

HOME ADDRESS

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NORMAN H. ADAMS

Curriculum Vitae

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WORK ADDRESS

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EDUCATION**University of Michigan, College of Engineering**

Ann Arbor, MI

PhD in Electrical Engineering: Systems, GPA: 8.1 (A=8.0)

Fall 2007

Dissertation: *A Model of Head-Related Transfer Functions based on a State-Space Analysis*

Research areas: • Acoustic signal processing • Music information retrieval
 • Binaural display and 3D sound • Melody indexing and classification

Coursework: • Source coding • Information theory • Stochastic processes
 • Detection and estimation • Time-frequency analysis and wavelets
 • Acoustics • Image processing
 • Linear systems theory • Combinations and graph theory

University of Michigan, School of Music, Theater and Dance

Ann Arbor, MI

Candidate for MA in Performing Arts Technology, GPA: 8.0

Fall 2004 to present

Research areas: • Time-frequency visualization • Interactive sound installations

Coursework: • Sound synthesis • Algorithmic composition
 • Media art • Sonification

University of Virginia, School of Engineering

Charlottesville, VA

MS in Electrical Engineering, GPA: 3.9 (A = 4.0)

Summer 2001

BS dual-major in EE and Music, GPA: 3.8

Spring 2000

Thesis: *Modulation Formats for Nonlinear DWDM Fiber Optic Communications*

Research areas: • Fiber optic communications • Multi-path communications

Coursework: • Modulation and channel coding • Probability and random variables
 • Digital and analog circuit design • EM Fields and Microwaves
 • Linear algebra • Algorithms • Data structures
 • Composition • Music theory • Musicology

JOURNAL PAPERS

N.H. Adams, M.B. Bartsch, G.H. Wakefield, *Note Segmentation and Quantization for Music Information Retrieval*, IEEE Trans. on Audio, Speech and Language Processing, Jan. 2006, v.16, n.1, pp.131-141.

N.H. Adams, G.H. Wakefield, *State-Space Synthesis of Virtual Auditory Space*, in review, submitted to IEEE Trans. on Audio, Speech and Language Processing.

N.H. Adams, V.E. Perlin, M.M. Rohde, et al., *Upper-Bounding the Incidence Rate of Associations between Camouflage Associations and Surveillance Images*, in preparation, to be submitted to Journal of Forensic Sciences.

N.H. Adams, G.H. Wakefield, *Psychophysical validation of a low-order state-space model of head-related transfer functions*, in preparation, to be submitted to the Journal of the Acoustical Society of America.

BOOK CHAPTER

N.H. Adams, *Visualization of Musical Signals*, Analytical Methods for Electroacoustic Music, M.H. Simoni Editor, 2005, Routledge Taylor.

CONFERENCE PAPERS

N.H. Adams, G.H. Wakefield, *Efficient Binaural Display Using MIMO State-Space Systems*, Proc. of IEEE International Conference on Acoustics, Speech and Signal Processing, April 2007, Honolulu, HI.

N.H. Adams, G.H. Wakefield, *The binaural display of clouds of point sources*, Proc. of IEEE Workshop on Applications of Signal Processing to Audio and Acoustics, Oct. 2005, New Paltz, NY.

N.H. Adams, D.V. Marquez, G.H. Wakefield, *Iterative deepening for melody alignment and retrieval*, Proc. of International Conference on Music Information Retrieval, Sept. 2005, London.

N.H. Adams, M.B. Bartsch, J.B. Shifrin, G.H. Wakefield, *Time-Series Alignment for Music Information Retrieval*, Proc. of International Conference on Music Information Retrieval, Oct. 2004, Barcelona.

N.H. Adams, M.B. Bartsch, G.H. Wakefield, *Coding of Sung Queries for Music Information Retrieval*, Proc. of IEEE Workshop on Applications of Signal Processing to Audio and Acoustics, Oct. 2003, New Paltz, NY.

CONFERENCE TALKS

M.M. Rohde, V.E. Perlin, N.H. Adams, et al., *Are camouflage uniforms unique? Estimating the probability of Accidental match for camouflage uniforms*, 60th Annual Meeting of the American Academy of Forensic Sciences, Feb. 2008, Washington, DC.

