The **Comp** button turns the effect on/off.

The **S/P Ctrl** button brings up the sustain and pitch control section of the instru-



Figure 11: Sustain and pitch control panel

ment FX. Both controllers can be set per sample group and are operating in real time. The *Sustain* controller is controlled by the drum strokes programmed in the *Sustain1* and *Sustain2* layers in the pattern. The speed of the controller can be set independently for rising and falling. The velocity of the programmed controller strokes in the pattern determine the instantaneous sustain level of the sample envelope. If there's no envelope defined for the sample the controller will not have any effect. The *Pitch* controller is similarly controlled, but via the drum strokes programmed in the *Pitch1* and *Pitch2* layers in the pattern. The velocity of the programmed controller strokes in the pattern determine the instantaneous pitch of the sample between 0 (original pitch) and 1 (pitch one octave up). The controller layers can contain probability strokes just like the regular *Notes* layers.

4.5 Kit FX

A drum kit can be placed into a chosen room. A number of impulse responses can be chosen from a list (the **Rooms** button). The selected responses will



Figure 12: Kit FX panel

be loaded in the 16 room slots, starting from the currently active room slot. The room slots facilitate fast and easy switching between different rooms. 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, iPad Air models will process the reverb as a mono signal. Later models can apply the effect in stereo. If CPU load becomes too high, DPP will eventually switch back to mono/short impulse response (cheap reverb), in which case the user could try to increase the audio buffer size. The mix of dry and wet signal can be controlled via the *Dry-Wet* slider. In **Send/I** mode, the reverb send level is set per instrument.

4.6 Hidden live-pad

In the top right of the *Kit view* is the panel with kit/instrument buttons, e.g. the **Clear** button. Tapping the bottom left or bottom right corner of this panel brings up the live-pad, similar to the one in Pattern view. This way, instruments can easily be auditioned. Tapping the corners again brings back the kit/instrument buttons.

4.7 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. Longpress **Mute** will let all instruments play again.

4.8 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). DPP offers a similar option, where two instruments can be linked via the **Pedal** controller. In Kit view, 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 en 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, whereas this *is* necessary in case of pedal simulation to close the pedal again.

A second option for Hi-hat pedal simulation is the choke group per instrument. The *Choke* instrument is the instrument that will be choked on the occurrence of the active instrument. Every instrument can have one choke instrument. For example, a Hi-hat pedal instrument can be set to choke the Hi-hat open sound, just like in a real drum kit. The velocity of the choking instrument determines how fast the choking will be.

4.9 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 instrument and also to import and export standard midi files. Midi notes can be learned by first tapping the **Learn** button, which will turn orange. Then, any incoming midi note within the GM map will be taken as a 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. Another convenient way of creating the midi map is via the built-in midi map editor, which is opened by longpressing the Learn button. The editor garantuees a unique mapping from sample groups to midi notes and vice versa. Also, the editor allows to copy the midi map of a whole kit and paste it in another kit. In the editor a note can be linked to a sample group by tapping the corresponding cell, followed by a longpress of the sample group button on the upper right of the screen. A single tap on the sample group button will audition its sound. Green midi notes on the left side indicate occupied notes, white ones are still available for mapping. If a cell of an occupied note is selected, it will turn red.

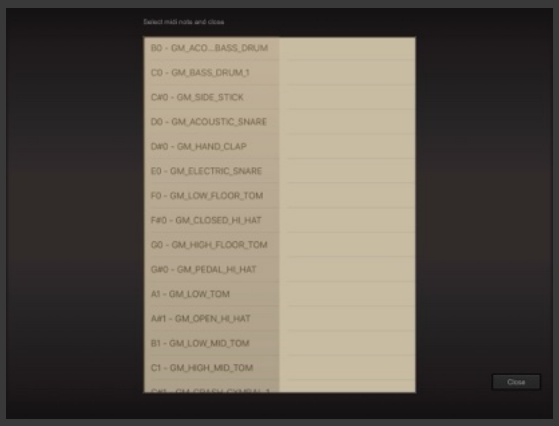


Figure 13: Midi note list

4.10 Sample selection

Individual or multiple samples can be selected via the **Select** button. Select samples by touching them in the list. Selected samples will turn blue. **Select all** will select all samples at once. **Erase** will erase the selected samples.

