

# PERCEPTION-BASED ENGINEERING RESEARCH



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## Perception-Based Engineering

### THE VISION AND RESEARCH OBJECTIVES

**Objective:** To integrate into the design of engineering systems, the ways in which people perceive and are affected by machinery outputs. The long-term result of the research will be people living and working in much more pleasing, safe and productive environments.

**Context, rationale and impact of research:** While related to human factors and ergonomics research, the novelty of this research approach is in the detailed modeling of the perceptive processes, models that can be used directly in product and process design. These are mathematical models that use measured or predicted engineering quantities (sound, vibration, contaminant concentration, etc.) as inputs and predict human response (comfort, productivity, a decision). The perception models can be combined with the stimuli prediction models based on machine/system function, and these complete machine-person models can be used in optimization of machines and environments for people; thus effects on people will be an integral part of the design optimization and not something considered after most of the design decisions have been made.

Industry has sponsored applied research in this area which has led to the existing collaborations between the faculty, not only at the Ray W. Herrick Laboratories, but also across campus in engineering and liberal arts and at other Universities. More long-term research of a fundamental nature, necessary to support and feed the applied research, has been funded from government sources such as the National Science Foundation and the FAA.

**Current research includes:** quantification of sound quality; cognitive processing in noise: receiving and processing information to make decisions; human processing of acoustic information for diagnostics; effects of car and highway design on driver performance; perception of transient events and impact on product perception; interface design in applications such as telesurgery; effects of noisy environments on interactions; perception and measurement of air quality; thermal comfort; touch and feel (haptic) interfaces; response to and perception of vibration; image perception, gesture and speech processing; tactile communication of speech; texture perception.; environmental noise impact.

**Research Areas:** the research can be broadly categorized in the following manner.

*Perception of machinery output and people-based criteria:* Here, the focus is on understanding what contributes to people's perception of quality, and quantification of that perception. Four areas of sensory input are focused on leading to research projects on: image, sound, air, and touch quality. Models of relationships between machine or system function and machine output, and between machine output and human perception of machine output, are both necessary components for the optimization of machine or system function for people's response. Projects in this area involve psychological experimentation to establish perceptual factors, model-building to predict how these factors combine to give an overall impression of quality, and further psychological experimentation for model validation.

*Modeling of perceptual processes and decision making:* Human perception and detection of a stimulus is affected not just by the strength and clarity of the signal but by numerous factors including environmental conditions (e.g., noise, thermal conditions) as well as decision making criteria such as the analysis of the costs involved in making a mistake. These factors can affect the decision-making processes involved in product testing and design. The biases are systematic and can be modeled in order to predict and correct for them. Research in this area is focused on the relationship between perception, decision making, and environmental factors that impact them, and quantitative models of the interaction between perception in the auditory, visual, and tactile modalities and decision-making processes will be constructed.

*Effects of multiple sensory inputs:* In our daily lives we are constantly being bombarded by irrelevant information in the form of machine sounds, background speech, and other disruptive noises. In addition, technological advances have led to the ability to utilize multiple sensory modalities in order to transfer meaningful information to the user of any engineering product. Research in this area is focused on exploration of the capacity of the human information processing system to process multiple inputs from different sensory modalities (vision, hearing, touch) and how the interaction of modalities affects performance. This research is focused on gaining an understanding of how people perform in noisy or other adverse environments, and turning that knowledge into the design of better environments and the design of efficient communication devices for such environments.

### **Faculty of Perception-Based Engineering Group:**

#### **Mechanical Engineering:**

James E. Braun, Air Quality and Thermal Comfort  
Yan Chen, Air Quality and Comfort  
George T-C. Chiu, Image Quality, Touch, Ride Quality  
Patricia Davies, Sound Quality, Vibration

#### **Psychological Sciences:**

Greg Francis, Computational Vision, Human Factors  
Zygmunt Pizlo, Image Perception, Cognitive Processes Modeling  
Robert Proctor, Human Factors and Performance

#### **Speech, Language, and Hearing Sciences:**

Michael Heinz, Auditory Signal Processing & Perception  
Ronnie Wilbur, Linguistics, Phonology, Language, Adaptive Technologies

