

NEWSLETTER

CENTRE FOR ACOUSTIC SIGNAL PROCESSING RESEARCH (CASPR)

August 2026

The Centre for Acoustic Signal Processing Research (CASPR) is a research centre at the Section for Artificial Intelligence & Sound, Department of Electronic Systems, Aalborg University, Denmark. CASPR is supported by the Demant Foundation, Oticon A/S, and Aalborg University.



If you are interested in learning more about the research and teaching taking place in CASPR, check our webpage [here](#).

Or, reach out to:

- [Prof. Jan Østergaard](#)
- [Prof. Jesper Jensen](#)
- [Prof. Zheng-Hua Tan](#)

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Centre for Acoustic Signal Processing Research

01/07

Department of Electronic Systems Section on
Artificial Intelligence & Sound Aalborg University

RESEARCH IN CASPR

ABOUT CASPR

CASPR is conducting research related to advanced statistical signal processing solutions for assistive listening. The research finds direct use in communication devices such as hearing aids, helmets, headphones, cochlear implants, ear monitor, ear pieces, diagnostic equipment, etc. However, the envisioned research also finds use in related areas such as robust speech/speaker recognition, brain computer interfaces, acoustic event detection, etc.

CASPR will navigate in a rapidly changing technological landscape: we envision a near future, where the technological landscape allows very different, and better, hearing assistive devices than are known today.

The scientific scope of CASPR encompasses:

- Signal processing for hearing assistive devices that use multiple modalities such as sound, vision, EEG, and other body signals.
- Advanced signal processing concepts in closer symbiosis with the user in order to e.g., automatically adapt to the user's needs.
- Beyond audibility. Restore audibility, increase intelligibility, decrease listening effort.

SCIENTIFIC DISCIPLINES OF CASPR

Machine Learning

- Deep Neural Networks
- Automatic Speech Recognition
- Multimodal Biometric
- Brain-Computer Interfaces
- Big Data

Information and Communication Theory

- Information in the brain and the auditory system
- Streaming of sound
- Compression of sound
- Wireless acoustic sensor networks

Statistical Signal Processing

- Speech processing
- Signals in noise
- Spatial signal processing
- Multimodal signal processing
- EEG signal processing
- Processing of body worn sensor data

Signal Processing and Perception

- Signal processing that compensates auditory system
- Signal processing that complements auditory system

TEACHING IN CASPR

CURRENT COURSES RELATED TO CASPR

CASPR is heavily involved in teaching and education at B.Sc., M.Sc., PhD., and Postdoc level in disciplines that are relevant to the scientific scope of CASPR:

- Machine learning, Master and PhD courses.
- Deep learning, Master and PhD courses.
- Self-Supervised Learning, PhD course.
- Reinforcement Learning, PhD course.
- Introduction to Information Theory in Neuroscience, PhD course.
- CASPR Seasonal Schools on Signal Processing for Hearing Assistive Devices.
- Information and coding theory, Master course.

DURING SPRING 2026, CASPR WAS INVOLVED IN THE FOLLOWING STUDENT PROJECTS

Project title: “Electroencephalography Phase Synchrony Discriminates Linguistic Violations During Retention of Noisy Speech”
Student: Sif Bjerre Lindby
Education: Mathematical Engineering - joint 9/10th-semester Master’s thesis
Supervisors: Jan Østergaard, Zheng-Hua Tan, Jesper Jensen

Project title: “Universal Speech Enhancement – A Speech Language Modelling Perspective”
Student: Nikolai Lund Kühne
Education: Mathematical Engineering - joint 9/10th-semesters Master’s thesis
Supervisors: Zheng-Hua Tan, Jan Østergaard, Jesper Jensen

Project title: “Sound Bubbles for Hearing Aids: A Study of Microphone Configurations and Synthetic Data Augmentation”
Student: Nicolaj Boelt Pedersen
Education: Computer Engineering (AI, Vision, and Sound) - 10th-semester Master’s thesis
Supervisors: Niels Overby, Svend Feldt, Jesper Jensen, Jan Østergaard

Project title: “Multimodal Learning for Understanding Human Behavior”
Students: Andreas Peter Juhl Hansen, Jeppe Roden Münster, Simon Bock Seggaard
Education: Mathematical Engineering - 10th-semester Master’s thesis with the University of Southern California (visiting Prof. Shrikanth Narayanan)
Supervisors: Zheng-Hua Tan

