Mary B. Pietrowicz

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IBM Thomas J Watson
Research Center
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Education

University of Illinois at Urbana-Champaign — **Ph.D. Computer Science** 2017
Advisors: Mark Hasegawa-Johnson and Karrie Karahalios
Committee Members: Jennifer Cole, Julia Hockenmaier, Jerome McDonnough, and Gina-Anne Levow
Studied Music Composition with: Philipp Blume, Guy Garnett, Heinrich Taube, Stephen Taylor, and Reynold Tharp.

Florida Atlantic University — **Master of Computer Science** 1994
Degree completed while working full time in industry.

Purdue University — **B.S. Electrical Engineering** 1986

Teaching Experience

Interactive Computer Graphics: 2015, 2016, & 2017, Teaching Assistant
Taught computer graphics programming sections two hours per week to grad students and advanced undergrads. Developed course content. Graded student projects and exams, and advised students on their class projects.

Multimedia Signal Processing: 2016, Teaching Assistant
Taught lectures pertaining to programming projects to grad students and advanced undergrads. Graded homework, and advised students.

User Interfaces: 2014, Teaching Assistant
Developed course content, graded student projects and exams, and advised students at all levels in office hours.

Student quote: "I really enjoyed your teaching since it is very clear and helpful."

Industry Experience

IBM Thomas J Watson Research Center 2017-current
Postdoctoral researcher studying human expression and speech in the context of health and wellness. Investigating the relationships among behavioral signals, expressive speech, biological data, medical history, traumatic events, creative artifacts, and the detection and prediction of mental and physical illness. Exploring human development and wellness assessment and monitoring.

W.W. Grainger, Inc. 2015-2016
Intellectual Property researcher and software development engineer, focusing on IoT technologies.

National Center for Supercomputing Applications (NCSA), & 2006-2011
Institute for Advanced Computing Applications and Technologies (IACAT)
Research programmer, developer, and performer for virtual worlds projects, interactive art performances, and cyber-infrastructure development. Composed and performed interactive creative works, explored novel interfaces for interactive creativity platforms, and developed machine models for human motion quality based on Laban movement analysis. Explored multimodal creativity in the context of live and machine-generated sound, live motion, virtual worlds, and physical device interactions. Developed electronic dashboards for monitoring watershed environments.

Informatics Research Institute at IUPUI 2006
Consultant and engineer for continuing Pervasive Technology Labs projects.

Pervasive Technology Labs at Indiana University 2002-2005
Senior engineer specializing in location tracking, RFID, and tangible user interface applications. Developed location tracking systems for a museum digital docent and a building navigation system. Developed a tangible interface for teaching nutrition to children, which used RFID-instrumented food models and the USDA foods database. The finished system simulated the process of selecting foods from a school cafeteria line and placing them on a tray, with nutrition content provided on an overhead display.

University of Illinois, Department of Computer Science 2001-2002
Research programmer for explorations in smart environments. Explored applications and infrastructure for a cluster-driven tiled display wall and various sensors and devices. Did the initial research for the location tracking system which was deployed at the Supercomputing 2002 conference.

Personal Genie 2000-2001
Senior engineer specializing in smart device control.

dChain Commerce 1999-2000
Chief research and development engineer for electronic trading hub projects. Designed database architecture and Java service architecture for B2B commerce.

National Center for Supercomputing Applications (NCSA) 1995-1999
Research programmer specializing in scientific workbenches, synchronous and asynchronous collaborative systems, early web portals, and notification systems.

Motorola, Inc. 1993-1995
Computer-aided software engineering (CASE) engineer.

Ungermann-Bass 1991-1993
Software engineer for network management projects.

Motorola, Inc. 1986-1991
Software engineer for embedded radio software and radio service software (RF tuning and software configuration of police radios). Also managed an array of radio service software projects and contracts.

Leadership & Service

Journal of Artificial Intelligence Research (JAIR): reviewer 2018.
PLOS ONE: reviewer 2018
Undergraduate Mentoring Program at the University of Illinois: research supervisor and mentor 2016-2017.
Journal of the Acoustical Society of America (JASA): reviewer 2015, 2016, 2017.
iConference: reviewer 2015.
Creativity & Cognition: Graduate Student Symposium Committee, 2015.
CHI: WIP Program Committee, 2014.
ASSETS: Mentor, 2014 (resulted in successful publication for 1st-time authors).

