

# CURRICULUM VITAE

**John Usher**

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## **Education:**

- Ph.D. Audio upmixing signal processing and sound quality evaluation. 2006.  
Faculty of Music, McGill University, Montreal, Canada.  
Dean's Honours List Recommendation.  
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). 2001 .  
School of Acoustics & Electronic Engineering, University of Salford, England.  
Supervisors: Dr. W.J. Davies and Prof. T. Cox.

## **Research and experience:**

### **Audio software and hardware system architect at Hearium Labs.**

September 2006 – present.

I have filed over 50 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.

### **Audio research engineer at Fundacio Barcelona Media (Barcelona, Spain).**

April 2009 – May 2010.

3D audio upmixing for music and sports transmission.  
Blind room equalization using music and speech signals.  
Ph.D. supervision.

Patent drafting with the audio group: successful commercialization of 3D upmixer for cinema currently implemented in theatres in Europe and S. America.

### **Research engineer at Philips Research DSP department, 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.

John Usher  
January 2011

**Recording engineer for Amon Tobin, Ninja Tune records.**

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

**Research Assistant, McGill University.**

Department of Computer Science .

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, McGill University.**

Electroacoustic measurement.

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

**Student research engineer, Bang & Olufsen , Denmark.**

Electroacoustic department.

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.

**Internship Thompson-Marconi SONAR, Templecombe, UK.**

Analog signal processing for military grade SONAR system.

**Specialties:**

- Subjective sound quality enhancement and evaluation for music and speech.
- Room acoustic analysis: especially blind RIR measurement and room equalization.
- Spatial audio upmixing systems (5.1 and 3D systems).
- Hearing protection and sound dosimetry using active sound control for earphones.
- Digital audio signal processing (10+ years experience with Matlab, C, C++, assembly, GDB, Visual Studio).
- Adaptive filtering for music beat analysis, extraction and removal.
- Patent drafting experience (50+ patents on digital audio signal processing).
- Excellent inter-personal communication and highly creative independent project management skills.
- Conversational language skills in French and Spanish.

**List of publications:****Patents:**

50+ patents filed on real-time, low-latency, high-quality adaptive audio technologies.

Selected patents:

(WO/2008/023178) Methods and devices for audio upmixing.

(US2009290721) Method and System for Automatic Level Reduction.

(WO2009059051) Earhealth monitoring system and method.

(WO2009097009) Method and device for linking matrix control of an earpiece

(WO2009136955) Method and device for in-ear canal echo suppression.

(WO2008095013) Sound pressure level monitoring and notification system.

(WO2008022271) Method of auditory display of sensor data.

John Usher  
January 2011

### **Journal publications:**

1. An improved method to determine the onset timings of reflections in an acoustic impulse response. J. Usher. *J. Acoust. Soc. Am.*, vol. 127, EL172--EL177, 2010.
2. Enhancement of spatial sound quality: A new reverberation-extraction audio upmixer. J. Usher and J. Benesty. *IEEE Trans. on Audio, Speech, and Language Proc.*, vol. 15, pp.2141-2150, 2007.
3. Audio spectrum and sound pressure levels vary between pulse oximeters. J. Usher, D. Chandra and M. Tessler. *Canadian Journal of Anesthesia*, 2006.

### **Conference publications:**

4. Automatically optimizing situation awareness and sound quality for a sound isolating earphone. J. Usher. 129th AES Int. Convention, San Francisco, November, 2010.
5. Measuring impulse responses using speech and music. J. Usher. 128th AES Int. Convention, London, 2010.
6. Determining a room geometry from its impulse response. With D. Garcia, D. Arteaga and T. Mateos . *Internoise10*, Lisbon, 2010.
7. Which of the two digital audio systems best matches the quality of the analog system? With W. Woszczyk, J. Engel, R. M. Aarts and D. Reefman . *AES 31st Int. Conf.*, London, 2007
8. Perceived naturalness of speech sounds presented using personalized versus non-personalized HRTFs. With W. L. Martens. *International Conference on Auditory Display (ICAD)*, Montreal, 2007.
9. A new upmixer for enhancement of reverberance imagery in multichannel loudspeaker audio scenes. J. Usher. In *Proc. of the AES 121st International Convention*, San Francisco, 2006.
10. Extraction and removal of percussive sounds from musical recordings. J. Usher. In *Proc. of the 6th international conference on Digital Audio Effects*, Montreal, 2006.
11. Design criteria for high quality audio upmixers. J. Usher. In *Proc. of the AES 28th international conference*, Piteå, Sweden, 2006.
12. Interaction of source and reverberance spatial imagery in multichannel loudspeaker audio. With W. L. Woszczyk. In *Proc. of the AES 118th international convention*, Barcelona, Spain, 2005.
13. A multifilter approach to acoustic echo cancellation. With W. L. Woszczyk and J. Cooperstock. In *Proc. Of the 75th Meeting of the Acoustical Society of America*, New York, 2004.
14. Visualizing auditory spatial imagery of multi-channel audio. With W. L. Woszczyk. In *Proc. of the AES 116th international convention*, Berlin, Germany, 2004.
15. The influence of the presence of multiple sources on auditory spatial imagery as indicated by a graphical response technique. With W. L. Martens and W. L. Woszczyk. In *Proc. of the 18th International Congress on Acoustics*, Kyoto, 2004.
16. Design and testing of a graphical mapping tool for analyzing spatial audio scenes. With W. L. Woszczyk. In *Proc. of the AES 24th international conference on Multichannel Audio*. Banff, 2003.

Undergraduate BEng. honours project:

"Computational Auditory Scene Analysis in the Lateral plane of two channel audio material to predict image locations spectrally, as would be perceived on a loudspeaker pair".

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