#### **Electrical and Computer Engineering:**

Jan P. Allebach, Image Quality  
Ed Delp, Imaging and Sensing  
David S. Ebert, Graphics and Visualization  
Leah H. Jamieson, Speech Communication  
Thomas M. Talavage, Functional Magnetic Resonance Imaging  
Hong Z. Tan, Haptics

#### **Civil Engineering:**

Jon Fricker, Transportation Engineering

#### **Industrial Engineering:**

Barrett Caldwell, Performance in Time-Critical Environments, Information Flow Dynamics  
Vincent Duffy, Digital Human Modeling, Safety, Work Methods and Measurement, Ergonomics  
Steve Landry, Human-Computer Interaction, Air Traffic Control  
Mark Lehto, Decision Making, Safety, Alarms  
Sara McComb, Team Communication, Collaborative Cognition, Teamwork in Healthcare Delivery  
Ji Soo Yi, Human-Computer Interaction, Information Visualization, Decision Making

#### **Faculty at other Institutions and Campuses:**

[Glenis Long](#), Graduate Center, CUNY, Psychoacoustics  
[Dave Pick](#), Psychology, Purdue Calumet, Human Factors, Performance  
[Aimee M. Surprenant](#), Memorial University, St. John's, Newfoundland, Cognitive Processing, Effects of Noise, Aging

**CHRONOLOGICAL LIST OF THESES IN PERCEPTION-BASED ENGINEERING**

<b>Name</b>	<b>Degree</b>	<b>Thesis Title</b>	<b>Major Professor</b>
R.S. Gentile	Ph.D. 1989	Color Image Processing for High Quality Reproduction Based on Uniform Color Spaces	J. Allebach (ECE)
J. Foley	Ph.D. 1990	The Effect of Law and Training on All-Terrain Vehicle Riders	M. Lehto (IE)
C. Johnson	MSIE 1990	Design of an Inflatable Knee Bolster Restraint Using Cinematographic Procedures and Computer Simulation	M. Lehto (IE)
W. Zhu	MSIE 1991	Empirical Evaluation of Computer Hypertext System and Conventional Book	M. Lehto (IE)
M. Analoui	Ph.D. 1992	Problems in Halftone Imaging: Synthesis and Reconstruction	J. Allebach (ECE)
R. Balasubramanian	Ph.D. 1992	Color Image Quantization for Display Applications	J. Allebach and C. Bouman (ECE)
T. DeSalvo	MSIE 1992	An Analysis of Hazard Communication Phrases Using Semantic Modeling	M. Lehto (IE)
A. Hatem	MSIE 1993	The Effect of Performance Level on Warning Compliance	M. Lehto (IE)
F.B. Morris	MSME 1993	Experimental and Simulated Performance of Optimal Control of Building Thermal Storage	J. Braun (ME)
B. Carpenter	MSIE 1994	An Empirical Evaluation of Computer-Based Tools for the Design of Warnings	M. Lehto (IE)
K.H. Drees	MSME 1994	Modeling and Control of Area Constrained Ice Storage Systems	J. Braun (ME)
M. Wolski	Ph.D. 1994	Applications of Vector Space Methods to the Colorimetric Problems of Scanning Filter Selection and Gamut Mismatch Compensation	J. Allebach and C. Bouman (ECE)
J.D. Douglas	MSME 1995	A Cost-Based Method for Comparing Alternative Refrigerants Applied to R-22 Systems	J. Braun (ME)
W. Giffen	MSIE 1995	Adaptive Warnings: Are Humans Good at Adjusting a Warning Threshold to Maximize Their Performance?	M. Lehto (IE)
T.M. Rossi	PH.D. 1995	Detection, Diagnosis, and Evaluation of Faults in Vapor Compression Cycle Equipment	J. Braun (ME)
T. Tillman	MSIE 1995	A Benchmarking Study to Identify and Analyze Professional Certification Programs in Industry and Engineering	M. Lehto (IE)
W. Zhu	Ph.D. 1995	Decision Support for Information Indexing and Retrieval Implications for Hypertext Systems	M. Lehto (IE)

