

Dissertation press release

03.05.2020

Predicting your acoustic fingerprint

Title of the dissertation Verification and validation of wave-based simulations of head-related transfer functions

Contents of the dissertation Virtual and augmented reality are new and disruptive technologies, which have recently shown accelerated development and deployment. Acoustics is one key element for the success of these novel technologies. Although the fundamentals of simulating 3D sound are relatively well known for more than three decades, one critical aspect remains unsolved: synthesized 3D sound is indistinguishable from the real target only in highly controlled laboratory environments. This is mainly due to the strong dependence of the ear acoustics on the exact anatomy of the external ears, which are believed to be as unique as ones fingerprints.

Computer simulations, now generally accepted as the third branch of science, could offer the long-awaited mass adoption of 3D sound by moving the acoustic laboratory inside a blazing fast computer. However, most scientific fields employing computer simulations soon realize that computer predictions should not always be taken at face value: they embed many shortcomings which need to be properly addressed should the simulations be trusted as a proxy for reality and/or measurements.

The present dissertation addresses such shortcomings in the context of simulating the acoustics of the ear. The work employs rigorous and methodical approaches to study the limitations of such simulations. Results unfold the difficulty in capturing the individualized ear-acoustics – be it with measurements or simulations. The present work establishes a precedent in rigor and approach, effectively pushing the state of the art in ear-acoustics simulations forward.

Field of the dissertation Virtual Acoustics, Virtual/Augmented Reality

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Time of the defence 29.05.2020 time 16:00 (EEST)

Place of the defence Online, via video conferencing (zoom).

Opponent Professor Ning Xiang, Rensselaer Polytechnic Institute, NY, USA

Custos Professor Lauri Savioja, Aalto University School of Science, Department of Computer Science

Electronic dissertation <https://aaltodoc.aalto.fi/handle/123456789/44181>

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