

## Summary: "Future Sound Tech Solutions" – Meeting #13

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Meeting # 13 in working group "Future Sound Tech Solutions" took place on May 10, 2023.

### Agenda:

1. Webinars & Physical events during 2023:
  - a. Follow-up on proposals and ideas from meeting # 12 including additional comments and proposals.
  - b. Proposals for possible speakers
  - c. New themes?
2. Collaborative projects, update of proposals, indication of possible project consortia
3. Other events of interests
  - a. Roskilde Festival Webinar
  - b. Roskilde Festival Innovation Partner Event
  - c. Other info from the DSC secretariat
4. A.O.B.

A new team member of Danish Sound Cluster, Jens Nedergaard, presented himself.

### Summary details

See the following pages.

## Ad 1a & 1b: Proposals for Webinars

#	Subject	Background
14.a 14.b	Feedback and noise cancellation	Webinar event successfully delivered on May 9, 2023 Huge interest, 70 participants.
15	Speech Prediction	<p>The theme postponed until the next meeting due to absence of key people in the area.</p> <p>A topic in its own right - and interests seem high. However, difficult to find speakers. The aim is to find an approach to overcome the middle frequency range challenge, where existing solutions appear to fail.</p> <p>Shelley is struggling to find speakers, but have not been successful up to now, despite many discussions. Can anyone point to on-going interesting R&amp;D work in the area? <b>WE NEED HELP!</b></p> <p><b>Background:</b> Active noise cancellation, ANC, can remove low frequency noise and passive noise cancellation can remove high frequency elements.</p> <p>However, noise related to speech in between the two regions remain an issue. ANC will never be able to suppress noise related to speech in the middle frequency range. Can the challenge be handled to some degree through employment of speech prediction to overcome this downside of in ANC?</p> <p>A difficult research topic, where speech modelling may have solutions. Today classic speech modeling has been overtaken by neural network approaches. Can original classic speech modeling prove a way ahead.</p> <p><b>Potential speakers:</b></p> <ul style="list-style-type: none"> <li>Johannes Sars ? (check with Niels)</li> </ul>
17	Use of sound with robotics	<p><b>Time schedule:</b> May 23, 2023</p> <p>The sound component may prove important in some applications using robotics.</p> <p><b>Speakers:</b></p> <ul style="list-style-type: none"> <li>Jonas Jørgensen, Associate Professor at University of Southern Denmark</li> <li>Jesper Rindom Jensen, Associate Professor at Aalborg University</li> <li>Christer P. Volk, Senior Specialist at FORCE Technology</li> </ul> <p>Planned and is announced on the WEB.</p>

#	Subject	Background
18	'Sound Quality in Digital Meetings'	<p>Shelley is in contact with a Microsoft employee, Sebastian Braun, previously a Fraunhofer employee, that may be able to give a presentation on the subject matter:</p> <ul style="list-style-type: none"> <li>Sebastian Braun - Microsoft <a href="https://www.microsoft.com/en-us/research/people/sebraun/">https://www.microsoft.com/en-us/research/people/sebraun/</a></li> </ul> <p><b>Tentative title:</b> "DNN-based speech enhancement for real-time communication"</p> <p><b>Short abstract:</b> In the last few years, fast progress has been made in research, adopting deep neural networks (DNNs) for audio signal processing tasks such as noise reduction, echo cancellation, speech detection and separation. In this talk, we show crucial steps how to design and train small and efficient DNNs under the challenging requirements of real-time communication pipelines as used in online meeting software on PCs and phones. Practical aspects such as balancing computational budget, quality aspects like speech distortion vs. noise reduction, and realistic evaluation methods will be covered.</p> <p>We are interested in finding contributions from competitors in the market. Shelley is also in contact with another person at Fraunhofer. He has informed that he can help in finding another person but has not yet sent details.</p> <p>We are still open to other suggestions!</p> <p>A suggestion to have someone from Jabra or EPOS serve as moderator for the event to ensure high quality in questions.</p>
20	AI and Sound in general	<p>Pedro (and Niels) have contacted Per Bækgaard (DTU COMPUTE, Institute for Mathematics &amp; Computer Science), but no response yet, and no info on progress has been tabled.</p> <ul style="list-style-type: none"> <li>AI related to e.g speech, Assistant professor Per Bækgaard</li> </ul> <p><b>NLP:</b> The topic area of natural language processing, NLP, related to e.g. the upcoming CoRaL project that is starting at Alexandra Institute, Alvenir and Corti/DTU. The project (3. Year project starts in March 2023 and will run for 3 years, budget 13 mio. DKK): First results envisaged in October 2023.</p> <p>The working group "<b>Healthcare &amp; Welfare</b>" have agreed with Dan Sattrup Nielsen, Alexandra Institute, to run a first webinar on the topic already in October/November 2023. We will follow the work and discuss, if also our working group on "Future Sound Tech Solutions should engage in the topic.</p>