F. Calisir	Ph.D. 1996	Human Decision Making and Seat Belt Use	M. Lehto (IE)
R. Chen	Ph.D. 1996	Speech Recognition Using Statistical Models and Recurrent Neural Networks	L. Jamieson (ECE)
B.L. Minner	MSME 1996	Design Optimization for Thermoacoustic Cooling Systems	J. Braun (ME)
M. Breuker	MSME 1997	Evaluation of a Statistical, Rule-Based Fault Detection and Diagnostics Method for Vapor Compression Air Conditioners	J. Braun (ME)
C. Davis	MSME 1997	Evaluation of Steady-State Detectors for Fault Detection and Diagnostics	J. Braun (ME)
J. LeRoy	MSME 1997	Capacity and Power Demand of Unitary Air Conditioners and Heat Pumps Under Extreme Temperature and Humidity Conditions	J. Braun (ME)
P. N. Srinivasan	Ph.D. 1997	Speech and Wideband Audio Compression Using Filter Banks and Wavelets	L. Jamieson (ECE)
J.D. West	MSE 1997	Evaluation of Methods for Controlling Ice Storage Systems	J. Braun (ME)
C.B. Atkins	Ph.D. 1998	Classification-Based Methods in Optimal Image Interpolation	J. Allebach and C. Bouman (ECE)
S. Chatterjee	Ph.D. 1998	A Connectionist Approach for Classifying Accident Narratives	M. Lehto (IE)
E. Eriksen	MSIE 1998	Influence of Outcome Range in Utility Assessment	M. Lehto (IE)
K.W. Montgomery	MSME 1998	Development of Analysis Tools for the Evaluation of Thermal Mass Control Strategies	J. Braun (ME)
C.C. Taylor	Ph.D. 1998	Image Quality Assessment Based on a Human Visual System Model	J. Allebach (ECE) and Z. Pizlo (Psych)
G. S. Ying	Ph.D. 1998	Automatic Measurement and Representation of Prosodic Features	L. Jamieson (ECE)
A.U. Agar	Ph.D. 1999	Color Imaging: Efficient Transformations and Model Based Halftoning	J. Allebach (ECE)
M. Comstock	MSME 1999	Development of Analysis Tools for the Evaluation of Fault Detection and Diagnostics in Chillers	J. Braun (ME)
S. Liang	Ph.D. 1999	Information Representation and Decision Process: Effects of Measurement Scale and Shape of Decision Matrix on Preferential Choice	M. Lehto (IE)
D.J. Lieberman	Ph.D. 1999	The Analysis and Efficient Implementations of Direct Binary Search and Related Halftoning and Image Enhancement Applications	J. Allebach (ECE)
F.A. Baqai	Ph.D. 2000	Halftoning Algorithms for Robust Digital Printing	J. Allebach (ECE)

