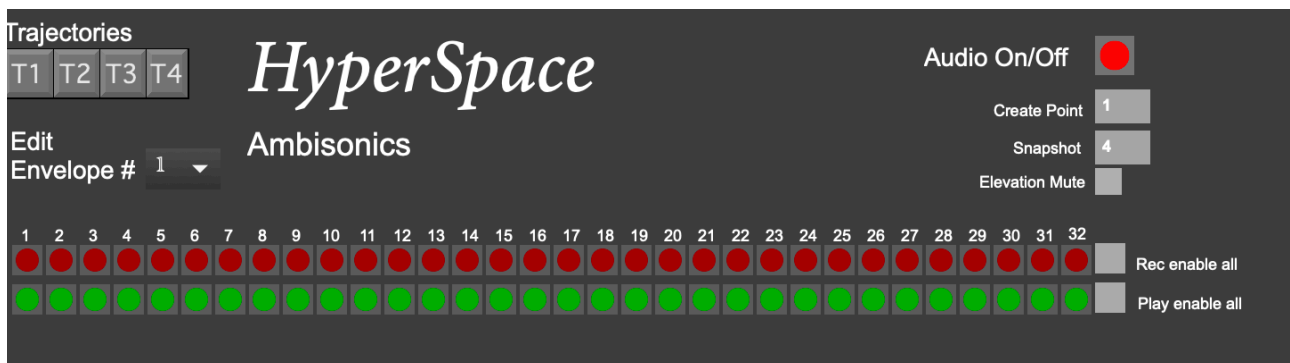# Hyperspace Ambisonics

What it is

HyperSpace is to be though of as a way to control the panning of sound using various techniques and to let the user work with his/her favourite DAW to control the spatialization of sound over any multi channel system ranging from 4 to 49 channels. However, HyperSpace is also designed to work as a realtime performance tool. Together with an iPad it becomes an intuitive way of playing with sound in space.

Since MIDI control data is being used to store the panning information it is easy to edit and fine tune the movement and positioning of sound using standard MIDI manipulation of data. It also becomes an integrated part of the project file and can later be redistributed through another system with a completely different configuration of loudspeakers and distribution technologies (for instance VBAP or Ambisonic). In this way controlling panning of sound in large scale systems (up to 49 loudspeakers) becomes almost as straight forward as panning in stereo.

HyperSpace is built with Max/MSP the multimedia programming environment from Cycling74 (www.cycling74.com) and the actual ambisonic encoding/decoding along with some interface objects are part of the ICST objects for Max/MSP. For Hyperspace to work properly you will need to download and install the IEM vst plugins. These can be found here: https://plugins.iem.at/download/

How it works

HyperSpace sits between the DAW and the outside world translating the MIDI data representing the position of a channel of sound (also coming from the DAW) or places the sound in space directly using various control functions. It also enables use of some panning controls not normally found in DAWs. It is also very easy to use it as a real time controller device for live diffusion of a piece of music as well as live input from instruments. Data from HyperSpace can either be used "as is" in real time or recorded into the DAW as MIDI data.

Ambisonics in Hyperspace

Hyperspace uses the ICST encoding and decoding algorithms. The encoding is always done in 6th order ambisonics (49 channels) and can either be recorded directly for later decoding or be directly decoded and recorded for any loudspeaker setup using from 4 to 48 speakers. Hyperspace comes with several predefined loudspeaker configurations but you can create your own setups as well. There is also a built in binaural decoder for the purpose of working without a real loudspeaker rig or to record a binaural version of your composition.

Basic operation

1. The menus

The Edit menu

There are two items in the file menu (grayed out items have no function):
Preferences, will open the preferences window. As of now preferences are used only for wireless communication and MIDI i/o settings.
MIDI assign, will open MIDI assignment window (see assigning and using MIDI controllers).

The Audio menu

Settings, will open the audio settings window where you can choose audio driver, sample rate, buffer size etc.
Channel test, gives access to a routine for playing noise directly to the output channels. This is good for checking that all channels are working but also for finding the actual connection between a channel and the loudspeaker it is connected to. Also usable for tuning of the sound system.
Panning test, will send a pulsating noise to the first input channel. This is good for making sure that the panning is working correctly and that output channels are properly set up.

The Devices menu

This menu gives you access to the different devices that you will need in order to work. It includes the Panning Display, The Input Mixer, The Output Matrix, The Speaker Configuration, The Snapshot Sequencer, The Playback engine, The Renderer and The Preset Manager. These devices will be explained later.

The Functions menu

This menu gives you access to the four trajectory generators along with the Energy Visualizer and the MultiEQ. Trajectories can also be activated from the main screen.

2. The Blackhole64 server

In order to send sound from your DAW to HyperSpace you will need to use the Blackhole64 (or 16 or 128 or whatever your computer can handle) audio server. Once installed it's very easy to use. It will show up as any audio interface when you set up your DAW. Just create as many output buses you want to use and assign them to Blackhole output channels. In Hyperspace set Blackhole to be your input device and whatever audio interface you are using as your output device. Hyperspace supports (as of now) 32 audio input channels and up to 48 audio output channels.

3. Setting up tracks

In your DAW create an audio track with some sound (mono or stereo). Now it´s time to prepare the track(s) that will hold the panning data. Create a new MIDI track below the audio track you just created. Make sure to set the MIDI in port to "from HyperSpace 1" and the MIDI out port to "to HyperSpace 1".

Setting up a MIDI track for recording

When using more than 16 audio channels in the mix, MIDI track 17-32 will have to be set as "from HyperSpace 2 (Max 2)" and "to HyperSpace 2 (Max 2)" 1-16 respectively.
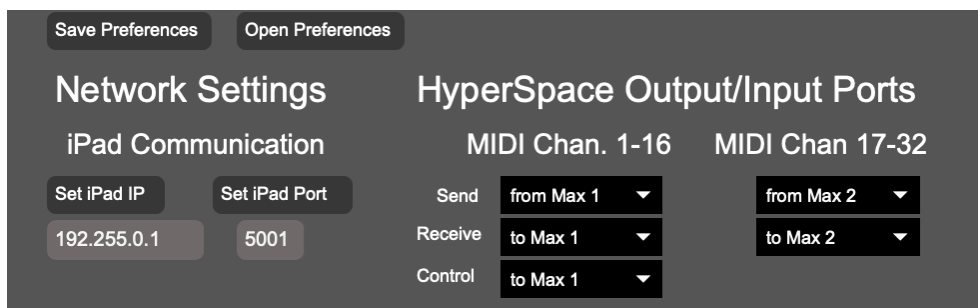

NOTE These ports may also appear as "from/to Max 1"and "from/to Max 2"
Also check that your MIDI in/out ports are correctly set in the HyperSpace preferences. If you plan to use the iPad controller for Hyperspace you also need to set the local iPad IP along with a Port. Default port number is 5001.

