

NEWSLETTER

HEARING SYSTEMS IN PROFILE

February 2021



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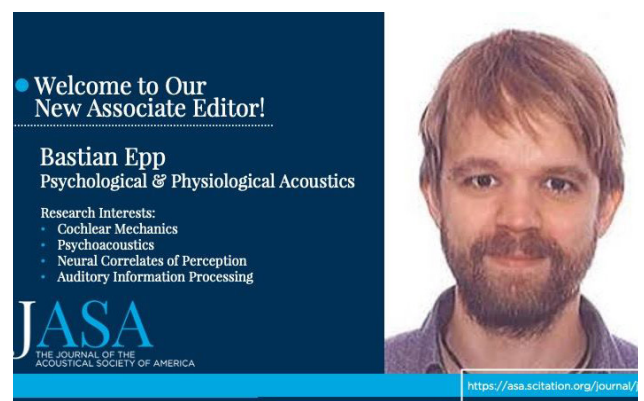
News, awards, prizes



Photo: Jesper Scheel, DTU Health Tech

Corresponding member of the German Society of Audiology (DGA)

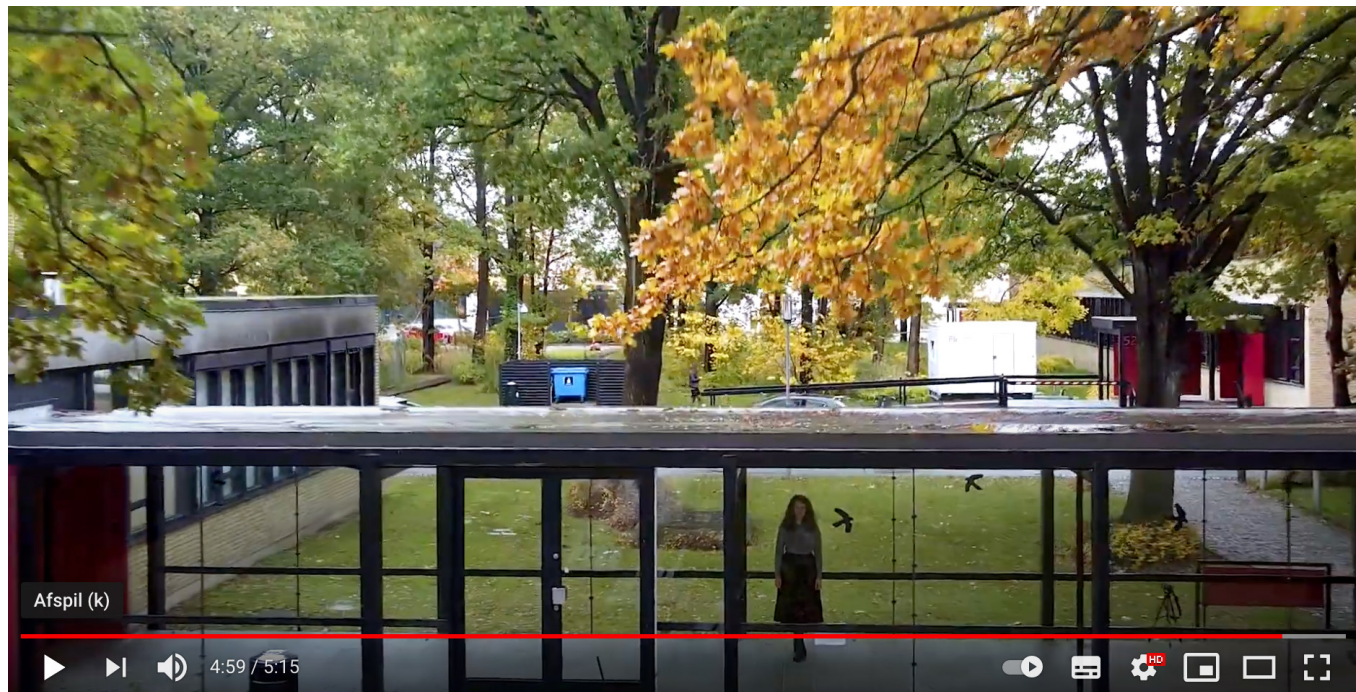
Torsten Dau, Head of Hearing Systems, has been appointed corresponding member of the German Society of Audiology (DGA, Deutsche Gesellschaft für Audiologie) for his 'outstanding scientific contributions to the field of audiology and his contributions to the activities of the DGA'. The honourable corresponding membership is given to leading researchers who are active outside of Germany. Torsten is the 7th corresponding member of the DGA. The laudatio at the annual meeting of DGA was given by Prof. Birger Kollmeier from the University of Oldenburg.