N.H. Adams, G.H. Wakefield, *Binaural Environment Modeling with MIMO State-Space Systems*, Artificial Intelligence Lab Seminar Series, Jan. 2006, University of Michigan.

N.H. Adams, G.H. Wakefield, *Representation and alignment of sung queries for music information retrieval*, 150th Meeting of the Acoustical Society of America, Oct. 2005, Minneapolis, invited talk.

N.H. Adams, M.H. Simoni, *Time-Frequency Visualization of Electro-Acoustic Music*, Enriching Scholarship Workshop, University of Michigan, May 2005, invited talk.

N.H. Adams, M.H. Simoni, *Time-Frequency Visualization of Electro-Acoustic Music*, Annual Conference of the Society for Electro-Acoustic Music for the United States, April 2005, Muncie, IN.

TECHNICAL REPORTS

N.H. Adams, *State-Space Architectures for Binaural Environment Modeling*, EECS Dept. Tech. Report, Mar. 2007, <http://www.eecs.umich.edu/techreports/systems/cspl/cspl-380.ps.gz>.

N.H. Adams, *Low-Order State-Space Models of Head-Related Transfer Function Arrays*, EECS Dept. Tech. Report, <http://www.eecs.umich.edu/techreports/systems/cspl/cspl-379.ps.gz>, Mar. 2007.

N.H. Adams, *The Binaural Display of Reverberant Space using MIMO State-Space Systems*, EECS Dept. Dissertation Prospectus, Nov. 2005.

N.H. Adams, *Time-Series Representations for Music Information Retrieval*, EECS Dept. Tech. Report, July 2004, <http://www.eecs.umich.edu/techreports/systems/cspl/cspl-349.ps.gz>.

N.H. Adams, *Automatic Segmentation of Sung Melodies*, EECS Dept. Tech. Report, July 2003, <http://www.eecs.umich.edu/techreports/systems/cspl/cspl-340.ps.gz>.

INDUSTRY EXPERIENCE

Quantum Signal, LLC.

Signal and Image Processing Engineer

Ann Arbor, MI

June 2006 to present

Designed and validated a statistical model of associations between camouflage garments and surveillance images for forensic investigations. Designed an efficient algorithm for finding similar camouflage patches, and matching specific surveillance patches to the mater pattern.

The Mathworks, Inc.

Programmer

Natick, MA

Summers, 1998-2000

Developed software for MATLAB: Communications Toolbox & Blockset. Wrote Galois field arithmetic functions and error-counting utilities in M and C++. Wrote functional specs, self-testing procedures, and team code reviews.

MEA Consulting Engineers

Draftsman

Waltham, MA

Summers, 1995-1997

CAD and manual draftsman of HVAC, electrical and sprinkler systems. Maintained office database and library.

RESEARCH PROJECTS

Binaural Auditory Display

Fall 2003 to present

Developed a novel framework for efficient and flexible binaural displays. An HRTF filter array is modeled as a reduced-order MIMO state-space system, enabling the synthesis of a wide variety of binaural auditory scenes including reflections and motion. Supported by an AFCEA fellowship and a Rackham pre-doctoral fellowship.

Music Information Retrieval

Summer 2002 to Summer 2005

Explored multi-scale melodic representations of sung queries and iterative database retrieval techniques for query-by-humming systems. Mentored one MS student and two BS students. Supported by a grant from the ITR project of the NSF.

Time-Frequency Visualization

Spring 2004 to Spring 2005

Developed GUI to generate high-quality TF images of musical signals. Supported by a CARAT/Rackham fellowship.

Nonlinear Fiber-Optic Communications

Winter to Summer 2001

Explored alternative modulation formats to reduce crosstalk in multi-user DWDM.

Channel Equalization

Fall 1999 to Spring 2000

Designed a Kalman filter for channel estimation and equalization for CDMA.

Autonomous Blimp Navigation

Spring 1996

Freshman team design and build project: employed an array of proximity sensors with hacked remote control car and simple AI steering control.

