

GUEST EDITORS' NOTE

Special Issue on Sonification

The oldest visual presentations conserved until today date back over 40,000 years. Visualization, the visual representation of data, took thousands of years to evolve and become a part of human life, education, expression, and self-conception. In contrast, conserving sound was only possible through oral tradition and musical instruments until sound recording, manipulation, and playback became possible in the late 19th century. Sonification, the auditory representation of data, is still in the fledgling stages, seeking recognition by audio enthusiasts and its place in human life.

One driving force in the research and development of sonification is the International Community for Auditory Display (ICAD). Since 1992, their annual conferences have brought together researchers, students, artists, and the industry. Another event is the triennial Interactive Sonification Workshop (ISon), which focuses on the interaction loop between humans and sonification. Sonification stands and falls with audio engineering, from audio programming over digital signal processing and sound design to spatial and binaural audio. However, correct sound is not only a matter of the right signal processing but also considers psychoacoustics, human factors, multimodality, and aesthetics. The long-term goal is that sonification is used routinely by the wider population. Here, the main hurdle is a vicious circle: Many people are inexperienced and acoustically uneducated listeners. They are not aware of the potential and existing applications of sonification, nor are they able to use it to its full potential, as a sound with a high information density is often overwhelming for inexperienced listeners. However, without sonification in their lives, they will hardly gain acoustic experience and expertise.

We hope for the Audio Engineering Society to serve as a communication channel between the sonification community and the wider population: Dear audio engineers, get in touch with sonification and the auditory display community; use sonification apps, and get involved in research, development, and communication of sonification.

This special issue is a sweeping blow in the field of sonification research and as diverse as the field itself.

The eight papers in this issue focus on sound design and terminology, multimodal perception and psychology, as well as the aims of sonification, like raising awareness and augmenting interaction.

The paper by Tim Ziemer reviews the literature on interdisciplinary research with the aim of transferring general solutions to the sonification domain. The main outcome is a list of recommendations regarding the sound terminology in sonification and a thorough list of terms from the fields of psychoacoustics and audio engineering.

Katharina Groß-Vogt and colleagues present a technical setup to record and sonify handwriting in real time. They observe that a clean playback of the writing sound is preferred and leads to a more fluent writing compared to plausible and implausible sonification, showing the potential to affect handwriting through sonification.

Akash Kumar et al. investigate multichannel sound rendering and echo suppression using wave field synthesis and the finite-difference time-domain method. They compensate for echo-induced degradation in sound quality by enhancing the signal-to-noise ratio. They observe that the direct sound quality in a reverberant room can be improved by rendering the primary source's images from auxiliary actuators to reduce the impact of reflected waves.

Michael Nees and colleagues present a replication and extension of a study on the interruption of ongoing tasks by auditory and visual alerts. They found that the users' multitasking performance was superior with non-speech auditory alerts as compared to visual alerts. There was also converging evidence to suggest that performance with speech alerts was superior to performance with nonspeech tonal alerts.

Stefano Kalonaris conceptualizes and evaluates two sonification approaches of coral health to raise awareness of climate issues. His online survey shows that web-based, interactive sonification enables an accessible, participatory experience that is interpretable, emotional, and raises awareness.

Sandra Pauletto and Yann Sez nec present workshops with experts in sonification and a domain science. They recommend participatory design methods—i.e., the

inclusion of potential end-users—in the sonification design process to ensure effectiveness and increase acceptance of sonification and sonic interaction design.

Adrián García Riber and Francisco Serradilla present a collection of sonification approaches and data-driven music composition for big data from the field of astronomy. An online study revealed that users with expertise in music and astronomy interpreted the sonification with the highest accuracy, especially when mapping data to sine wave frequencies, compared with unsupervised polyphonic music compositions from stellar spectra.

Mara Helmuth presents an astronomy sonification of pulsars using granular synthesis to represent features such as galactic longitude, rotation speed, age, and distance—offering not only inspiring sonifications but an effective computer music composition, which has been performed in various concerts.

This special issue features a broad sample of the ongoing research in the field of sonification. We hope that this collection will motivate more researchers to engage

with sonification tools and to carry out their own sonification research and development projects. We thank Bozena Kostek, who had the idea for a special issue on sonification in the AES Journal of the Audio Engineering Society and established the contact. Many thanks to JAES editor Vesa Välimäki for his support and his quick and detailed replies.

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