4.11 Standard, View, and Listen mode



Figure 14: View mode

In Standard mode, **View** and **Listen** are both off. If **Select** is off as well, the

list of left-handed and right-handed samples indicates which ones are currently being played via the green-colored names. Tapping a sample will bring up the sample library, from which new samples can be imported and selected. If **Select** is on, tapping a sample will select it, indicated by the blue color. If **Listen** mode is active, tapping a sample will audition it. If **View** mode is active, the waveform of the current sample is shown. If **Select** is off, the mini panel will show up in navigation mode, where each of the 16 small boxes (light yellow) represents a sample slot. If **Select** is on, the mini panel will show in selection mode, where each of the small boxes (light blue) represents a sample slot. If **Select** is off and the sample name is tapped in the waveform, the mini panel turns gray, and tapping one of the small boxes will bring up the sample library. If the **Sample on/off** label is tapped, the mini panel will turn green/red, indicating if a sample is currently active or not.

Various other touch gestures facilitate sample editing. Tapping on the very left or very right of the waveform will navigate to the previous or next sample, respectively. Tapping in the middle will audition the sample. Tapping again stops the auditioning. Sliding down in the waveform view will zoom in, sliding up will zoom out. While zoomed-in, dragging the waveform left and right will move the view window.

4.12 Envelopes

In **View** mode, an amplitude envelope can be set for each individual sample. There are two types of envelopes: a square envelope and an ADSR (Attack-Decay-Sustain-Release) envelope. The envelope can be turned on in the waveform view and the envelope type can be chosen as well. **Reset** resets the envelope to its default values. Changes in the envelope settings apply to the current sample, or -if **Select** is on- to the whole set of selected samples. In square mode, the envelope has a start, stop and sustain level. In ADSR mode, the envelope has a number of additional parameters that define an exponential attack, decay and release. The envelope parameters can be set by dragging the orange-colored markers to the desired location in the waveform.

4.13 Sample editing panel

In **View** mode, the *Sample editing panel* turns up in the upper right panel in *Kit view*. The first button selects the part of the waveform marked by the envelope, which part can in turn be dragged left and right in the waveform view. The *copy* and *paste* symbols allow to duplicating the selected part for other samples. The *loop* symbol puts the sample in looped mode: once triggered, a looped sample will play forever, until the instrument is choked in the pattern. The *reverse* symbol will put a sample in reverse mode, in which the sample will be played in

reverse. All functions in this panel will also work on a set of selected samples. There's one exception: dragging a selected envelope part to left or right does only apply to the current sample, as it is not likely that every sample in the instrument will require the same envelope time shift.

5 Pad view



Figure 15: Pad view

Pad view offers 32 velocity-sensitive pads for live-playing and recording of patterns and songs. Velocity-sensitivity is achieved via the iPad's gyro sensor and works best if the iPad is suspended by a slightly flexible surface. The Pad view has a **Support** slider that represents the stiffness of the iPad's suspension. Also, there's a slider control for the **Sensitivity** of the pads. Slider to the left means that the pad's velocity is always equal to 0.5. The **PatKit** button brings up the PatKit view for fast navigation between patterns and kits. This view can be dragged around at its border. The **Pattern/Song button** switches between *Pattern* and *Song* mode. In Pattern mode, the **Clone** button will create a copy of the current pattern and place it in the subsequent pattern slot, which allows for easy and fast creation of variations of an existing pattern. The **Erase** button will show the active instruments in the current pattern (in Pattern mode) or the active instruments in the current song (in Song mode). Tapping an active instrument will erase all of its drum strokes.

For live recording a new song with the pads, start in Song view and tap **New**. Then go to Pad view, tap **Metronome**, **Record** button followed by **Play** button.