6. Setting up the loudspeaker layout

Before you can start to spatialize your sound you will have to define how many loudspeakers you have and how they are positioned. From the **Devices menu** select "Speaker Config" if its not already open. If it is not already loaded by default, open one of the speaker_setup XML files that comes with Hyperspace using the "read" option in the top of the window. There are two basic layouts to choose from. One is the "German" style setup with loudspeakers going clockwise from 1 upwards named speaker_setups.xml (default). The other is the "French" style putting pairs of channels/loudspeakers i.e. front 1-2, front sides 3-4, mid 5-6 etc
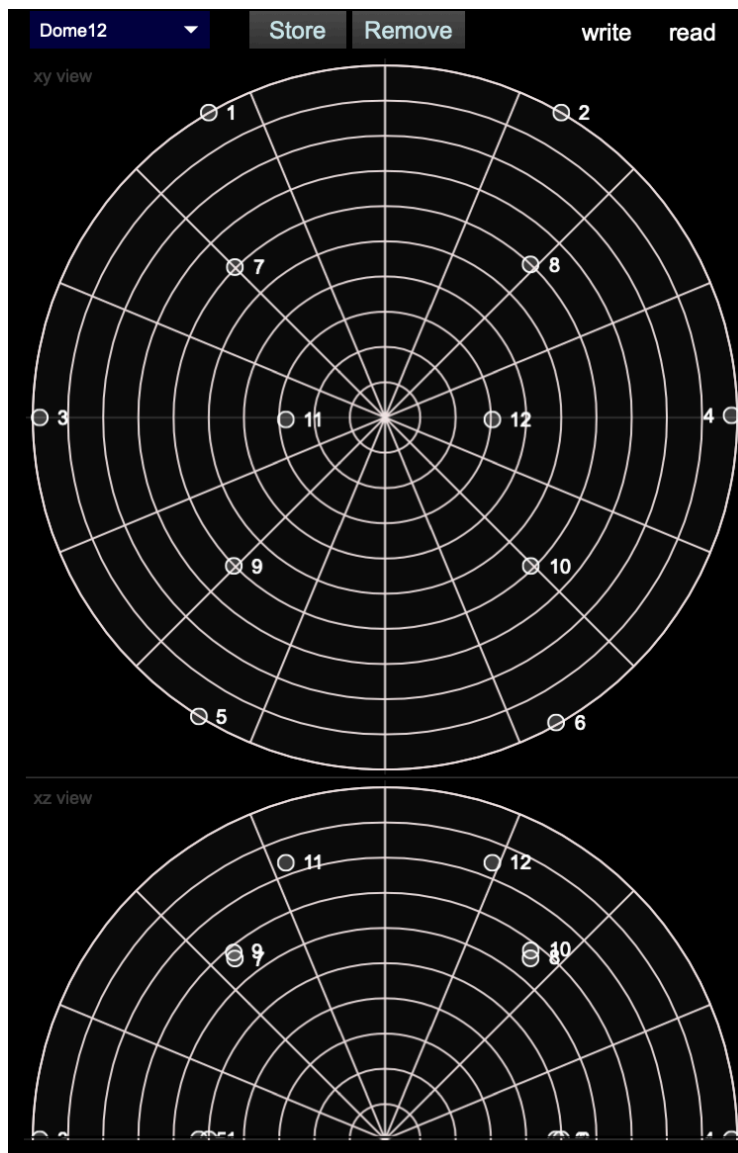

Defining the loudspeaker setup French style

The numbering of the loudspeakers should correspond to your output channel numbering. If it does not correspond you can patch channel routing using the Output Matrix from the **Devices menu** (see Output matrix)

7. Creating control points and testing your audio setup

In the **Devices menu** choose "Panning Display" (if it is not already open) and click in the display window anywhere inside the circle. By default the first control point is created at startup and placed in the center of the panning display. To create another point, press "2" on the computer keyboard. You will see a text saying "set no 2". Click anywhere in the circle to create a new control point. Alternatively you can position the mouse pointer where you want to place a new control point and then control-doubleclick.You can rename control points to give them more meaningful names by choosing a control point (by clicking it) and then pressing "Rename" at the top right of the display. A dialog box will prompt you to give the point a new name (instead of 1 2 3 etc).
However, the display tends to be cluttered rather fast if you use names and use a lot of input channels. In this case it is better to stick to simple numbers.
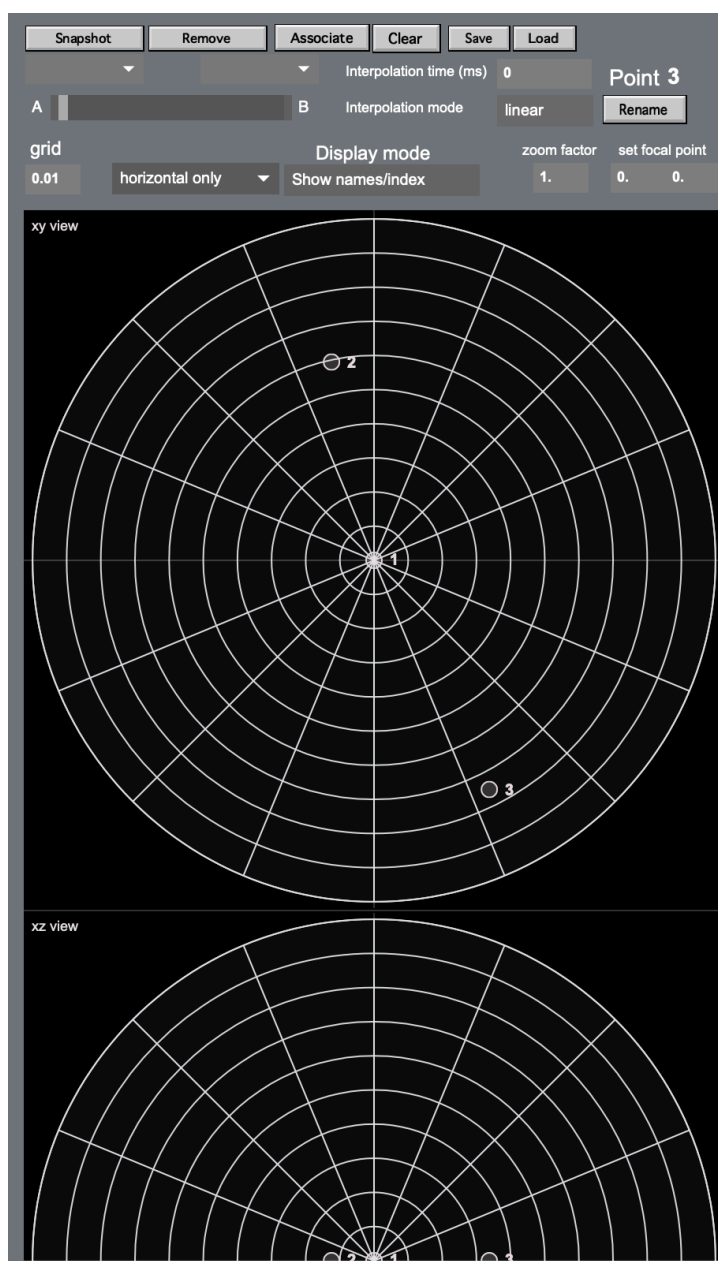
Creating control points

Before you can hear anything you will need to start the audio processing in HyperSpace by clicking the "Audio ON/Off" toggle in the upper left corner in the main window so it lights up (On by default). You can also activate processing in the Audio menu -> Settings.

Before proceeding you might want to make sure that your loudspeaker setup matches the way your output channels are connected. To do so select "Channel test" from the Audio menu. Activate the Panning test by clicking the Panning test toggle. You should hear a pulsating noise.

Now move the control point 1 by clicking and dragging it around. Make sure the sound moves between the speakers as it should. If not you will have to patch channels in the Output Matrix.

There is another test routine that will help you identify output channels -> speakers relations (see "the Output Matrix").
Make sure you have turned off the Panning test and then activate the Channel test toggle.
You can now select what channel you want to send your sound to by setting the channel number in the number box.
NOTE Be careful with the volume. Use the level control and start at a low volume to avoid shocking your ears and the loudspeakers.

When done, turn off the Channel test and close the window. You are now ready to start working.
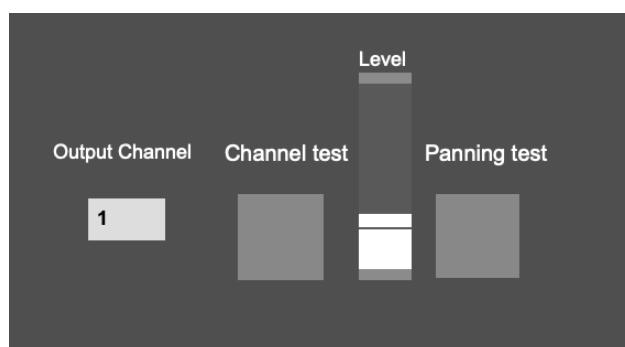
If you have prepared one or more channels of sound in your DAW you can now start it.
You should hear the sound from any soloed audio track and you can try to move it around.

NOTE You must create at least one control point for each channel of audio that you are sending from your DAW.

If you don´t hear the sound (and if you don´t see a signal in the Input Mixer (see below)) then you need to check your connections. Make sure you have set your DAW to use Blackhole as your output device. Make sure that Hyperspace is set to use Blackhole as input device and your audio interface as output device.

