

Summary: "Future Sound Tech Solutions" – Meeting #18

Meeting # 18 in the working group "Future Sound Tech Solutions" took place on June 06, 2024.

Agenda

1. Short presentation of new WG member
2. Webinars & Physical events during 2024:
 - a. Follow-up on proposals and ideas from meeting # 15 including additional comments and proposals.
 - b. Proposals for possible speakers
 - c. New themes?
3. Collaborative projects, update of proposals, indication of possible project consortia.
4. News from DSC secretariate
5. A.O.B.

Presentation of new Work Group Member

A new member has joined the working group:

Jesper Rindom Jensen

Jesper Rindom Jensen, Associate Professor in the Department of Electronic Systems at Aalborg University, Denmark, and head of the research group called Audio Analysis Lab for 1 year. The group focusses on audio, well being and security. Work is related to audio, space, robot addition, noise reduction, ANC in general. Audio in relation to defense applications are also key application areas.

Jesper has been in research for audio for about 15 years, e.g. acoustic array processing and the use of multiple microphones and loudspeakers for support. He has mostly worked on modelling analysis and processing aspects. Recently, the focus has been on using audio in robotics and drone applications as well as using AI combined with signal processing. Audio for defense has become a prime domain of interest. Work has been funded by public funding as well as private funding, i.e. private foundations.

Ad 2: Proposals for Webinars

#	Subject	Background
15	Speech Prediction	<p>Background:</p> <p>Speech Prediction is a topic in its own right - and interests seem high. The aim is to find an approach to overcome the middle frequency range challenge, where existing solutions (see below) appear to fail.</p> <p>Active noise cancellation, ANC, can remove low frequency noise and passive noise cancellation can remove high frequency elements.</p> <p>Some research on speech Prediction exists, but in general it is today still a tiny R&D domain.</p> <p>Potential speakers:</p> <ul style="list-style-type: none"> • Johannes Sars ? (check with Niels Pontoppidan) • Yurii Iotov, Ph.D. Student, AAU in collaboration with Jabra, (contact also Jesper Rindom Jensen, AAU) <p>Yuri is currently very busy completing his Ph.D., and some of his work addresses sensitive patent applications, so he is now not able to take active part in a webinar. He appears willing at a later point in time, most likely at the end of 2024, to assist in a webinar. Jesper will try to obtain information when a possible event could take place in relation to Yuri's schedule.</p> <p>Henrik Fønns, IDA (involved in speech recognition) has offered his assistance as moderator for the session.</p> <p>Jeppe has approached Jesper Jense, AAU (the other Jesper Jensen at the same department), if he could be interested in contributing to a webinar on the topic.</p> <p>Jeppe and Henrik Fønns have in addition pursued opportunities related to "Deep Fake" that could form another part of the event. They have contacted 11 labs on that topic but have not yet received any response. "Deep fake" will be part of the event.</p> <p>Consensus in the working group, that the two focus areas might fit into one webinar event.</p> <p>Jeppe will continue to work on arranging the webinar.</p>

#	Subject	Background
21a	<p>Augmented sound in future society</p> <p>Focus on Auracast</p> <p>(Webinar 2024)</p> <p>Follow-up to the SoundDay panel discussion</p>	<p>Timing:</p> <ul style="list-style-type: none"> September 25, 2024 has been proposed <p>Industrial perspective.</p> <p>The Hearing Aid industry is promoting Bluetooth Auracast, and some companies are investing significantly in Bluetooth Auracast. We have had events before where the focus was on sharing the good news of the upcoming new standard. For the event in front of us, we like to include experience related to the actual implementations, preferable from people already involved in developing application, hear about how they see the market, understand what real challenges lie ahead in implementation of Auracast, and not least understand if it is tricky to make solutions, etc.</p> <p>We strive at 3 possibly 4 presentations, not necessarily long presentations, leaving time for discussions between the speakers and not least have questions and comments from people listening to the event.</p> <p>Moderator:</p> <ul style="list-style-type: none"> Nick Hunn has been proposed as moderator, but he personally prefers to give a speech and has accepted that. Damian Murphy, University of York. Jeppe has obtained accept form Damian Murphys that he is willing to participate. <p>Potential other candidates for industry case presentations:</p> <ul style="list-style-type: none"> Bjarne Klemmensen, Oticon (sas good experience in implementation and associated challenges – according to Torben Chr.) or Søren Møllskov Larsen, WS-Audiology (Morten has checked with Søren Møllskov Larsen and he is willing to take an active role) Thomas Olsgaard, to focus on Auracast applications in hearing aids (has accepted take part in a webinar. GN now also have products in the market employing Bluetooth Auracast.) <p>The idea is to have 4 presentations, each max 15-20 minutes, and have time for discussions at the end, where people involved in development of technology discuss with people actually have their hands deep in implementation.</p> <p>Info:</p> <p>Auracast (focus on broadcast) applications.</p> <p>Auracast is an extension to Bluetooth LE (peer-to-peer communication). The WG agrees that the topic is highly relevant, especially with the focus on real applications of Auracast – we are past the point of just talking about a promising new technology in its infancy. Now the focus is on real world applications. The hearing aid industry seems to be ahead of the consumer industry in use of Auracast for now, and that is where we can learn about the first real applications.</p> <p>New Laptops appear to be supporting Bluetooth LE, and it is envisioned that consumer companies by the end of 2024 will launch e.g. headset products supporting Auracast. One product supporting Auracast, Google Pixel phone, is already on the market.</p>

