

# Me Too

Department of Mechanical Engineering  
Laboratory for Computational Sensing and Robotics  
Johns Hopkins University

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EDUCATION	<p><b>Ph.D., Mechanical Engineering</b> 2010 Johns Hopkins University Dissertation: Characterization of Human Perception Using Haptic Systems and Implications for Upper-Limb Prosthetics Advisor: Dr. xxx Thesis Committee Members: Dr. xxx (Mechanical Engineering, JHU/Stanford) Dr. xxx (Mechanical Engineering, UPenn) Dr. xxx (Neuroscience, JHU) Dr. xxx (Psychological and Brain Sciences, JHU)</p> <p><b>M.S., Mechanical Engineering</b> 2007 Johns Hopkins University Specialization: Robotics, Controls</p> <p><b>B.S.E., Mechanical Engineering, <i>Cum Laude Society</i></b> 2004 University of Pennsylvania Thesis: Determination of Human Dynamics in a Pivot Turn Advisors: Dr. xxx (Neuroscience, JHU) Dr. xxx (Mechanical Engineering, UPenn)</p>
POSITIONS HELD	<p>Postdoctoral Fellow 2010 - Present Johns Hopkins University Advisor: Dr. xxx</p> <p>Research Assistant 2004 - 2010 Johns Hopkins University Advisor: Dr. xxx</p>
RESEARCH INTEREST	<p>My research interest is to integrate analysis and design tools from the field of robotics with computational neuroscience, to develop a richer understanding of the human nervous system and to enhance treatment of those with compromised haptic perception and motor control.</p>
AWARDS AND HONORS	<p>NSF Graduate Research Fellowship 2006 - 2010 Dean's Fellowship, JHU Whiting School of Engineering 2004 - 2009 Jacob M. Abel Undergraduate Summer Research Internship, UPenn 2003 John &amp; Lillian Neff Scholarship, UPenn 2000 - 2004</p>

RESEARCH  
EXPERIENCE

**Characterization of Human Stiffness Perception** 2009 - Present

Johns Hopkins University, *Haptics Laboratory*

Proposed a computational model to describe how humans may internally represent a haptic interaction with a mechanical spring. Human stiffness perception is modeled using one's force and position sensing capabilities, and human subject testing showed the model to be a plausible mechanism for how stiffness perception occurs.

**Proprioceptive Information for Prosthetics** 2006 - Present

Johns Hopkins University, *Haptics Laboratory*

Created a robotic system and conducted human subject studies to investigate the role of visual motion and proprioceptive motion cues during motion control and spring discrimination tasks. Results show proprioceptive motion to improve success rate during a targeting task and to be perceived as more useful than visual motion feedback during a spring discrimination task. Then investigated the ability of a skin stretch device attached to the forearm to artificially relay proprioceptive information. Testing shows the skin stretch device to give comparable performance to using natural proprioceptive motion cues and visual motion cues in a spring discrimination task. Currently am investigating the effectiveness of a novel custom-made skin slip device for relaying position information to the toe under working memory loading and no loading conditions. Additionally, am testing the feasibility of relaying four synergistic hand motions using vibratory cues to convey one's overall hand configuration.

**Vibratory Feedback to the Foot for Prosthetics** 2006 - 2009

Johns Hopkins University, *Haptics Laboratory*

Investigated the possibility of providing upper-limb prosthesis users tactile feedback through vibrations to the foot. Results indicate that vibration feedback to the foot enables environment discrimination comparable to vibration feedback at the fingertip.

**Human Performance in a Knob-Turning Task** 2004 - 2007

Johns Hopkins University, *Haptics Laboratory*

Created a robotic system and designed a human subject study to investigate user strategies in a knob-turning task. Results indicate that humans change their turning strategy depending on the knob-turning difficulty, and apply forces and torques in directions that are not conducive to the task.

**Analysis of Human Movement** 2003 - 2004

University of Pennsylvania, *Vestibular Ocular Motor Research Laboratory*

Revised a human turning model to be more mathematically and anatomically accurate, did biomechanical testing, and created a simulation that supported my hypothesized turning model.