New Associate Editor at The Journal of the Acoustical Society of America

Bastian Epp, Associate professor at Hearing Systems, has joined the JASA Editorial Board recently as Associate Editor. He will be processing manuscripts in the area of psychological and physiological acoustics for a period of three years.

News



ARCHES 2020

On December 1, the 14th Audiological Research Cores in Europe (ARCHES) meeting took place. ARCHES is a European network of research groups from Amsterdam, Groningen, Nottingham, Oldenburg, Paris, Leuven, Zurich, Groningen, Salamanca and Copenhagen, focusing on hearing science, with the aim to stimulate networking, interaction, and scientific collaboration between researchers in the auditory field. The meeting was this year arranged by Hearing Systems and was held online. The online format attracted 120 participants to tune in, which is about three times as many as compared to the physical meetings in previous years.

Each participating research group gave a presentation of their university, collaboration partners, and lab activities. This year, the research groups were given a special assignment: to make a video presentation about their research group and lab facilities. Between the group presentations and some individual project presentations, the participants had the opportunity to connect in smaller break-out sessions to discuss topics relevant to their individual areas and interests. This was the 14th ARCHES meeting. The next one will take place in Amsterdam, The Netherlands. Read more about ARCHES [here](http://www.hea.helthtech.dtu.dk/news/ARCHES%2020) : [www.hea.helthtech.dtu.dk/news/ARCHES 2020](http://www.hea.helthtech.dtu.dk/news/ARCHES%2020)

An exciting place for auditory research

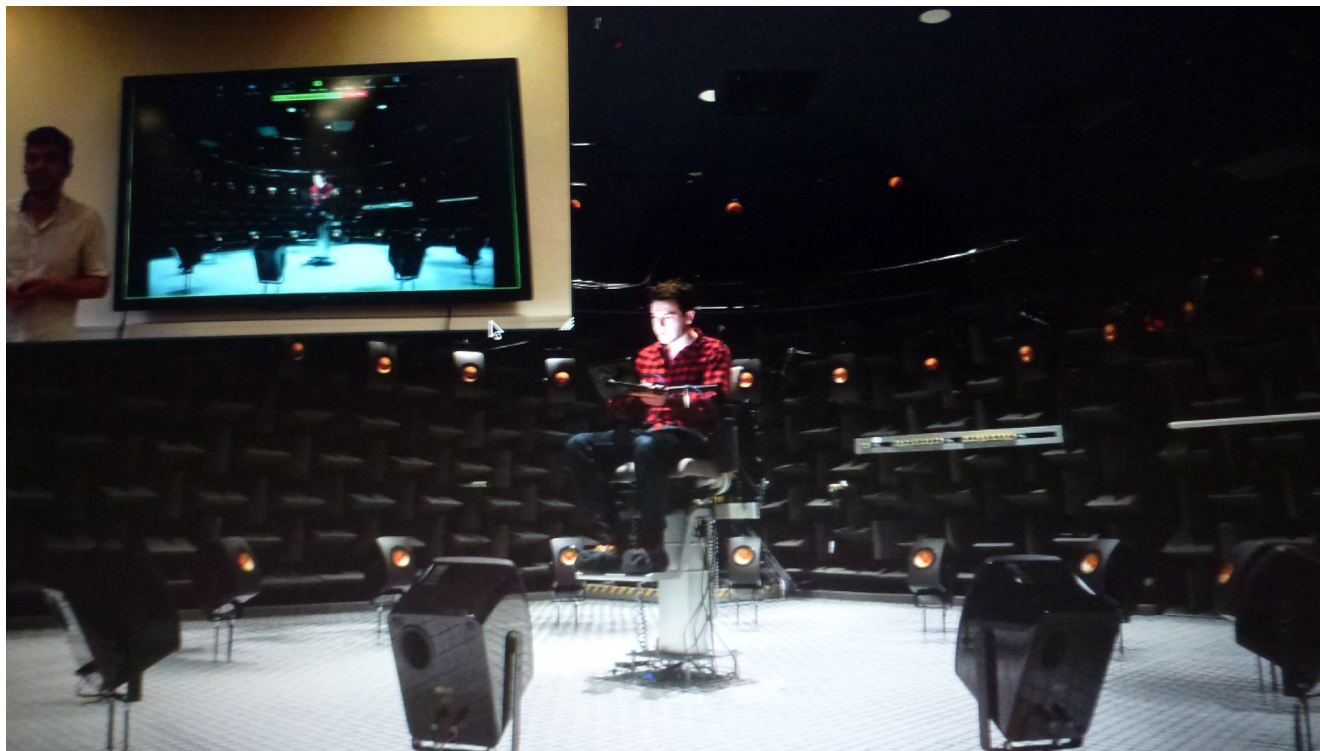
In connection to the ARCHES meeting, Hearing Systems produced a video about some of the ongoing activities in the Section. "Here in the Hearing Systems Section at DTU, we conduct research on human hearing and the intricate ways all of us navigate through our auditory world. In this video, we want to show you how we do this, by taking you on a tour around our high-tech lab facilities. It's these environments that enables us to investigate how people's ears and brains process sound, how that processing affects their perception and behaviour, and how impairments to the system can be characterized and perhaps overcome."

