
Teaching Experience

Instructor, *Acoustics for Musicians and Recording Engineers*, Fall Semesters, 1999–2001

Mechanical Engineering Department, The University of Texas at Austin

This class was an introduction to the math, physics, and physiology of sound and hearing specifically as it relates to music. Though non-technical students struggled at times with the mathematics, the overall enthusiasm of the students was remarkable, as it represented the first formal presentation of acoustics for many. After exploring the basic physics, the class moved into specific instruments, including the human voice, and then into analog and digital theory for recording and reproduction equipment. The final topic was room and auditorium acoustics. Student projects and field trips rounded out the experience.

- Designed, taught, and graded this general-elective open-to-the-university class
- Guided class tours of research, performance, and recording spaces around Austin, Texas
- Created images, animation, and classroom demonstrations to help students understand acoustics
- Student evaluation scores were excellent (average of 4.7 out of 5.0)
- Semester enrollment: 18–30 undergraduate students of all majors and levels of technical ability

Teaching Assistant, *Senior Design Laboratory*, Spring and Summer Semesters, 2000–2004

Electrical and Computer Engineering Department, The University of Texas at Austin

- Instructed, graded, and guided students through the design, implementation, documentation, and presentation of senior design projects
- Mentored groups based on their interest in acoustics (speaker, microphone, and tuner design) and audio (amplifier and effects processor design), but also instructed groups focused on DSP, power, software, microcontrollers, antennas, user-interface design, control systems, and hardware reliability
- During the last two years of this position, was assigned groups who formed larger teams with Mechanical Engineering senior design groups to construct cross-disciplinary projects with broader scope
- Semester Enrollment: 10–17 senior ECE undergraduates

Recording, Audio, and Radio Experience

Production Director, 1989–1990; **Promotions Director**, 1990–1991; **Disc Jockey**, 1988–1992

WSBF-FM, Clemson University, Clemson, SC

- As Production Director:
 - Led semester workshops on the usage of all recording equipment in the live and recording production studio including 24-channel mixing board, $\frac{1}{4}$ and $\frac{1}{2}$ -inch tape decks, effects units, and on-air delay feeds
 - Managed up to 20 student assistants to provide all live band performances, station identifications, public service announcements, audio promotional material for on-air broadcast
 - Technical Director for Tigerama, an annual pre-recorded theatrical event with an audience of 30,000
- As Promotions Director:
 - Managed 30 students working on all promotional work at the radio station
 - Redefined the promotions director position to be “concerned with the improvement of the internal and external attitude toward the radio station”
- As Disc Jockey:
 - Selected and played three to six hours of music programming each week
 - Spoke on-air for public service announcements, station identifications, music description, news reports, movie reviews, and interviews

Other Music, Dance, and Performance Experience

- Musical background and performances in electronic music, 1991–current; hand drum, 1995–current; musical theater, 2004; and guitar, 1984–current
- Designed Audio for student theatre: *Blind Horses*, 1999; and *Marisol*, 2000
- Undergraduate Individual Design Project: *Sound Design for Film*
- Co-curator of Series 28, a monthly performance art exhibition at *Movements Art Gallery*, Austin, Texas, 1997–1999
- Dance background through coursework; individual performances, 1995–2005; and as member of the *Juwonka Dance Group*, 1993–2000

- Related Coursework:
 - Computer Music
 - Improvisational Dance
 - Music in the Western World
 - Electronic Media Projects
- West African Drumming
- Film
- Modern Dance

Academic and Research Experience

Professional

Senior Researcher, 2009–2011

Project Numediart, University of Mons, Belgium

- Led and participated in 3–12 member groups using DSP technology for artistic performances, software, and prototypes
- Technical skills: group software development, microcontroller programming, product assembly design, sensor signal integration, and rhythm analysis and classification
- projects (3–6 months in length):
 - *Social Controllers* — led a team to create small, inexpensive, handheld, electronic devices to promote social interaction through communal music creation using sensors and embedded microcontrollers
 - *Augmented Conductor* — led a team to place gyroscope, accelerometer, and magnetometer sensors on the arm of an orchestra conductor to generate realtime music musical control parameters for sound processing
 - *Music Programming in Minim* — led a team to develop a music programming interface for the Minim Sound Library of the Processing programming environment
 - *LaughterCycle* — added rhythm analysis to search keys generated for a database of laughter audio and video searchable by realtime laughter
 - *Multimodal guitar* — installed multiple pressure sensors on a guitar to generate realtime musical control parameters for a self-designed software toolbox for guitar sound processing

Education

PhD in Electrical and Computer Engineering (Acoustics specialization), August 2008

The University of Texas at Austin

Dissertation Title: *Human-Based Percussion and Self-Similarity Detection in Electroacoustic Music*

