Technical University of Denmark

NEWSLETTER

HEARING SYSTEMS IN PROFILE

January 2017

HEARING SYSTEMS

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Outstanding Paper by a Young Presenter at the Acoustical Society of America Conference

Anna Josefine Sørensen (rightmost), Master student at DTU Elektro, together with Thea Mathilde Larsen and Lærke Cecilie Bjerre from DTU Civil Engineering, won the Young Researcher Award, which came with a travel grant worth DKK 8.000 for scientific research.

The scholarship, together with additional funding from the Head Genuit Stiftung, the Oticon Foundation and DTU, made it possible for the three women to go to the Acoustical Society of America Conference which took place in Hawaii from Nov 28th until Dec 2nd, 2016.

At the conference, Anna Josefine Sørensen presented the group's project "On-site and laboratory soundscape evaluations of recreational urban spaces" in the section "Noise Impacts and Soundscapes at Outdoor Gathering Spaces". The presentation resulted in very positive feedback from many of the Noise and Soundscape researchers, and Anna Josefine Sørensen was awarded the Acoustical Society of America's "Outstanding Paper by a Young Presenter" in the technical comittee "Noise".



Andreu Paredes Gallardo and Gerard Encina Llamas with Francesc Vives Uya, CI test person. Photo by Eva Helena Andersen.

Hearing Systems Presentation Day

In November, Hearing Systems invited collaboration partners, colleagues and alumni for this year's Presentation Day to give an overview of the activities in the research group. This year, the presentation took place at a new location in the new laboratory building and it turned out to be a success.

Torsten Dau, Head of Hearing Systems, gave an introduction with an overview of the research group and the activities. It has grown over the years and currently consists of 21 PhD students and 11 postdocs. Torsten Dau took the audience on a historical journey from the start thirteen years ago as CAHR (Centre for Applied Hearing Research). Today Hearing Systems also incorporates the fundamental research centre CHeSS (Oticon Centre of Excellence for Hearing and Speech Science). The two centres have a close collaboration with various partners and external experts and include several EU projects, e.g. COCOHA (Cognitive Control of a Hearing Aid, Horizon 2020). In 2016, Hearing Systems also started as a participating partner in the large scale project BEAR (Better Hearing Rehabilitation).

The PhD students and postdocs presented their current activities and research projects in nine short talks and 18 posters. The talks described the results from current research projects on spatial hearing and realistic environments, auditory modelling and applications and attention and electric hearing. In between the many interesting talks, poster sessions took place, giving the attendees the opportunity to discuss the topics and to network.

Niels Søgaard Jensen, a former researcher at Eriksholm Research Centre who is now Audiological Specialist in the marketing department at Widex, found it very interesting to hear about the different projects at Hearing Systems: "It's exciting to see what is going on in the research field, to meet the new students, and to hear about the projects. It might be useful for further collaboration, and I also like the idea of being here close to the new laboratories. It is a fine way to get a quick insight into what is going on, and it was very well arranged," he said.

Karsten Bo Nielsen, Innovation and Project Manager at Oticon agreed: "This is a much better location, I really enjoy that this presentation day both gives overview and details about the projects in an excellent way," he said.



Photo by Eva Helena Andersen

First Music and CI conference in Denmark

The first International Symposium on Cochlear Implants and Music was held on October 13-14. Participants travelled from all over the world to Erikholm Research Centre in Snekkersten were the conference was held, and around 90 researchers and experts from across the globe came together to discuss how to improve music perception for cochlear implant users.

The program included many interesting talks. Among the speakers were Jeremy Marozeau from Hearing Systems DTU, who also was Co-Chairman. Furthermore, PhD student Niclas Janßen assisted with the organization of the conference.

Jeremy Marozeau's talk was titled "Pitch, can it be measured?" Pitch is the auditory attribute of sound in which sounds can be ordered on a scale from low to high. By definition, the perception of pitch is not straightforward in CI-listeners. "We don't really understand the true nature of pitch perception in CI-listeners. And the question is, can CI users perceive pitch at all?" he said.

Jeremy Marozeau recommended singing as a form of musical training for CI users, though one should be a bit careful because the children might confuse vowel changes with pitch changes. "We need to be better at understanding perception by electrodes and to be better to convey simple information in different channels," he concluded.