#	Subject	Background
21b	Augmented sound in a Metaverse society	<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"> • System devices • Metaverse, virtual/augmented audio (<i>Metaverse: Improved digital environment where it is possible to move seamlessly between work, play, shopping, socializing and creativity in one digital landscape</i>). <p>Professor Damian Murphy, University of York and results from his Lab seems to be quite interesting</p> <p>WG members envision that a real breakthrough will happen, if, and most likely, when large companies, e.g. Apple, bring applications to the market. Then other industries will follow.</p> <p><i>Still remains the situation. For now, it is a bit difficult to set up a webinar on the theme, but we expect that in the foreseeable future things will change. For that reason, we keep the theme, and once we can get more substance, we reactivate the planning of an event.</i></p>
23	Better tools for ensuring good audio quality in e.g. field recordings, hence reducing the need for dubbing	<p>The theme is interesting, but we need to scope it better. Highly relevant to have input from some of the people that originally have addressed the issue (Birger will try to get Morten Brandstrup, TV2 Danmark A/S involved in a future discussion).</p> <p>We will focus on the middle segment, not the highly professional market and not the market for amateurs, but more the middle segment.</p> <p>Focus is on producing good quality audio everywhere</p> <p>A Finnish company, Genelec, making monitors have e.g. stated that it is not so much the picking up of sound, rather the reproduction of it when used in home studios. Here automatic equalization, calibration, room control, etc. are at stake. It applies to both making music and professional audio.</p> <p>It was mentioned that 3D audio is gradually entering use in headsets and other sound applications. Here room calibration becomes even more of an issue.</p> <p>To reach out for more info on 3D recording Industry, Torben Ch. proposed to contact Sennheiser that already in 2017 had a first solution released. One person to contact could be Veronique Larcher. Ph.D., Sennheiser. She in turn has recommended us to contact Henrik Oppermann from Schallgeber, who apparently is an expert in the field and has done several activities with Sennheiser.</p> <p>(Birger has contacted Henrik Oppermann after the meeting. We need to define better, what we want, see Appendix 4)</p> <p>We expect that there will be a breakthrough in the area emerging from leading hi-tech companies in the foreseeable future.</p> <p>Miika will also try to identify people that could assist in setting up an event on the theme.</p>

#	Subject	Background
25	<p>Immersive Audio & Quality Development in Digital Meetings</p> <p>Reshaped from the original themes: 'Sound Quality in Digital Meetings (#18) and 'Quality of sound in cell phone communication' (#25)</p>	<p>Webinar completed</p> <ul style="list-style-type: none"> 30 April, 2024, 15:00 – 16:30 <p>Background: Transmission of sound quality in communication systems (i.e. digital meetings”) depends on several factors in the individual devices (headsets, speakerphones), echo cancellation, CODECS, compression algorithms, transmission solutions, etc. Even placement of the microphone close to the mouth of the speaker and the acoustic performance of the speaker/listener environments are essential. Add to that that products are getting more complex. E.g. employing several microphones per unit to ensure better performance. 'AI' in various implementations is part of this in part of the entire chain of transmission. Success in a quality transmission of sound depends on the fact that basically all elements in a cascaded effort are performing in an optimal manner. The current webinar theme tries to address some of these vital elements.</p> <p>Audience:</p> <ul style="list-style-type: none"> Electronic Engineers Machine Learning / AI Engineers DSP Engineers Acoustics Engineers <p>Speakers and topics:</p> <ul style="list-style-type: none"> Markus Multrus, Fraunhofer Institute for Integrated Circuits IIS Stefan Bruhn, Dolby Laboratories <p>This event was created in collaboration with IDA – The Danish Association of Engineers.</p>
26	<p>Autonomous Response to Audio</p>	<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>Potential speaker:</p> <ul style="list-style-type: none"> Dorothea Wendt, Eriksholm Research Lab Jens Hjortkær, DTU (group of Jeremy) <p>The topic is about physiological response to different stimuli. Noise is well known to create a lot of issues in that context.</p> <p>The WG agrees that the topic is highly interesting. Miika will contact a former Ph.D. student at B6O, who now has a job at a British University to try to obtain some references to the theme. Torben Ch. will contact the two persons above to acquire more details. Discussions on the topic will be continued at the next meeting.</p>