CREATIVE PROJECTS

Haptic Theater of Cruelty

Spring 2005

Designed and built an interactive multimedia installation with five other graduate students from art, architecture and music. Supported by a U. Mich. GROCS fellowship.

Water Bug

Fall 2004

Stochastic computer music composition.

Included in regional SEAMUS concert, Nov. 2004, Ann Arbor.

Partial Precept

Fall 2003

Computer music composition.

Included in the first Vox Novus 60×60 concert, Nov. 2003, NYC, and on Capstone CD.

Bostitched & IMF-Free Europa

Spring 2000

Algorithmic computer music compositions. Included in concert of undergraduate student works, April, 2000, Charlottesville, VA. *Bostitched* was also included in Sonic Circuits' *Artful Noise*, Nov. 2000, Minnesota, MN.

TEACHING EXPERIENCE

Signals & Systems I

Ann Arbor, MI

Student Instructor

Winter 2002, Fall 2005, Winter 2006

Taught and graded weekly lab sessions for EECS 206, a sophomore-level introduction to signal processing. Two 25-student sections. Held office hours to discuss homework and lecture material.

Source Coding

Ann Arbor, MI

Grader, EECS 650

Winter 2005

Stradivarius as Biologist

Ann Arbor, MI

Student Instructor

Winter 2004

Taught and graded weekly lab sessions for UC 263, an interdisciplinary course (between Kinesiology, Otolaryngology, Music and Engineering) that explores the singing voice. Two 10-student sections.

Digital & Analog Communications

Charlottesville, VA

Student Instructor

Spring 2001

Taught and graded weekly lab sessions for ECE 422L, a senior-level course in analog and digital communications and modulation. Two 15-student sections.

Signal & Systems I & II

Charlottesville, VA

Student Assistant

Spring 1999

Wrote and graded four lab projects for ECE 323 & ECE 324, a junior-level introduction to signals and systems.

SERVICE & PROFESSIONAL SOCIETIES

Reviewer Have reviewed paper submissions for the IEEE Trans. on Audio, Speech and Language Processing, the Journal of the Acoustical. Society of America, and the IEEE Workshop on Applications of Signal Processing to Audio and Acoustics.	Summer 2003 to present
WCBN FM, Ann Arbor Freeform music DJ (<i>Machines for Making Mistakes</i>), and public-affairs engineer (<i>Closets R4 Cloths</i>) at student-run radio station. Production director (May'04 - Dec'05). Student member of board of directors (Jan'04 - May'05).	Spring 2002 to Winter 2005
Publicity Chair, IEEE WASPAA, Oct. 19-22, 2003, New Paltz, NY Distribution of the CFP and other announcements, organized printed materials for conference.	Summer, Fall 2003
McIntire Dept. of Music: U.Va. Concert Recorder, DAT/CD/Cassette archive of academic performances and recitals	1996-2000
Institute of Electrical and Electronic Engineers , Full member	1997 to present
Acoustical Society of America , Student member	2003 to present
Audio Engineering Society , Student member	2004 to present
Society for Electro-Acoustic Music in the United States , Student member	2005 to present

FELLOWSHIPS & AWARDS

Rackham Predoctoral Fellowship	2006/07 school year
EECS Dept. Student Instructor Award (EECS 206)	April 2006
AFCEA Scholarship Award	March 2006
CARAT/Rackham Interdisciplinary Fellowship	2004/05 school year
GROCS Fellowship	Winter 2005
GAANN Fellowship	2001/02 school year
Dean's Fellowship Nomimated for College of Engineering Student Instructor Award Nomimated for 7's Society Teaching Assitant Award (ECE 422L) E-Summit Student Panelist Undergraduate Honor Societies: HKN, ΦHΣ and Golden Key Undergraduate Social Society: OΞ Rodman Scholars Honors Program William L. Everitt Award in Communications McIntire Dept. of Music Composition Award Brander W. Morrison Award	Fall 2000 Spring 2006 Spring 2001 Spring 2000 1997-1998 1997-2000 1995-2000 1998, 2000 2000 1999