
Modulbezeichnung: Speech Enhancement (SpEn) **2.5 ECTS**

Modulverantwortliche/r: Emanuel A. P. Habets

Lehrende: Emanuel A. P. Habets

Startsemester: WS 2014/2015

Dauer: 1 Semester

Turnus: jährlich (WS)

Präsenzzeit: 30 Std.

Eigenstudium: 45 Std.

Sprache: Deutsch

Lehrveranstaltungen:

Speech Enhancement (WS 2014/2015, Vorlesung, 2 SWS, Emanuel A. P. Habets)

Inhalt:
Course Description

We live in a noisy world! In all applications (telecommunications, hands-free communications, recording, human-machine interfaces, etc.) that require at least one microphone, the signal of interest is usually contaminated by noise and reverberation. As a result, the microphone signal has to be "cleaned" with digital signal processing tools before it is reproduced, transmitted, or stored.

This course is about speech enhancement. Different well known and state-of-the-art methods for noise reduction and dereverberation, with one or multiple 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.

Relation to other courses

This course is the most advanced course offered by the university on this topic, and serves as an excellent basis from which to commence research in the area. Various aspects of the course bring students up to date with the very latest developments in the field, as seen in recent international conferences and journals. This course builds on *Sprach- und Audiosignalverarbeitung* (by Prof. Kellermann), and is well complimented by *Mensch-Maschine-Schnittstelle* (by Prof. Rabenstein), *Praxis der Audiodatenkompression* (Dr. Grill) and *Selected Topics in Perceptual Audio Coding* (Prof. Herre), which deal with many other signal processing methods and gives an understanding of human auditory perception (also a key part of speech enhancement) and speech and audio compression techniques.

Verwendbarkeit des Moduls / Einpassung in den Musterstudienplan:

Das Modul ist im Kontext der folgenden Studienfächer/Vertiefungsrichtungen verwendbar:

[1] Communications and Multimedia Engineering (Master of Science)

(Po-Vers. 2011 | Masterprüfung | Wahlpflichtmodule | Technische Wahlpflichtmodule)

[2] Communications and Multimedia Engineering (Master of Science)

(Po-Vers. 2011 | Masterprüfung | Wahlmodule | Technische Wahlmodule)

[3] Informations- und Kommunikationstechnik (Master of Science)

(Po-Vers. 2010 | Schwerpunkte im Masterstudium | Schwerpunkt Multimediasysteme | Wahlpflichtmodule | Wahlpflichtmodul aus EEI im Schwerpunkt Multimediasysteme)

[4] Informations- und Kommunikationstechnik (Master of Science)

(Po-Vers. 2010 | Schwerpunkte im Masterstudium | Schwerpunkt Realisierung von Informations- und Kommunikationssystemen | Wahlpflichtmodule | Wahlpflichtmodul aus EEI im Schwerpunkt Realisierung von Informations- und Kommunikationssystemen)

[5] Informations- und Kommunikationstechnik (Master of Science)

(Po-Vers. 2010 | Schwerpunkte im Masterstudium | Schwerpunkt Übertragung und Mobilkommunikation | Wahlpflichtmodule | Wahlpflichtmodul aus EEI im Schwerpunkt Übertragung und Mobilkommunikation)

Studien-/Prüfungsleistungen:

Speech Enhancement (Oral Examination) (Prüfungsnummer: 122773)

(diese Prüfung gilt nur im Kontext der Studienfächer/Vertiefungsrichtungen [1])

Prüfungsleistung, Klausur, Dauer (in Minuten): 90

Anteil an der Berechnung der Modulnote: 100%

Erstablegung: WS 2014/2015, 1. Wdh.: SS 2015

1. Prüfer: Emanuel A. P. Habets

Speech Enhancement (Oral Examination) (Prüfungsnummer: 788996)

(diese Prüfung gilt nur im Kontext der Studienfächer/Vertiefungsrichtungen [2], [3], [4], [5])

Prüfungsleistung, Klausur, Dauer (in Minuten): 90

Anteil an der Berechnung der Modulnote: 100%

Erstablingung: WS 2014/2015, 1. Wdh.: SS 2015

1. Prüfer: Emanuel A. P. Habets

Organisatorisches:

Pre-requisites: The minimum pre-requisite for the course are *Analysis und Lineare Algebra*, *Signale und Systeme I*, *Signale und Systeme II* and *Digitale Signalverarbeitung* (or equivalent). The course *Sprach- und Audiosignalverarbeitung* (by Prof. Kellermann) provides an excellent basis for the Speech Enhancement course and is therefore highly recommended. Knowledge from *Statistische Signalverarbeitung* (Prof. Kellermann) and/or *Stochastische Prozesse* (by Prof. Kellermann) is highly desirable.

Assumed knowledge: It is essential that you are familiar with the sampling theorem, the discrete Fourier transform, random signals, auto- and cross-correlation and frame-by-frame processing. Students who are not confident in their knowledge from previous signal processing courses (especially the topics mentioned) are strongly advised to revise their previous course materials as quickly as possible to avoid difficulties in this course.