During the conference several videos were shown with children and young people who progressed through song and music training. Several researchers also mentioned the cababilities of apps as a tool to train the perception of music in the brain.

Between the speeches, there were panel debates where everyone had the chance to ask questions and discuss the topics, and during the breaks, posters sessions were held.

Oticon Medical, who organized the conference funded by the Oticon Foundation, had arranged a special dinner at Marienlyst Hotel, Elsinore, for all the participants. The dinner included music entertainment from some of the participants themselves.

Read more on our webpage www.hea.elektro.dtu.dk (News Nov 4)



Celebration of the Volunteers

Photo by Niclas Janßen.

In the end of August 2016, all the people that have participated in experiments this year were invited to a special event in the laboratories. Here, the researchers had the opportunity to thank the test persons and tell them more about the experiments they took part in. Associate Professor Jeremy Marozeau welcomed all and thanked them for their contribution to the research, which is very important for the work on this field. All the volunteers had the chance to go for a tour to see a demonstration in the new laboratories and get information about the projects with a few scientific posters. Three people won awards: Per Svendsen for the most available volunteer, Grete Boisen for the most enthusiastic volunteer and Lise Gyldmark for the most committed volunteer. With the awards came a nice box of French biscuits.



Close collaboration with hospitals

Since March 2016, Assistant Professor Santurette has been employed in a joint position between the Hearing Systems, DTU Elektro and the Department of Otorhinolaryngology, Head and Neck Surgery & Audiology at Rigshospitalet, Gentofte and Bispebjerg Hospitals. Anja Kofoed Pedersen and Raul Sanches Lopez, both PhD students at Hearing Systems, are also affiliated with Bispebjerg Hospital for their projects, which is also part of the BEAR (Better Hearing Rehabilitation) colaboration. At an occasion, researchers from the Hearing systems group were invited to Bispebjerg Hospital in order to present their projects related to the hospital staff from the audiology departments at Gentofte, Bispebjerg and Rigshospitalet.

From the top leftmost Birger Christensen, Audio Technician; Michael Bille, Chief Physician; Erik Kjærbøl, Civil Engineer MSc, and Sébastien Santurette. And the front row (leftmost) PhD student Raul Sanchez Lopez, postdoc Federica Bianchi, postdoc Michal Fereczkowski and PhD student Anja Kofoed Pedersen. Photo by Eva Helena Andersen

Staff news

Adjunct professor at Hearing Systems Group



Thomas Lunner, Senior Scientist, Project Leader and Group Manager at Oticon Eriksholm Research Centre as well as Adjunct Professor of cognitive hearing science at Linköping University, has also become Adjunct Professor at Hearing Systems. This joint position at DTU will further strengthen the collaboration within the H2020 project "A cognitively controlled hearing aid" (COCOHA) and CHeSS as well as inspire new links in research and education within the areas of cognitive neuroscience and brain-computer interfaces.

On December 5th 2016, Henrik Gert Hassager started at Widex as a Technical Audiology Engineer at the Department of Audiological Signal Processing.





Jonatan Marcher-Rørsted has started as a Research Assistant working with EEG measures of attention in normal hearing and hearing impaired.

PhD Defences



On October 7th, PhD student Johannes Zaar successfully defended his PhD thesis "Characterizing apparent source width perception."
He now works as a postdoc in the group.

On October 25, PhD student Johannes Käsbach successfully defended his PhD thesis "Characterizing apparent source width perception." He is now studying Jazz guitar at the "Centre Des Musiques Didier Lockwood" (CMDL) in Paris, France.





On November 15, Gusztáv Lőcsei successfully defended his PhD thesis titled "Lateralized speech perception with normal and impaired hearing".
He now works at Oticon
as Development Engineer.

Katrine Louise Bang Termansen has started as Project Controller for the Hearing Systems group.





As a part of her Phd studies, Wiebke Lamping is working at the Cognition and Brain Sciences Unit (CBU)
in the Hearing and Language Group, Cambridge, UK,
from January 3rd until June 30.