Project title: “Neural Decoding of the Lexical Competition Using Deep Learning and EEG Signals”
Students: Mads Dyrbjerg Andersen, Mary Andrea Folkedal Hole, Signe Strøm Møller Christensen, Philip Jacob Pedersen
Education: Mathematical Engineering - 8th-semester project
Supervisors: Jan Østergaard, Christophe Biscio, Sif Bjerre Lindby

Project title: “Employing Dynamic Neural Networks for Speech Enhancement on Hearing Aid Devices”
Students: Aran Huarte Domec, Deian Orlando Petrovics, Max Bohk, Melina Søndergård Rasmussen
Education: Computer Engineering (AI, Vision and Sound) - 8th-semester project with Oticon A/S
Supervisors: Peter Asbjørn Leer Bysted and Zheng-Hua Tan

CASPR III

We gratefully acknowledge the generous support of the William Demant Foundation, Oticon, and Aalborg University, which enables us to continue and expand the work of our research centre.

The Centre for Acoustic Signal Processing Research (CASPR) is anchored in the AI & Sound Section of the Department of Electronic Systems at Aalborg University in Aalborg, Denmark. Established in November 2016 and extended in 2021 and 2026, CASPR brings together expertise in audio and acoustics, signal processing, and machine learning to conduct pioneering research and develop technologies that improve hearing assistance and communication.

Building on this strong foundation, CASPR III aims to shape the future of hearing assistance by harnessing advanced artificial intelligence and emerging sensor technologies. Its ambition is to help people with hearing loss hear the sounds that matter, understand speech with less effort, and communicate confidently anywhere and at any time—even in complex listening environments.

To realize this vision, CASPR III explores efficient neural network architectures, generative audio, language and speech foundation models, and multimodal sensing technologies such as EEG electrodes, accelerometers, and cameras. By combining advances across these fields, CASPR III seeks to move hearing assistance beyond audibility toward effortless understanding, intention-aware listening, and truly personalized support.

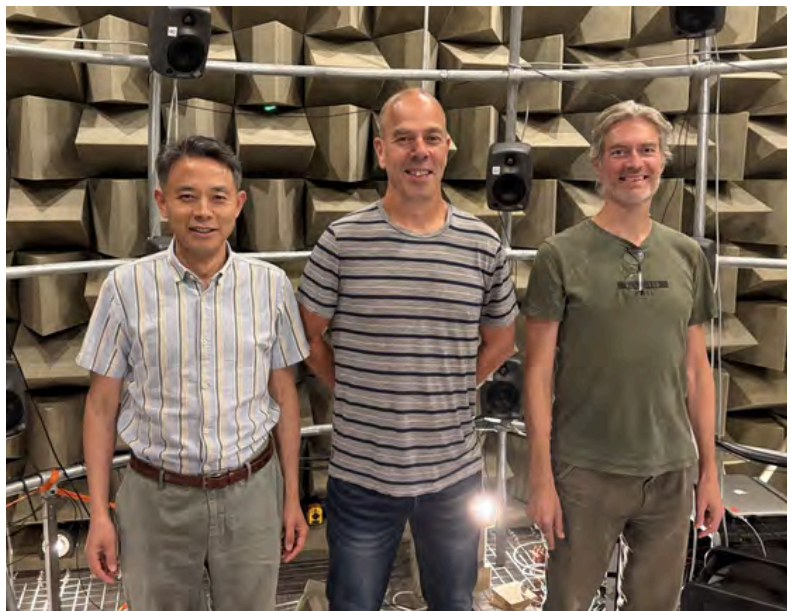
CASPR works closely with students at Aalborg University and maintains strong collaborations with academic researchers, industry partners, and the Danish sound community.

CASPR III OPENING AND AIS OPEN LAB EVENT

To celebrate the continuation of the centre and strengthen these valuable connections, we warmly invite you to the CASPR III and AI & Sound Open Lab event.

The event will take place at Aalborg University on 22 October 2026, from 09:30 to 14:30. Attendance is free of charge. Please register using the QR code at the bottom of the page. To help us provide sufficient lunch and refreshments for everyone, we kindly ask you to register in advance.

During the event, our researchers will present their latest work and host demonstrations in our laboratories. There will also be plenty of opportunities to meet and exchange ideas with researchers, students, and industry representatives. We look forward to welcoming you.



From left to right: Profs. Zheng-Hua Tan, Jesper Jensen, and Jan Østergaard (heads of CASPR)



[sign up here](#)
deadline: 9 October

NEWS

Prof. Zheng-Hua Tan has been re-elected as a member of the IEEE Signal Processing Society's Speech and Language Processing Technical Committee (SLTC). He will serve a second term from 2027 to 2029. The SLTC is responsible for promoting research in speech and language processing and for overseeing the organization of technical sessions in these fields at ICASSP.