N. Chaturvedi	MSME 2000	Analytical Tools for Dynamic Building Control	J. Braun (ME)
B. Chen	MSME 2000	Evaluating the Potential of On-Line Fault Detection and Diagnostics for Rooftop Air Conditioners	J. Braun (ME)
D. Kacker	Ph.D. 2000	Color Transforms, Halftoning, and Watermarking	J. Allebach (ECE)
P. Li	Ph.D. 2000	Efficient, High Quality Halftoning Algorithms	J. Allebach (ECE)
M. T. Johnson	Ph.D. 2000	Incorporating Prosodic Information and Language Structure into Speech Recognition Systems	L. Jamieson (ECE)
W. Wu	Ph.D. 2000	Two Problems in Digital Color Imaging: Colorimetry and Image Fidelity Assessor	J. Allebach (ECE) and Z. Pizlo (Psych)
Y. Yang	Ph.D. 2000	Graphic Information for Blind Users of the Web	M. Lehto (IE)
S. Leman	MSIE 2001	Decision Support System to Predict Print Quality	M. Lehto (IE)
M. Anderson	MSME 2001	Non-Thesis: Sound Quality Inside Earth Moving Equipment Cabs	P. Davies (ME)
A. Sen	MSCE 2001	Effective Deployment of Portable Dynamic Message Signs--Experimental Design	J. Fricker (CE)
L. A. Slivovsky	Ph.D. 2001	A Real-Time Sitting Posture Tracking System	H. Tan (ECE)
R. Witman HL 2001-10	2001	Java Based Multi-User Interface and Remote Control for Telemicroscopy	G. Chiu (ME)
H. Sun HL 2001-11P	2001	Motion Synchronization of Multi-Cylinder Electro-Hydraulic Lift Systems	G. Chiu (ME)
J. Reedy HL 2001-13	2001	Design and Control of High Performance Electrohydraulic Systems	G. Chiu (ME)
G. Chaney	MSCE 2002	Effective Deployment of Portable Dynamic Message Signs--Truck-Caused Occlusion	J. Fricker (CE)
S. K. Garrett	MSIE 2002	Operational Knowledge Development and Utilization: A Study of Process and Usability	B. Caldwell (IE)
J. Lee	Ph.D. 2002	Advanced Halftoning Algorithms: Printer Models, Color, and Compression	J. Allebach (ECE)
K. M. White	MSIE 2002	The Total User Experience: Providing the Information the User is Searching For	B. Caldwell (IE)
C-L. Chen	Ph.D. 2003	Modeling, Analysis and Robust Control for Electrophotographic Imaging Systems Subject to Spatially Periodic Disturbances and Measurable Nonlinearities	G. Chiu (ME)

K. Merrill	MSME 2003	Perturbation Observer Design and Cylinder Piston Velocity Estimation for Electro-Hydraulic Systems	G. Chiu (ME)
S. Choi	Ph.D. 2003	Towards Realistic Haptic Rendering of Surface Textures	H. Tan (ECE)
R.J. Fisher	Ph.D. 2003	General-Purpose SIMD Within a Register: Parallel Processing on Consumer Microprocessors	L. Jamieson (ECE)
S. Kim	Ph.D. 2003	High Quality/Low Complexity Halftoning and Color Image Enhancement	J. Allebach (ECE)
J. B. Lafren	Ph.D. 2003	Measurement & Analysis of Perceptual Coding in the Human Auditory System Multi-Modal Studies using Neural Activation Patterns	T. Talavage (ECE)
G. Lin	Ph.D. 2003	Electronic Imaging System Improvements via Novel Hardware Architecture and Halftoning Algorithms	J. Allebach (ECE)
K. Mercer	MSME 2003	Modeling and Testing Strategies for Evaluating Ventilation Load Reduction Technologies	J. Braun (ME)
R. Ippili HL 2003-5	MSE 2003	System Identification of Quasi-Static Foam Behavior and Its Application in the Prediction of Static Equilibrium Position of a Car Seat Occupant	P. Davies/A. Bajaj (ME)
K. Oldenberger	MSIE 2003	Critical Incident Study of Factors Impacting Customer Satisfaction in E-Commerce	M. Lehto (IE)
S. Adabala	Ph.D. 2004	Execution of Unmodified Applications on Distributed Storage and Compute Resources	L. Jamieson (ECE)
S. Bendapudi	Ph.D. 2004	Development and Evaluation of Modeling Approaches for Transients in Centrifugal Chillers	J. Braun (ME)
T. Chang	Ph.D. 2004	Memory Efficient Error Diffusion and Halftone Texture Characterization	J. Allebach (ECE)
M. C. Gonzalez	MSIE 2004	Usability Aspects of Digital Devices and Content	B. Caldwell (IE)
A. Hastings	Ph.D. 2004	Sound Quality of Diesel Engines	P. Davies (ME)
W-Y. Jang	Ph.D. 2004	Print Quality: Assessment and Enhancement	J. Allebach (ECE)
T. Lawrence	Ph.D. 2004	Methodologies for Evaluating Demand-controlled Ventilation Retrofits in HVAC Applications	J. Braun (ME)
J. Mynderse	MSME 2004	Design and Control of a Steering Wheel Vibration Simulator for Human Perception Testing	G. Chiu (ME)