#	Subject	Background
21	Augmented sound in future society	<ul style="list-style-type: none"> <li>• <b>Bluetooth Auracast™</b> (<i>Auracast broadcast audio will let people invite others to share in audio experiences. People can log on to streams that are in the air. Is likely to change our society already short term</i>).</li> </ul> <p>Shelley has been in Contact with Nick Hunn, and he is willing both to give a presentation at SoundDay 2023, and to offer a presentation in a webinar on the theme.</p> <p>We would also like to include an industrial perspective. Not least the Hearing Aid industry has been promoting Bluetooth Auracast, and some companies have already invested 7-8 person years in efforts related to Bluetooth Auracast.</p> <p><b>Potential candidates for industry case presentations:</b></p> <ul style="list-style-type: none"> <li>- Bjarne Klemmensen, Eriksholm</li> <li>- Søren Vilsgaard ?, WS-Audiology</li> </ul> <p>Morten and Niels will look for candidates.</p> <p>The aim of this topic is also to look for general trends in augmented sound that could pivot the Danish sound Industry into a future leading technologically position in sound – rather than just wait for trends to come to us from the outside.</p> <p>Directions to investigate could be:</p> <ul style="list-style-type: none"> <li>• <b>System devices</b></li> <li>• <b>Metaverse, virtual/augmented audio</b> (<i>Metaverse: Improved digital environment where it is possible to move seamlessly between work, play, shopping, socializing and creativity in one digital landscape</i>).</li> </ul> <p>Jeremy will look for some potential candidates in the university environment.</p>
22	Text-to-speech	<p>Microsoft is reported to focus on text-to-speech in its Azure offerings. What will that mean for development in the sound sector ?</p> <ul style="list-style-type: none"> <li>• Jens offered to circulate a recent Microsoft article on the topic. No action up to now.</li> </ul>
23	Better tools for ensuring good audio quality in e.g. field recordings, hence reducing the need for dubbing	<p>A spin-off from the brainstorming on “<b>Augmented sound in future society</b>” could be the option for devising better tools for audio recordings in the field. We know from discussions in the working group “<b>Creative Sound Solutions</b>” that broadcast organization like <b>DR</b> and <b>TV2</b> are actively interested in obtaining better tools for recording in the field for their journalists, so that dubbing activities can be reduced or avoided. Progress in areas like headsets and speaker phones involving widespread use of AI, might be a solution to the needs of journalists and broadcasting organizations.</p> <p>Various speech enhancement solutions may fit the needs. Actually, there are rather huge R&amp;D activities in the field throughout the world that may have solutions, or are in the process of developing solutions that could fit into this context. It could prove of interest to broader group of people to hear about such tools and what they could be used for.</p> <p>Augmented audio support indications already at the time of recording may be another way of improving recordings in the field.</p> <p>We aim at setting up a subcommittee on this, bringing the users and providers together to see, if we can devise improved solutions. More awareness and bringing people together could be vital for further innovation.</p> <p>The working group on “Creative Sound Solutions” is in the process of setting up a webinar on podcast including:</p> <ul style="list-style-type: none"> <li>• Nomono - sound recording kit and AI-driven DSP</li> <li>• Nick Dunkerley, Hindenburg Systems.</li> <li>• Center for Podcasting (focus: Podcast hosts, platforms, tools, networks, facilities, etc.</li> </ul> <p>Shelley is deeply involved in this and thinks that the event will go in the air in June 2023.</p> <p>We will wait to see that event. Subsequently we can discuss if we see a need for an additional webinar focusing on the specific focus that we have discussed.</p>