Everything you play in the pads will be recorded according to the chosen time signature and subdivision of the pattern/song. For minimum latency, set the number of frames to the lowest possible value in Kit view.

Tapping the low-left corner of the screen an alternative pad layout will show up for users who like a more traditional drum kit in an inspiring atmosphere..

6 Mixer view



Figure 16: Mixer view

The mixer allows to set various parameters for the 16 different instruments in a single view. Instrument channels have fixed semantic tags in this version, such as "Kick", "Snare" etc. The upper bar shows the current time and bpm, several settings for the last touched instrument channel, and the usual transport controls. During play, the level meters will show the actual instrument level on a logarithmic scale. The 0 dB level is highlighted on the scale. Above 0 dB, the peak level is indicated by red markers. A double-click on one of the sliders will reset it to 0 dB level. A double-click on one of the panning knobs will reset it to center position. A double-click on one of the reverb-knobs will reset it to zero (reverb off).

7 Song view

Fig. 17 shows the **Song view**. A song is a set of ordered patterns that together form the rhythmic track of a piece of music. Extended kit and pattern selectors



Figure 17: Song view

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.

7.1 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.

7.2 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, DPP 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 DPP as a midi slave. When DPP'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 DPP at the song pointer position of the host. Also, DPP will automatically adopt the tempo of the host. The **Loop** button will put the song in loop mode. Longpress of this button will put the song in selected-loop mode in which the selected set of song patterns are played in a loop. 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 will immediately send a midi start message on Record and start sending midi clock after the count-in, insert an empty pattern in the DPP song with the length of the count-in.

7.3 Parts

Song patterns can be grouped into Parts to facilitate structuring of the song. For this purpose, select a set of contiguous song patterns and press the **Part** button. The newly created part can be named and will show in the song ribbon. Pressing the **Part** button again while Select is off will unfold parts in the song ribbon. The parts will still exist though. Pressing the **Part** button again while Select is on will *unpart* the song patterns in the selected parts. Parts can be copied/pasted just like song patterns. A special type of part is the *random* part, which can be created by a longpress of the **Part** button. Every time a random part is being played, one of the song patterns in the part will be randomly selected for playing. As an example, a random part of multiple fills could be created, such that every time a different fill would be played in the song.

7.4 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 DPP patterns, which together constitute the song. Sometimes, a number of the imported patterns are identical. Use the **Pack** button to remove redundant (duplicate) patterns from the imported song, as well as to remove patterns that are not used in the song from the pattern bank. 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 DPP'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 one of the clock sync methods or use the metronome to keep time. Start recording by tapping **Play**.

7.5 Song tempo and automation

In normal mode, the **Song tempo** slider sets the tempo of the song between 0.1 and 10 times the original tempo. BPM differences between the different patterns in song events will be maintained relative to the first pattern in the song. **Reset** will reset the song tempo to the original tempo of 1.

The **song tempo** slider is also used for recording automation data for tempo and JAM! control. Tap the **Tempo** button to switch between tempo and JAM! automation. Automation can be in one of the 3 states: *Off*, *On*, and *Rec*. If the state is *Off*, automation data for the entire song can be removed by longpressing the **Reset** button. *Rec* state can be reached via longpressing the state button. In *Rec* state, automation data can be recorded live or per song pattern. Recorded data is shown in the song time line via a shaded surface plot. Once ready recording, tap the state button. From now on, the automation data will lead the tempo during song play.

Automation of JAM! works similarly as tempo. In song mode, the SNL indicator under the **Audition** button can be used in *Rec* state to quickly set the JAM! level of the current song pattern.

8 Export view

A non-real-time option for sharing audio is available via the **Export** view. Audio can be rendered and exported to any app that supports *Open-in*, to Document Picker, AudioShare, and DPP itself. Audio files exported to DPP as sample have a maximum duration of 20 s. Midi can be exported to *Open-in* apps, to Document Picker, AudioShare and DPP itself. As some midi sequencers need midi note-off messages matching the note-on messages, there's an option for this. You can chose between pattern and song rendering. The number of loops can be set, which is especially useful in case of probabilistic strokes, as each realisation of the pattern or song will be slightly different. You can chose to include a tail to make sure that all decaying voices at the end are included.