H. Patwardhan	MSIE 2004	Engineering Cost Advisory System with Design Feedback	M. Lehto (IE)
M. Saweikis	MS 2004	Non-Thesis	A. Surprenant, Memorial Univ., St. John's, Newfoundland
R. Anderson	MS 2005	Non-Thesis	A. Surprenant, Memorial Univ., St. John's, Newfoundland
Y. Bang	Ph.D. 2005	Hardcopy Banding Measurement and Assessment	J. Allebach (ECE) and Z. Pizlo (Psych)
D. P. Gallant	MSME 2005	An Experimental Study of the Perceptual Attributes of Tonal Sounds and Annoyance with Application to Automotive Component Noise	P. Davies (ME)
Y-F Kuo	MSME 2005	Non-thesis: Equivalent System Mass Analysis & Reduction for Urine & Solid Waste Treatment for Advanced Life Support	G. Chiu (ME)
J. Lau	MSME 2005	The Performance of Floor-Supply Displacement Ventilation in Workshop Configurations with Measurements and Simulation Studies	Y. Chen (ME)
A. Lu	Ph.D. 2005	Volume Illustration	D. Ebert (ECE)
D-Y. Ng	Ph.D. 2005	Imaging Colorimetry Using a Digital Camera with Dental Applications and Digital Video Capture Image Analysis	J. Allebach (ECE)
A. Noorinaeini	MSIE 2005	Use of Singular Value Decomposition to Improve Performance of a Bayesian Text Based Decision Support System	M. Lehto (IE)
R. C. Palmer III	MSIE 2005	How Can Meetings Hinder Productivity? Information Alignment and Production System Consequences	B. Caldwell (IE)
X. Zhou HL 2005-12	Ph.D.	Dynamic Modeling of Chilled Water Cooling Coils	J. Braun (ME)
A. A. Rao	Ph.D. 2005	Model Based Estimation & Detection of Hemodynamic Response in Event-Related fMRI	T. Talavage (ECE)
K. Riley	Ph.D. 2005	Efficient, Graphics Hardware-Accelerated, Atmospheric Rendering & Multi-Field Weather Visualization	D. Ebert (ECE)
G. Tamer	Ph.D. 2005	Characterizing Acoustic Imaging Noise in Auditory Cortex Event-Related Functional Magnetic Resonance Imaging	T. Talavage (ECE)
E. Wang	Ph.D. 2005	Human-Computer Network Interaction: Delay Effects and Its Mediators	B. Caldwell (IE)

Z. Zhang	MSME 2005	A Study on Transport and Distribution of Indoor Particulate Matter	Y. Chen (ME)
N. Alla	MSCE 2006	Dynamic Message Signs on Indiana Highways—Guidelines for Message Content and Deployment	J. Fricker (CE)
O. Arslan	Ph.D. 2006	Development of a Softcopy Environment for Banding Visibility Assessment Experiments and Identification of Inkjet Printers for Forensic Applications	J. Allebach (ECE) and Z. Pizlo (Psych)
E. Bernal	Ph.D. 2006	Improved Rendition of Text and Lines in Inkjet and Electrophotographic Printers	J. Allebach (ECE) and Z. Pizlo (Psych)
P. Choe (prelim completed)	Ph.D. 2006	Adaptive Interface for Web-based Diagnosis	M. Lehto (IE)
L. Farley	Ph.D. 2006	Assessing the Inhibitory Deficit Hypothesis Utilizing the Access Function of Inhibition	A. Surprenant, Memorial Univ., St. John's, Newfoundland
J. Gosselin	MSME 2006	A Ventilated Window for Indoor Air Quality Improvement in Residential Buildings	Y. Chen (ME)
C. Kim (prelim completed)	Ph.D. 2006	Impact of External Memory Aid on Efficiency of Collaboration in a Remote Group Work Environment	M. Lehto (IE)
B-S. Lee	Ph.D. 2006	Characterization of Opponent Channels, Automated Detection of PQ Defects, and Green Noise Mask Design by Dual Metric	J. Allebach (ECE) and Z. Pizlo (Psych)
K.H. Lee	Ph.D. 2006	Demand-Limiting Control Using Building Thermal Mass in Commercial Buildings	J. Braun (ME)
K.Y. Lee (prelim completed)	Ph.D. 2006	Effects of Spatial Ability and Visuospatial Cues on the Effectiveness of Instructional Materials Requiring Mental Animation	M. Lehto (IE)
K. H. Lee	Ph.D. 2006	Perception of Tones in Machinery Noise and Its Influence on Annoyance	P. Davies (ME)
S. Lin	Ph.D. 2006	A Fuzzy Bayesian Model Based Semi-automated Task Analysis	M. Lehto (IE)
B. Shen	Ph.D. 2006	Improvement and Validation of Unitary Air Conditioner and Heat Pump Simulation Models at Off-Design Conditions	J. Braun/E. Groll (ME)
G. Ali	Ph.D. 2007	Image Quality Analysis of Electrophotographic Printers for Banding Measurement and Forensic Applications	J. Allebach (ECE)
X. Feng	Ph.D. 2007	Ringling Artifact Assessment/Reduction and Low Quality Image Interpolation	J. Allebach (ECE)
B. Zhang	Ph.D. 2007	Three Problems in Digital Photography: Image Sharpness, Image Interpolation, and Image Restoration, (jointly supervised with Prof. Z. Pizlo)	J. Allebach (ECE) and Z. Pizlo (Psych)

