

Computer, Research, and Laboratory Experience

Professional**Senior Software Engineer, 2011–2013**

Reddwerks Corporation, Austin, Texas

- Designed, implemented, deployed, go-live supported, and support transitioned team software solutions for warehouse logistics and ordering for enterprise-level customers
- Led technical teams of up to 10 Software Engineers and 5 QA Engineers
- Interviewed 100+ Java developer candidates and promoted Reddwerks at university and public technical career fairs
- Technologies: Java, SQL (MySQL, Informix, MSSQL), Hibernate, Struts, JMS, RSA BSAFE/Crypto-J/Cert-J, Log4j, unix, Eclipse, IntelliJ, JIRA, Subversion, Confluence
- projects (4-16 months in length):
 - *Pharmacy CSOS* — uniquely centralized DEA-certified *Controlled Substance Ordering Software* for a major US pharmacy; personally developed the PKI security engine for this new-to-Reddwerks product
 - *WCS with PTL* — *Warehouse Control Software* for a major US retailer (\$400M/year) with a single national distribution center including *Pick To Light*, *Pick To Mobile*, *Pick To Assignment*, quality control, packing station, hospital, shipping downlane control, and single screen load management

Independent Contractor, 2011

Konfuzo Consulting, Austin, Texas

- Designed and implemented data translator for a one million song analysis dataset (280 GB) in Java and Ruby
- State of the Art report and initial design for customer intention data acquisition using automatic speech recognition and 3D camera interpolation for brick and mortar stores

Researcher/Project Manager, 2009–2011

Numediart Institute, University of Mons, Belgium

- Led and participated in 3–12 member groups using DSP technology for artistic performances, software, and hardware prototypes
- Developed embedded firmware for microcontroller based devices
- Designed and constructed final product assemblies for sensor-based devices
- Integrated signal data from sensors for device control
- Developed small-to-medium-scale software applications and libraries using group development tools and techniques
- Developed rhythm analysis algorithms for audio-searchable databases
- projects (3–6 months in length):
 - *Augmented Conductor* — (Max/MSP) 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
 - *Social Controllers* — (embedded C++) led a team to create small, inexpensive, handheld, electronic devices to promote social interaction through communal music creation using sensors and embedded microcontrollers
 - *Music Programming in Minim* — (Java) led a team to develop a music programming interface for the Minim Sound Library of the Processing programming environment
 - *Multimodal guitar* — (PureData, Max/MSP) installed multiple pressure sensors on a guitar to generate realtime musical control parameters for a self-designed software toolbox for guitar sound processing
 - *LaughterCycle* — (C++) added rhythm analysis to search keys generated for a database of laughter audio and video searchable by realtime laughter

System Administrator of High Performance Computing Linux Cluster, 2004–2008

Mechanical Engineering Department, The University of Texas at Austin

- Managed a 37-computer Linux cluster including eight external servers for authentication, home directory, email, mailing list, printing, web, license manager, and backup services
- Transitioned the cluster from a desktop-accessible lab to a rack-based, remotely accessible resource; process included hardware purchase, installation, and configuration of the new hardware and design and implementation of a transition plan to retire the old hardware

Open Source Projects**Minim, 2008–current**

Developer

- Codeveloped this Java sound library for music and sound signal processing as the default sound library for the *Processing* programming environment
- Continuing maintenance, support, and development

Computer and Laboratory Skills

- Fluent languages: Java, C/C++, bash scripting
- Group programming tools: IntelliJ, Eclipse, Xcode, Git, Github, Mercurial, Subversion, CVS
- Conversant languages: Ruby, Matlab, PHP, HTML, CSS, L^AT_EX, Fortran, Lisp, Ada, M4, Verilog, 8088 assembly, Cobol, Basic
- Sound programming languages: Minim, Csound, ChuckK, Max/MSP, Pure Data
- Workshop skills: breadboarding, soldering, electrical wiring, wood and metal tools, power, table, and hand tools

Research and Experimental Experience

- Designed, constructed, and programmed multiple LED matrix display arrays
- Extensive speaker and material testing using reverb and anechoic chambers including expert analysis for Austin news station
- Conducted an intelligibility study of an auditorium classroom
- Designed and implemented a rudimentary graphical-score system for electroacoustic music
- Designed a real-time, HRTF-based auralization system for a virtual-reality system
- Implemented a head-tracking system for a virtual-reality system
- Designed and implemented a data-sonification system to accompany a computer-visualization system
- Expert subject for company that tested hearing protectors
- Group Design Project: Model Car Control (microcontroller specialist)
- Individual Design Project: DSP for Sound Synthesis on a NeXT Computer
- Programming Coursework:
 - Digital Signal Processing
 - Data Structures in C++
 - Microprocessor Programming
 - Operating System Programming
 - Hardware Description Language
 - Knowledge Engineering

Education

PhD in Electrical and Computer Engineering, GPA 3.97 (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 identifies 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, GPA 3.79, 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 determined the error associated with 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
- Acoustic Data Measurement and Analysis
- Acoustics of Fluid Media
- Electro-acoustic Transducers
- Computational Acoustics
- Building Acoustics
- Techniques in Experimental Acoustics
- Mathematical Methods in Engineering

BS in Computer Engineering, GPA 3.55 (Software Engineering specialization), August 1992
Clemson University

Teaching Experience

Teaching Assistant for 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, I 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

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 Experience in the Professional Environment

- Designed and taught classes in acoustics software
- Designed and taught classes in general software and computer use
- Designed and taught classes in computer assembly

Other Interests

- Conversant in French, fluent in Esperanto
- Music performance, audio and music production, and sound design
- Go enthusiast and active member of the American Go Association, 1999–current
- Physical fitness through dancing, yoga, bicycling, and bocking

Publications and References available on request