Environmental audio scene description and rendering model for virtual or augmented reality

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ABSTRACT

New virtual and augmented reality audio experiences require rendering multiple digital objects and supporting navigation though complex scenes for a listener using earphones or a head-mounted audio-visual display device. Practical audio scene rendering and creation tools developed for these applications originate from game audio systems and address the effects of acoustic reverberation, reflectors and obstacles in the virtual and/or physical environments, using combinations of pre-computed and real-time propagation models. It is desirable to separate the characterizations of the environment, the listener, and the individual sound sources, in a manner that enables minimizing the per-source propagation and rendering computations to be executed in real time according to source or listener positions, orientations and movements. In this paper, we review the OpenAL EFX scene description and rendering model and demonstrate how it can be extended to meet these objectives by exploiting statistical properties of diffuse reverberation decays in enclosures. In augmented reality applications, for instance, this enables the realization of a computationally efficient real-time binaural rendering engine that can blend multiple virtual audio objects within the acoustics of a user's local environment, detected at rendering time.

Keywords: Audio, Scene, Virtual, Augmented, Reality

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