Watch the movie [here](https://www.youtube.com/watch?v=loQSnFiUOyA&feature=youtu.be):

<https://www.youtube.com/watch?v=loQSnFiUOyA&feature=youtu.be>

Filmed and edited by Marina Kliuchko and Naim Mansour.
Featuring Naim Mansour, Sam Watson, Florine Bachmann, Josefine Sorensen, Maaïke van Eeckhoutte, Marina Kliuchko.

News



Presentation Day

Hearing Systems held the annual Presentation Day on November 13. Due to the Corona situation, the format of the meeting was a bit different this year. Despite the limitations in conducting the event online, the afternoon turned out to be a success. 125 people participated in the event. After a brief overview of last year's major activities and achievements, seven talks and sixteen posters were presented by the young researchers in the group throughout the afternoon.

The talks were organized in three major sessions: "Audiology and hearing rehabilitation", "Computational modeling of natural sound processing" and "Perception and virtual sound environments and multi-sensory listening".

The posters covered a large variety of topics and were realized as parallel break-out sessions. Even though the 'networking' element of the meeting was probably less intense than it would have been at a physical meeting, the feedback from many participants, alumni and collaboration partners regarding the format of the online event and the scientific content was very

Photo: Naim Mansour is presenting his project "The effect of hearing aid signal processing on speech intelligibility in a realistic virtual sound environment" (Screenshot)

positive. After the scientific part, it was possible to connect socially in "Gather Town", a video calling space.

Read more about the event [here](#):

www.hear.hea.healthtech.dtu_news_Hearing_Systems_Presentation_Day

PhD defences



Photo: The tradition is that the fellow PhD students in the group build a PhD hat at each PhD defence. Charlotte's project included physiological research with mice and CI. "A mouse takes of a ramp on her motorcycle to land in a net, surrounded by funky pulse shapes and mice friends."

Photo: Pernille Holtegaard

On 30 November 2020, Charlotte Amalie Emdal Navntoft successfully defended her thesis: "Improving cochlear implant performance with new pulse shapes: a multidisciplinary approach".

The external examiners of the defence were:

Professor Andrej Kral, Hannover Medical University

Professor Johannes Frijns, Leiden University. The Chairman of the examiner committee was Associate Professor Bastian Epp,

DTU Health Tech. Principal supervisor: Associate Professor Jeremy Marozeau, Co-supervisor: Associate Professor Tania Rinaldi Barkat Department of Biomedicine of the University of Basel.

Charlotte is now in a position at Oticon Medical as Scientist in Hearing Regeneration, Research & Technology.



Photo: Valentina Zapata Rodriguez

On October 30 2020, Juan Camilo Gil Carvajal successfully defended his thesis "Towards a feature-based theory of audiovisual integration of speech".

The external examiners of the defence were: Professor Salvador Soto-Faraco, University of Pompeu Fabra, Spain, Kaiser Maria Tilippana, University of Helsinki Finland. The chairman of the examiner committee was Senior researcher Jens Hjortkjær, DTU Health Tech. Principal supervisor Associated Professor Tobias Andersen, DTU Compute, Co-supervisor Professor Torsten Dau. Camilo is now employed at Oticon.