To create more control points simply repeat the process using the number keys 1-9 for the first 9 channels. Then holding down <shift> while typing on the keypad you can add any number of control points you need. If you work with a laptop and don´t have access to a keypad you can use the "Create Point" number square in the main window or use control-doubleclick to create new points. Click and drag with the mouse to position a new control point. If you have access to an Apple Ipad and the TouchOSC application, creating control points is even easier (see "Wirelessly controlling HyperSpace").

8. Recording and playing back of panning data

First of all make sure that your MIDI settings are correct both for your DAW and Hyperspace.
Note that Hyperspace has two output and input MIDI ports. Since each MIDI port can use 16 MIDI channels the control data from Hyperspace channel 1-16 is sent on MIDI port 1 channel 1-16.
Hyperspace channel 17-32 is sent on MIDI port 2 channel 1-16.
Now you are ready to record some movements.

Begin by putting your DAWs first MIDI track in record mode. Then do the same with the first channel in HyperSpace main window by clicking the record ready button that corresponds to channel 1 (or any other channel you want to record).
Start your DAW recording either from your control surface or the DAWs internal transport controls.

It´s good practice to use some preroll to give you time to switch from your DAW to Hyperspace before actual recording takes place. If you make it between 5-10 seconds you will have plenty of time to get set. As you move the control point in Hyperspace, data is recorded into the MIDI track of your DAW. Once you finished recording, You can stop the DAW. You should see the MIDI data in your MIDI track. If not, check your settings.

To replay what you just recorded, activate the play enable button of channel 1 in HyperSpace (and deactivate the record button to make sure you don´t create a feedback loop). Rewind your DAW and start playback. You should see the control point of channel 1 move as it was previously recorded and you should hear the sound moving accordingly. If this is not the case you should make sure you have assigned the MIDI ports in/out correctly in your DAW (from HyperSpace 1/ch1 for input and to HyperSpace 1/ch1 for output).

9. Editing of panning data

A smart thing about having panning data stored as MIDI is that it is easy to edit and fine tune movements.
The easiest way is to use copy/paste and time compression/expansion. However you can also alter the MIDI control data directly for each movement on the XYZ axis where X=left/right, Y=Front/Back and Z bottom/top. Hyperspace generates MIDI CC 1,2 and 3 foe X Y Z respectively.

Hint! You can easily create a "movement library" of patterns that are likely to be usable in more than one project for instance a circular movement. Simply record the movement on a MIDI track and then export that part of the track (don´t forget to solo the track during export) as a standard MIDI file. Later you can simply drag and drop that file into a new project and alter it to fit. In Cubase for instance you can easily change the timing of MIDI control data by time compressing or expansions.

If you choose to record the decoded mix you can go from 4 to 48 channels using HyperSpace without touching your mix. Depending on your loudspeaker configuration this will give different results. If you have made a 2D surround mix (no elevation data), you can not transform it to 3D later. If on the other hand you have made a 3D mix and want to transform it to 2D you may do so by activating the "Elevation mute" toggle in the main window. Results may vary...

Simply set the new output format by configuring your loudspeakers and off you go!
The higher ambisonics order/output channels/loudspeakers you use the better definition of your mix you will get.

10. Working with snapshots

One way of using HyperSpace is taking so called "snapshots". They are (as the name proposes) "pictures" of a set of control points. After organizing your control points (placing your sound channels in space) in a certain fashion, you can store this "picture" as a snapshot simply by clicking the "snapshot" button and, when asked to, give it a name. You can create any number of snapshots you want and as you add more, the drop down menu below the "snapshot" button will fill up and eventually let you choose your snapshot of desire.

You can set a default interpolation time that will move the positions in either a linear or polar fashion. However, if you want each snapshot to have a specific interpolation time and interpolation mode, just select the snapshot, set the interpolation time and mode, and then press the "associate" button.

Snapshots can be a very efficient way of moving large numbers of sound channels in a well ordered way. Also for live performances, snapshots are great for complex but yet manageable ways of altering the sound image. You can also use the slider below the snapshot menus to make manual interpolation between two snapshots. The drop down menu at the left represents the "from" and the one at the right the "to" snapshots.

Finally to remove a snapshot from the menu select the snapshot you want to delete from the leftmost menu and then press the "remove" button.
You can recall snapshots from you DAW using MIDI program change. Insert a program change number corresponding to the snapshot you want to recall anywhere in your sequence. It is however recommendable to create a separate track for program changes for the sake of clear organisation.
In fact, if you plan things well, snapshots together with MIDI program change can replace all other MIDI data. It depends on how complex mixes you intend to do.

If you intend to use many snapshots in your mix and want to use MIDI program change numbers to recall them, a good idea is to add a number at the beginning of whatever name you give your snapshots. This way it is easier to keep track of the connection between a specific snapshot and it´s corresponding MIDI program change number. Try to create a couple of snapshots and then click the "save" button to save all snapshots to disk. Later you can recall them using the "load" button"

11. The Snapshot sequencer

Instead of using MIDI program change messages to switch between snapshots, you can use the Snapshot sequencer. Let´s say you have programmed 8 snapshots. In the sequencer you can set interpolation times along with interpolation type (linear or polar) for each snapshot.
There are two edit modes. You select between Duration and Interpolation using the drop down menu on top of the sequencer display. There you can also choose the number of steps in the sequence.
Drag the indicator lines up or down to change the duration of each step. The step duration along with interpolation type is displayed in the lower left of the window. Holding your mouse (without clicking) over any step will display its values. Now you can play through the sequence using the Play toggle and select the kind of loop you want.
For more free form live performance you can choose to use a MIDI keyboard to freely move between snapshots.

Click the "Learn" button and play the note on your keyboard that you want to trigger the first step. The rest of the steps will be triggered playing chromatically upwards from the base note.

The Snapshot sequenser

You can choose different loop modes and also set a range of playback using the arrow markers in the top portion of the display.

12. Envelopes

The Envelope generator

There are 32 multi stage envelope generators in Hyperspace. Each envelope has separate curves for XYZ movement control.
You can choose and open an envelope from the drop down menu in the main window.

Envelopes are connected to any control point/channel set in the upper right corner of the window. You may assign any envelope to any output, but envelopes are by default assigned like "envelope 1 -> channel 1", "envelope 2 -> channel 2" etc.
NOTE For an envelope to send data to any connected channel, the "Activate" button in the upper left corner need to be on.

The envelopes can also generate random movements along with LFO -like movements including circular movements.
Use the "Gain" parameter to create either random or Wave movements.
These functions does not need the envelope to be in play mode but still need the "Activate" toggle to be on.

With the random function, "Gain" controls the relative spread/size of the movement.

"Rate" controls the speed of generating new random values and
"Slew" defines the interpolation time between values.

The "Gain" parameter with the Waves function controls the relative diameter of the movement. "Freq X" and "Freq Y" controls speed and direction of X/Y movement. Use "Reset phase" to create a perfect circle.

The "Origo" button resets the starting point of random movements and waves to the center of the space.

Envelopes can be scaled and offset using the Envelopes scale XYZ parameters along with the Offset XY parameter. Offset XY can also be used with Random and Waves functions.

NOTE Parameters can be reset to their default values by double clicking on any dial.

You can decide the playback range of the envelope using the "Range" slider.
The "Position" slider will show the actual playback position when in Play mode.
It can also be used in Stop or Pause mode to scrub through the envelope manually.

NOTE If you select any range smaller than the total length of the envelope the duration will still be the same, meaning that the smaller the selected range, the slower the playback speed.

The Play and Pause toggles should be self explanatory.
"Dur" decides the total duration of the envelope.
The "Loop" toggle activates loop mode and the drop down menu lets you choose to loop forward, backward or palindrome (Forward-Backward alternating).

Editing the envelope curves

To select one of the envelope control curves, you can click on it. The display at the lower right side of the window will display which parameter the curve represents.
You can also use the small dots at the lower mid part of the envelop display to select which curve to edit. Yellow curve = X (front/back). Blue curve = Y (left/right) and Green curve = Z (elevation).

To create a new breakpoint, click anywhere on the curve. Breakpoints can be dragged up/down and left/right. To delete a breakpoint, shift-click on it. To create a slope, option-click and drag up or down between two breakpoints.

The "Clear" button will clear the selected curve (X Y or Z). "Grid" toggle will display a grid and "Snap" will lock the breakpoints to the grid. Grid size determines just what it says.