K. Boustany	MSIE 2007	A System-Of-Systems Examination of Humans in Multi-Site Healthcare Coordination Under Nominal and Degraded Conditions	B. Caldwell (IE)
M-C. Chen	Ph.D. 2007	Psychophysics Study and Reduction of Banding Artifact in Secondary Colors Using an Embedded Implementation of Closed-Loop Control on Multiple Motion Systems in an Electrophotographic Process	G. Chiu (ME)
K. Cheng	Ph.D. 2007	Remote vs. On-site Engineering Education	M. Lehto (IE)
S. K. Garrett	Ph.D. 2007	Provider Centered Coordination, Resource Foraging, and Event Management in Healthcare Tasks	B. Caldwell (IE)
N. Ellen Taylor	MSECE 2007	Evaluation of a Noiseband-Based Cochlear Implant Simulator	T. Talavage (ECE)
Y. Jang	Ph.D. 2007	Interactive Procedural Visualization of Terabyte Datasets	D. Ebert (ECE)
N. Svakhine	Ph.D. 2007	Interactive Illustrative Medical Visualization	D. Ebert (ECE)
S. Ghosh	MSIE 2007	Information Flow Modeling in Expert Communities	B. Caldwell (IE)
A. Israr	Ph.D. 2007	Tactual Transmission of Phonetic Features	P. Davies (ME) and H. Tan (ECE)
S. Leeman	Ph.D. 2007	Optimal Interface Design for Decision Support in Routing Decisions	M. Lehto (IE)
H. Pandith	MSIE 2007	Effects of Software Change on Usability	M. Lehto (IE)
L. Wang	Ph.D. 2007	Coupling of Multizone and CFD Programs for Building Airflow Distribution and Contaminant Transport Simulations	Y. Chen (ME)
A. Wichman	MSME 2007	Evaluation of Fault Detection and Diagnosis Methods for Refrigeration Equipment and Air-Side Economizers	J. Braun (ME)
S. Wu	Ph.D. 2007	Intelligent Interface for Medical Mobile Computing Device	M. Lehto (IE)
B. Zhang	Ph.D. 2007	Three Problems in Digital Photography: Image Sharpness, Image Interpolation, and Image Restoration	J. Allebach (ECE) and Z. Pizlo (Psych)
E. Cox	MSEE 2007	A Graphical User Interface and Database Framework for Image Comparison in the Context of Printer Firmware Qualification	J. Allebach (ECE)
T. Zhang	Ph.D. 2007	Detection and Mitigation of Contaminant Transport in Commercial Aircraft Cabins	Y. Chen (ME)
X. Chen	MSME 2007	A Numerical Study on Decontaminating Unoccupied Airliner Cabins	Y. Chen (ME)