Staff news

Visiting Professor at Hearing Systems

Andrew Oxenham



From April 2021, Professor Andrew Oxenham will be Visiting Professor at Hearing Systems DTU.

Andrew Oxenham is a Distinguished McKnight University Professor in the Departments of Psychology and Otolaryngology at the University of Minnesota, where he directs the Auditory Perception and Cognition Lab. Before coming to Minnesota in 2006, he was a Principal Research Scientist at MIT's Research Laboratory of Electronics. His research interests include auditory and speech perception in normal, impaired and electric hearing.

Andrew Oxenham is looking very much forward to his stay and the research collaboration with Torsten Dau and the researchers in the group.

"I've known Torsten and the world-leading work done by him and his outstanding group for over 25 years now, so it's a great pleasure to be able to work with the group in person, social-distancing regulations permitting. I'm particularly looking forward to harnessing our different skills and perspectives to understanding how our processing of sound modulations (the information in sound that carries information) changes in the face of hearing loss and cochlear implantation, and whether we can harness that knowledge to improve the lives of people with hearing loss," Andrew Oxenham says.

New postdoc projects

Relative pitch perception in normal-and hearing- impaired listeners

Sara Miay Kim Madsen



This project focuses on the concept of "relative pitch" – the pitch relationships between consecutive or simultaneous sounds. It has been shown that especially non-musicians are poor at pitch interval size discrimination and one study investigates how interval discrimination abilities are affected by tonal context. Another study is concerned with mistuning perception of melodies and explores the role of beating for mistuning perception. The project is funded by a grant from the William Demant Foundation and was planned to be carried out at the University of Minnesota but was moved to DTU in November 2020 due to Covid-19 restrictions. The project is conducted in collaboration with Prof. Andrew Oxenham.



Speech communication challenges due to rever- beration and hearing loss: Perceptual mechanisms and hearing-aid solutions

Axel Ahrens

From 1st of March, Axel Ahrens is starting a new postdoc position at the University of Southern Denmark in collaboration with DTU, Boston University and WS Audiology. The project was awarded to Tobias Neher and funded by the Independent Research Fund Denmark. Hearing-impaired listeners are known to struggle to understand speech particularly in rooms with strong reverberation. The aim of this project is to understand the perceptual mechanisms of speech communication in listeners with hearing loss, particularly in the presence of reverberation. Furthermore, the influence of hearing aids and algorithms will be investigated.

New PhD projects



Computational modeling of auditory evoked potentials in the hearing-impaired system

Miguel Temboury Gutierrez

Increasingly more patients diagnosed with 'normal-hearing' by the standard audiometric test have difficulties understanding speech. Research suggests that this 'hidden' hearing loss is related to neural degeneration and is affected by age. It remains a challenge to diagnose 'hidden' hearing loss through non-invasive measures that reflect the neural processing throughout the auditory pathway. Combining computational and statistical models, this PhD project focuses on predicting individual auditory evoked responses and linking them to different types of hearing-impairment and age. The project is supported by the Oticon Centre of Excellence for Hearing and Speech Sciences (CHeSS).



Binaural speech enhancement in noisy and reverberant environments using deep learning

Philippe Gonzalez

The recent success of machine learning has substantially elevated the performance of speech enhancement systems. Despite this success, one major challenge of learning-based approaches is the limited generalization to unseen conditions. When properties of the acoustic scene change between the training and the testing stage (e.g. the direction of the target or the type of background noise), this mismatch can considerably reduce the effectiveness of learning-based approaches. Thus, the following project aims at analyzing and improving the generalization abilities of learning-based binaural speech enhancement systems in adverse acoustic conditions where both interfering noise and room reverberation are present.

New job position



Development Engineer at IDUN audio

Kasper Duemose Holm

After many years in Hearing Systems, Kasper Duemose Lund starts on February 1 as Development Engineer at IDUN audio. [IDUN audio](#) is a company that specializes in software for spatial audio and natural listening experiences via headphone playback. With very low processing power the software can simulate and render virtual acoustic environments in real time. In his new position as a development engineer at IDUN audio, Casper will work mainly on developing the interface for controlling the audio processing.

New Research Assistant



Charlotte Sørensen

In February 2021, Charlotte Sørensen will start as research assistant in the Hearing Systems section.

Charlotte will primarily work with the audiological and electrophysiological studies in [UHEAL \(Uncovering Hidden Hearing Loss\)](#).