You can chain several envelopes to create longer movements. The "Chain in" parameter lets you set a receive address while the "Chain out" sets a send address. This means that if an envelope is set to send at the end of the playback it will start any envelope set to receive on the the same address.

Example: Envelope 1 is set to send on address output one and envelope 2 is set to receive on input address 1, then Envelope 1 will start envelope 2 after reaching the end of playback. If Envelope 2 is set to send on address 2 and Envelope 1 is set to receive on address 2, this will create a loop.

Envelopes can also be set in "Sync" mode. This allows you to start several envelopes at once using the Transport control (see below).
The same can be achieved by using the same MIDI note to trigger several envelopes. In this case each envelope will retain it´s own range, duration and loop settings.

The "Stereo" toggle will send data to a control point one step higher than the assigned control point. So if the envelope is set to send to control point one, activating Stereo will also send to control point 2. To separate the channels you can use the "Stereo X" and "Stereo Y" offset parameters.

Assigning MIDI control

You can control almost all parameters in the envelope by assigning MIDI controllers from your keyboard or other control surface.
Click the "MIDI assign button to bring up the MIDI assign window.

Click "Learn" and move a controller to assign it.
The "Start" needs a MIDI note and can be set to either "Switch" mode or "Toggle" mode.

In Switch mode one press on the MIDI note will start the envelope while the next press will stop it.

In Toggle mode the envelope will play as long as you hold the MIDI note pressed and stop when you release it.

Transport control
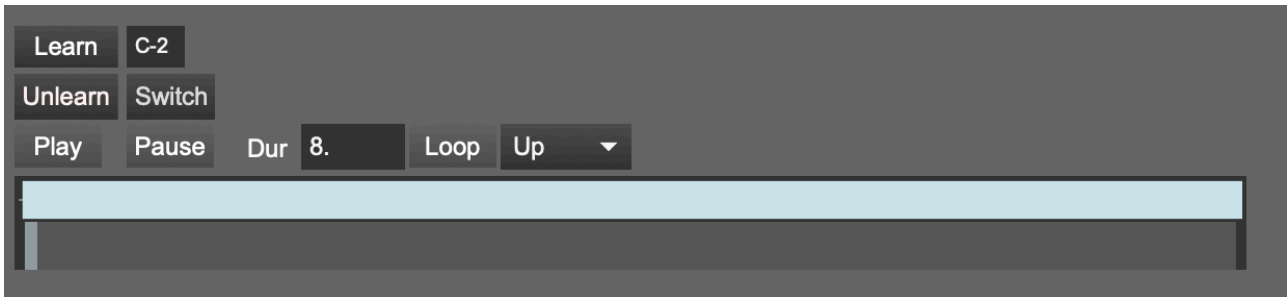
Any envelope that is set to "Sync" mode will follow the Transport control.

Play/Stop, Pause, Duration and Loop mode along with Range and scrubbing will apply to all connected envelopes.

You can use a MIDI note to start/stop the Transport control. Switch and Toggle mode behaves as mentioned before.

13. Trajectories

In the **Functions menu** select one of the four Trajectories generators. You can also click on one of the trajectory buttons in the main window.
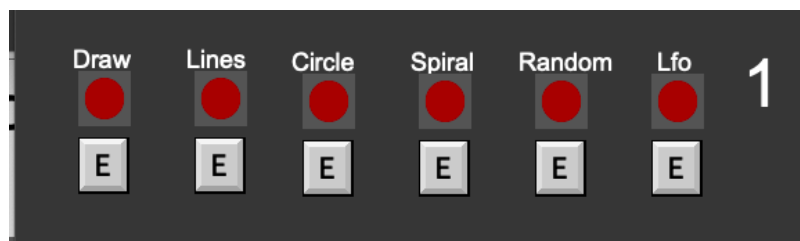
Trajectories are basically tools for creating automated movements of control points. There are four trajectory generators and each of them contains seven different control methods. The control methods are:

1. Drawing
2-3 Point to point line mode
4. Circle
5. Spiral
6. Random
7. Lfo

To edit one of the functions, click the E button to bring up it´s interface.

Before a trajectory function will affect the movement of a sound you need to assign it to one or more input channels (or control points if you prefer to think like that).

You do that by activating the **Main** output toggle and choose a channel/control point from the drop menu below it. The value "Nil" means that the function is not assigned to any channel.

The 2-D controllers named **Scale** and **Offset** allows you to manipulate the movement in various ways. Try them out on a simple movement (like a circle) to understand their effect.

There are also three **auxiliary outputs** that you can activate. This way you can couple up to four channels (good for panning of stereo or four channel premixed sounds) with different offsets in x (left-right) y (front-back) and z (elevation) directions.

The **Elevation envelope** is used to control the height of the sound if you are working with a 3-D setup. You can activate it with the toggle in the lower right corner.
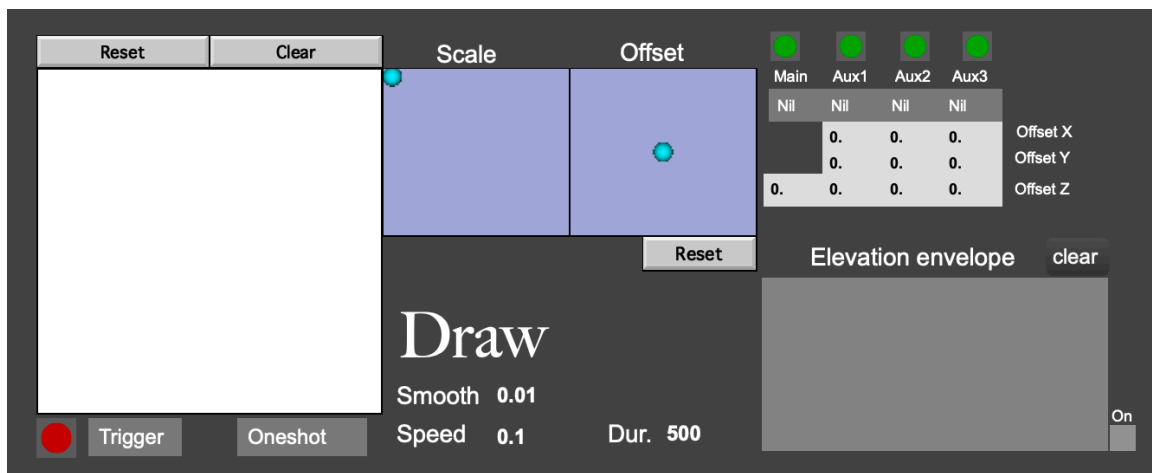
In **Draw mode** you can draw a trajectory in 3 dimensions. In the square main window you can define the XY movement of the sound and on top of that you can add an elevation trajectory using the **Elevation envelope**.

You can alter the size and relative offset of your drawing with the **Scale** and **Offset** squares. On top of this you can set a duration for the movement and also scale that duration using the "speed" parameter.

The "smooth" parameter controls the relative interpolation time between points in the drawing. Furthermore you can choose to put the playback mode in **one shot**, **loop**, or **palindrome** (looping forwards and backwards) mode.

The Trajectory can be used in **trigger**, **gate** or **toggle** mode. These modes are only usable when applying MIDi control (see using MIDI controllers).

Trigger will start the trajectory and leave it running until you manually stop it by clicking the red activation button.

Gate will run the trajectory for as long as you keep a MIDI note down.

