

Meeting Notes, AES High Resolution Audio Technical Committee, Nov. 6, 2023 (online)

Attending:

John Dawson
John Grant
Bob Stuart
Bob Katz
Hyunkook Lee
Thierry Heeb
Hans van Maanen
David Rich
David Jones
Vicki Melchior

New member introduction

Thierry Heeb recently joined the TC. He is currently Senior Researcher and TTO (technology transfer officer) at the University of Applied Sciences and Arts of Southern Switzerland (SUPSI), where he leads the audio research group. He's the founder of several audio companies and has long been active in high resolution audio with key research, publications, and patents in filtering technologies, ASRC, cross-talk cancellation, and others.

Summary of HRA TC Events this year, 2023

Spring AES convention in Helsinki:

1. Workshop by Hans van Maanen, Milind Kunchur, and Josh Reiss on "Towards an Objective Understanding of High End Audio"
2. Tutorial by Jamie Angus (given as Heyser Lecture): "The Ear is Not a Fourier Transformer"
3. Tutorial by Hyunkook Lee on "Immersive Audio Experience in Binaural Reproduction"

Fall AES in NYC:

Two events were planned and both were postponed. The first was the large-scale demo comparing 7.1.4 immersive mixes to their binaural mix-downs as discussed earlier. It requires headphones at each seat within a 7.1.4 room, and both wired and wireless headphone options were problematic in Javits. This can be postponed to Europe, however an additional problem was recognized in that any loudspeaker to Headphone comparison has to be done at the same resolution, and all of the WiFi options (internet-based, server-based) are directed toward lossy codecs.

The second event is discussed below (wireless workshop for 2024).

New proposals for Madrid (spring, 2024) and fall, 2024

1. Binaural audio

Since binaural is a way to deploy immersive audio, it is an important element for the future of high quality two-channel delivery. Beyond Atmos and Apple, music delivery could involve rendering immersive to binaural with a very high quality renderer, followed by streaming, e.g. in FLAC- encoded PCM or MQA.

Hyunkook will organize one and possibly two events: (a) a continuation of his binaural tutorial from Helsinki, explaining issues in binaural, and (b) a panel discussion on current challenges, limits and ways to solve them. An aspect of the panel discussion is the question of audio objects versus simple channel-based panning for spatial localization. Both the tutorial and panel can be structured to include demos.

2. Asynchronous Sample Rate Conversion (ASRC)

ASRC is used for rate conversion on the chips in many D/A converters and in studio equipment but is contentious due to often poor sound quality. It's been argued that ASRC doesn't belong in high quality conversion, but experienced designers say that it can be good if designed properly, which is often not done. Thierry Heeb has extensive experience and is an advocate for ASRC. He will prepare a tutorial covering ASRC uses, design and design problems, good and bad solutions, and good and bad implementation practice, along with contrasts to PLLs. For Madrid if timing allows, otherwise NYC or beyond.

3. Wireless distribution

Wireless distribution (WiFi, Bluetooth, UWB) of high res is considered a strong developing technology. WiFi has good bandwidth but lacks a well-defined standard. Current generation Bluetooth cannot get to Redbook but a new standard supports higher BW, and HRA codecs have been written for it by multiple companies (Sony, Fraunhofer etc). The SCL6 codec, developed by the MQA group, has continuously variable BW and is useful with any of the wireless types including Ultra Wideband (UWB). UWB is a new initiative that was presented in Helsinki and NYC by its developers, who have also begun an AES Standards group writing an UWB standard. UWB has very high BW and low latency.

The TC will organize a workshop for Madrid on the state of new wireless developments, including capabilities, limits, and standards of these various methods. Also integration into listening environments and the necessity of standards for interoperability, considering that there are many big players involved in these developments.

4. Continuation of Helsinki workshop, above

There were two parts to the workshop, a summary tutorial on the human auditory system (Milind Kunchur) and topics relating high end design to auditory system capability.

The second area (design) was discussed as an area to further formulate. Hans mentioned that he and colleagues are preparing either papers or a presentation based on recent work regarding measurement of impulse responses of microphones.

5. Continued interest areas.

Dither tutorial (Bob); core transparency and resolution