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Curriculum vitae last updated on June 7, 2011

EDUCATION

- Ph.D. 2006** Mechanical Engineering, Stanford University, Stanford, California, USA
Dissertation: Characterizing and Controlling the High-Frequency Dynamics of Haptic Interfaces
Advisor: Dr. Günter Niemeyer
- M.S. 2002** Mechanical Engineering, Stanford University, Stanford, California, USA
Specialization: Robotics, Mechatronics, Design, and Controls
- B.S. 2000** Mechanical Engineering, Stanford University, Stanford, California, USA
With Distinction

POSITIONS HELD

- 2007-present **Skirkanich Assistant Professor of Innovation**, Department of Mechanical Engineering and Applied Mechanics, University of Pennsylvania
- 2010-present Member, Bioengineering Graduate Group, University of Pennsylvania
- 2006-2007 Postdoctoral Research Fellow, Department of Mechanical Engineering, NSF ERC for Computer-Integrated Surgical Systems and Technology, Johns Hopkins University
Advisor: Dr. Allison M. Okamura
- 2000-2006 Research and Teaching Assistant, Department of Mechanical Engineering, Stanford University

RESEARCH INTERESTS

My research centers on the design, control, and performance of two types of systems: robots that capably manipulate physical objects, and haptic interfaces that enable a user to touch virtual objects and distant environments as though they were real and within reach. Building on an understanding of human sensory and motor capabilities, the systems I study combine electromechanical sensors and actuators with computer control to accomplish challenging tasks and fool the human sense of touch. By studying applications such as robot-assisted minimally invasive surgery, stroke rehabilitation, explosive ordnance disposal, and personal computing, I seek to elevate and formalize our understanding of haptic feedback while simultaneously uncovering new opportunities for its use in interactions between humans, computers, and machines.

AWARDS AND HONORS

- 2011 Participant, National Academy of Engineering's U.S. Frontiers of Engineering Symposium
2011 Best Poster in Session (of 17 posters), American Urological Association Annual Meeting
2011 Best Associate Editor, IEEE International Conference on Robotics and Automation
2011 Outstanding Reviewer, IEEE Transactions on Instrumentation and Measurement
2010 Popular Science Brilliant 10
2010 Ford Motor Company Award for Faculty Advising, SEAS, University of Pennsylvania
2010 Best Teaser Presentation (short talk, given by a student), IEEE Haptics Symposium

- 2010 Finalist for Best Poster, IEEE Haptics Symposium
- 2009 National Science Foundation CAREER Award
- 2009 Early Career Spotlight Talk (keynote speaker), Robotics: Science and Systems Conference
- 2009 Best Hands-on Demonstration, IEEE World Haptics Conference
- 2008 Citation for Meritorious Service as a Reviewer, IEEE Transactions on Haptics
- 2007 Best Haptic Technology Paper, IEEE World Haptics Conference
- 2006 Tuition Fellowship, IEEE-RAS/IFRR School of Robotics Science on Haptic Interaction
- 2005 Travel Grant, IEEE International Conference on Robotics and Automation
- 2004-2005 Achievement Rewards for College Scientists (ARCS) Fellowship
 - 2004 Best Student Paper, Dynamic Systems and Controls Division, ASME IMECE
 - 2004 Best Poster, Medicine Meets Virtual Reality Conference
- 2000-2003 National Science Foundation Graduate Research Fellowship
- 2000-2001 MacDonalld Memorial Fellowship, Stanford University
- 2000-2001 Tau Beta Pi Fellowship
- 2000-2001 Mayfield Fellow, Stanford Technology Ventures Program
 - 2000 Henry Ford II Scholar, #1 Graduating Student in School of Engineering, Stanford University
 - 2000 Henry O. Fuchs Memorial Award for Excellence in Mechanical Design, Stanford University
 - 2000 Best of Program, Senior Design Competition, James F. Lincoln Arc Welding Foundation
- 1999 ASME Kenneth Andrew Roe Scholarship
- 1999 Phi Beta Kappa Honor Society, elected Junior Year
- 1999 Tau Beta Pi Engineering Honor Society, elected Junior Year
- 1998 Cap and Gown, the Stanford Women's Honor Society, elected Junior Year
- 1996-1999 Scholar Athlete Award, Varsity Volleyball, Stanford University

