

Joel D. Miller

Software and electrical engineer with an emphasis in real-time audio signal processing, Windows audio-visual programming, and virtual acoustic environment modeling. Contact: jdmiller at sonisphere dot com.

Experience

Senior Research Engineer

Contractor, NASA Ames Research Center, Moffett Field, CA, 1993 - Present

Provided software and hardware solutions for display design and psychoacoustic research. Developed slab3d, a real-time Windows-based virtual acoustic environment rendering system. Coded MATLAB scripts for HRTF (Head-Related Transfer Function) analysis and visualization. Maintained and enhanced an HRTF measurement system. Developed software for the Convolvotron, a 3D-sound rendering system. Created a slab3d/TMS320 cross-development framework and used it to develop a delay-and-sum beamformer. Provided Continuous Wavelet Transform tools for manual control task data analysis.

Audio DSP Engineer

Contractor, Air Force Research Laboratory, Dayton, OH, 2005 - 2009

Added several features to the slab3d virtual acoustic environment rendering system. Features included DIS (Distributed Interactive Simulation) radio and VoIP (Voice over IP) support, arbitrary sample rate conversion, instant replay with silence skip, and network sound file streaming.

Senior Research Engineer

VRsonic Inc., San Francisco, CA, 2005 - 2007

Designed and implemented acoustic models for a real-time virtual acoustic environment rendering system. Models included air absorption, material reflection, sound transmission, elevation enhancement, early reverberation (arbitrary geometry image model), and late reverberation (feedback delay network).

DSP Programmer

Speech Recognition Lab, San Francisco State University, San Francisco, CA, 1991 - 1993

Provided DSP hardware and programming support for a real-time cochlear model. Implemented FFTs, Hilbert transforms, and frequency-domain filtering on a NeXT workstation DSP56001, developed a framework for NeXT DSP control, and designed a NeXT DSP SIMM expansion board. Ported parts of the cochlear model to the Sharp LH9124 DSP.

Software Engineer

Micro Computer Tools (Samsung contract), Concord, CA, 1990

Co-wrote a cross-assembler capable of assembling multiple instruction sets based on instruction set descriptor files. Assisted in the design of the instruction set descriptor semantics. Coded the lexical analyzer, preprocessor, parser, and binary generator.

Software Engineer

Ana-Systems, Foster City, CA, 1989 - 1990

Ported a UNIX-based Modula-2 compiler to the Amiga by writing a UNIX to AmigaDOS object file converter.

Tools and Technologies

Windows, C#/.NET, C++/Win32/MFC, XNA, DirectSound, DirectShow, Direct3D, ASIO, SAPI Speech Recognition and Synthesis, rVoice Speech Synthesis, DIS Radio, VoIP, MATLAB, Assembly Language, DSPs and Microcontrollers, and recording studio hardware and software. Audio Engineering Society (AES) Member.

Education

Master of Arts - Music, Science, and Technology
Stanford University, April 2002

Bachelor of Science - Electrical Engineering
San Francisco State University, May 1993

Bachelor of Science - Computer Science
San Francisco State University, May 1993

Open-Source Software

slab3d is an open-source virtual acoustic environment rendering system developed for the NASA Ames Spatial Auditory Displays Lab and the Air Force Research Laboratory. For more information, please visit <http://slab3d.sonisphere.com>.

Patent

Begault, D.R., Anderson, M.R., McClain, B.U., and Miller, J.D. (2008) "Reconfigurable auditory-visual display" United States Patent 7,378,963.

Publications

Wenzel, E.M., Godfroy, M., and Miller, J. D. (2012) Prototype Spatial Auditory Display for Remote Planetary Exploration. Proceedings of the 133rd Convention of the Audio Engineering Society, San Francisco, CA, 26-29 October 2012.

Begault, D.R., Wenzel E.M., Godfroy M., Miller J.D., Anderson M.R. (2010) Applying Spatial Audio to Human Interfaces: 25 years of NASA Experience. Proceedings of the 40th International Conference of the Audio Engineering Society, Tokyo, Japan, 8-10 October 2010.

Godfroy, M., Miller, J.D., Sandor, P.M.B., and Adelstein, D. (2009) Visual Orientation and Navigation in 3D space: Active manual control countermeasures. Proceedings of the IMRF, New York, NY, 29 June - 2 July 2009.

Begault, D.R., Godfroy, M., Miller, J.D., Roginska, A., Anderson, M.R., and Wenzel, E.M. (2006) Design and Verification of HeadZap, a Semi-Automated HRIR Measurement System. 120th Convention Audio Engineering Society, Paris, France, 20-23 May 2006.

Begault, D.R., Anderson, M.R., McClain, B.U., and Miller, J.D. (2005) Audio-Visual Communication Monitoring System for Enhanced Situational Awareness. Working Together: R&D Partnerships in Homeland Security Conference, Boston, MA, 27-28 April 2005.

Miller, J.D., Anderson, M.R., Wenzel, E.M., and McClain, B.U. (2003) Latency Measurement of a Real-Time Virtual Acoustic Environment Rendering System. Proceedings of the International Conference on Auditory Display, ICAD 2003, Boston, MA, pp. 111-114.

Miller, J.D. and Wenzel, E.M. (2002) Recent Developments in SLAB: A Software-Based System for Interactive Spatial Sound Synthesis. Proceedings of the International Conference on Auditory Display, ICAD 2002, Kyoto, Japan, pp. 403-408.

Miller, J.D. (2001) SLAB: a Software-Based Real-Time Virtual Acoustic Environment Rendering System. Proceedings of the International Conference on Auditory Display, ICAD 2001, Espoo, Finland.

Wenzel, E.M., Miller, J.D., and Abel, J.S. (2000) A software-based system for interactive spatial sound synthesis. Proceedings of the International Conference on Auditory Display, ICAD 2000, Atlanta, GA, pp. 151-156.

Wenzel, E.M., Miller, J.D., and Abel, J.S. (2000) Sound Lab: A real-time, software-based system for the study of spatial hearing. Proceedings of the 108th Convention of the Audio Engineering Society, Paris, France, Feb. 2000, Preprint 5140.

Miller, J.D., Abel, J.S. and Wenzel, E.M. (1999) Implementation issues in the development of a real-time, Windows-based system to study spatial hearing. Journal of the Acoustical Society of America, 105, 1193.

Begault, D.R., Wenzel, E.M., Shrum, R., and Miller, J.D. (1996) A virtual audio guidance and alert system for commercial aircraft operations. Proceedings of the International Conference on Auditory Display, ICAD 1996, Xerox PARC, Palo Alto CA.

These are available for download at the NASA Advanced Controls and Displays Personnel page: <http://humansystems.arc.nasa.gov/groups/ACD/personnel.php>