New PhD project



Modeling audiovisual speech perception
Juan Camilo Gil Carvajal

This project will be carried out in collaboration with DTU Compute

Speech perception in face-to-face communication differs from auditory-only speech perception, since the perceptual system binds together phonetic information from sound and vision in a process of multisensory integration. Under normal circumstances, coherent information from the speaker's voice and face provides cues that facilitate speech perception. However, an illusion of hearing a phoneme not mediated by either face or voice arises when a phonetically incongruent voice is dubbed onto a video of a talking face (McGurk effect). The current project seeks to understand the information processing underlying these phenomena. The work will include the design of audiovisual speech stimuli, execution of psychophysical experiments, as well as model development and evaluation.

Prestigious publication on spatial hearing with incongruent visual or auditory room cues

Current headphone techniques can simulate or recreate the spatial properties of an auditory scene in a manner that is indistinguishable from real-world sources. However, although listeners may be wearing headphones, the perceptual fidelity is reduced when the room in which they listen differs from the room in which the simulated/recreated auditory scene was set. For example, when the playback takes place in larger, more reverberant rooms, listeners perceive the simulated/recreated sources to be closer. In a recent publication in Scientific Reports, Juan-Camillo Gil-Carvajal and colleagues demonstrated that it is the acoustic rather than visual properties of the playback room that influence this effect.

New Postdoc projects



Johannes Zaar

As a postdoc, Johannes Zaar investigates speech perception in hearing-impaired and normal-hearing listeners (with/without hearing aids) by means of experimental work in combination with computational models of the auditory system. He is involved in various research projects, including co-supervision of several PhD projects within this area.

Visiting students

Dietmar Wohlbauer, visiting PhD student from the University of Zürich, Switzerland, working on his project "Loss in spatial details as result of spectral information degradation in bilateral cochlear implants"





Charlotte Amalie Emdal Navntoft, visiting PhD Student from the University of Basel, Switzerland, working on her project "Neuronal Correlate of Auditory Streaming in a Cochlear Implanted Mouse"

Recent publications

Recent articles

Bianchi F, Santurette S, Wendt D, Dau T (2016) Pitch Discrimination in Musicians and Non-Musicians: Effects of Harmonic Resolvability and Processing Effort. JARO 17 (1) 69-79

Bouserhal RE, MacDonald E, Falk TH, Voix J (2016) Variations in voice level and fundamental frequency with changing background noise level and talker-to-listener distance while wearing hearing protectors: A pilot study. International Journal of Audiology 13–20

Ohlenforst B, Souza PE, MacDonald E (2016) Exploring the Relationship Between Working Memory, Compressor Speed, and Background Noise Characteristics. Ear and Hearing 37(2)137-143

Wendt D, Dau T, Hjortkjær J (2016) Impact of Background Noise and Sentence Complexity on Processing Demands during Sentence Comprehension. Frontiers in Psychology 7

Relaño-Iborra H, May T, Zaar J, Scheidiger C , Dau T (2016) Predicting speech intelligibility based on a correlation metric in the envelope power spectrum domain. Journal of the Acoustical Society of America 140 (4) 2670–2679

Hjortkjær J, McAdams S (2016) Spectral and temporal cues for perception of material and action categories in impacted sound sources Journal of the Acoustical Society of America 140 (1) 409-420

Marozeau J, McKay CM (2016) Perceptual Spaces Induced by Cochlear Implant All-Polar Stimulation Mode Trends in Hearing 20 (0)

Bianchi F, Fereczkowski M, Zaar J, Santurette S , Dau T (2016) Complex-Tone Pitch Discrimination in Listeners With Sensorineural Hearing Loss. Trends in Hearing 20 (0)

Locsei G, Pedersen JH, Laugesen S, Santurette S, Dau T, MacDonald E (2016) Temporal Fine-Structure Coding and Lateralized Speech Perception in Normal-Hearing and Hearing-Impaired Listeners. Trends in Hearing 20 (0)

Thorup N, Santurette S, Jørgensen S, Kjærbøl, E Dau, T Friis M (2016) Auditory profiling and hearing-aid satisfaction in hearing-aid candidates. Danish Medical Journal 63 (10)

Müller J, Wendt D, Kollmeier B, Brand T (2016) Comparing eye tracking with electrooculography for measuring individual sentence comprehension. PLoS One 11 (10)

Gil-Carvajal JC, Cubick J, Santurette S, Dau T (2016) Spatial Hearing with Incongruent Visual or Auditory Room Cues. Scientific Reports 6 (37342)