Toggle will start the trajectory the first time you press the assigned MIDI note and stop it the next time you press the same note.
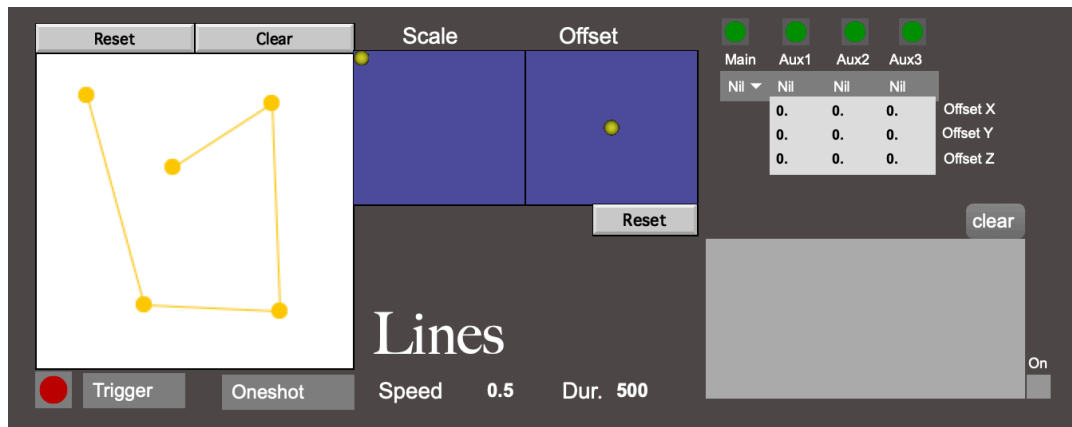
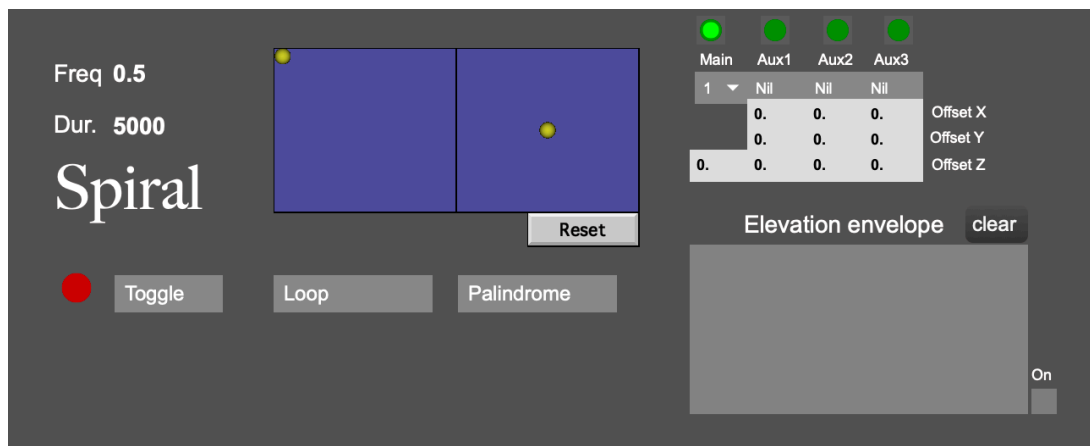In **Line mode** you can click in the main square to create linear movements in space.

Make sure you don´t keep the mouse down and drag around since then you will create a LOT of points and the line trajectory tool will not like you.

The other controls are working as described above.
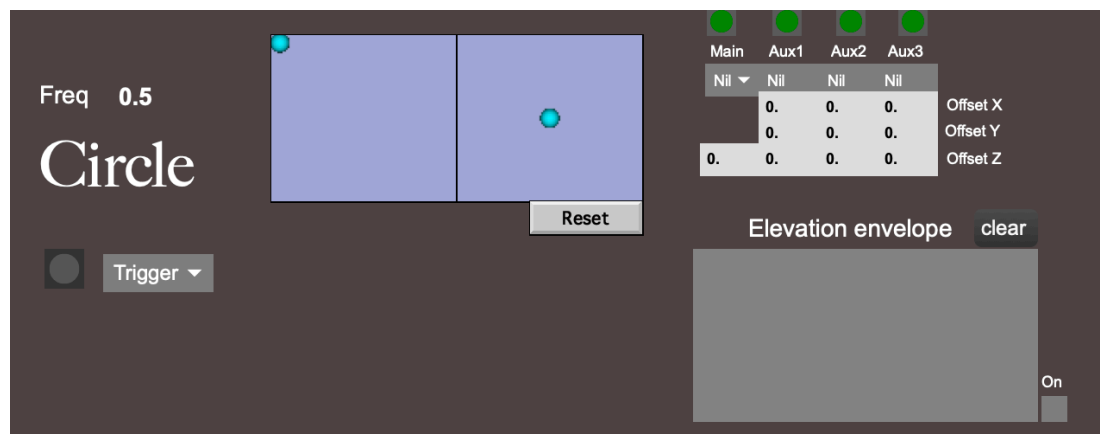
The **Circle mode** simply creates a circular movement defined by the frequency parameter together with the other controls governing scale and offset.

Positive frequency values renders a clockwise movement while negative values creates an anti clockwise movement.

Spiral panel:

Freq **0.5**

Dur. **5000**

Spiral

Toggle   Loop   Palindrome   Reset

Main Aux1 Aux2 Aux3
1 ▼   Nil   Nil   Nil
      0.   0.   0.   Offset X
      0.   0.   0.   Offset Y
0.   0.   0.   0.   Offset Z

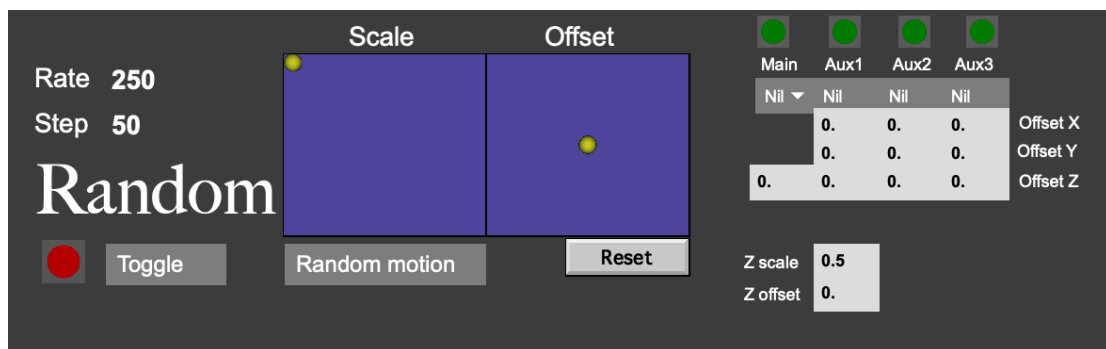Elevation envelope   clear

On

The **Spiral mode** uses duration and frequency to define a spiral movement over time.

At this point there is no elevation envelope implemented however you can use the offset parameter to place the spiral movement in height.
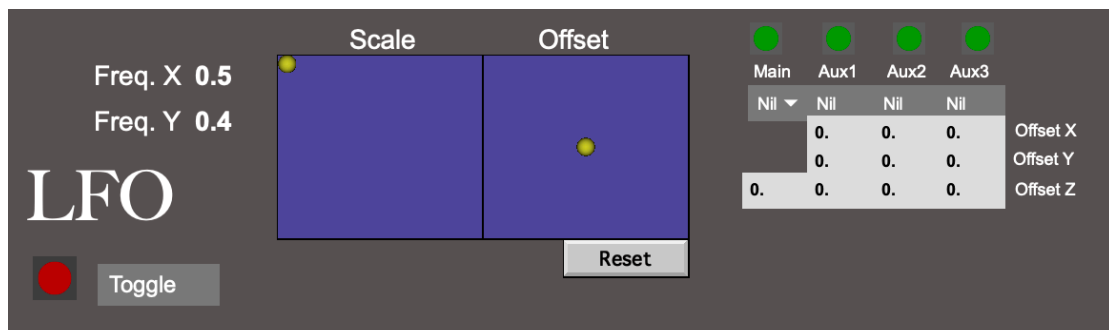
Positive and negative frequency values works as with circle

NOTE The spiral function has no meaning unless you have set the distance parameter in the Input Mixer to a high value along with the absorption parameter.

Random panel:

Rate **250**

Step **50**

Random

Scale   Offset

Toggle   Random motion   Reset

Main Aux1 Aux2 Aux3
Nil ▼ Nil   Nil   Nil
       0.   0.   0.   Offset X
       0.   0.   0.   Offset Y
0.   0.   0.   0.   Offset Z

Z scale 0.5
Z offset 0.

The **Random mode** moves the control point(s) in a random fashion in two modes.
Standard random or brownian motion.

Using scale and offset the random movement can be extended at the elevation plane as well.

