GUEST EDITORS' NOTE
Special Issue on Audio for Virtual and Augmented Reality

Part I

Virtual, augmented, and mixed reality (VR, AR and XR, respectively) represent a rapidly growing market with applications in music production, healthcare, training, and education, to name but a few. In August 2022, AES organized the 4th AVAR (Audio for Virtual and Augmented Reality) Conference at the DigiPen Institute of Technology, and this editorial is the first part of a special issue on the same topics. The first part of the special issue covers theoretical aspects of sound for VR and AR, while the second part is more focused on applications. The papers show how spatial audio is an essential underlying technology for VR, AR, and XR, being used not only to give a strong sense of reality but also to add "hyper-reality" to make immersive experiences visceral and plausible.

CONTENT OF THIS SPECIAL ISSUE

The first part of this special issue includes six papers. The paper "MPEG-I Immersive Audio - Reference Model for The Virtual/Augmented Reality Audio" by Jürgen Herre and Sascha Disch introduces MPEG-I Immersive Audio, a forthcoming standard that is under development to provide a compressed representation and rendering of audio for Virtual and Augmented Reality (VR/AR) appli- cations with six degrees of freedom (6DoF).

The SONICOM HRTF dataset by Isaac Engel introduces a head-related transfer function (HRTF) dataset collected as part of the SONICOM project. The set includes HRTF measurements for 200 subjects at 793 locations on the sur- face of a sphere with 1.5-m radius, along with depth images and 3-D scans of the head and torso. The paper presents a detailed description of the hardware setup and measurement procedure, as well as results from perceptually motivated objective evaluations. In the spirit of open and reproducible research, the SONICOM HRTF dataset is made publicly available online.

In "The Ability to Memorize Acoustic Features in a Discrimination Task," Florian Klein et al. investigate how room acoustic matches the expectations of certain room classes or a specific room. This is achieved by evaluating the ability of listeners to recognize room acoustic features. The results show a significant decrease of the auditory memory capacity within 10 seconds, with more pronounced values when subjects were distracted. Auditory memory depends on what auditory cues are available.

In "Spatial Reconstruction-Based Rendering of Microphone Array Room Impulse Responses," Leo McCormack and co-authors propose a parametric rendering framework in which spatial filtering techniques are used to decompose the input room impulse response into individual reflections and anisotropic diffuse reverberation.

In "Efficient Binaural Rendering of Spatially Extended Sound Sources," Carlotta Anemüller and co-authors propose a novel method for efficient and realistic binaural rendering of spatially extended sound sources.

With applications in musical instruments, the paper "Perceptual Significance of Tone-Dependent Directivity Patterns of Musical Instruments" by Andrea Corcuera and co-authors examines the directivity of 38 musical instruments extracted from a freely available database with violin, oboe, and trumpet. The results show that, in anechoic conditions, listeners can reliably detect differences between the tone-dependent and averaged directivities for the oboe but not for the violin or the trumpet.

CONCLUSIONS

The papers presented in this special issue show how spatial sound, binaural rendering, and HRTFs are still an active field of research. Overall, the special issue shows the diverse set of research issues faced when creating immersive auditory environments, from designing new standards to the problem of creating efficient but high-fidelity simulations.

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