#	Subject	Background
24	'Sound Pollution'	<p>As discussed during the brainstorming on '<b>Augmented sound in future society</b>', sound is added to a lot of products and solutions – sometimes with rather meager or even negative effects. Is that what society needs? One example is noise added to silent electrical cars.</p> <p>In general, at low driving speed, 50 km/hour or below, the noise from cars is basically noise from the tires, not the engines. However, the topic here is the noise from electrical cars that is being added to ensure that electric cars driving at very low speed, e.g. at parking spots, can be observed by people walking with their backs to an approaching car (accidents were reported in Japan). The requirement for this is actually a result of a Danish R&amp;D activity at DELTA, where Torben Holm Petersen did the original work and suggestions. His recommendations were subsequently adopted as requirements for all electric cars in the USA for safety reasons (at very low speed, you cannot even hear the tire noise). Later, the requirements spread to many other countries.</p> <ul style="list-style-type: none"> <li>• Tore will approach one of the “fathers for noise in electric cars” to obtain the background for such noise (see Appendix 4)</li> <li>• Shelley has previously worked with the car industry and will identify contact on the subject.</li> <li>• Jeremy knows of noise design in relation to cars, and he will also try to identify speakers.</li> </ul> <p>We will address the issue in more depth at the next meeting.</p>
25	Quality of sound in cell phone communication  (Initiated under item 18, Sound Quality in Digital Meetings)	<p><b>Background:</b> Upcoming standardization on a new CODEC, addressing quality in speech in cell phone communication worldwide, including digital meetings. The activity is a result of an upswing in immersive media services, such as the spatial or 'surround' audio experience.</p> <p>The partners of the standardization states, it will enable the sharing of immersive audio experiences from highly mobile and uncontrolled capture environments and the rendering of those experiences in other virtually unconstrained environments using headsets, earbuds, or multi-speaker systems with custom loudspeaker configurations – in environments such as homes, cars or conference rooms.</p> <p>The 3GPP SA4 Codec is now closing the gap through standardization of its codec for Immersive Voice and Audio Services (IVAS), see: <a href="https://www.3gpp.org/technologies/ivas-highlights">https://www.3gpp.org/technologies/ivas-highlights</a></p> <p>Potential speakers could be:</p> <ul style="list-style-type: none"> <li>• Stefan Bruhn (Dolby)</li> <li>• or Markus Multrus (Fraunhofer)</li> </ul> <p>Other companies involved in the development: Ericsson, Nokia, Orange, etc.</p> <p>Potential audience: Some concerns that the audience may be rather limited due to few Danish companies in the area. However, Jabra, EPOS and other headset manufacturers may have an interest. RX possibly also. In addition, a research audience at universities could be of interest.</p> <p>We should approach Prof. Mads Græsbøll, AAU, to learn his view on the topic. We will have a discussion on the topic again at the next meeting.</p>

