

CURRICULUM VITAE

John S. Usher

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EDUCATION

Ph.D.

September 2001–June 2006 (transfer from Master program in 2003).
Dean's Honours List Recommendation.
Faculty of Music, McGill University, Montreal, Canada.
Thesis title: "*Subjective evaluation and electroacoustic validation of a new approach to audio upmixing*".
Thesis committee: Prof. W.L. Martens, Prof. W. Woszczyk, Prof. J. Benesty and Prof. A.S. Bregman.

B.Eng.

Electroacoustics (highest grade in year-group).
1997-2001
School of Acoustics & Electronic Engineering, University of Salford, England.
Thesis title: "*Computational auditory scene analysis in the lateral plane of two channel audio to predict image locations spectrally, as would be perceived on a loudspeaker pair*".
Supervisors: Dr. W.J. Davies and Prof. T. Cox.

RESEARCH AND EXPERIENCE

Audio software and hardware system architect

Hearium Labs

September 2006 – present

I have filed over 20 patents on technology relating to low-latency, high-quality audio signal processing for a state-of-the-art earphone for music listening and voice communication. These patents have mostly been filed by myself with a patent agent. During this time at Hearium (Personics) I have been working at an executive level with a team of 15 hardware and software engineers. I have also implemented this technology on a hardware development board at a low-level

coding implementation layer. The work relates mostly to audio signal processing of music for automatic gain control using machine learning algorithms; and automatic sound recognition (e.g. car-horns, alarm sirens, snoring). The algorithms used are state-of-the-art (e.g. hearing dose algorithms to predict hearing loss, Gaussian Mixture Models and MFCC algorithms for pattern recognition) and have been developed with universities and then adapted by our engineering team for use with a low-powered real-time earphone product.

Student research engineer
DSP department

Philips Research
Eindhoven, Netherlands
September – December 2005

Conducted listening tests on very high resolution audio discrimination.
Electroacoustic measurements of various transducers.
Development and evaluation of audio upmix system.

Recording engineer
Amon Tobin

Ninja tune records
2005

Ultrasonic recordings of insects for use in electroacoustic composition by internationally renowned artist.

Research Assistant
Department of Computer Science

McGill University

Aug. 2003–July 2004

Designed, programmed and evaluated real-time single-channel acoustic echo canceller (AEC) for use with full-duplex high-resolution network audio. In a blind sound quality study with commercially available AEC systems, this new system was found to be superior.

Course instructor
Electroacoustic measurement

McGill University

2001

Tutored six graduate students in the *Tonmeister* graduate program in sound recording.

Student research engineer
Electroacoustic department

Bang & Olufsen
Struer, Denmark
Aug. 1999 – July 2000

Coded and evaluated a real-time frequency-domain multichannel upmix system, using ADSP-21062 hardware (assembly and C); this work resulted in a patent. Design and construction of novel high-quality pyramidal 3-way passive loudspeaker.

PUBLICATIONS

Journal articles: D. Chandra, J. Usher, and M. Tessler.

Audio spectrum and sound pressure levels vary between pulse oximeters.
Canadian Journal of Anesthesia, Jan. 2006.

J. Usher and J. Benesty.

Enhancement of spatial sound quality: A new reverberation-extraction audio upmixer.
IEEE transactions on Audio, Speech, and Language Processing, Sept. 2007.

Conference papers:

1. J. Usher and W. L. Martens.

Perceived naturalness of speech sounds presented using personalized versus non-personalized HRTFs.
In Proc. International Community for Auditory Display, Montreal, 2007

2. J. Usher.

A new upmixer for enhancement of reverberance imagery in multichannel loudspeaker audio scenes.
In Proc. of the AES 121st International Convention, San Francisco, 2006.

3. J. Usher.

Design criteria for high quality audio upmixers.
In Proc. of the AES 28th International Conference, Piteå, Sweden, 2006.

4. J. Usher.

Extraction and removal of percussive sounds from musical recordings.
In Proc. of the 6th International Conf. on Digital Audio Effects, Montreal, 2006.

5. J. Usher and W. Woszczyk.

Interaction of source and reverberance spatial imagery in multichannel loudspeaker audio.
In Proc. of the AES 118th International Convention, Barcelona, Spain, 2005.

6. J. Usher, J.R. Cooperstock, and W. Woszczyk.

A multi-filter approach to acoustic echo cancellation for teleconferencing.
In Proc. of the 75th Meeting of the Acoustical Society of America, New York, 2004.

7. J. Usher, W. Martens, and W. Woszczyk.

The influence of the presence of multiple sources on auditory spatial imagery.
In Proc. of the 18th International Congress on Acoustics, Kyoto, Japan, 2004.

8. J. Usher, and W. Woszczyk.

Visualizing auditory spatial imagery of multi-channel audio.
In Proc. of the AES 116th International Convention, Berlin, Germany, 2004.

9. J. Usher and W. Woszczyk.

Design and testing of a graphical mapping tool for analyzing spatial audio scenes.
In Proc. of the AES 24th International Conference on Multichannel Audio.
Banff, Canada, 2003.

OTHER DETAILS

SKILLS

- Computer languages: C, C++, Matlab, Assembly (ADSP-2106x SHARC family and TI c6000 series), R.
 - Strong technical writing and grammar skills.
 - Provisional patent drafting experience; I have been the primary author for over 20 patents on headphone audio systems concerning spatial audio enhancement, hearing protection, automatic acoustic management.
 - Excellent inter-personal communication skills from 10 years of leading mountaineering expeditions.
 - Languages: English, conversational French, Danish and basic Spanish.
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PRINCIPAL RESEARCH INTERESTS

- Real-time low-latency digital audio effects processing for electronic music reproduction, performance and composition.
 - Subjective evaluation of earphone and loudspeaker sound quality.
 - Adaptive filtering for music audio signals.
 - Hearing loss: prevention, monitoring and intervention for earphone reproduction.
 - Upmix signal processing for multichannel loudspeaker audio.
 - Psychoacoustics for audio (psychophysics of human sound localization).
 - Auditory cognition and spatial auditory scene analysis.
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GRADUATE COURSES UNDERTAKEN. GPA 3.92 OUT OF 4.0

- Computational Perception.
Electrical and Computer Engineering Department, Prof. M. Langer.
- Digital Signal Processing.
Electrical and Computer Engineering Department, Prof. F. Labeau.
- Perception & Cognition.
Department of Psychology, Prof. D. Levitin.
- Psychology of music seminar.
Department of Psychology, Profs. R. Zatorre and D. Levitin.
- Auditory Perception.
Department of Psychology, Prof. A.S. Bregman.
- Quantitative & Individual Differences.
Department of Psychology, Prof. J.O. Ramsay.
- Electroacoustic Measurement.
Dr. D.R. Begault (NASA).
- Digital Studio Technology.
- Advanced Digital Editing and Post Production.
- Science Writing & Publishing.