The **Separate tracks** option will let you save individual instrument tracks to separate files (stems). The track files get both an *instrument* and a *track* suffix to their name. An archive of mono or stereo tracks is created (Open-In, Document Picker, AudioShare). The audio level is automatically normalized during rendering, which will prevent the rendered track from clipping. The audio format



Figure 18: Export view

can be either *m4a* or *wav*. The *Select* button in the lower left corner prepares the view for multiple pattern export, i.e. the selected patterns will be exported in one go in the form of a zip archive.

9 Settings view

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

- CPU Load Control (CLC) switch. Recommended setting is *on*.
- Maximum number of voices (only if CLC is off). Higher values can 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.
- 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.

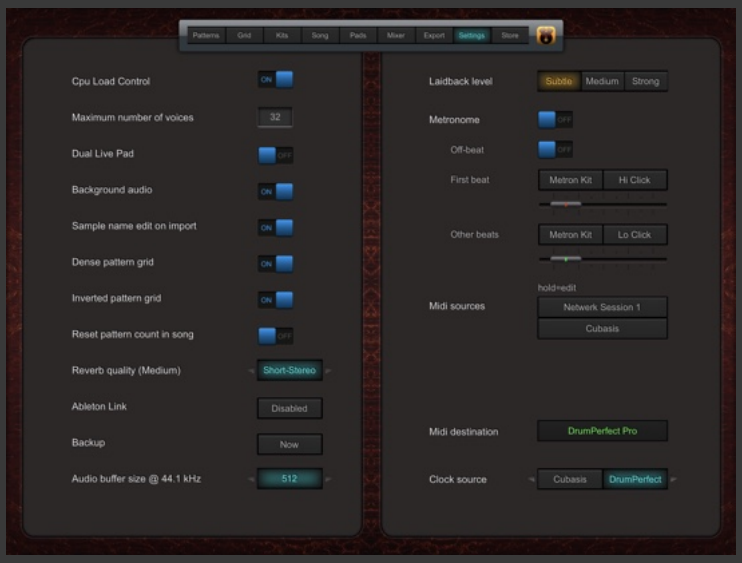


Figure 19: Settings view

- Reset pattern count in song. The linked set period counters are by default only reset at the start of a song. When this option is switched on, the counters are reset every time a series of the same pattern is interrupted by another pattern, as well as at the beginning of a song.
- Reverb quality. The convolution reverb van be based on a shorter/mono version of the room response, which reduces cpu load at the cost of slight loss of quality.
- Ableton Link configuration, which enables or disables sync on Link's shared beat timeline with other apps.
- Backup function to create an archive of user files (patterns, kits and songs) and save that to a chosen location via Document Picker. Samples of the IAP packs are not backed-up, as they can always be restored via the *Store view*.
- Audio buffer size, which determines the latency of audio playback. Can be 128, 256, 512 or 1024 samples. Depending on the iPad type, lower buffer settings can give rise to audible glitches and crackle if the iPad cannot keep up.
- 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

