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Binaural rendering assessment in the context of augmented reality

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The paper presents recent work undertaken on binaural rendering in the context of the European project LISTEN, dedicated to augmented reality (AR) and museum applications. Thanks to wireless technology applied to audio transmission and tracking systems, binaural synthesis, up to now confined to laboratory contexts, may be applied to create large scale immersive and interactive virtual sound scenes. In these applications, the visitor, equipped with motion-tracked wireless headphones, explores a real space seamlessly augmented by an interactive audio content. The virtual sound scene, composed of sound sources disseminated in the space and of associated room effects, is rendered using binaural synthesis, the only technique allowing fully controlled localization cues. The paper reminds the different implementation approaches for binaural rendering and the remaining issues often commented in the litterature, such as the front-back localization ambiguity and the need for an individual morphological adaptation. However, the introduction of the 3D sound modality in augmented environments highlights the need for a better understanding of multi-sensorial integration mechanisms, since the context involves user's navigation and perception-action mechanisms linked to auditory versus idiothetic interactions. Moreover, augmented reality also allows the use of non physical or realistic laws, when modelling distance effects, auditory perception field or room reflexions. Therefore, conventional localization performance tests, usually applied for assessing binaural rendering quality, should be replaced in a multimodal scheme focusing on the congruence of the virtual world and on the user's ability to fulfil a navigation task or to build a cognitive spatial map of the proposed world.