Students at AAU supervised by CASPR staff successfully defended their theses in June and August 2026: Andreas Peter Juhl Hansen, Jeppe Roden Münster, Simon Bock Seggaard, Nicolaj Boelt Pedersen, Nikolai Lund Kühne, and Sif Bjerre Lindby.

Prof. Jan Østergaard has received a total of DKK 13.4 million from the Novo Nordisk Foundation New Exploratory Research and Discovery (NERD) grant. The project is entitled "Information Theoretic Disentanglement of the Exceptional Biological Learning Machine (INFOCEPTIONAL)".

The following people (left to right) attended ICASSP 2026 in Barcelona, Spain, from May 4-8: Peter Asbjørn Leer Bysted, Panagiotis Apostolidis, Jesper Jensen, Nikolai Lund Kühne, Sif Bjerre Lindby, Kevin Wilkinghoff, Zheng-Hua Tan, and Lasse Borgholt.



PUBLICATIONS

CONFERENCE PAPERS

Interspeech

1. Kevin Wilkinghoff, Gordon Wichern, Jonathan Le Roux, and Zheng-Hua Tan. "Mind the gap: detecting cluster exits for robust local density-based score normalization in anomalous sound detection". In: Proceedings of the Annual Conference of the International Speech Communication Association (Interspeech) (Accepted). Sydney, Australia, September 27–October 1, 2026.

IWAENC

1. Niels Overby, Svend Feldt, Zheng-Hua Tan, and Jan Østergaard. "Speech separation: from simulated spaces to realistic situations". In: Proceedings of the 19th International Workshop on Acoustic Signal Enhancement (IWAENC) (Accepted). Cremona, Italy, September 7–10, 2026.
2. Panos Apostolidis, Svend Feldt, Zheng-Hua Tan, Jan Østergaard, and Jesper Jensen. "Listen first: output-based multi-microphone speech enhancement". In: Proceedings of the 19th International Workshop on Acoustic Signal Enhancement (IWAENC) (Accepted). Cremona, Italy, September 7–10, 2026.

EUSIPCO

5. Asjid Tanveer, Jesper Jensen, Emina Alickovic, Zheng-Hua Tan, and Jan Østergaard. "Subject-independent auditory attention decoding from mobile EEG via contrastive learning". In: Proceedings of the 34th European Signal Processing Conference (EUSIPCO) (Accepted). Bruges, Belgium, August 31–4 September, 2026.
6. Kevin Wilkinghoff, Keisuke Imoto, and Zheng-Hua Tan. "How much does machine identity matter in anomalous sound detection at test time?" In: Proceedings of the 34th European Signal Processing Conference (EUSIPCO) (Accepted). Bruges, Belgium, August 31–4 September, 2026.

EMBC

7. Sif Bjerre Lindby, Jesper Jensen, Zheng-Hua Tan, and Jan Østergaard. "Electroencephalography phase synchrony differentiates linguistic violations in noisy speech". In: Proceedings of the 48th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC). Toronto, Canada, July 26–30, 2026, pp. 727–733.

ICASSP

8. Sif Bjerre Lindby, Jesper Jensen, Zheng-Hua Tan, and Jan Østergaard. "Investigating the effect of sentence-level syntactic structure on information loss in the human auditory system". In: Proceedings of the 51st Annual IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP). Barcelona, Spain, May 4–8, 2026, pp. 16577–16581.
9. Nikolai Lund Kühne, Jesper Jensen, Jan Østergaard, and Zheng-Hua Tan. "Exploring resolution-wise shared attention in hybrid Mamba-U-Nets for improved cross-corpus speech enhancement". In: Proceedings of the 51st Annual IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP). Barcelona, Spain, May 4–8, 2026, pp. 16327–16331.
10. Mojtaba Farmani, Svend Feldt, and Jesper Jensen. "Beamforming using virtual microphones for hearing aid applications". In: Proceedings of the 51st Annual IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP). Barcelona, Spain, May 4–8, 2026, pp. 15552–15556.
11. Peter Leer, Svend Feldt, Zheng-Hua Tan, Jan Østergaard, and Jesper Jensen. "Ranking the impact of contextual specialization in neural speech enhancement". In: Proceedings of the 51st Annual IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP). Barcelona, Spain, May 4–8, 2026, pp. 17432–17436.
12. Kevin Wilkinghoff and Zheng-Hua Tan. "DSPAST: disentangled representations for spatial audio reasoning with large language models". In: Proceedings of the 51st Annual IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP). Barcelona, Spain, May 4–8, 2026, pp. 14747–14751.
13. Kevin Wilkinghoff, Alessia Cornaggia-Urrigshardt, and Zheng-Hua Tan. "Quantization-based score calibration for few-shot keyword spotting with dynamic time warping in noisy environments". In: Proceedings of the 51st Annual IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP). Barcelona, Spain, May 4–8, 2026, pp. 18787–18791.
14. Lasse Borgholt, Jakob Havtorn, Christian Igel, Lars Maaløe, and Zheng-Hua Tan. "A text-to-text alignment algorithm for better evaluation of modern speech recognition systems". In: Proceedings of the 51st Annual IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP). Barcelona, Spain, May 4–8, 2026, pp. 3476–3480.