Zaar J Dau T (2016) Sources of Variability in Consonant Perception and Implications for Speech Perception Modeling. Part of: Physiology, Psychoacoustics and Cognition in Normal and Impaired Hearing (Book chapter) 437-446

Chabot-Leclerc A, MacDonald E, Dau T (2016) Predicting binaural speech intelligibility using the signal-to-noise ratio in the envelope power spectrum domain. Journal of the Acoustical Society of America 140 (1)192–205

Santurette S Dau T Christensen-Dalsgaard J Tranebjærg, L Andersen, T Poulsen T (2016) Individual Hearing Loss: Characterization, Modelling, Compensation Strategies. Trends in Hearing (20). Part of: Proceedings of ISAAR 2015, Nyborg DK

Conference Papers

Epp B Wit H, van Dijk, P (2016) Clustering of Cochlear Oscillations in Frequency Plateaus as a Tool to Investigate SOAE Generation. Conference Proceedings AIP, MD US, 1703

Sanchez Lopez R, Epp B (2016) Simultaneous measurement of auditory-steady-state responses and otoacoustic emissions to estimate peripheral compression. Part of: Proceedings of ISAAR 2015, Nyborg DK

Nordahl Jacobsen G, Ih J, Song W, MacDonald E (2016) Predicting Detectability and Annoyance of EV Warning Sounds using Partial Loudness. Presented at: 45th International Congress and Exposition on Noise Control Engineering 2016, Hamburg P. 1706-1715

Käsbach J, Hahmann M, May T, Dau T (2016) Assessing the contribution of binaural cues for apparent source width perception via a functional model. Part of: Proceedings of the 22nd international congress on acoustics 2016, Buenos Aires, Argentina

Fereczkowski M, Dau T, MacDonald E (2016) Investigating low-frequency compression using the Grid method. Part of: Proceedings of ISAAR 2015, Nyborg DK, (p) 413-420

Nielsen NØ, Marschall M, Santurette S Jeong C (2016) Subjective evaluation of restaurant acoustics in a virtual sound environment. Presented at: 45th International Congress and Exposition on Noise Control Engineering 2016, Hamburg 6140-6149

Kowalewski B, Fereczkowski M, MacDonald E, Dau T (2016) A new procedure for automatic fitting of the basilar-membrane input-output function to individual behavioral data. Presented at: 63rd Open Seminar on Acoustics, 2016, Białowieża P. 555-561

Fereczkowski M, Dau T, MacDonald E (2016) Grid - a fast threshold tracking procedure
Presented at: 63rd Open Seminar on Acoustics, 2016, Białowieża 545-553

Locsei G, Pedersen JH, Laugesen S, Santurette S, Dau T, MacDonald E (2016) Lateralized speech perception in normal-hearing and hearing-impaired listeners and its relationship to temporal processing. Part of: Proceedings of ISAAR 2015, Nyborg DK P. 389-396

Olsen S, Agerkvist F, MacDonald E , Stegenborg-Andersen T, Volk C (2016) Modelling the Perceptual Components of Loudspeaker Distortion. Presented at: 140th International Audio Engineering Society Convention, 2016, Paris

Sanchez Lopez R Dau T (2016) Modeling spectro - temporal modulation perception in normal - hearing listeners. Presented at: 45th International Congress and Exposition on Noise Control Engineering 2016, Hamburg

PhD theses

Johannes Zaar (2016) Measures and computational models of microscopic speech perception

Gusztáv Lőcsei (2016) Lateralized speech perception with normal and impaired hearing

Johannes Käsbach (2016) Characterizing apparent source width perception

Master projects

Improving music perception for hearing impaired listeners. Dmitry Vasilev. Supervisors: Jeremy Marozeau (DTU) Marianna Vatti (Eriksholm Research Centre) This master project is conducted in collaboration with Eriksholm Research Centre

Musical expectation in cochlear implant listeners. Steffen Spangmose Pedersen. Supervisor: Jeremy Marozeau (DTU)

Influence of noise and second language on conversational dynamics. Anna Josefine Sørensen. Supervisor: Ewen MacDonald (DTU)

Investigating noise-induced neural degeneration using high-frequency audiometry and speech intelligibility in noise. Sara Al-ward. Supervisor: Bastian Epp (DTU)



Hearing Systems staff 2016-17. Photo by Niclas Janssen.