Awards

Qualcomm Innovation Fellowship Finalist 2014-2015
University of Illinois Department of Music, Composition Division Award, 2007

Project highlights

Voice Analysis for Human Health and Wellness 2017-2018
IBM: Center for Computational Biology, Thomas J Watson Research Center
Developed analytic methods and software for the detection of physical and mental health conditions, including Amyotrophic Lateral Sclerosis (ALS) and Autism Spectrum Disorder. (ASD). Developed software to infer selected emotional intelligence parameters from acoustic and interactive conversational qualities in the voice. Exploring relationship among paralingual elements in speech, such as emotion, voice quality, prosody, and non-vocal expression. Exploring automated analysis of child speech, movement, and interactive behavior for health assessments. ***See publications list below for project papers***.

Perception-grounded Analytics for Vocal Expression 2013-2017
UIUC: Departments of Computer Science and Electrical and Computer Engineering
Developed transformative research methods for exploring the perception of human vocal expression. These methods enabled 1) the discovery and description of naturally-occurring expressive dimensions in human speech, and 2) the discovery of relationships among emotion, voice quality, prosody, and nonverbal quality. Also developed machine listening software to recognize these dimensions, along with lower-level voice qualities, in both scripted and unscripted speech. Demonstrated that whispering, breathiness, modal speech, and resonant speech lie on a continuum, both perceptually and acoustically (they are not unrelated, discrete states). Methods applied here are recommended for all researchers interested in 1) exploring

any form of human expressive modality (not just speech), 2) discovering relationships among different expressive modalities, and 3) producing applications which support natural interaction which is correctly aligned with human perception. ***See publications list below for project papers.***

CrowdBand 2013
UIUC: Department of Computer Science
Developed software for automated, crowdsourced sound composition. This project demonstrated the potential of using crowdsourced systems for the creation of complex, creative works. ***See publications list below for project paper.***

Astral Convertible 2010-2011
National Center for Supercomputing Applications (NCSA)
Developed interactive gesture-tracking software for remade version of original groundbreaking Trisha Brown/John Cage piece, which was performed at the Krannert Center for the Performing Arts. ***See the press release: https://news.illinois.edu/blog/view/6367/205733*** .

Kinetic Flame 2011
UIUC: Departments of Music and Dance
Interactive piece for dancer, percussion, motion sensors, electronics, lighting, and video, performed at the Krannert Art Museum, University of Illinois. I composed the piece, rendered the sound electronically, developed gesture tracking software, and used the dancer's gestures to modulate the sound, visuals, and lighting in real time. Incorporated the stage set for Astral Convertible into the piece. ***See a recording at: https://vimeo.com/23083695*** .

Location-aware Museum Guide: ArtXplore 2004-2005
Pervasive Technology Labs (PTL) at Indiana University
Developed wifi-based, location-tracking software for a handheld museum guide, which was demonstrated at the Indianapolis Museum of Art (IMA) during its 2005 re-opening. This project was influential in the future technology directions at the IMA, and indirectly, at other museums. ***See the press release: http://newsinfo.iu.edu/news-archive/2129.html .***

Make-a-Meal System for Health Education 2003-2004
Pervasive Technology Labs (PTL) at Indiana University
Developed an engaging, child-appropriate, RFID-instrumented physical object interface for teaching nutrition (part of the required curriculum) to thousands of Indiana school children at the Ruth Lilly Health Education Center in Indianapolis, IN. The interface allowed a class to build meals by placing instrumented food models on a cafeteria tray for nutrient analysis. The system automatically detected the selected foods, analyzed the nutrient content, and displayed the results. ***See the presentation list below for presentation and demonstration.***

NCSA Joule & NCSA Habanero 1995-1998
National Center for Supercomputing Applications (NCSA)
Developed early internet tools for synchronous and asynchronous collaboration. Joule, the asynchronous collaboration system, was an early interactive web portal package created before the term "web portal" had been coined, and before web infrastructure was generally available (created with pre-serialization versions of Java). Also wrote the subscription-based notification

system for Joule (also in pre-serialization Java). Developed an object database interface for Habanero (the primarily synchronous platform), and extended its infrastructure to support a blended synchronous-asynchronous collaboration infrastructure for the collaboration platform. ***See the Wall Street Journal Article for NCSA Habanero:*** ***http://www.wsj.com/articles/SB833398067192005000***

Radio Service Software Toolkits 1986-1988
Motorola, Inc.
Developed field service software packages for the electronic tuning/programming of police radios. Also managed a range of software contracts and contractors in this application domain. ***Motorola service shop engineers and field technicians worldwide used this software.***

Publications

Conference Papers & Posters (Peer-Reviewed)

[1] **Mary Pietrowicz**, Carla Agurto, Jonah Casebeer, Mark Hasegawa-Johnson, Karrie Karahalios, and Guillermo Cecchi, "Dimensional Analysis of Laughter in Female Conversational Speech," submitted to ICASSP, currently under review, 2018.