PUBLICATIONS

JOURNAL PAPERS

1. Eleftheria Lydaki, Zheng-Hua Tan, Jesper Jensen, and Meng Guo. "Deep feedback cancellation in hearing aids". In: IEEE Transactions on Audio, Speech and Language Processing 34 (2026), pp. 3159–3173.
2. Filippo Villani, Wai-Yip Chan, Zheng-Hua Tan, Jan Østergaard, and Jesper Jensen. "Near-end listening enhancement via combined noise-dependent spectro-temporal energy reallocation". In: IEEE Access 14 (2026), pp. 43795–43812.
3. Gustav Wagner Zakarias, Lars Kai Hansen, and Zheng-Hua Tan. "BiSSL: enhancing the alignment between self-supervised pretraining and downstream fine-tuning via bilevel optimization". In: Transactions on Machine Learning Research 2 (2026). This publication was awarded the J2C certification and presented at the 43rd International Conference on Machine Learning (ICML) in Seoul, Korea.
4. Haolan Wang, Wai-Yip Chan, and Jesper Jensen. "TSIP-Net: no-reference speech intelligibility prediction in the presence of competing speech". In: Speech Communication 179 (2026).
5. Ioannis Stylianou, Achintya Kr Sarkar, Nauman Dawalatabad, James Glass, and Zheng-Hua Tan. "LibriVAD: a scalable open dataset with deep learning benchmarks for robust voice activity detection". In: Computer Speech Language (2026).
6. Ioannis Stylianou, Jon Francombe, Pablo Martinez-Nuevo, Sven Ewan Shepstone, and Zheng-Hua Tan. "One prompt, many sounds: modeling listener variability in LLM-based equalization". In: IEEE Journal of Selected Topics in Signal Processing, Special Series on AI in Signal Data Science—Toward Large Language Model (LLM) Theory and Applications (2026).
7. James Brooks-Park, Søren Bech, Jan Østergaard, and Steven van de Par. "Room compensation for loudspeaker reproduction using a supporting source". In: The Journal of the Acoustical Society of America 159.4 (2026), pp. 3006–3017.
8. Jesper Brunnström, Martin Bo Møller, Jan Østergaard, Shoichi Koyama, Toon van Waterschoot, and Marc Moonen. "Sound field estimation with moving microphones using kernel ridge regression". In: IEEE Transactions on Audio, Speech and Language Processing (2026).
9. Jesper Brunnström, Martin Bo Møller, Jan Østergaard, Shoichi Koyama, Toon van Waterschoot, and Marc Moonen. "Time-domain sound field estimation using kernel ridge regression". In: IEEE Transactions on Audio, Speech and Language Processing 34 (2026), pp. 1243–1258.
10. José Miguel Cadavid Tobón, Martin Bo Møller, Toon van Waterschoot, Søren Bech, and Jan Østergaard. "Reducing computational complexity in adaptive sound zones with online room impulse response estimation". In: The Journal of the Acoustical Society of America 159.6 (2026), pp. 5729–5744.
11. Nikolai Lund Kühne, Jesper Jensen, Jan Østergaard, and Zheng-Hua Tan. "MambaAttention: mamba with multi-head attention for generalizable single-channel speech enhancement". In: IEEE Transactions on Audio, Speech and Language Processing 34 (2026), pp. 820–833.
12. Payam Shahsavari Baboukani, Emina Alickovic, Jan Østergaard, and Kasper Eskelund. "Parietal alpha-band connectivity tracks listening effort in hearing-aid users under competing speech and noise". In: European Journal of Neuroscience 63.6 (2026).