#	Subject	Background
26	Autonomous Response to Audio	<p>Some companies, e.g. hearing aid companies, are highly interested in how sound influences human bodies, i.e. human nerve systems. In the past, these companies frequently sent students to Roskilde Festival with equipment to measure and indicate the effects that sound had on the human body. Today, some companies instead send students to New York, so that students can experience on their own body how the surrounding sound and noise are influencing them.</p> <p>Some companies also work closely with schools on the topic. However, there are ethical aspects related to this as well, when techniques are transformed into use in other contexts, e.g. the office, at political events, etc.</p> <p><b>Potential speaker:</b></p> <ul style="list-style-type: none"> <li>• Dorothea Wendt, Eriksholm Research Lab</li> </ul>
27	AI created music and the threat to artistic generated music	<p>New music tracks can be artificially created using AI based tools like Boomy-AI. Simply use a number of keywords that describe the direction in which the result should go. The new music tracks can be created almost instantly and can then be put online and streamed.</p> <p>Apart from creating a major challenge to traditional artistically generated music, it also distorts the business model for music streaming. When AI generated music is put onto a streaming service, the people, that used AI to generate the music, are entitled payments, although they basically have not been artistically creative in the generation.</p> <p>Spotify, the world's largest music streaming service has recently removed more than 7% of all music tracks that were generated by Boomy. More than 14 million tracks are believed to have been created by Boomy, so it is a substantial problem.</p> <p>How concerned should we be about AI generated music, and what needs to be done? (See also Berlingske Business, May 10, 2023)</p>

### Ad 3 3. Other events of interests

#### Roskilde Festival Webinar

Insights from 50 Years of Roskilde Festival

***“Mastering the Art of Live Sound”***

30th May 2023 @ 15.00 - 16.30

<https://danishsoundcluster.dk/mastering-the-art-of-live-sound/>

#### Roskilde Festival Innovation Partner Event

***“Partners for Live Sound Innovation”***

26th June 2023 - Full Day Event

<https://danishsoundcluster.dk/partners-for-live-sound-innovation/>

Roskilde Festival is inviting to their creative playground!

Roskilde Festival is offering this unique opportunity for potential partners within the sound and audio sectors to participate in this day-long event of talks, and networking.

Potential partners (from various organizations and research institutions) who want to experiment with new audio technologies, create weird sonic happenings or immersive performances are invited. It could also be profiles working with related topics such as sustainability or inclusivity. Limited number of seats!

#### Danish Sound Day, 7th November, 2023 at The Center for Hearing & Balance

Still in early stages of development, but the themes we are working with now include:

- Sound & Mental Health
- AI in the Clinical Environment
- Hearing Health

New this year, is that we will have a poster session. The event invite and more info will be coming in our next newsletter.

If someone in the group feels that they already know a fantastic topic/research/demo that should be part of our day, please get in touch with me.

### Next meeting

The next meeting in the working group on “Future Sound Tech Solutions” will take place:

- **Tuesday August 29, 2023**                      **14:00 to 15:00**

## Appendix 1: Participants in the meeting

Jeremy Marozeau	DTU, Department of Health Tech. Hearing Systems Section	Associate professor
Jakob Brinck	GN-Hearing	Manager, Electro Acoustics
Morten Kroman	WS Audiology	VP R&D Electronics
Niels Pontoppidan	Eriksholm Research Centre	Eriksholm Research Centre
Tore Stegenborg-Andersen	FORCE Technology, SenseLab	Senior Researcher
Birger Schneider	CHAMAJ Consult ApS	Director
Shelley Livingstone	Danish Sound Cluster	Project Manager
Torben Vilsgaard	Danish Sound Cluster	CEO



## Appendix 2: Events proposed and promoted by the working group

#	Title	Comments	Event type	Date
1.a	AI/Machine Learning	Workshop (Edge)	On-line	5 April, 2022
1.c	AI in signal processing		Webinar	
2	“Demant Discovery”	Start-up in dialogue with Demant	Networking event	17 March, 2022
4	Audio & privacy	Part of physical conference	Panel discussion	4 May, 2022
5	Sound Quality in Digital Meetings	<ul style="list-style-type: none"> <li>• Position paper</li> <li>• Conference session</li> </ul>	Conference	4 May, 2022
6	Multisensory Processing		Webinar	7 December 2021
7	Sustainable transformation in Audio Companies	Green footprint in sound	Webinar	25 January, 2022
9	Personalization of User Needs		Webinar	1 June, 2022
10	Data Simulation for AI		Webinar	7 June, 2022
11	Perceptual Audio Evaluation		Webinar	13 October, 2021
12	Key Note, Sound Day 2021 “The Sound of Metal”	Oscar Winning Mikkel E.G: Nielsen, Film editor & Nicolas Becker, Sound Designer	Conference, Sound Day 2021	17 November, 2021
	AI in Audio Applications	Conference event at Digital Hi-Tech Summit, Bella Center	Conference	26 October, 2022
19	AI in Audio Applications		Webinar	13 December, 2022
8	Emerging Acoustic Sensor Technologies and Applications		Webinar	14 March, 2023
14	Feedback and noise cancellation		Webinar	9 May, 2023
17	Use of sound with robotics		Webinar	23 May, 2023