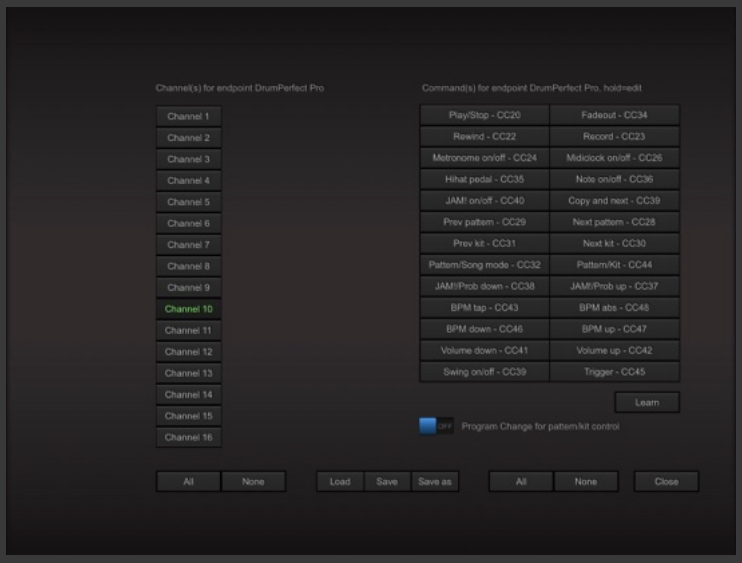


Figure 20: Midi map view

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

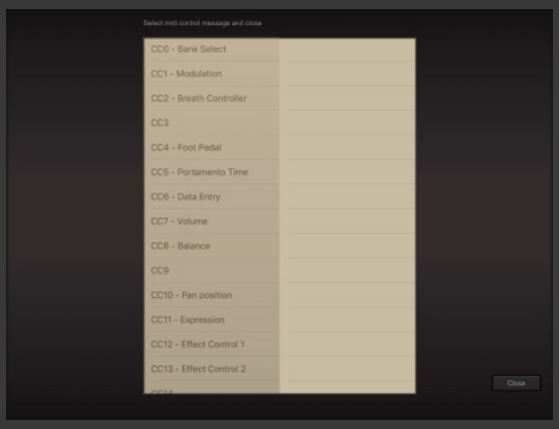


Figure 21: Midi controller message list

Learn and select the desired command. It will turn orange. An incoming

midi controller message will now be mapped to the selected command. Patterns and kits are midi-assignable via midi Program Changes. Enable the switch and DPP will respond to PC00-63 for pattern selection and PC64-79 for kit selection. Enable the Midiclock switch to have the port listen to incoming midi clock ticks. In virtual midi, there are two ways to create a midi connection between apps:

1. Connect the receiver/sender app, in our case DPP, to the virtual midi source/destination of the other sender/receiver app. The other sender/receiver app must be configured to send/receive midi to/from its virtual midi source/destination port. *Some iOS apps do advertise a virtual midi source/destination, but do not actually send/receive midi data to/from it.*
2. Connect the sender/receiver app to the virtual destination/source endpoint of the receiver/sender app, in our case DrumPerfect Pro. The virtual destination/source endpoint (named Virtual in/out) must be enabled. The sender/receiver app must be configured to send/receive midi to/from DrumPerfect Pro. A possible disadvantage of this type of connection is that multiple sender/receiver apps may -even by default- send/receive midi data to/from DPP's virtual destination/source endpoint.

10 Store view



Figure 22: Store view

DPP offers professional grade In-App Purchases with patterns, songs and drum kits in various musical styles. At the time of writing the following packs are available:

- General Midi Vol. 1
- 5/4 Swing
- Pop Drum Beats Vol. 2
- Afro Beats Vol. 1
- Latin Percussion Vol. 1
- Reggae Roots Vol. 1
- Rock Drums Vol. 1
- Funky Breakbeats Vol. 1
- Funky Breakbeats Vol. 2
- Jazz Sessions Vol. 1
- Brazilian Rhythms Vol. 1
- Brazilian Rhythms Vol. 2
- Heavy Metal
- Batucada Vol. 1

The packs are hand-crafted by musician/designer Gilbert Medam and are characterised by their high level of authenticity and musicality. The patterns and songs in the packs form a perfect starting point for further exploration and creation of music in the respective styles. Each pack has a demo track that puts the pack's content in a musical context. Each pack contains a high-quality multi-sampled kit that matches the style of the pack.

