IEEE Signal Processing Society
Germany Chapter Technical Meeting
May 12, 2023, Carl von Ossietzky University Oldenburg

Carl von Ossietzky
Universität
Oldenburg

Donnerstag, 11. Mai 2023

19:00   Informelles Abendessen

Restaurant Heini am Stau, Stau 142, 26122 Oldenburg (Selbstbezahlung)

Freitag, 12. Mai 2023

09:00   Treffpunkt Raum W30-0-33/34, Nessy Gebäude, Küpkersweg 74, 26129 Oldenburg

09:15   Eröffnung (Gerald Enzner)

Introduction to the Department of Medical Physics and Acoustics @ UOL (Simon Doclo)

Introduction to Speech Technology and Hearing Aids @ UOL (Gerald Enzner)

10:15   IEEE Distinguished Lecture

Dr. Hiroshi Sawada, NTT Communication Science Laboratories, Kyoto, Japan

Signal Processing for Blind Source Separation of Speech and Music

11:45   Informelle Mittagspause

Snack vor Ort

13:00   Kurzbeiträge aus dem Germany Chapter

- Prof. Dr.-Ing. Tim Fingscheidt, Technische Universität Braunschweig

Using Non-Differentiable Losses for Discriminative Deep Noise Suppression

- Prof. Dr.-Ing. Reinhold Häb-Umbach und die DFG Forschergruppe 2457

Acoustic Sensor Networks: Challenges and Solutions

- Prof. Dr. Waldo Nogueira

Deep Learning Sound Coding for Auditory Implants

14:30 Coffee & Lab Tour @ UOL

15:30 Tagungsabschluss (Gerald Enzner)

IEEE Distinguished Lecturer
Dr. Hiroshi Sawada
NTT Communication Science Laboratories, Kyoto, Japan

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By invitation of the IEEE Signal Processing Society (SPS) Germany Chapter, Dr. Hiroshi Sawada, NTT Communication Science Laboratories, will give a lecture on May 12th, 2023, 10am-12am, room W30-0-33/34 (Nessy building) at University of Oldenburg, on

## Signal Processing for Blind Source Separation of Speech and Music

All members of the IEEE SPS Germany Chapter and the Carl von Ossietzky University Oldenburg and its partner institutions are cordially invited to participate in the presentation and the discussion. The lecture will be followed by an informal reception for personal interaction with Dr. Sawada.

Abstract of the presentation:

Humans can naturally separate mixed speeches and also musical instruments. Building such a capability into a computer contributes to automatic speech recognition in noisy environments, hearing aids, music analysis, etc. This talk starts by defining the task of blind source separation (BSS) as separating sound sources from the mixtures with as little prior information as possible. We will have a live demonstration of BSS to separate two simultaneous speeches recorded with a stereo IC recorder. Various signal processing techniques for BSS will then be explained. Independent component analysis (ICA) is a primary method for BSS and makes the outputs independent and far from a stationary Gaussian (normal) distribution. However, to separate sounds mixed in a real reverberant environment, we additionally need to solve the source modeling task. Nonnegative matrix factorization (NMF) is a way to model a sound source by identifying frequent sound patterns with a low-rank approximation. Independent low-rank matrix analysis (ILRMA) is a sophisticated integration of ICA and NMF, and achieves BSS in a real reverberant environment. For more challenging tasks of underdetermined situations, where the sources outnumber the microphones, full-rank spatial covariance analysis (FCA) is effective. All these signal processing techniques can be connected by modeling the sound sources with time-varying Gaussian distributions.

Speaker biography:

Hiroshi Sawada received the B.E., M.E., and Ph.D. degrees in information science from Kyoto University, Kyoto, Japan, in 1991, 1993, and 2001, respectively. In 1993, he joined NTT Corporation, Kyoto, Japan. He is currently a senior distinguished researcher at NTT Communication Science Laboratories, Kyoto, Japan. His research interests include statistical signal processing, audio source separation, array signal processing, machine learning, latent variable model, graph-based data structure, and computer architecture. He served as an Associate Editor for the IEEE Trans. Audio, Speech and Language Processing from 2006 to 2009, and as an Associate Editor of the IEEE Open Journal of Signal Processing from 2019 to 2022. He was a Member and an Associate Member of the Audio and Acoustic Signal Processing Technical Committee of the IEEE SP Society from 2006 to 2018. He received the Best Paper Award of the IEEE Circuit and System Society in 2000, and the Best Paper Award of the IEEE Signal Processing Society in 2014. He serves as an IEEE Signal Processing Society Distinguished Lecturer from 2022 to 2023. He is an IEEE Fellow, an IEICE Fellow, and a member of the Acoustical Society of Japan.
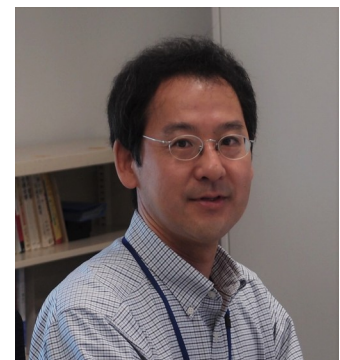
Moderators:
Prof. Dr.-Ing. Gerald Enzner
(IEEE SPS Germany Chapter Chair & University of Oldenburg)
Prof. Dr. Simon Doclo
(University of Oldenburg)

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