A. Marshall	MSME 2007	A Preliminary Investigation into the Perceptual Characteristics of Low Level Sonic Booms Heard Outdoors	P. Davies (ME)
J.A. Sutherland	MSIE 2007	Development and Validation Methods for Dynamic Ergonomic Assessment Tools of the Lumber Spine	V.G. Duffy (IE)
Z. Zhang	Ph.D. 2007	Modeling of Airflow and Contaminant Transport in Enclosed Environments	Y. Chen (ME)
Z. Zhong	Ph.D. 2008	Combined Heat and Moisture Transport Modeling for Residential Buildings	J. Braun (ME)
J.M. Santos Rodriguez	Ph.D. 2008	Novel Pre-Surgical Screening for Cochlear Implant Candidates	T. Talavage (ECE)
S.G. Kim	Ph.D. 2008	Neural Correlates of Visual and Audio-Visual Perception Using Functional Magnetic Resonance Imaging (fMRI)	T. Talavage (ECE)
J.A. Kassebaum	Ph.D. 2008	Application of Frequency Domain State-Space Analysis to Sleep	T. Talavage (ECE)
A. Mariappan	Ph.D. 2008	Personal Dietary Assessment using Mobile Devices	E. Delp (ECE)
S. Douglas	MSIE 2008	Development of a Health Report that Better Communicates Healthy Information to Individuals	B. Caldwell (IE)
L.M. Ignacio	MSIE 2008	Effect of Workload Transitions on Stress and Performance in a Hospital Inpatient Pharmacy	B. Caldwell (IE)
S. Gindi	MSEE 2008	Color Characterization and Modeling of Scanners	J. Allebach (ECE)
M. Qiao	Ph.D. 2008	Digital Press Characterization and Artifact Prediction and Reduction	J. Allebach (ECE)
C.H. Lee	Ph.D. 2008	Hybrid Screen Design and Automatic Portrait Image Enhancement	J. Allebach (ECE) and M. Boutin (ECE)
R. Kennell	Ph.D. 2008	A Practical Method for Authentication of Remote Computer Systems	L. Jamieson (ECE)
F. Liu	Ph.D. 2009	Modeling and Control of a Two Component Development Process for Xerography	G. Chiu (ME)
A. Lagu	Ph.D. 2009	Adaptive Function Allocation for Human-Machine Systems: a Comparative Study of Triggers. Strategies and Stabilization	S. Landry (IE)
H-Y Chen	MSECE 2009	Information Transfer on Tactile Signals on Mobile Devices	H. Tan (ECE)
S.W. Han	Ph.D. 2009	Training Based Error Diffusion and Halftone Quality Quantification	J. Allebach (ECE)
H. Wang	Ph.D. 2009	Four Low-Complexity Color Trapping Algorithms	J. Allebach (ECE)