Advisors: Elmer L. Hixson, Michael F. Becker

Committee: Brian L. Evans, Mark F. Hamilton, Dennis McFadden, Russell F. Pinkston

Dissertation Summary:

- Created an algorithm that tries to identify instants in pieces of music that humans would also identify as percussive
- Collected human judgments about percussive sounds to acquire percussive cues
- Designed a percussivity-profile algorithm using a time-domain, channel-based approach and psychoacoustic models with input parameters tuned to maximally match human choices
- Combined a similarity matrix with the percussivity-profile algorithm to demonstrate structural characteristics in the percussive sounds of electroacoustic music

Related Coursework:

- Fundamentals of Physical Acoustics
- Nonlinear Acoustics
- Psychoacoustics
- Wavelets

MS in Acoustics, August 1997

The Pennsylvania State University

Thesis Title: *Sensitivity of a Computational Version of the Kirchhoff Integral Theorem to Surface Discretization*

Advisor: Donald E. Thompson

Committee: Victor W. Sparrow, Philip J. Morris, Jiri Tichy

Thesis Summary:

- Designed, implemented, validated, and evaluated the surface discretization of a computational version of the Kirchhoff Integral Theorem for sound propagation from a jet engine
- Worked as a team member with Aerospace Engineering researchers to integrate results from computational-fluid-dynamics software

Related Coursework:

- Fundamentals of Acoustics
- Acoustics of Fluid Media
- Computational Acoustics
- Techniques in Experimental Acoustics
- Acoustic Data Measurement and Analysis
- Electro-acoustic Transducers
- Building Acoustics
- Mathematical Methods in Engineering

BS in Computer Engineering, August 1992

Clemson University

Technical Area: Software Engineering

Other Research Experience

- Group Design Project: Model Car Control (microcontroller specialist)
- Individual Design Project: DSP for Sound Synthesis on a NeXT Computer
- Designed a real-time, HRTF-based auralization system for a virtual-reality system
- Designed and implemented a data-sonification system to accompany a computer-visualization system
- Conducted an intelligibility study of an auditorium classroom
- Designed and implemented a rudimentary graphical-score system for electroacoustic music
- Implemented a head-tracking system for a virtual-reality system
- Current Computer Languages: Java, C/C++, Matlab, Fortran
- Sound programming languages: Minim, Csound, ChuckK, Max/MSP, Pure Data
- Other specific-use computer languages: Lisp, Ada, M4, Verilog, Pascal, 8088 assembly, Cobol, Basic
- Workshop skills: wood and metal tools; table, power, and hand tools; circuit layout, breadboarding, circuitboard etching, and soldering
- Coursework:
 - Data Structures in C++
 - Digital Signal Processing
 - Operating System Programming
 - Microprocessor Programming
 - Hardware Description Language
 - Knowledge Engineering

Recent Professional Affiliations

- New Interfaces for Musical Expression, 2010
 - 2010, Sydney, Australia
- International Society on Music Information Retrieval, 2008
 - 2008, Philadelphia, Pennsylvania
- Acoustical Society of America, member 1992–current
 - 2007, Salt Lake City, Utah [presented]
 - 2006, Providence, Rhode Island [presented]
 - 2005, Vancouver, British Columbia [presented]
 - 2004, New York, New York [presented]
 - 2003, Austin, Texas

Recent Publications

- J. A. Mills III, D. Di Fede, and N. Brix, “Music Programming in Minim,” in *New Interfaces for Musical Expression (NIME)*, Sydney, Australia, 2010, pp. 37–42.
- L. Reboursière, C. Frisson, O. Lähdeoja, J. A. Mills III, C. Picard, and T. Todoroff, “Multimodal Guitar: A Toolbox For Augmented Guitar Performances,” in *New Interfaces for Musical Expression (NIME)*, Sydney, Australia, 2010, pp. 415–418.
- J. A. Mills III, L. Reboursière, and R. Chessini Bose, “Developing Social Controllers,” in *QPSR of the Numediart Research Program*, 2010, pp. 37–43.
- C. Frisson, L. Reboursière, W. Chu, O. Lähdeoja, J. A. Mills III, C. Picard, A. Shen, and T. Todoroff, “Multimodal Guitar: Performance Toolbox and Study Workbench,” in *QPSR of the Numediart Research Program*, 2009, pp. 67–84.
- S. Dupont, T. Dubuisson, J. A. Mills III, A. Moinet, X. Siebert, D. Tardieu, and J. Urbain, “LaughterCycle,” in *QPSR of the Numediart Research Program*, 2009, pp. 23–31.

Other Interests

- Conversant in French
- Fluent in Esperanto and active member in the Universal Esperanto Association, Esperanto-USA, and Texas Esperantists, 2003–current
- Go enthusiast and active member of the American Go Association, 1999–current
- Physical fitness through dancing, bicycling, bocking, and yoga