The NAVE: Design and Implementation of a 3D Audio System for a Low Cost Spatially Immersive Display

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ABSTRACT

The NAVE is a low cost spatially immersive display system developed by the Georgia Tech Virtual Environments Group. The NAVE audio environment uses two independent speaker systems driven by a dedicated audio PC with two sound cards. The speakers are amplified by four Pioneer 200 watt receivers. The primary system utilizes 4 Bose Acoustimass speakers to create a three dimensional soundfield. A Sound Blaster LIVE! audio card is used for audio spatialization. The secondary system steers bass audio content across four zones embedded in the NAVE floor. Bass audio is moved within the zones using a Diamond Monster Sound MX200 PC sound card. Bass vibration effects are maximized by six Aura Bass Shaker Pro's along with seat mounted subwoofer speakers. The steerable bass audio system can be used to create audio-tactile effects for simulating the vibration of vehicles, thunder, explosions, shockwaves, and earthquakes.

A custom real-time audio effects application programming interface (API) allows virtual environment designers to attach sounds to graphic entities. The spatial position of sounds are synchronized with the position of their associated graphical objects. The API is also capable of reproducing real world phenomena including reverberation and doppler effects.

Keywords

3D audio, spatial audio, virtual environments, large screen display