**Determination of Flow Patterns in Uterine Model** Summer 2002

Tel Aviv University, *Biofluids Lab*

Performed biofluid study to analyze flow patterns in a uterine model upon injection of a dye.

PUBLICATIONS

**Peer-Reviewed Journal Publications**

- [J1] N. Gurari, K. J. Kuchenbecker, A. Shelton, S. Hsiao, and A. M. Okamura, *Characterization of Position, Force, and Stiffness Perception Using Psychophysics Testing and a Novel Perception Model*. [In Preparation for Dec 2011 Submission]
- [J2] A. Wu, N. Gurari, C. Montojo, and A. M. Okamura, *Novel Haptic Skin Slip Feedback Mechanism to Toe*. [In Preparation for Dec 2011 Submission]

- [J3] **N. Gurari**, K. J. Kuchenbecker, and A. M. Okamura, *Perception of Springs with Visual and Proprioceptive Motion Cues: Implications for Prosthetics*. [Under Review]
- [J4] **N. Gurari**, J. Wheeler, A. Shelton, and A. M. Okamura, *Discrimination of Springs with Vision, Proprioception, and Artificial Skin Stretch Cues: Implications for Upper-Limb Prosthetics*. [Under Review]

### Peer-Reviewed Conference Publications

- [R1] A. Cheng, K. Nichols, H. Weeks, **N. Gurari**, and A. M. Okamura, *Conveying the Configuration of a Virtual Human Hand Using Vibrotactile Feedback*. [Accepted to the \*\*\* Haptics Symposium]
- [R2] **N. Gurari**, K. Smith, M. Madhav, and A. M. Okamura, *Environment Discrimination with Vibration Feedback to the Foot, Arm, and Fingertip*. Proceedings of the 11th International Conference on Rehabilitation Robotics (ICORR), pp. 343-348, 2009.
- [R3] **N. Gurari**, K. J. Kuchenbecker, and A. M. Okamura, *Stiffness Discrimination with Visual and Proprioceptive Cues*. Proceedings of the Third Joint Eurohaptics Conference and Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems (World Haptics), pp. 121-126, 2009.
- [R4] J. Tapson, **N. Gurari**, J. Diaz, E. Chicca, D. Sander, P. Pouliquen, and R. Etienne-Cummings, *The Feeling of Color: A Haptic Feedback Device for the Visually Disabled*. Proceedings of the Biomedical Circuits and Systems Conference (BioCAS), pp. 381-384, 2008.
- [R5] K. J. Kuchenbecker, **N. Gurari**, and A. M. Okamura, *Effects of Visual and Proprioceptive Motion Feedback on Human Control of Targeted Motion*. Proceedings of the 10th International Conference on Rehabilitation Robotics (ICORR), pp. 513-524, 2007.
- [R6] **N. Gurari** and A. M. Okamura, *Human Performance in a Knob-Turning Task*. Proceedings of the Second Joint Eurohaptics Conference and Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems (World Haptics), pp. 96-101, 2007.

### Peer-Reviewed Short Refereed Conference

- [S1] K. J. Kuchenbecker, **N. Gurari**, and A. M. Okamura, *Quantifying the Value of Visual and Haptic Position Feedback During Force-Based Motion Control*. Proceedings of the Second Joint Eurohaptics Conference and Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems (World Haptics), pp. 561-562, 2007.

### Dissertation/Thesis

- [D1] **N. Gurari**, *Characterization of Human Perception Using Haptic Systems and Implications for Upper-Limb Prosthetics*. Doctoral Dissertation, Department of Mechanical Engineering, Johns Hopkins University, 2010.
- [D2] **N. Gurari**, *Locomotion and Vestibular Ocular Motor Control*. Bachelor of Science in Engineering Thesis, Department of Mechanical Engineering and Applied Mechanics, University of Pennsylvania, 2003.