B. Min	Ph.D. 2009	Development of Soft Copy Environment for Color Banding Assessment	J. Allebach (ECE)
K.S. Byrd	PhD 2009	Examining the Effect of Decreasing Mobile Device Information Display Size on Procedural Task Performance	B. Caldwell (IE)
Y. Song	PhD 2009	Multi-variate Scientific Data Visualization and Analytics	D. Ebert (ECE)
Demirel, H.O.	2009	Tactile Feedback Mechanism for Virtual Build Methodology	V. Duffy (IE)
J.S. Hayden	Ph.D. 2009	Diffusion Weighted Imaging in Auditory Functional Magnetic Resonance Imaging	T. Talavage (ECE)
S. Hu	Ph.D. 2009	Characterization and Compensation of Artifacts in Functional Magnetic Resonance Imaging	T. Talavage (ECE)
L. Huang	Ph.D. 2009	Novel Imaging-Processing-Based Analysis of FMRI Data	T. Talavage (ECE)
M. Kwon	Ph.D. 2009	Characterization of Acoustic Imaging Noise-Induced Hemodynamic Response as a Function of Noise Intensity in Human Auditory Cortex FMRI at 3.0T	T. Talavage (ECE)
K. Ostmo	Ph.D. 2009	Automatic Portion Estimation and Visual Refinement in Mobile Dietary Assessment	D. Ebert (ECE)
P.C. Livengood	Ph.D. 2009	Comparative Visual Analytic Techniques for Mass Spectrometry Data	D. Ebert (ECE)
R. Maciejewski	Ph.D. 2009	Exploring Multivariate Data through the Application of Visual Analytics	D. Ebert (ECE)
S. Mazumdar	Ph.D. 2009	Transmission of Airborne Contaminants in Airliner Cabins	Y. Chen (ME)
H. Swift	MSME 2009	Non-thesis: Potential Health Effects of Aircraft Noise	P. Davies (ME)
W. Zuo	Ph.D. 2010	Advanced Simulations of Air Distributions in Buildings	Y. Chen (ME)
G. Joshi	MSME 2010	Planar Whole-Body Vibratory Response of a Nonlinear Multi-Body Model of a Seat-Occupant System with Polyurethane Foam	P. Davies (ME)
Y. Deshmukh	MSME 2010	Measurement of Foam Properties and Modeling of Layered Foam Systems	P. Davies (ME)
A. Pattath	Ph.D. 2010	Interactive Visualization for Mobile Visual Analytics	D. Ebert (ECE)
S. Sandstrom	MSCE 2010	Learning in the Freespace Driving Simulator: An Exploratory Study with Active Safety Systems	A. Tarko (CE)
S. More HL 2010-7	Ph.D. 2010	Aircraft Noise Characteristics and Metrics	P. Davies (ME)

J. Gupta	Ph.D. 2010	Respiratory Exhalation/Inhalation Models and Prediction of Airborne Infection Risk in an Aircraft Cabin	Y. Chen (ME)
J. Swaminathan	Ph.D. 2010	The Role of Envelope and Temporal Fine Structure in the Perception of Noise Degraded Speech	M. Heinz (SLHS)
L. Liu	Ph.D. 2010	Probabilistic Discriminant Analysis for Functional MRI and Model-Based Tuning Algorithm for MRI Coil Array	T. Talavage (ECE)
O.A. Olulade	Ph.D. 2010	Characterizing the Effect of Recent Acoustic History Properties on Auditory fMRI Responses	T. Talavage (ECE)
J.M. Speciale	Ph.D. 2010	Sparse Representation of Parallel MRI Reconstruction	T. Talavage (ECE)
S. McGuire	MSME 2010	Non-thesis: Effects of Aircraft Noise	P. Davies (ME)
E. Jun	Ph.D. 2011	Design Methods for Information Visualization	S. Landry (IE)
S. Kale	BME 2011	Temporal Coding in Auditory-Nerve Fibers Following Noise-Induced Hearing Loss	M. Heinz (SLHS)
A. Chintanpalli	BME 2011	Evaluating the Neural Basis for Concurrent Vowel Identification in Dry and Reverberant Conditions	M. Heinz (SLHS)
F. Eberhardt HL 2011-1	MSME 2011	Study of the Feasibility of Estimating Combustion Noise Radiation in Reverberant Environments	P. Davies (ME)
Y-F. Kuo	Ph.D. 2011	Improving Tone Consistency and Reducing Calibration Frequency for Color Electrophotography	G. Chiu (ME)
M. Wang	Ph.D. 2011	Modeling Airflow and Contaminant Transport in Enclosed Environments with Advanced Models	Y. Chen (ME)
K.S. Lee	Ph.D. 2011	Air Distribution Effectiveness and Thermal Stratification with Stratified Air Distribution Systems	Y. Chen (ME)
G. Xue	MSME 2011	Design Tool for Under-Floor Air Distribution System	Y. Chen (ME)
S. Srivastava	Ph.D. 2011	Display Device Color Management and Visual Surveillance of Vehicles	E. Delp (ECE)
A. Snyder	Ph.D. 2011	Monitoring/Evaluating Disease States Using Functional Magnetic Resonance Imaging	T. Talavage (ECE)
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