### Appendix 3: List of potential Themes

Addressed or proposed in previous meetings' but for the time being put on the list of potential topics until the topics are better matured - or the need better identified.

#	Subject	Background	Proposers
13	Hearables, OTC	<p>Theme is rather interesting.</p> <p>However, difficult to find speakers. Hearing aid companies are reluctant to contribute since the topic is too close to current business interests. It is not the products themselves but where and how such products are placed in the competitive landscape.</p> <p>University contribution is also not so likely since it is a topic mostly in the business domain.</p> <p>A discussion on what type of products is included under the term "hearables". The product term "hearables" was originally coined for a hybrid of the terms: wearable and headphone.</p> <ul style="list-style-type: none"> <li>• OTC ("over the counter" products) belongs to the category of medical product, i.e. hearing aids. The WG feels that this is a separate domain, and does not fit into the general term "hearables"</li> <li>• Instead, most of the "hearables" seen to date are Bluetooth devices that use phones or PCs as the central computing unit. Focus seems to be on mobile communication, real time information services, activity tracking including biometric data, e.g. temperature, heart rate or oxygen saturation.</li> </ul> <p>Although "hearables" is a business domain for many consumer technology manufacturers, several SME's and start-ups also have managed to obtain crowdfunding and soft funding from e.g. EU R&amp;D funding, and are active in the area.</p>	<p>Niels Pontoppidan Jonas Raun Hansen Morten Kroman Clément Laroche Tobias Neher Peder Costa</p>

## Appendix 4: Noise added to electric cars

Response mail from Torben Holm Petersen in relation to the requirement of noise added to electric cars.

**From:** Torben Holm Pedersen <[thp@forcetechnology.com](mailto:thp@forcetechnology.com)>  
**Sent:** 11. maj 2023 10:27  
**To:** Tore Stegenborg-Andersen <[toan@forcetechnology.com](mailto:toan@forcetechnology.com)>  
**Subject:** RE: Elbilstøj

Hej Tore.

Ja, jeg lavede et projekt om det. Resultaterne kan ses i:

T. H. Pedersen, T. Gadegaard, K. Kjems, and U. Skov, "White paper on external warning sounds for electric cars - Recommendations and guidelines," 2011.

som ligger i Mendeley og på vores hjemmeside. Jeg har også et par PP-shows om emnet.

Jeg forsøgte dengang at overtale kommissionen til at lade lydstyrken afhænge af tydeligheden af det specifikke signal i baggrundsstøj. Ideen er også beskrevet i de amerikanske forskrifter.

Man ville dog kun have en metode, der var så enkel, at den kunne kontrolleres med en billig lydtrykmåler. Dvs. at kravene er specificeret i dB(A), detaljerne kan ses i EU direktivet.

Konsekvensen er så, at nogen signaler er svære at høre og andre opfattes som unødigt larmende. De gælder både kørsels- og baklyde, hvilket man kan observere hvis man lytter efter i trafikken og på P-pladser.

Hvis man er opmærksom på det, kan man også konstatere, at i langt de fleste tilfælde hører man lyden af dæk før advarsels- og motorlyde. Det gælder både for el- og mange fossilbiler.

Måske er reglerne nu så gamle, at der er basis for at se på dem igen. Dels er der mange flere typer af elbiler og dels er der mange fossilbiler med meget støjsvage motorer.

Vh. Torben.