Tutorial 4:

Room acoustic modeling, diffuse sources and reverberation

Summary

In this session you will learn how to create a room acoustical environment in TAS-CARpro. You will define room dimensions, surfaces, obstacles and reverberation parameters and experience their effect on direct and diffuse sounds. The presented tools are useful for applications like VR scenarios for hearing aid evaluation or investigations of the influence of room acoustical parameters on hearing.

What will I learn?

- How to simulate room acoustics in TASCARpro

- How to render impulse responses

- Concept of diffuse reverberation in TASCARpro

What can I use it for?

- Measure influence of early reflections on hearing aid performance

- Increase complexity of virtual acoustic environments
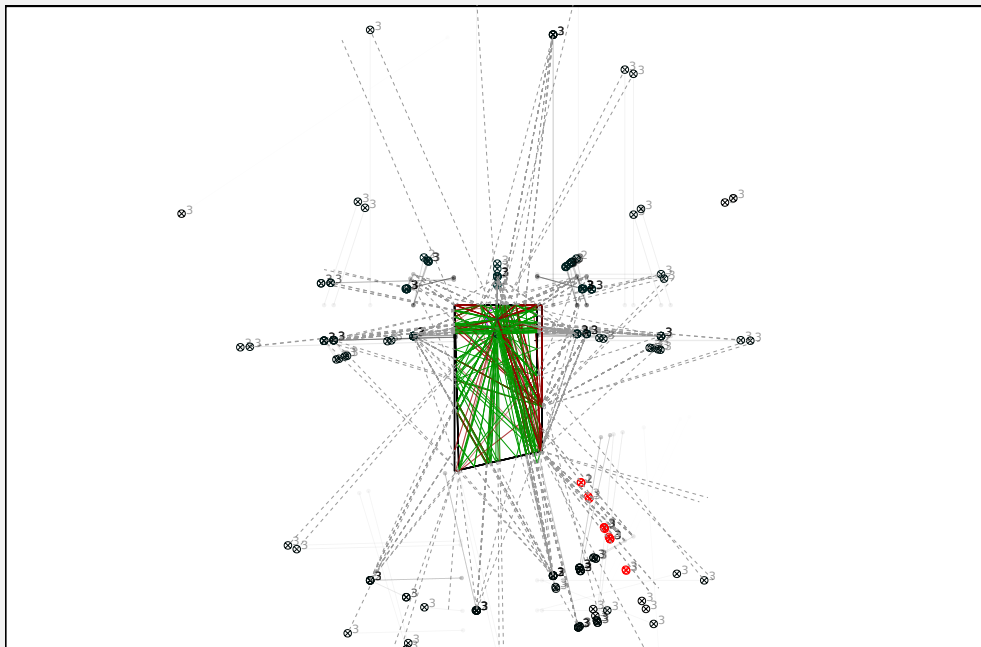
Different Types of Sound Sources and Signal Paths in TASCAR

- Make a copy of file `task4_basic.tsc` in text editor. Then load your scene in TAS-CAR.

- Identify the three scenes in the session. Have a look the receivers. How many receivers are there? What is the purpose of each receiver?

- Look at the jack signal graph (e.g., with patchage, type Ctrl-R to reload, and Ctrl-G to reorder).

- As you remember from the introduction, diffuse sources are rendered in first order Ambisonics and require four-channel audio signals. Identify diffuse signals in both scenes.

- zita-rev1 is a feedback delay network (FDN) reverberation tool (to be replaced by RaZRTM in the future).

- Can you change late reverberation from FDN to convolution reverb? You can use the impulse response `diff_nuclear_b_format.wav` in the tutorial4 folder or look for other impulse responses in `~/tascar_scenes/diffusereverb` or on `http://www.openairlib.net/`.

- Listen carefully to the diffuse background and diffuse reverberation. Are they diffuse? What happens if you move your head?

Surfaces and Their Properties

- Have a look at the elements face, facegroup and obstacle. How was the movement of "thewall" defined?

- Create a movement of a sound source or a receiver using one of the tools described in the manual sections 6.6 – 6.8.

- Open your copy of a file `task4_basic.tsc` in text editor.

- Open script `task4_example1.m` in MATLAB or GNU Octave (to open MATLAB, please open a terminal and type `matlab &`).

- Modify the reflectivity and damping properties of surfaces in your copy of `task4_basic.tsc`.

- Using this example, see how easy you can render impulse responses and image source model. If external modules (e.g. zita-rev1, jconvolver) shall be included, you can use `tascar_jackio`.