John F. Woodruff

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Research Interests

Audio signal processing, machine learning, auditory perception, computational auditory scene analysis, multichannel speech enhancement.

Education

Ph.D., M.Sc. in Computer Science and Engineering 2012
The Ohio State University, Columbus, Ohio
Thesis: Integrating monaural and binaural cues for sound localization and segregation in reverberant environments
Focus Areas: Artificial intelligence, digital signal processing, statistical learning

M.Mus. in Music Technology 2006
Northwestern University, Evanston, Illinois

B.Sc. in Mathematics, B.F.A. in Performing Arts and Technology 2004
The University of Michigan, Ann Arbor, Michigan

Research Experience

Research Scientist 2012 – present
Kuzer Co., Columbus, Ohio
Development of speech separation algorithms; speech perception studies

Visiting Researcher 2010
Oticon A/S, Copenhagen, Denmark
Development of multichannel speech enhancement algorithms for digital hearing aids

Graduate Research Associate 2006 – 2011
Perception and Neurodynamics Laboratory, Department of Computer Science and Engineering
The Ohio State University, Columbus, Ohio
Development of binaural computational auditory scene analysis algorithms; supervised learning methods for source segregation and speech enhancement; speech perception studies

Research Assistant 2005 – 2006
Interactive Audio Laboratory, Department of Electrical Engineering and Computer Science
Northwestern University, Evanston, Illinois
Development of signal processing algorithms for source separation and stereo music remixing

Research Assistant 2004
School of Music
Northwestern University, Evanston, Illinois
Assisted with literature research for the book "Producer as Composer" by Virgil Moorefield

Teaching Experience

Lecturer 2007
Department of Computer Science and Engineering, The Ohio State University
Computer Assisted Problem Solving

Laboratory Instructor 2006 – 2007
Department of Computer Science and Engineering, The Ohio State University
Computer Assisted Problem Solving for Business

Teaching Assistant 2006
School of Music, Northwestern University
Digital Sound Synthesis, Music Programming, Introduction to Max/MSP

Laboratory Instructor 2002 – 2004
School of Music, The University of Michigan
Sound Recording I and II

Relevant Professional Experience

Audio Engineer 2000 – 2007
Freelance and with Perfect Balance and Solid Sound Studios, Ann Arbor, Michigan
Worked as recording, mixing and mastering engineer

Audio Facilities Manager 2001 – 2004
Duderstadt Center, The University of Michigan
Coordinated training and certification of students in audio recording studio and two electronic music studios; recorded, mixed and mastered student and faculty recordings; maintained hardware and software in studios; developed technical instructional materials

Selected Publications

J. Woodruff and D.L. Wang "Binaural localization of multiple sources in reverberant and noisy environments", In *IEEE Trans. Audio, Speech and Lang. Proc.*, Vol. 20, No. 5, pp. 1503-1512, 2012.

J. Woodruff and D.L. Wang "Binaural speech segregation based on pitch and azimuth tracking", In *Proc. ICASSP*, 2012.

N. Roman and J. Woodruff "Intelligibility of reverberant noisy speech with ideal binary masking", In *J. Acoust. Soc. Amer.*, Vol. 130, No. 4, pp. 2153-2161, 2011.

J. Woodruff and D.L. Wang "Directionality-based speech enhancement for hearing aids", *Proc. ICASSP*, 2011.

J. Woodruff, R. Prabhavalkar, E. Fosler-Lussier and D.L. Wang "Combining monaural and binaural evidence for reverberant speech segregation", In *Proc. INTERSPEECH*, 2010.

J. Woodruff and D.L. Wang "Sequential organization of speech in reverberant environments by integrating monaural grouping and binaural localization", In *IEEE Trans. Audio, Speech and Lang. Proc.*, Vol. 18, No. 7, pp. 1856-1866, 2010.

J. Woodruff and D.L. Wang "Integrating monaural and binaural analysis for localizing multiple reverberant sound sources", *Proc. ICASSP*, 2010.

Y. Li, J. Woodruff and D.L. Wang "Monaural musical sound separation using pitch and common amplitude modulation", In *IEEE Trans. Audio, Speech and Lang. Proc.*, Vol. 17, No. 7, pp. 1361-1371, 2009.

J. Woodruff and D.L. Wang "On the role of localization cues in binaural segregation of reverberant speech", *Proc. ICASSP*, 2009.

J. Woodruff and D.L. Wang "Resolving overlapping harmonics for monaural musical sound separation using pitch and common amplitude modulation", *Proc. ISMIR*, 2008.

J. Woodruff and B. Pardo "Using pitch, amplitude modulation and spatial cues for separation of harmonic instruments from stereo music recordings", In *EURASIP J. Adv. Signal Proc.*, Vol. 2007, 2007.

J. Woodruff, B. Pardo and R. Dannenberg "Remixing stereo music with score-informed source separation", *Proc. ISMIR*, 2006.

A. D. Shamma, B. Pardo and J. Woodruff. "MusicStory: an autonomous, personalized music video creator", In *Intelligent Music Information Systems: Tools and Methodologies*, J. Shen, J. Shepherd, B. Cui, L. Liu, Eds., 2007.

Invited Talks

"Localization and segregation of speech by combining monaural and binaural grouping cues," University of Oldenburg, May 31, 2011.

"Diffuseness Detection," meeting on Perception and Processing of Spatial Sound, Eriksholm Research Facility, Oticon A/S, October 26, 2010.

"Integrating monaural and binaural grouping cues for speech segregation in reverberant environments," Centre for Applied Hearing Research, Technical University of Denmark, October 1, 2010.

"Active source estimation for improved source separation," Phonatics Research Group, Northwestern University, March 22, 2006.

Awards

B. Chandrasekaran and Sandra Mamrak Fellowship 2012
Department of Computer Science and Engineering, The Ohio State University
Annual award given to one graduate student in Computer Science and Engineering in recognition of research accomplishment

Best poster award 2011
Department of Computer Science and Engineering, The Ohio State University
Best poster at the Computer Science and Engineering Research Exhibition

Tuition grant 2005-2006
School of Music, Northwestern University

Technical Skills

Programming languages
Matlab, Java, C, C++, LaTeX 2ε, R, SuperCollider, Max/MSP

Operating systems
Apple, Windows, Linux

Audio production
Digital audio editors, mixing consoles, digital and analog audio effects, samplers, synthesizers

Memberships and Service

Member of *IEEE* and *Signal Processing Society*

Reviewer:
IEEE Transactions on Audio, Speech and Language Processing
IEEE Signal Processing Letters
EURASIP Journal on Advances in Signal Processing
EURASIP Journal on Audio, Speech and Music Processing
Neural Networks
International Conference on Acoustics, Speech and Signal Processing (ICASSP)
European Signal Processing Conference (EUSIPCO)
International Joint Conference on Neural Networks (ICJNN)
International Conference on Music Information Retrieval (ISMIR)