

# ***SAOmaker***

**v3.1**

*SAOmaker* is an application for creating *Spatial Audio Objects* (SAO). It is used to create SAO files that can later be sequenced, to audition multiple SAOs, or to prepare a score that can be played back in the multi-spatial loudspeaker configuration of *The Morning Line*. *The Morning Line* can play back up to 100 SAO files simultaneously.

The SAO concept links sound files with spatial locations or trajectories.

The *SAOmaker* can create and edit trajectories and previously created SAO files.

## **Importing audio**

After opening the *SAOmaker*, import an audio file by selecting “Import audio file” from the File menu. One or two-channel AIFF and WAV files are supported.

SAO files and trajectory file created by the *SAOmaker* can be kept in the same directory.

## **Audio playback**

First, set up the audio according to your preferred options:

- Select “audio settings” in the options menu to open the audio settings window. Here you can check that the correct audio driver is selected for your system, and that the outputs correspond to your connected loudspeakers.
- A test button can be found next to the meter for each audio output to assist in aligning speakers and channels.

The audio settings window has four different loudspeaker arrangement options. Audio will be decoded correctly to reproduce the spatial trajectories you create in the best way possible for each of the given loudspeaker configurations. These are monitoring possibilities designed to be used when creating SAOs to give a good impression of spatial movement on common loudspeaker systems. Only the VBAP option will provide full 3D surround decoding in conjunction with an appropriate loudspeaker arrangement.

1. UHJ stereo: An ambisonic stereo decode for playback on two channels, e.g. a laptop, if creating trajectories outside a studio environment. Channel 1 = L; channel 2 = R.
2. Quad: 4-channel B format decode to give horizontal surround. Loudspeakers should be connected as follows: Channel 1 = L; 2 = R; 3 = Ls; 4 = Rs

3. 5.1: 6-channel B format decode: Channel 1 = L; 2 = R; 3 = C; 4 = LFE; 5 = Ls; 6 = Rs
4. Custom VBAP: This decode uses Ville Pulkki's Vector Based Panning (VBAP) method. It will decode according a description of a two or three dimensional loudspeaker array, described in the file "speakers.txt". This can be found in the same directory as the SAO applications. You can edit this file according to your loudspeaker layout. It should contain a single line of text in the form:
5. d azi1 ele1 azi2 ele2 azi3 ele3 ...etc., where d is either 2 for 2D decodes (horizontal only) or 3 for a 3D (with height) decode. azi and ele are azimuth/elevation pairs describing the location of each loudspeaker in degrees from centre front, normally listed in a clockwise direction. VBAP loudspeaker configurations can be described by angles which are positive from 0 to 180 CLOCKWISE, and negative from 0 to -180 ANTICLOCKWISE.

When you have loaded a soundfile the waveform display can be used to zoom, navigate, select, play and loop sections of the sound file.

Select the area you wish to play or spatialise by dragging over the waveform display.

The space bar can be used to start and stop playback.

A playback volume control is at the right side of the SAOMaker window.

## Trajectories

The azimuth, elevation and diffusion trajectories are shown in the three displays above the audio waveform. Their zoom and selection correspond to the waveform zoom and selection. During playback, the indicators on the sphere/plane/TML display, and the azimuth, elevation and diffusion dials and sliders, update to show the path of the spatialization.

Left and right channel trajectories for stereo files are shown on the same displays simultaneously. You can edit each channel individually by selecting the "left" or "right" buttons located below the sphere display (next to the diffusion slider).

There are three different ways to write a trajectory and specify a location:

1. Drawing directly into the azimuth, elevation and diffusion data display windows.
2. Moving the spatialization controls during playback, using either the insert or overwrite writing modes:
  - Insert mode only writes trajectory data while the control is being moved with the mouse button depressed, switching back to reading when the mouse button is released.

- Overwrite mode writes data constantly during playback regardless of movement on the controls.

In a stereo file, the two channels can be controlled separately or can be linked by selecting a link mode: stereo – maintaining 60 degrees between the left and right channels, or by mirroring the movement of one channel on any axis).

1. Using the function generator (in the Functions menu) to automate a trajectory across the selection area. Set the ranges and parameters and then click “Go” to automate panning over the selected period. The function menu also offers options to smooth the selected trajectories, reverse them, and interpolate between values at the start and end of the selected area.

When you have created and edited you SAO file, select save from the file menu.