[2] Carla Agurto, **Mary Pietrowicz**, Elif Eyigoz, Guillermo Cecchi, Elizabeth Mosmiller, and Raquel Norel, "Analyzing Progression of Motor and Speech Impairment in ALS," submitted to ICASSP, currently under review, 2018.

[3] Carla Agurto, Raquel Norel, **Mary Pietrowicz**, Muhammad Parvaz, Sivan Kinreich, Keren Bachi, Guillermo Cecchi, and Rita Z. Goldstein, "Speech Markers for Clinical Assessment of Cocaine Users," submitted to ICASSP, currently under review, 2018.

[4] Raquel Norel, **Mary Pietrowicz**, Carla Agurto, Shay Rishoni, and Guillermo Cecchi, "Detection of Amyotrophic Lateral Sclerosis (ALS) via Acoustic Analysis," INTERSPEECH 2018.

[5] Jonah Casebeer, Hillol Sarker, Murtaza Dhuliawala, Nicholas Fay, **Mary Pietrowicz,** and Amar Das. "Verbal Protest Recognition in Children with Autism," International Conference on Acoustics, Speech, and Signal Processing (ICASSP) 2018.

[6] **Mary Pietrowicz,** Mark Hasegawa-Johnson, and Karrie Karahalios. "Discovering Dimensions of Perceived Vocal Expression in Semi-structured, Unscripted Oral History Accounts," International Conference on Acoustics, Speech, and Signal Processing (ICASSP) 2017.

[7] **Mary Pietrowicz**, Mark Hasegawa-Johnson, and Karrie Karahalios. "Acoustic Correlates for Perceived Effort Levels in Expressive Speech," INTERSPEECH 2015 (poster presentation).

[8] **Mary Pietrowicz** and Karrie Karahalios. "Visualizing Vocal Expression," CHIEA 2014 (poster presentation).

[9] **Mary Pietrowicz** and Karrie Karahalios, "Sonic Shapes: Visualizing Vocal Expression," International Community for Auditory Display (ICAD) 2013.

[10] **Mary Pietrowicz**, Danish Chopra, Amin Sadeghi, Puneet Chandra, Brian Bailey, and Karrie Karahalios. "CrowdBand: An Automated Crowdsourcing Sound Composition System," Human Computation and Crowdsourcing (HCOMP) 2013.

[11] **Mary Pietrowicz** and Karrie Karahalios. "Phonetic Shapes: An Interactive, Sonic Guest Book," CHIEA 2012 (poster presentation).

[12] Guy Garnett, Robert E. McGrath, and **Mary Pietrowicz**. "mWorlds: novel human interaction with virtual worlds," Mardi Gras 2009: Virtual Worlds: New Realms for Culture, Creativity, Commerce, Computation, and Communication, 2009.

Journal articles

[13] Hillol Sarker, **Mary Pietrowicz**, and Amar Das, "Cross-language generalizability of vocal protest detection in children with autism," Submitted to Journal of the Acoustical Society of America (JASA) Express Letters, currently under review, 2018.

[14] **Mary Pietrowicz**, Mark Hasegawa-Johnson, and Karrie Karahalios. "Acoustic correlates for perceived effort levels in male and female acted voices," Journal of the Acoustical Society of America (JASA), 2017.

Book chapters

[15] "Special Edition, Using Java," First Edition, Que Publishing, 1996.

Workshop papers (peer-reviewed)

[16] **Mary Pietrowicz** and Karrie Karahalios. "Paralingual Analysis, Voice Visualization, and Mobile Devices as Enabling Technologies," HCIC 2014.

[17] Jennifer Kim, Melinda Snodgrass, **Mary Pietrowicz**, Karrie Karahalios, and Jim Halle. "Visual Analytics for Behavioral and Physiological Data," VAHC 2013.