### PRESENTATIONS

#### Technical Talks

- [T1] *Characterization and Enhancement of Touch Perception Using Custom Haptic Systems*. Presentation giving an overview of my research, Robotics, Brain and Cognitive Sciences Department, Istituto Italiano di Tecnologia, Genova, Italy, Nov 23, 2011.
- [T2] *Characterization and Enhancement of Touch Perception Using Custom Haptic Systems*. Presentation giving an overview of my research, Sensory Motor Performance Program, Rehabilitation Institute of Chicago, Chicago, Illinois, USA, Oct 17, 2011.

- [T3] *Characterization of Human Perception Using Haptic Systems and Implications for Upper-Limb Prosthetics*. Dissertation Defense, Department of Mechanical Engineering, Johns Hopkins University, Maryland, USA, Oct 15, 2010.
- [T4] *Characterization of Human Sensing Capabilities for Improved Upper-Limb Prosthesis Use*. One of two JHU graduate students selected to give a high-level presentation of the PhD research to the general JHU community, Lattman Graduate Student Community Lecture Series, Maryland, USA, Apr 14, 2010.
- [T5] *Human Performance in a Knob-Turning Task*. Paper Presentation, Second Joint Eurohaptics Conference and Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems (World Haptics), Tsukuba, Japan, Mar 22, 2007.

**Educational Outreach Talks**

- [E1] *Leading Labs: Engineering*. Lecture to incoming graduate students, JHU Teaching Assistant Orientation, Johns Hopkins University, Maryland, USA, Sep 3, 2008.
- [E2] *Get a Grip!* Break Out Session Leader – presentation to primarily middle school females, Computer Mania Day, University of Maryland, Maryland, USA, Apr 9, 2005.

**Hands-On Demonstrations**

- [H1] *Comparing visual and haptic position feedback*. K. J. Kuchenbecker, **N. Gurari**, and A. M. Okamura, hands-on demonstration presented at IEEE World Haptics Conference, Tsukuba, Japan, Mar 23, 2007.
- [H2] *Get a Grip!* **N. Gurari**, P. Marayong, and S. Saha, hands-on demonstration of the Impulse Engine 2000 and Phantom Omni presented at Computer Mania Day, Maryland, USA, Apr 9, 2005.

TEACHING  
EXPERIENCE

**Teaching Assistant**, JHU, Electronics & Instrumentation 2008

Level of Course: Sophomore Undergraduate

Primary Instructor: Dr. xxx

Student Evaluations:

Effectiveness in helping students learn course material: 4.67/5

Genuine interest in students' progress in the course: 4.67/5

Organization of laboratory sessions: 4.78/5

Thoroughness of answers to student questions: 4.75/5

Clear and understandable voice: 4.89/5

Role: Instructed weekly lab sessions, graded lab reports, held office hours, and lectured three classes.

**Teaching Assistant**, JHU, Design and Analysis of Dynamic Systems 2006

Level of Course: Junior Undergraduate

Primary Instructor: Dr. xxx

Student Evaluations:

Effectiveness in helping students learn course material: 4.2/5

Genuine interest in students' progress in the course: 4.25/5

Thoroughness of answers to student questions: 4.5/5

Role: Held office hours, conducted problem solving sessions, graded homework, wrote homework solutions, and lectured one class.

**Academic Tutor** 2002 - 2003

University of Pennsylvania

Topics: Calculus I, II, and Hebrew

MENTORING  
EXPERIENCE

**Co-founder of ‘Me To Me Too’** 2010 - Present  
www.metometoo.com  
My identical twin sister and I share our academic career experiences both subjectively and objectively. Our goal is to draw positive attention to Engineering and the Sciences by using the twin appeal and sharing our excitement for what we do.

**Undergraduate Student Research Mentor**

Haptic Feedback through Toe Stimulation, JHU 2008 - Present  
Mentoring undergraduate student, **xxx**, in developing and characterizing a novel custom-made haptic device, designing and running a human subject study, analyzing the results, and publishing the findings in a journal.

