Lecture: Speech Enhancement
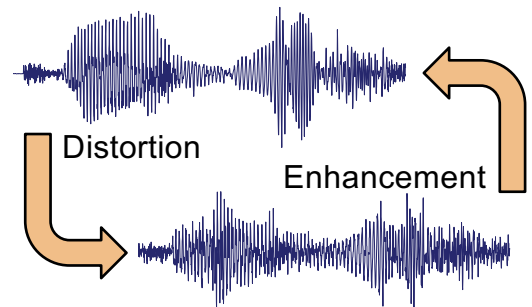## WS 2019/2020

Instructor

Prof. Dr. ir. Emanuël Habets

Format

Lecture:	2 SWS, Wednesday's,14:15-15:45
ECTS-Credits:	2,5
Language:	English
First Meeting:	Wednesday, 16.10.2019, 14:15-15:45
Place:	Room 3R4.04, Am Wolfsmantel 33

Content

We live in a noisy world! In all applications that are related to speech from hands-free communication, teleconferencing, hearing aids, cochlear implants, to human-machine interfaces such as smart speakers, a speech signal of interest captured by one or more microphones is contaminated by noise and reverberation. Depending on the level of noise and reverberation, the quality and intelligibility of the captured speech can be greatly reduced. Therefore, it is highly desirable, and sometimes even indispensable, to "clean up" the noisy signals using signal processing techniques before storage, transmission or reproduction.

In this course both traditional and deep learning methods for noise reduction and dereverberation, with one or more microphones, are discussed.

The goal of this course is to provide a strong foundation for researchers, engineers, and graduate students who are interested in the problem of signal and speech enhancement.

Learning Outcomes and Competences

- Derive optimal single- and multi-channel filters to reduce noise and reverberation.
- Design a microphone array and analyze its performance.
- Design a speech enhancement system for a given acoustic scenario.
- Understand the limitations and challenges of existing speech enhancement systems.
- Understand the importance of binaural cues and the influence of a speech enhancement system on the binaural cues in the context of hearing aids.
- Evaluate both subjectively and objectively the performance of a speech enhancement system in terms of the speech quality and intelligibility.

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