[18] **Mary Pietrowicz**, Robert E. McGrath, Guy Garnett, and John Toenjes. "Multimedia Gestural Interaction in Performance," Whole Body Interfaces Workshop, CHI 2010.

[19] Robert E. McGrath, **Mary Pietrowicz**, Ben Smith, and Guy Garnett, "Transforming Human Interaction with Virtual Worlds," Workshop on Computational Creativity Support, CHI 2009.

Presentations

[20] **Mary Pietrowicz**, Mark Hasegawa-Johnson, and Karrie Karahalios, "Discovering Dimensions of Perceived Vocal Expression in Semi-Structured, Unscripted Oral History Accounts," Midwest Speech and Language Days (MSLD) 2017 (presentation).

[21] **Mary Pietrowicz**, Mark Hasegawa-Johnson, and Karrie Karahalios," Acoustic Correlates for Perceived Effort Levels in Male Scripted Speech," Midwest Speech and Language Days & Midwest Computational Linguistics Colloquium (MSLD & MCLC) 2016 (presentation).

[22] **Mary Pietrowicz**, Mark Hasegawa-Johnson, and Karrie Karahalios, "Acoustic Correlates for Percived Effort Levels in Expressive Speech," Midwest Speech and Language Days (MSLD) 2015 (poster).

[23] **Mary Pietrowicz** and Karrie Karahalios. "Visualizing Vocal Expression," for NSF Expeditions project: "Collaborative Research: Computational Behavioral Science: Modeling, Analysis, and Visualization of Social and Communicative Behavior," 2013 (presentation).

[24] John Toenjes, Thecla Schiphorst, and **Mary Pietrowicz**, Interactive Workshop on Laban Movement, 2009 (accelerometer-based, interactive motion analysis demonstration and presentation).

[25] **Mary Pietrowicz** and Polly Baker, "Location Aware Multimedia Delivery in an Art Museum," I-Light Symposium Presentation, Indianapolis, IN, 2005 (presentation).

[26] Robert Comer, Verlyn Wilson, and **Mary Pietrowicz**, "Make-A-Meal Interface for Nutrition Education," National Association of Health Education Centers, Philadelphia, PA, 2003 (demonstration and presentation).

Patents

[27] Geoffry A. Westphal and **Mary Pietrowicz**, "System and method for using geographical locations to provide access to product information," W.W. Grainger, Inc., US20170055112A1, Priority date 2015-08-17, Publication date 2017-02-23.

[28] Brice Klein, Alessia Serafino, Yashaswini Madhavan, Jerry Shim, Norman Lee, Murtaza Heider, Lindsay Hai, **Mary Pietrowicz**, and Xiaoyue Chen, "Methods and apparatus for securing a sensor to a monitored device," W.W. Grainger, Inc., US20170018165A1, Priority date 2015-07-13, Publication date 2017-01-19.

Interactive Art Performances

[29] **Air Tropes** Sept, 2014
A sonification of soybean growth data, which emphasized differences between CO2-enhanced and Ozone-enhanced environments for plant growth. Part of the "Sounds of Science" collaboration between artists and scientists at the University of Illinois, at the Krannert Art Museum, University of Illinois.

[30] **Kinetic Flame** April 2011

Interactive piece for dancer, percussion, motion sensors, electronics, and video, at the Krannert Art Museum, University of Illinois.
Available at: https://vimeo.com/23083695

[31] **Dark Star** April 2011
Interactive piece for dancer, percussion, motion sensors, electronics, and electronic lighting, at the Krannert Art Museum, University of Illinois.
Available at: https://vimeo.com/63711846

[32] **Remembering** October 2010
Composed piece for 4 voices and chamber orchestra, based on WWII oral history texts, at Smith Hall, University of Illinois.

[33] **Voltage** July 2010
Composed piece for flute, piano, and electronics, at Smith Hall, University of Illinois.

[34] **Astral Convertible** (motion tracking software component) February 2009
Developed gesture-tracking, interactive software for remade version of original Trisha Brown/John Cage piece, at the Krannert Center for the Performing Arts.

[35**] Edream and Be Merry** April 2009
Interactive, improvised, distributed performance for violin, flute, percussion, and distributed virtual worlds display. Developed portions of the interactive software, and performed the flute part. At the HASTAC Blue Lights in the Basement event, Krannert Center for the Performing Arts. Available at: https://vimeo.com/198106703