11 DrumPerfect Player

DrumPerfect Player is an **AUv3**-compatible audio unit plugin to be used from any audio plugin host app. It is a song player: any song created in DPP is available in the player. Multiple instances of the plugin can be used at the same time. DrumPerfect player requires the host to support tempo and beat time control, such that it can run in perfect sync with the host. The player can only be opened from within a host app such as AUM or Audiobus. After loading, tap the DPP icon to open the user interface. The AUv3 preset list will show

all songs from DPP's song directory. Once a song is saved in DPP, it will be available in the Player after a couple of seconds. The Player supports individual instrument outputs. Tapping the *Mute* button will bring up the mute selection bar, which allows to mute specific instruments, e.g. for the case where the muted instruments have their own separate output instances in AUM.

11.1 Playing songs

Songs are available in the plugin's preset list. Selecting a song in the list will make it load in the player, which typically takes a few seconds. Be aware that a song without looping (as set in DPP) has a finite duration. If the song pointer of the host is beyond the song end, the player will not produce any sound unless the *Loop* button is pressed. In *Absolute* mode, If the *Play* button is armed, the Player will sync to absolute host time. In *Relative* mode, the Player can be manually started, but beat-aligned. In *Relative/Absolute* mode, the Player is manually started, but as long as the host keeps playing, subsequent stops/restarts of the Player will sync in an absolute sense with respect to the initial relative start time.



Figure 23: DrumPerfect Player hosted by AUM

11.2 AutoJAM! control

The AUv3 player exposes the AutoJAM! parameters to the host. Hosts such as AUM allow such parameters to be controlled via midi commands. Parameters **AutoJAM Off/On**, **Intro Off/On**, **Beat Invert Off/On** can be set via midi CC,

where values 0-63 mean ”Off” and values 64-127 mean ”On”. Parameters **Fill**, **Accent**, **Outro**, **Next pattern** and **Previous pattern** can be triggered by midi CC or midi note control. Parameters **Autofill period**, **Intro length**, **Backbeat instrument** and **Timekeeper instrument** can be controlled via midi CC, where the value range of 0-127 is divided over the number of selectable options. Parameters **Master volume**, **JAM! level** and **Swing level** are controlled via midi CC as continuous sliders.



Figure 24: AutoJAM! panel

12 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 various list views for loading songs, kits and samples, files can be removed by the usual *swipe-left* gesture, followed by *delete*. In the pattern list view, multiple patterns can be selected and deleted via the **Erase** button. In this version, DPP support the Files app as well. Be careful not to remove any of the files for internal use as it may jeopardize the correct working of the app.

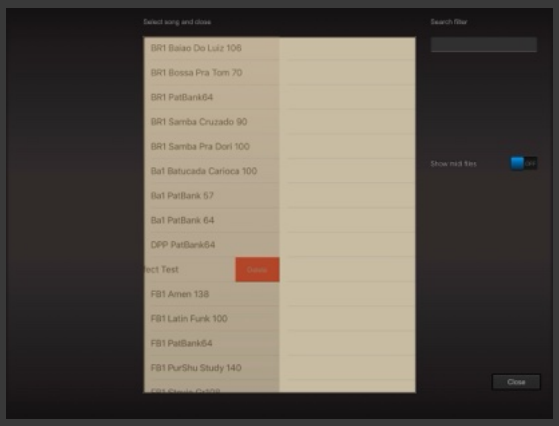


Figure 25: Left-swipe and delete

Kit, pattern, song and sample files that are copied DPP's root directory will be automatically installed in the proper directories on restart of the app. These files are also accepted if packed in zip-format. It is highly recommended to make regular backups of user data via the **Backup** button in *Settings view*. The above directories can also be saved to your local computer via iTunes file sharing.

13 Troubleshooting

In case the app crashes or locks, shutdown the app by double clicking the home button and swipe it away. Then, restart the app. If the problem persists, please clear the */state* directory via the Files app. Then restart the app. As a last resort, delete and reinstall the app, but not before having created a back-up of user data in *Settings view*. Such back-up file can be easily restored: start DPP, longpress the *Load* button e.g. in *Pattern view* and use Document Picker to grab the archive from Dropbox, AudioShare etc.

In case of issues 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.