Vibratory Feedback to the Foot for Prosthetics, JHU 2008 - 2009  
Mentored undergraduate student, **xxx**, in completing the design of an experimental set up, running a human subject study, analyzing the results, publishing the findings, and presenting the work at a conference.

Vibratory Feedback to the Foot for Prosthetics, JHU 2007 - 2008  
Mentored undergraduate student, **xxx**, in designing an experimental set up and human subject study.

Skin Stretch Feedback to the Forearm for Prosthetics, JHU 2007  
Mentored undergraduate student, **xxx**, in the design of a skin stretch feedback device.

**High School Student Research Mentor** 2006

Haptic Museum Display, JHU  
Mentored two high school students consecutively in designing and building an educational haptic device to be displayed in a museum.

WORKSHOPS AND  
SPECIALTY  
COURSES

**Negotiating the Ideal Faculty Position** 2011  
3-day NSF ADVANCE workshop at Rice University in which faculty leaders in science, engineering, and psychology teach underrepresented prospective faculty about the faculty application process, provide direct feedback on application items, and guide attendees through mock job talks and chair interviews.

**Telluride Neuromorphic Cognition Engineering Workshop** 2008  
3-week complete immersion workshop focused on neuromorphic engineering. Researchers from academia, industry, and national laboratories worked together on neurobiological and engineering aspects of sensory systems and sensory-motor integration. My unique experiences included a mini-course on how to perform fly electrophysiology.

**JHU Teaching Assistant Training Workshops** 2006  
Lectures and panels on a broad range of topics offered throughout the semester.

**Surgery For Engineers** 2005  
Semester long course that teaches fundamental skills and operative procedures for general surgery through lectures and laboratory sessions. Exposure to both traditional and innovative operating room environments, as well as basic surgical procedure techniques.

PROFESSIONAL ACTIVITIES	<b>Leadership Activities</b>	
	LCSR Graduate Student Committee, JHU, <i>Haptics Lab Representative</i>	2007 - 2010
	Women of Whiting, JHU, <i>Panel Chair</i>	2007 - 2009
	Women of Whiting, JHU, <i>Peer Advisor</i>	2006 - 2009
	Haptics Laboratory, JHU, <i>Manager of Human Subjects Protocols</i>	2006 - 2009
	Women of Whiting, JHU, <i>Social Chair</i>	2006
	Haptics Laboratory, JHU, <i>Demonstration Coordinator</i>	2005 - 2006
	Haptics Laboratory, JHU, <i>Web Master</i>	2004 - 2005
	<b>Outreach Events</b>	
	Science-Engineering-Technology Congressional Visits Days	2010
	Engineers Without Borders, <i>JHU South Africa Team Volunteer</i>	2010
	JHU Teaching Assistant Orientation, <i>Panel Member</i>	2008
	Women of Whiting, <i>WISE Panel Speaker</i>	2006
	Ready, Set, Design!, <i>Volunteer</i>	2006
Surgical Lego Competition, <i>Volunteer</i>	2005	
<b>Technical Reviews</b>		
Haptics Symposium	2012	
Haptics Symposium	2010	
World Haptics (w/ Peer)	2009	
IEEE International Conference on Robotics & Automation (w/ Advisor)	2009	
IEEE Transactions on Systems, Man, & Cybernetics (w/ Advisor)	2008	
IEEE International Conference on Robotics & Automation (w/ Advisor)	2007	
Eurohaptics (w/ Advisor)	2006	
PERSONAL	Citizenship: United States of America	
	Languages:	
	- Fluency: English (Native Language), Hebrew	
	- Proficiency: Russian, Spanish	
	- Working Knowledge: Polish, Portuguese	
EXTRACURRICULAR ACTIVITIES	Outdoor Activities and Traveling Enthusiast	
	Capoeirista, <i>Responsibilities included Instructor and Group Leader</i>	2002 - Present
	Marathon Training, <i>2002 Columbus Marathon</i>	2002
	Varsity Gymnastics Team, <i>UPenn Team Member</i>	2000 - 2001
	9th Pan American Maccabi Games, <i>USA Gymnastics Team Member</i>	1999