LFO panel:

Freq. X **0.5**

Freq. Y **0.4**

LFO

Scale   Offset

Toggle   Reset

Main Aux1 Aux2 Aux3
Nil ▼ Nil   Nil   Nil
       0.   0.   0.   Offset X
       0.   0.   0.   Offset Y
0.   0.   0.   0.   Offset Z

The **LFO mode** simply applies two sine functions to the X and Y axis

Finally, you can use more than one trajectory function at the time when working in sequencer mode. However it may be a bit difficult to manage the timing of things.

In live mode on the other hand, you can use all sets of trajectories giving you a total of 28 pre programmable movements with full control of timing.
Along with the **Preset Manager,** complex performances can be easily achieved.
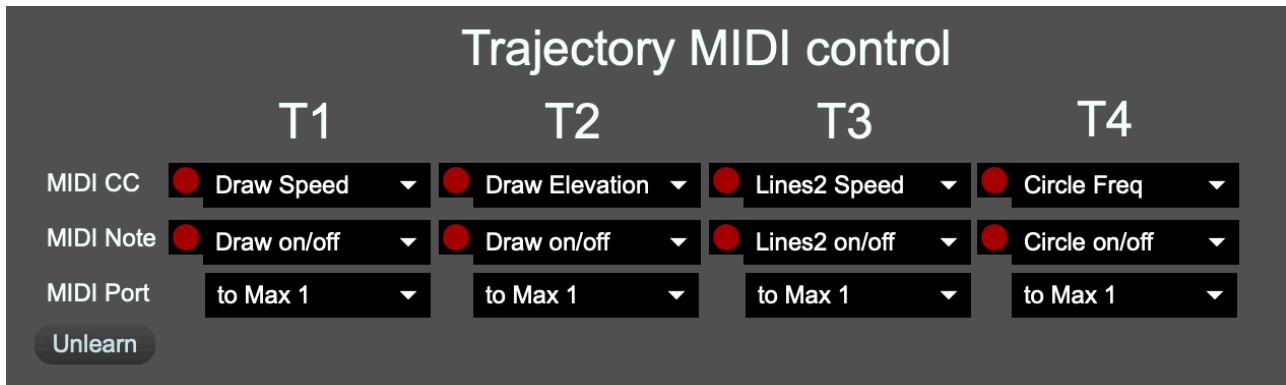
15. Assigning and using MIDI controllers

Another powerful feature of HyperSpace is that you can control the most important software functions using one or more external MIDI controllers. For instance, controlling up to 28 trajectories, 32 input faders and other functions, all in real time.

If you wish, this can of course be done just as well from your DAW. However, in order to use MIDI control from the DAW you will need to sacrifice one MIDI channel that will be dedicated to control data.

In the **Edit menu** select "MIDI assign".

Select a MIDI in port (corresponding to the MIDI device you want to use) and then select the parameter you want to control.

Click to highlight the red "LED" to the left and move a controller (or play a note on your keyboard). The LED will go out and your controller is now assigned.

You can check it by opening the corresponding trajectory function and make sure values change as you move your MIDI controller. The settings you make will be included in the Preset manager (assuming you are using it).

To clear all assignments press the "Unlearn" button.
Note that only one controller can be assigned to each function.

iPad controller

There is now an iPad TouchOSC based interface to control all aspects of HyperSpace. You will have to buy TouchOSC in the App Store (cheap) and install it on your iPad.

The software works on iPhone or iPod touch as well but the Hyperspace interface is made for iPad only.

From Hexler.net you can then download the editor software (MacOSX, XP/VISTA/8 and Linux).
From there you can open the HyperSpace TouchOSC interface (comes with the HyperSpace distribution package) and download it to your iPad.

The iPad interface is very easy to use and is more or less self explanatory. Instructions on how to connect the iPad and your computer is also part of the HyperSpace distribution.

16. The Input Mixer
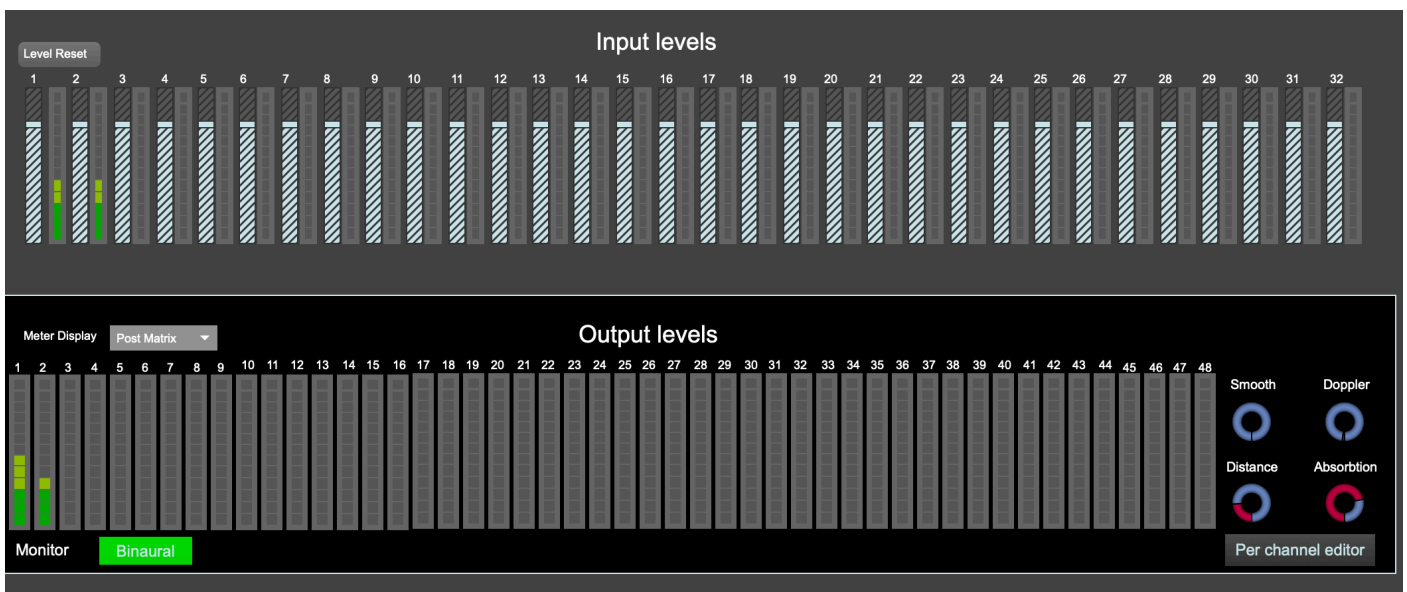
Select "Input Mixer" from the **Devices menu**.
In the input mixer window you can see incoming audio levels (in the top section) and adjust their levels with the faders.

In the lower section of the mixer you can see the levels of the signals coming out from HyperSpace after panning. This in turn can be viewed in two modes; pre and post the Output Matrix.
This is because HyperSpace will always output the audio signal in accordance with the virtual loudspeaker setup you have made, while the Output Matrix may have re-routed the signal to fit your physical setup.
You can switch view with the "Meter Display" drop menu.

In the lower left part of the window you can switch between Binaural monitoring and Direct decoded ambisonic output (defaults to Binaural monitoring).

In the lower right corner you will find a set of knobs to adjust various parameters that affect how the sound is projected in space.

Smooth is the parameter that governs how relatively fast the sound is interpolated when moving in space. If you set this parameter very low and use very fast movements you may hear "zipper" noise. If you put it very high, the movements becomes increasingly "blurred".

Doppler applies the well known Doppler pitch shifting effect to a sound depending on the speed of movement and distance from centre of space.

Distance affects the relative volume drop of the sound as it moves away from the centre. With a minimum setting of the knob there will be no difference in volume between the centre and the periphery. Note that there is also a volume drop when moving a sound up (away from the "floor" level. This parameter can drastically change the balance of a mix if changed between replay sessions, so keep a good record of how you are using it.

Absorption simulates the drop off of high frequencies with increasing distance.

