SCV Signal Processing

MONDAY March 14, 2011

Spatial Perception in Audio: '3D' and Perceptual Considerations

Speaker: James Johnston, Chief Scientist, DTS
Time: Pizza and Networking at 6.30 PM; Presentation at 7:00 PM
Cost: none
Place: National Semiconductor Campus, Building E Conference Room, 2900 Semiconductor Dr., Santa Clara
RSVP: not required
Web: www.ewh.ieee.org/r6/scv/sps

James Johnston (JJ) is presently the Chief Scientist for DTS, Inc, working from Kirkland, Washington. DTS provides the high-quality audio system for Blu-Ray disc, and is an industry leader in audio coding, codec preprocessing, multichannel audio, loudness control, and other advanced signal processing algorithms for audio.

His current interests include loudspeaker pattern analysis and control, loudness modeling, room simulation, stereo image control and analysis, filter design, speech coding, audio and speech testing methodology and execution, and implementation concerns in audio processing. He is the primary inventor and architect for a variety of signal processing algorithms related to room correction, loudness processing, perceptual modeling of audio, audio coding, audio sound field perception and presentation, and standards and ancillary mathematics and science related to audio issues.

His prior contributions include the MPEG-2 AAC (Advanced Audio Coding) standard, developed in collaboration with Fraunhofer IIS and other experts in the field of audio compression; MPEG-2 AAC, a reworking of the original AT&T Perceptual Audio Coder (PAC), done with Anibal Ferriera; co-invention and standardization of the well-known "MP3" algorithm; a variety of loudness estimation and control methods; automatic speaker and room correction systems; room and acoustic simulators; and invention of a perceptual sound field reconstruction system to capture the "sound" of an actual performance venue and reconstruct the perceptual cues of the venue in a fashion that can be conveyed in a small (presently 5) number of conventional, independent audio channels multichannel audio presentation, and audio coding (bit rate reduction). *(continued …)*

This talk will be presented in 3 parts, each approximately 20 minutes in length. In the first, the kind and abundance of auditory cues in a natural acoustic setting will be examined. In the second, some basic considerations in human hearing resulting from cochlear analysis (both frequency dependent and loudness-related) will be presented. Finally, the rest of the talk will discuss binaural hearing, the interactions of Head Related Transfer Functions (including both frequency dependent Inter-aural Time Delay and Inter-aural Level Delay) with the higher facilities, and how things like distance, direction, and envelopment arise from the acoustical cues. Finally, there will be discussion of how much of the analytic information is necessary to create an enhanced perception, and how much of the acoustic information cannot be analyzed in human terms at all.

Biography (continued)
In 2006, he was awarded the J. L. Flanagan Signal Processing Field Award from the IEEE Signal Processing Society for his work on creation and standardization of perceptual audio coding. In 1997, JJ was elected a Fellow of the Audio Engineering Society for his work on perceptual coding of audio. He became a Senior Member of the IEEE, and recieved an AT&T Technology Medal and AT&T Standards Award in 1998. In February 2001, he received a New Jersey Inventor of the Year award for his contributions to MP3 and audio coding in general. He was elected a Fellow of the IEEE in 2002.