

Master Thesis

## Control and Perception of Spatial Sound Synthesis

Methods for spatial sound synthesis perform an individual spatialization of sound components at an early stage of the synthesis process. Depending on the synthesis paradigm, the components and the means for spatialization can be of different nature. In granular and concatenative approaches, single grains can be treated individually in the temporal domain to achieve a spatial image [2, 1]. The virtual physical configurations of physical modeling synthesis can be used for spatial reproduction [3]. In spectral modeling, sinusoidal and noise components can be spatialized individually to create a virtual sound source with a dynamic geometry and dispersion [4, 5].

This master thesis investigates the perceptually relevant aspects of selected spatial sound synthesis methods and their configurations in passive and interactive applications. Different reproduction systems (WFS, Ambisonics, Binaural) can be chosen.

### Requirements

- interest spectral modeling and concatenative synthesis
- experience in Python, Matlab and C++

### References

- [1] Aaron Einbond and Diemo Schwarz. Spatializing Timbre with Corpus-Based Concatenative Synthesis. In *Proceedings of the International Computer Music Conference (ICMC)*, pages 1–1, New York, United States, June 2010. cote interne IRCAM: Einbond10a.
- [2] Aaron McLeran, Curtis Roads, Bob L Sturm, and John J Shynk. Granular sound spatialization using dictionary-based methods. In *Proceedings of the 5th Sound and Music Computing Conference, Berlin, Germany*, number 1, 2008.
- [3] Alexander Müller and Rudolf Rabenstein. Physical modeling for spatial sound synthesis. In *Proceedings of the International Conference on Digital Audio Effects (DAFx)*, 2009.
- [4] David Topper, Matthew Burtner, and Stefania Serafin. Spatio-operational spectral (sos) synthesis. In *Proceedings of the International Computer Music Conference (ICMC)*, Singapore, 2003.
- [5] Charles Verron, Mitsuko Aramaki, Richard Kronland-Martinet, and Grégory Pallone. Spatialized additive synthesis of environmental sounds. In *Audio Engineering Society Convention 125*. Audio Engineering Society, 2008.

### Supervisors

Henrik von Coler	E-N 323	<a href="mailto:voncoler@tu-berlin.de">voncoler@tu-berlin.de</a>
Prof. Dr. Stefan Weinzierl	E-N 322	<a href="mailto:stefan.weinzierl@tu-berlin.de">stefan.weinzierl@tu-berlin.de</a>