Note that the parameters when set with these knobs are global i.e. all incoming audio channels will be equally affected by these settings.
However, if you wish to set values per channel you may do so using the PerChannelEditor.
Here you can make individual settings for each channel in your mix. Note that if you make adjustments per channel and later make another adjustment with the global knobs, these will override the per channel settings you made for the respective parameter. To get them back all you need to do is switch to the PerChannelEditor and slightly touch one of the faders so the settings are re-sent to all channels.
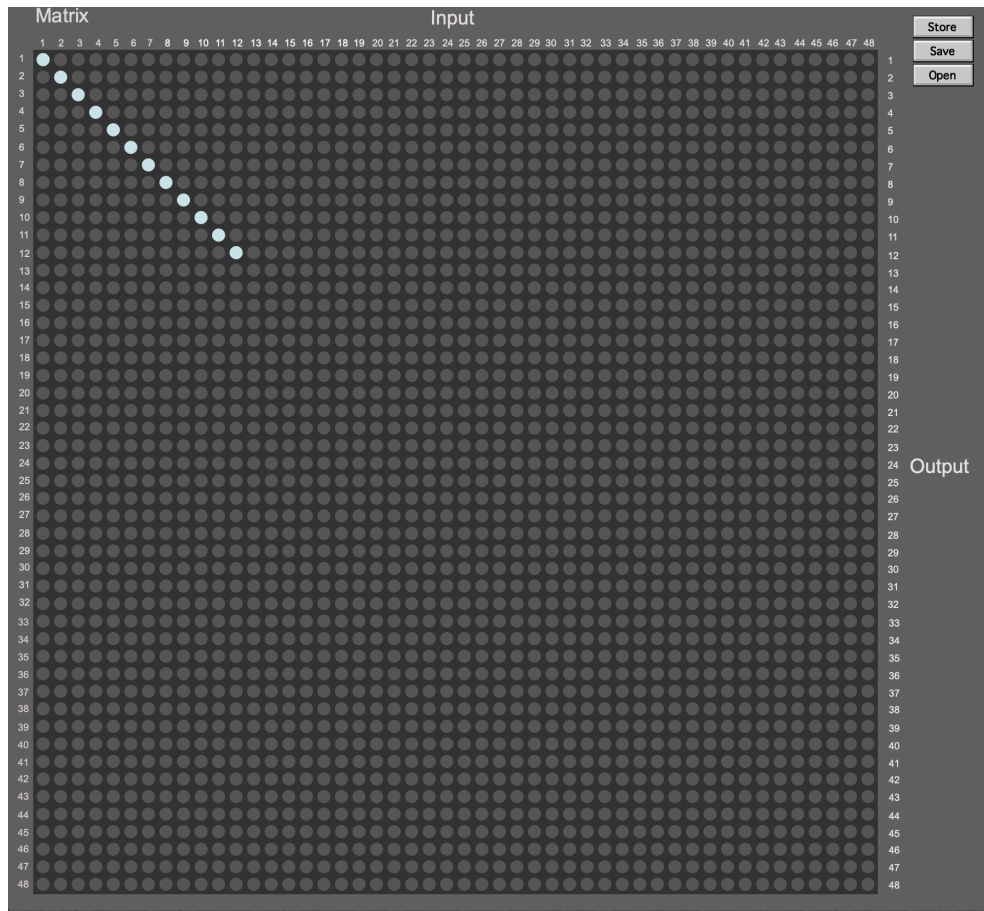
17. The Energy visualizer
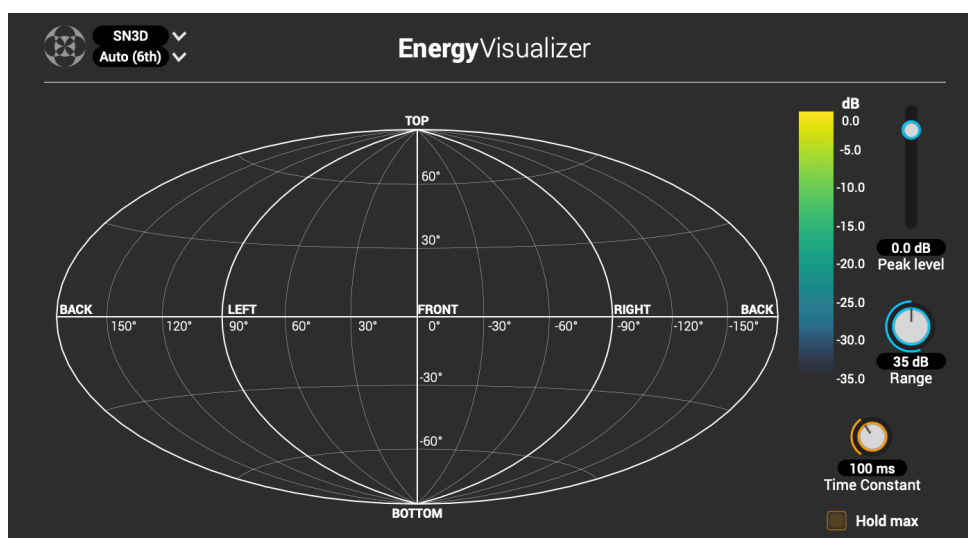
With the Energy visualizer you can check how one ore more sound sources will be projected in 3D space. To see results you may need to adjust the Peak level and Range settings.
This has no effect on the mix but can sometimes be useful when doing "dry" mixes.

18. The Output Matrix


In the **Devices menu** select "Output Matrix".

The Output Matrix enables you to redirect the audio signals coming from the panning process to physical channel outputs. Depending on your configuration (how many loudspeakers/audio channels you are using), only parts of the Matrix will be used.
For instance, if you are using a 32 in 12 out configuration, normally only the first 12 inputs and the first 12 outputs of the Matrix would be used.
It could of course be that you are using the first 12 channels on your audio interface for some other purpose and in that case maybe it would be appropriate to send the inputs 1-12 to outputs 13-24 instead.

There is normally one Matrix setting associated with a specific loudspeaker setup. If you want to have a custom Matrix setup saved separately you can do so.

First make the changes you need, press the "Store" button (this will associate the Matrix settings with the current loudspeaker setup) and then save it by pressing the "Save" button.
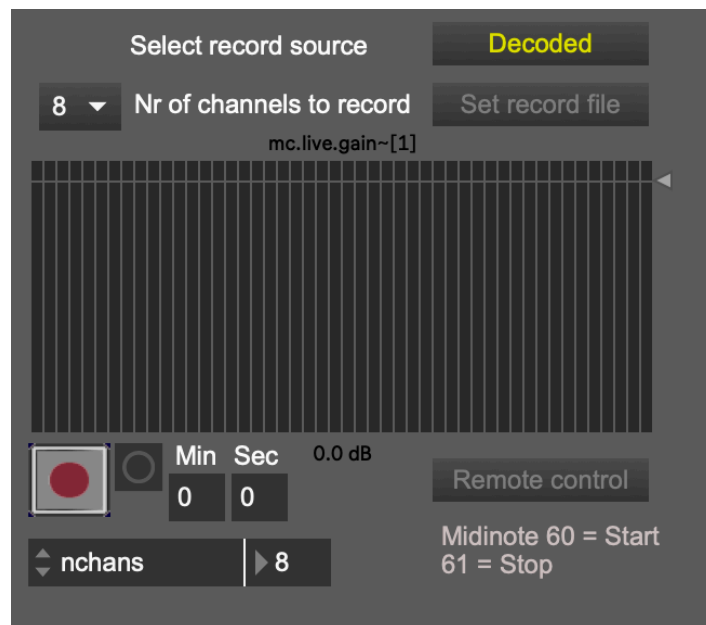
19. The MultiEQ
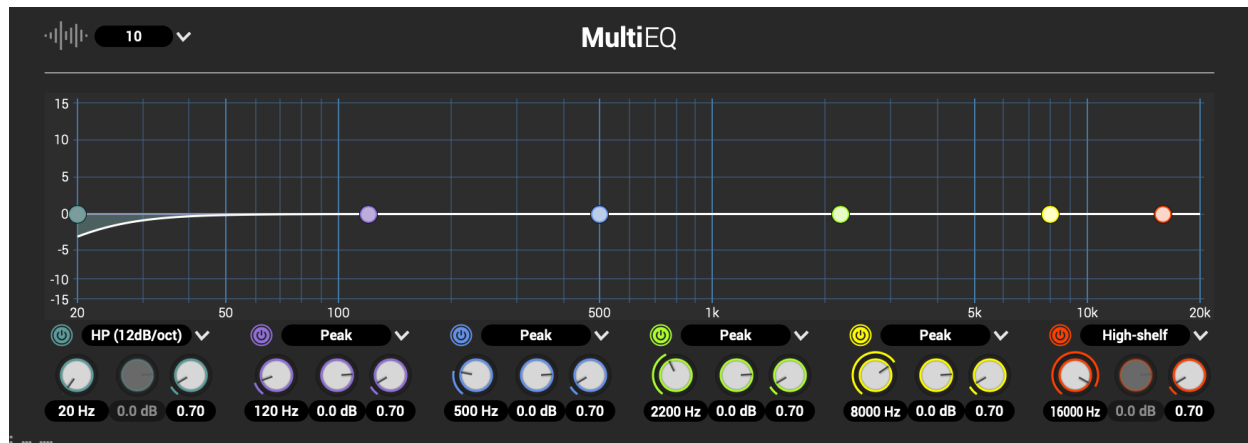
The MultiEQ allows you to make adjustments to the outgoing audio from Hyperspace. This can be vital to compensate for various types of loudspeakers that need a bit of tuning.
The settings you make here will affect all outgoing channels.


