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## *Audio Simulation for Mission-Critical Applications*

### *Autumn 2001*

AuSIM has continued to develop technology and solutions which enable a variety of applications to better leverage aural displays. Behind every solution is AuSIM's AuSIM3D™ technology, which encapsulates the latest technological advancements in psycho-acoustic research, signal processing, complex mathematical modeling, and computational architecture. AuSIM3D™ delivers the most versatile and powerful audio simulation engine on the market today.

This newsletter highlights some of these accomplishments below:

- **Greatly improved performance (10X)!**
- **Improved robustness.**
- **New HRTF measurement facilities and tools.**
- **Expanding audio simulation models.**
- **Improved 3D tracking utilities.**
- **New audio production facility.**
- **Professional audio production tools.**
- **NASA Flight Safety SBIR project.**
- **Installation of complete multi-point 3D communications facilities.**

### *Improved Performance and Robustness*

Our AuSIM3D™ filtering engine has been greatly optimized in both throughput and latency. While the system is user tunable to be optimized to your application requirements, we are now generally able to process localization cues for over 10 times as many sound streams as a year ago. In parallel, we have reduced our system latency to a third and increased our mean-time-between-failure (MTBF) ten-fold in the same period. Our motion trajectories, both radial and tangential, are definitively the smoothest of any product in the industry. Current customers enjoyed this unexpected turbo boost with a simple software upgrade over the Net.

### *HRTF Measurement and Acoustic Head Maps*

AuSIM now offers individualized Head-Related Transfer Function (HRTF) measurement for customers requiring highly accurate sound localization perception. Several AuSIM applications now place highly paid listeners in critical decision-making situations. Improving such listeners' performance by as little as 5% saves lives and money. Not only does AuSIM have an exceptionally well-controlled measurement facility, but we also have a portable system that allows us to travel to your site and measure all of your system operators. AuSIM has also defined an HRTF dataset format called Acoustic Head Map (AHM) that allows storage of data in a wide range of filter and geometric formats. AHM's promote sharing of HRTF data between researchers and all HRTF users. Software tools are also available for the measurement and editing of HRTF data for use with AuSIM3D™ and for research applications. Please contact AuSIM for more information on HRTF measurement systems.

### *Audio Simulation Models and Features*

AuSIM3D™ continues to stack up new features. Low-latency live audio spatialization is now available for up to sixteen streams on the standard AuSIM GoldServer; more channels are possible with custom systems.

Directionally radiating sound sources can now be precisely modeled and rendered. All AuSIM3D™ systems will now load any specific Acoustic Head Map (AHM). AuSIM3D™ now supports full 24-bit, 48 kHz audio on both the front and back ends, in addition to 16-bit and 44.1 kHz. Our most requested feature, room modeling, is almost ready ... please inquire if you would like to be a tester.

## *Improved 3D Tracking Utilities*

AuSIM's AuTrak™ collection of software components supports relative and absolute spatial six and three degree-of-freedom (DOF) position and orientation tracking on the Win32 platform. AuTrak™ supports 6DOF tracking instruments from Polhemus, Ascension Technologies, InterSense, Logitech, and Fakespace Labs. In collaboration with NASA, AuSIM has developed the lowest-latency tracker sampling software available. Our ASynchronous Tracking software (AST) now includes high-quality prediction filtering to reduce perceived latency to zero. Spatial warp correction is currently being added for use with electro-magnetic instruments.

## *New Audio Production Facility*

In spring 2001, AuSIM opened a new audio production facility, Satellite Studios, in Scotts Valley, CA. This location provides facilities for AuSIM simulation and product testing, precision HRTF measurement, and high-quality digital audio recording and production. AuSIM's audio solutions for simulation development are now true full-service, by being able to produce the specific audio tracks you need in your application.

## *Professional Audio Production Tools*

AuSIM has licensed its AuSIM3D™ technology for use in professional media production such as music, commercials, games, animations, and film. As part of this plan, AuSIM has developed a powerful production tool integrating 3D audio simulation into multi-channel audio editors such as ProTools, CuBase, Nuendo, Sonar and Vegas. More announcements are to come next quarter on this most exciting development, but don't hesitate to ask for a sneak peek!

## *NASA Fight Safety SBIR*

NASA awarded AuSIM a Small-Business Initiative Research (SBIR) contract to develop a 3D audio intercom and next-generation alerting system to improve aviation safety. The success of the project's first phase, which included research in human factors, sound design, parametric synthesis, and cockpit audio displays, should lead to exciting developments in future phases. AuSIM actively collaborated with experts from the University of Illinois' National Center for Supercomputing Applications (NCSA) and Boeing through the first phase, which developed an extensive R&D plan and new research tools for generating an optimally effective aural display system for pilots and vehicle operators. This work should directly contribute to the development of other system operator displays as well.

## *Multi-Point 3D*

### *Communications Installations*

AuSIM has created and installed full-featured and fully functional 3D audio, intercom, alerting, and audio management systems for US Air Force and Navy command and control centers. Located in select military research laboratories, our systems are now being used to conduct rigorous experimental research to unequivocally quantify the many benefits of 3D audio. Such benefits include:

- significant cost reduction by reducing the total number of operators and operator workstations required,
- improved communication quality and accuracy by reducing operator fatigue and increasing discernment,
- minimized life-threatening mistakes during operations by increasing the threshold for information-overload induced operator breakdown.

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