#	Subject	Background
28	Cultural, ethical, and social consequences of new use of sound	<p>How will the way we consume music/sound in the future affect the way we interact? What are the social consequences? As audio producers how do we take this into account?</p> <p>For example, future use of Auracast may also have an undesired effect of isolation people socially, since the sound transmitted directly into earbud may counteract social contact to people around. Similar effect when people use artificial vision solutions. When developing an augmented world, it is important that we make it distinct able, so that people can realize the differences.</p> <p>Important that we also understand how to handle the negative effects of new sound solutions. It is probably difficult to get people to give formal presentations on the topic, so a panel debate may prove a more efficient way to structure the theme.</p> <p>A new book “Kig op” (Danish) by Jakob Sorgenfri Kjær has been published. He addresses how people cannot find rest, cannot focus, because they are overloaded by massive information streams. Although his focus is on video content rather than audio, a similar effect is likely to influence humans due to massive audio info. May be Jakob Sorgenfri Kjær could contribute to a webinar, offering an “audio angle”?</p> <p>In general, it may be important not just to fill our lives up with audio but ensure quality and relevant purpose of surrounding audio. Augmenting audio should be as natural as possible.</p> <p>Many new technological developments add cognitive load to our brains, but our brains are results of thousands of years of development, so there is limit to how much cognitive load, we can handle on top of what we already handle.</p> <p>In addition, how do we convey emotions through e.g. video/audio connections? Hi-Tech companies are currently identifying a problem with people working remotely and hence only participate through video meetings that creativity is dropping, because employees do not meet informally e.g. in front of a coffee machine to exchange ideas.</p> <p>So, can some of the nice developments we see in new smart audio solutions also be seen as counterproductive in the sense that we at the same time loose out on significant and proven ways of interacting, and if so, what can we do to circumvent the negative effects?</p> <p><i>We will continue the discussion on the theme at our next meeting. In the meantime, Torben Ch. Will have a dialogue with Jakob Sorgenfri Kjær to check if we can obtain a focus that Jakob will be able to contribute in.</i></p> <p><i>All members of the WG are encouraged to think of how we can make the topic an interesting one.</i></p>
29	Competition for students at universities	<p>Competition among Students at Universities to come up with advanced solutions, novel ideas, for Future Sound Tech Solutions.</p> <p>Best idea/concept/solution wins a prize of e.g. 25.000 DKK. Event for Prize Award, where e.g. DR1 and TV2 are invited to broadcast winners and ideas in the news.</p> <p>The WG endorsed the idea. In our next meeting, we will try to frame how such an event can be activated and how we can find sponsorships for the price.</p> <p><i>Discussion postponed to next meeting.</i></p>
30	Audio in use with drones and robots	<p>Microphones can be placed in specific positions to help identify e.g. drones but could also be positioned on the drones and robots themselves to assist in navigating optimally.</p> <p><i>Jesper will try to identify a basis for discussion on the theme aiming at framing a webinar event.</i></p>

Next meeting

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

- **Thursday, September 5, 2024, 14:00 – 15:00**

Appendix 1: Participants in the meeting

Clément Laroche	GN Audio -Jabra	Senior Research Scientist
Jesper Rindom Jensen	AAU, Inst. f. Electronic Systems	Associate Professor
Facundo Ramón	GN Hearing	Senior Research Scientist
Miikka Tikander	Bang & Olufsen A/S	Director, Head of Acoustics
Torben Christiansen	EPOS Group A/A	Director of Technology
Tore Stegenborg Andersen	FORCE Technology	Senior Researcher
Birger Schneider	CHAMAJ Consult ApS	Director
Jeppe Lindegaard	Danish Sound Cluster	Program Manager

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"> • Position paper • Conference session 	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
27	AI in Music & Sound		Webinar	26 October 2023
25	Immersive Audio & Quality Development in Digital Meetings		Webinar	30 April 2024

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, it is 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"> • OTC ("over the counter" products) belongs to the category of medical products, i.e. hearing aids. The WG feels that this is a separate domain and does not fit into the general term "hearables". • 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. <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&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: 3D Audio

From: Henrik Oppermand
Sent: Tuesday, 9 July 2024 09.43
To: Birger Schneider
Cc: Torben Christiansen; Jeppe Lindegaard
Subject: Re: 3-D audio

Hi Birger,

Apologies for the late answer.
Would you like to jump on a call to discuss this.
3D Audio becomes a very wide topic and it would be great to find out what areas would be of your interest.

All the best
Henrik

Henrik Oppermand
hoppermand@schallgeber.com

On 19. Jun 2024, at 22:21, Birger Schneider wrote:

Hello Henrik Oppermand,
I understand from Veronique Larcher, Sennheiser, that you are highly active in 3D audio. At Danish Sound Cluster, www.danishsoundcluster.dk, a Danish industry cluster, we are interested in 3-D audio and have plans to take up the theme in a webinar on the theme, sometimes during the next 6-12 months.

In relation to that I would like to know, if you have an interest in being part of the webinar, contributing e.g. a small presentation on "3D audio"? We typically have 3-4 speakers in each webinar, and the total duration is up to 90 minutes for all presentations. The events are typically seen by 50-100 people, most of them from Danish Audio industry, but typically 25-30% people from outside of Denmark also see the events.

I cannot offer you any payment for giving a presentation. But I assume that it may be useful for you in marketing your services to a greater audience.

So, I would like to know, if this is of interest to you, and if so, I will have a person from our secretariat contact you for more details.

Best regards

Birger Schneider
Chairman, Danish Sound Cluster