20. Rendering

The Render function lets you record in two ways. Either you select to record the encoded 49 channels (6th order ambisonics) in AmbiX format directly from the encoder.

You can use this file if you want to use another decoder than the built in decoder.
In this case you need to set the number of channels to record to 49 using the drop down menu.
You also need to put the selected record source to "Encoded"

To record either the decoded multichannel mix or the Binaural version you must set record source to "Decoded" (default) and choose the number of channels to record.

21. The Player
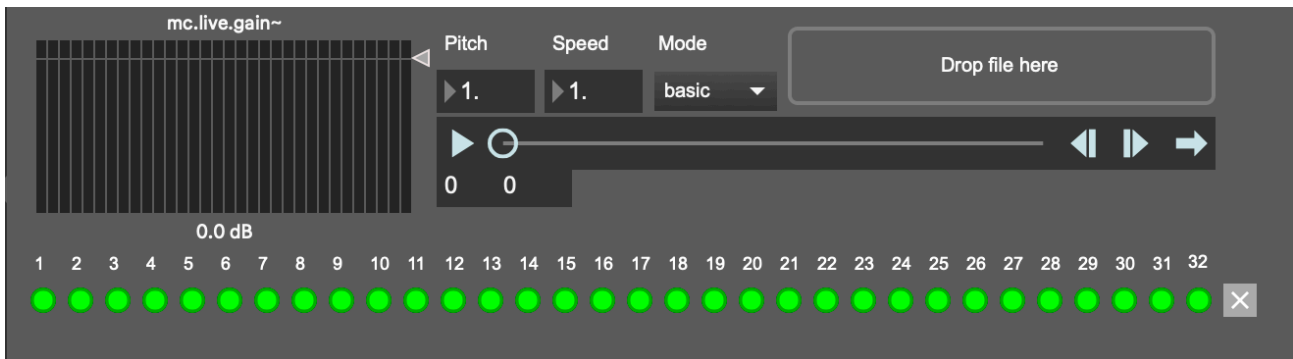
The Player lets you play sound files with up to 32 channels of interleaved audio channels. You can mute/unmute each channel for listening to individual channels. You can control pitch and speed independently.
The Player is intended for playback only and serves (for now) as a tool to check your mixes. The output from the player is sent directly to the output device.

22. The Preset Manager
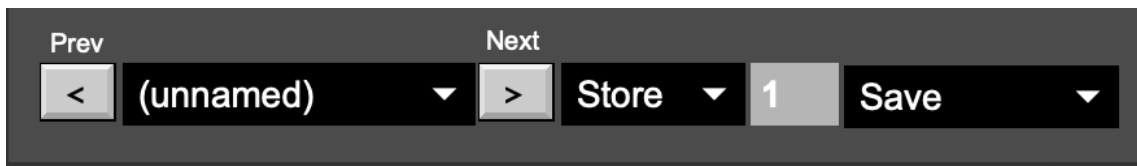
In the **Devices menu** select "Preset Manager".

The preset manager lets you store settings on a global level. It will include all settings for the Envelopes and Trajectory generators (parameters, on/off state etc) along with some settings in the Panning Display (such as selected snapshot), and MIDI port settings in the MIDI assign window.

You can use the drop menu to store, update, insert, remove or clear your presets.

To store a preset, select a location using the number box on the right side and then select "Store" from the drop menu. You will be prompted for a name of the preset.
To recall a preset, select it from the drop menu on the left or use the arrows to step forward/backwards in your presets.

If you have the iPad controller you can trigger presets from there.

23. Creating your own loudspeaker setup
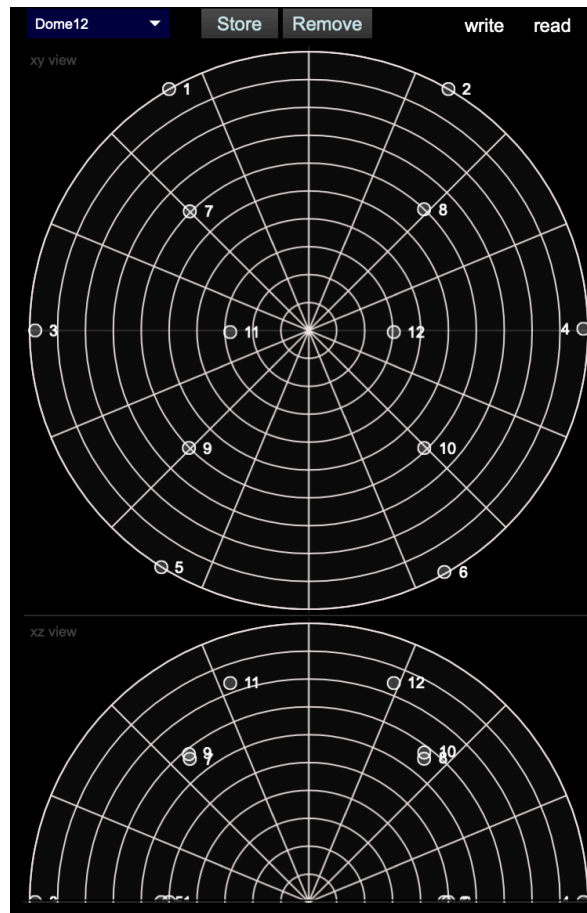
HyperSpace comes with 11 predefined loudspeaker setups. These setups cover some of the most commonly used settings but of course they don´t cover all possible scenarios. To create your own setup there are a few things you need to know:

Adding loudspeakers

The Speaker configuration works pretty much the same as the Panning Display. To create a new point, click in the display, press a number key (or shift-keypad number) or use control-doubleclick and click in the display where you want to place the loudspeaker. It´s a good idea to start with one of the presets with a similar layout to what you want. You can freely position speakers anywhere in the space. If you need to remove speakers, simply click on the loudspeaker and hit the <backspace>.

When you are finished and all speakers are set press the **Store** button in the upper right corner. you will be prompted for a new name of this setup.

For your changes to actually take effect after editing and storing a speaker setup, you need to select it from the preset drop menu again.

Note that speaker setups are not saved in presets. Instead you will have to save it separately. The default name of the file containing the configuration data resides in a file called "speaker_setups.xml" and needs to be in the same folder as the HyperSpace application.

If you want your new setup configuration to be automatically loaded when you launch HyperSpace you must give it the **same exact name** (speaker_setups.xml) and make sure it´s saved in the same folder as the application. However,

if you want to you can place this file anywhere on your hard drive but then you will have to manually load it after HyperSpace has been launched.
If you decide to overwrite the original configuration files it would be a good idea to make a backup of the original in a safe place before doing so.

If you have changed the number of speakers in the configuration you also need to **change the Output Matrix for this setup**. Open the Output Matrix and add or take off he number of output channels that you have added (or taken off) in the loudspeaker setup.

Store and save the new Matrix configuration.

Keyboard shortcuts (in Panning display and Speaker Config windows)

<1-9 >   Create control points
<shift>+keypad   Create control points 10-32
Control-doubleclick Create control point
<A> Select all points
<D> Deselect all points