

## Proposal for a Bachelor thesis

**Topic:** Experimental Investigation of the Sparsity of Speech Signal Mixtures

**Description:** In daily life situations almost all audio recordings are mixtures of several audio sources, containing the desired source, but also interfering sources. Therefore, blind source separation, which aims in separating sources of an observed mixture, is a very active field of research.

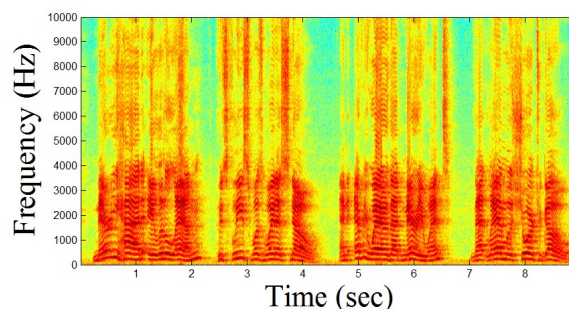
Many of these source separation algorithms are build on the assumption that at most one source is active at once, i.e., the mixture of the signals is assumed to be sparse. Most of the publications in this field give no justification of this assumption or just state their results as a proof of concept. A promising approach for validation of the sparsity assumption is the disjoint orthogonality measure [1,2], but however, a comprehensive study is not available yet.

The aim of this thesis is the validation of the sparsity assumption for different acoustic scenarios and preprocessing steps. This includes the investigation of different speech sources (reading speech, teleconferencing scenario...), preprocessing steps (windows, window lengths...), acoustic scenes (reverberation...) and the influence of interfering noise (bubble noise, AWGN...). A literature survey is also an important part of the thesis and the obtained results have to be related to existing work in literature.

As prerequisite, the student should have basic MATLAB programming experience and a firm grasp of the fundamentals of DSP.

[1]: Rickard, S. (EUSPICO 2006): *Sparse Sources are Separated Sources*

[2]: Yilmaz, O. and Rickard, S.: *Blind Separation of Speech Mixtures via Time-Frequency Masking*



STFT of a speech signal

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**Available:** Immediately