PC News >HOME THEATER SWEET SPOT: NEW TECHNOLOGY GRANTS EVERY LISTENER THE ...

The new system is one of the first to apply "fuzzy logic" to audio, assigning rules to sound wave data and providing a processor with instructions so that it can prioritize information.

Home theaters have always had a tricky quirk: in an average-sized room, the best sound would go to the listener in the middle, and everyone else had to settle for special effects that could sound far away or out of place.

Now, following years of research into how humans perceive sound, audio engineers have infused a home-theater receiver with software that automatically detects room acoustics, speaker placement, and other information at eight unique locations and then processes the sound to give each listener the "sweet spot."

Called MultEQ and developed by Chris Kyriakakis and his colleagues at Audyssey Laboratories, Inc., the technology is a product of research into "immersive audio" by Kyriakakis and others at the Integrated Media Systems Center (IMSC) at the University of Southern California, one of the National Science Foundation's Engineering Research Centers.

The new technology arises from findings in audio signal processing, acoustics, and psychoacoustics and is based on the NSF-supported doctoral research of Kyriakakis's one-time student, Sunil Bharitkar, and former IMSC Masters student Philip Hilmes. All three researchers are co-founders of Audyssey Labs and co-principal investigators on the research publications.

The MultEQ algorithm uses data from a microphone placed by the listener in any one of the listening locations. The home-theater receiver calibrates by playing a test tone through the main and surround speakers, a tone that is modified by each speaker's unique design characteristics and location ?and further altered by the reflections of the sound bouncing off the walls of the room. The listener repeats the process for each location, such as three spots on a couch, two on a loveseat and one more on a recliner.

Under normal playback, every the listening location receives a different spectrum of sound based on how the reflections and speaker factors interplay with each other. During calibration, MultEQ detects how each listening position is different and independently compensates for all of them, simultaneously modifying the sound to improve the experience for each person in the room.

Alternative approaches to provide multiple sweet spots have been developed by audio companies, but those algorithms average sound data, a process that can yield problems when sound waves cancel each other out. In addition, unlike traditional methods, MultEQ uses dynamic frequency allocation to assign more computing power to lower frequencies where problems with room acoustics can be more severe.

The researchers have recently adapted their process for car audio systems, a venue which has to compensate for far more obstacles such as window reflections and each listener's proximity to the various speakers.

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