Publications (Since September 2020)

Journal papers

Sanchez Lopez R, Fereczkowski M, Neher T, Santurette S, Dau T (2020) [Robust data-driven auditory profiling towards precision audiology](#). *Trends in Hearing* 24

Revels Jensen KH, Navntoft CA, Sindahl CH, Cayé-Thomasen P, Jørgensen MB (2020) [Cochlear implant should not be absolute contraindication for electroconvulsive therapy and transcranial magnetic stimulation](#). *Brain Stimulation*. 13, 5, p 1464-1466

West NC, Kressner AA, Baungaard LH, Sandvej MG, Bille M, Cayé-Thomasen P (2020) [Nordic results of cochlear implantation in adults: speech perception and patient reported outcomes](#). *Acta Oto-Laryngologica* 140, 11, p. 939-947

Wu M, Sanchez Lopez R, El-Haj-Ali M, Nielsen SG, Fereczkowski M, Dau T, Santurette S, Neher T (2020) [Investigating the effects of four auditory profiles on speech recognition, overall quality, and noise annoyance with simulated hearing-aid processing strategies](#). *Trends in Hearing*. 24, p 12

Van Eeckhoutte MC, Scollie S, O'Hagan R, Glista D (2020) [Perceptual benefits of extended bandwidth hearing aids with children: A within-subject design using clinically available hearing aids](#). *Journal of Speech, Language, and Hearing Research*. 63, 11, p. 3834-3846

Ahrens A, Joshi SN, Epp B (2020) [Perceptual Weighting of Binaural Lateralization Cues across Frequency Bands](#) *JARO - Journal of the Association for Research in Otolaryngology*. 21, p. 485–496

Guérit F, Marozeau J, Epp B, Carlyon RP (2020) [Effect of the Relative Timing between Same-Polarity Pulses on Thresholds and Loudness in Cochlear Implant Users](#). *JARO - Journal of the Association for Research in Otolaryngology*. 21, p. 497–51

Lamping W, Deeks JM, Marozeau J, Carlyon RP (2020) [The effect of phantom stimulation and pseudomonophasic pulse shapes on pitch perception by cochlear implant listeners](#). *JARO - Journal of the Association for Research in Otolaryngology*. 21, p. 511–526

McCormack L, Pulkki VT, Politis A, Scheuregger O, Marschall M (2020) [Higher-order spatial impulse response rendering: Investigating the perceived effects of spherical order, dedicated diffuse rendering, and frequency resolution](#). *Journal of the Audio Engineering Society* 68, 5, p. 338-354

Marozeau J, Gnansia D, Ardoint M, Poncet-Wallet C, Lazard, DS, O'Leary S (ed.) (2020) [The sound sensation of a pure tone in cochlear implant recipients with single-sided deafness](#) *PLOS ONE*. 15, 7, 21 p., e0235504

Sørensen PM, Epp B, May T (2020) [A depthwise separable convolutional neural network for keyword spotting on an embedded system](#) *Eurasip Journal on Audio, Speech, and Music Processing* 2020 1, 14 p 10

Favre-Félix A, Graversen C, Bhuiyan TA, Skoglund MA, Rotger-Griful S, Rank ML, Dau T, Lunner T (2019) [Absolute eye gaze estimation with biosensors in hearing aids](#). *Frontiers in Neuroscience* 13, 10 p 1294

Iborra HR, Zaar J, Dau T (2019) [A speech-based computational auditory signal processing and perception model](#). *Journal of the Acoustical Society of America* 146, 5 p 3306-3317

Dau T, Roersted JM, Fuglsang S, Hjortkjær J (2018) Towards cognitive control of hearing instruments using EEG measures of selective attention. *Acoustical Society of America* 143, 1744

Ceolini E, Hjortkjær J, Wong DDE, O'Sullivan J, Raghavan VS, Herrero J, Mehta AD, Liu S-C, Mesgarani N (2020) [Brain-informed speech separation \(BISS\) for enhancement of target speaker in multitalker speech perception](#). *NeuroImage* 223, 12 P 117282.

Sanchez Lopez R, Fereczkowski M, Dau T, Santurette S, Neher T (2021) [Towards Auditory Profile-Based Hearing-Aid Fitting: Fitting Rationale and Pilot Evaluation](#) *Audiology Research*. 11, 1, p. 10-21

Conference papers

Casolani C, Harte JM, Epp B (2020) [Looking for objective correlates between tinnitus and cochlear synaptopathy](#). Presented at the 7th International Symposium on Auditory and Audiological Research, 7 p 421-428

Jo ES, Park DC, Gil Carvajal JC, Jeong C-H, Song W (2020) [Perceived immersion and powerfulness of a vehicle driving simulator in different reproduction configurations](#). Presented at the Inter-noise 2020 South Korea.

Kim H, Epp B (2020) [Physiological correlates of masking release](#). Presented at the 7th International Symposium on Auditory and Audiological Research 7 p. 453-460

Lindahl JT, Encina-Llamas G, Epp, B (2020) [Analysis of a forward masking paradigm proposed to estimate cochlear compression using an auditory nerve model and signal detection theory](#). Presented at the 7th International Symposium on Auditory and Audiological Research 7, p 445-452

Sørensen LM, Bysted PL, Epp B (2020) [Clustering in an array of nonlinear and active oscillators as a model of spontaneous otoacoustic emissions](#). Presented at the 46 Jahrestagung der Akustik p 110-113

Lund K, Ordoñez R, Nielsen JB, Hammershøi D (2019) ["Yes, I have experienced that!" - How daily life experiences may be harvested from new hearing aid users](#). Presented at the 7th International Symposium on Auditory and Audiological Research, 7 p 281-288

May T, Sutojo S, van de Par S (2020) Glimpse formation based on local feature contrast and spectro-temporal context Presented at Forum Acusticum 2020 P 771-778.

Book chapter

Szibor A, Hyvärinen P, Mäkitie A, Aarnisalo AA (2021) [Low inter-rater consistency in semantic profiles of tinnitus-like sounds rated by tinnitus patients](#) *Progress in Brain Research*. Elsevier

PhD theses

Charlotte Amalie Emdal Navntoft (2020)

Improving cochlear implant performance with new pulse shapes: a multidisciplinary approach

Juan Camilo Gil Carvajal (2020) Towards a feature-based theory of audiovisual integration of speech

New master projects

Lu Xia. Objective Evaluation of Hearing Aid Noise-Reduction Algorithms on Environmental Sounds.

Supervisors: Sébastien Santurette (Oticon), Ewen MacDonald, Marton Marschall, Axel Ahrens (DTU) Pernille Holtegaard, Gerard Encina-Llamas, Bastian Epp (DTU)

Rasmus Tinndahn. Low-latency speech detection in adverse acoustic conditions using deep learning

Supervisors: Tobias May, Philippe Gonzalez (DTU)

Tobias Zanchetta Kock. A real-time hearing impairment simulator. Supervisor Bastian Epp (DTU)

Viktorija Ratkute (title will be announced later) Supervisors: Hyojin Kim, Bastian Epp (DTU)

Anaïs Bouchet. Measuring human hearing with functional near-infrared spectroscopy

Supervisors: Maaïke Charlotte Van Eeckhoutte, Abigail Anne Kressner, Torsten Dau (DTU), Erik Kjærbøl (Bispebjerg Hospital)

Bettina Skjold Jasper. In-situ audiometry for hearing aid fitting

Supervisors: Maaïke Charlotte Van Eeckhoutte, Torsten Dau (DTU Health Tech), Erik Kjærbøl (Bispebjerg Hospital)

David Gröblbauer Spatial perception of gain dependent group delay differences in binaural hearing aids using minimum phase. Supervisors: Abigail Anne Kressner, Torsten Dau (DTU) Lars Dalskov Mosgaard (WS Audiology)

Kirsten Maria Jensen. Rico Validation of a virtual reality sound environment - comparing binaural spatialized audio and physical loud-speaker array. Supervisors: Abigail Anne Kressner, Jeremy Marozeau (DTU), Kathleen Faulkner Scalzo (Oticon medical)

Tushar Verma. The effect of tactile feedback on the perception of musical timbre.

Supervisor: Jeremy Marozeau , Co-Supervisor: Scott Aker (DTU)

New bachelor projects

Nikolaj Linden-Vørnle A real-time DSP teaching platform based on BELA

Supervisor: Bastian Epp (DTU)

Swantje Hansen. Investigating peripheral sources of the frequency following response.

Supervisors: Jens Hjortkjær, Torsten Dau, Jonatan Märcher-Rørsted (DTU)



Photo: Part of the virtual group photo from the Presentation Day, arranged by Axel Ahrens