PUBLICATIONS

Journal Articles

- [J1] Karlin Bark, William McMahan, Austin Remington, Jamie Gewirtz, Alexei Wedmid, David I. Lee, and Katherine J. Kuchenbecker. In vivo validation of a novel system to provide haptic and auditory feedback of tool vibrations during robotic surgery. In preparation for *Journal of Urology*, 2011.
- [J2] Netta Gurari, Katherine J. Kuchenbecker, and Allison M. Okamura. Perception of springs with visual and proprioceptive motion cues: Implications for prosthetics. Under review for *IEEE Transactions on Systems, Man, and Cybernetics: Part A*, 2011.
- [J3] Joseph M. Romano and Katherine J. Kuchenbecker. Creating realistic virtual textures from contact acceleration data. Under review for *IEEE Transactions on Haptics*, 2011.
- [J4] Joseph M. Romano, Kaijen Hsiao, Günter Niemeyer, Sachin Chitta, and Katherine J. Kuchenbecker. Human-inspired robotic grasp control with tactile sensing. Under review for *IEEE Transactions on Robotics*, 2011.
- [J5] William McMahan, Jamie Gewirtz, Dorsey Standish, Paul Martin, Jacquelyn Kunkel, Magalie Lilavois, Alexei Wedmid, David I. Lee, and Katherine J. Kuchenbecker. Tool contact acceleration feedback for telerobotic surgery. Accepted to *IEEE Transactions on Haptics*, Special Issue on Haptics in Medicine and Clinical Skill Acquisition, 2011.
- [J6] Amy Blank, Allison M. Okamura, and Katherine J. Kuchenbecker. Identifying the role of proprioception in upper-limb prosthesis control: Studies on targeted motion. *ACM Transactions on Applied Perception*, 7(3):1–23, June 2010.

- [J7] Stephen Kim, Geoffrey Spencer, George Makar, Nuzhat Ahmad, David Jaffe, Gregory Ginsberg, Katherine J. Kuchenbecker, and Michael Kochman. Lack of discriminatory function for endoscopy skills on a computer-based simulator. *Surgical Endoscopy*, Online first, May 2010.
- [J8] Katherine J. Kuchenbecker and Günter Niemeyer. Induced master motion in force-reflecting teleoperation. *ASME Journal of Dynamic Systems, Measurement, and Control*, 128(4):800–810, December 2006.
- [J9] Katherine J. Kuchenbecker, Jonathan P. Fiene, and Günter Niemeyer. Improving contact realism through event-based haptic feedback. *IEEE Transactions on Visualization and Computer Graphics*, 12(2):219–230, March/April 2006.
- [J10] William R. Provancher, Mark R. Cutkosky, Katherine J. Kuchenbecker, and Günter Niemeyer. Contact location display for haptic perception of curvature and object motion. *International Journal of Robotics Research*, 24(9):691–702, September 2005.

Book Chapters/Collections

- [B1] Allison M. Okamura, Katherine J. Kuchenbecker, and Mohsen Mahvash. Measurement-based modeling for haptic rendering. In Ming Lin and Miguel Otaduy, editors, *Haptic Rendering: Algorithms and Applications*, chapter 21, pages 443–467. A. K. Peters, May 2008.

Peer-Reviewed Conference Papers

- [C1] Steven R. Gray, Joseph M. Romano, Jordan Brindza, Soonkyum Kim, Katherine J. Kuchenbecker, and Vijay Kumar. Planning manipulation and grasping tasks with a redundant arm. Accepted to ASME International Design Engineering Technical Conferences, DETC2011-47453, 2011.
- [C2] Karlin Bark, Preeya Khanna, Rikki Irwin, Pulkit Kapur, Steven A. Jax, Laurel J. Buxbaum, and Katherine J. Kuchenbecker. Lessons in using vibrotactile feedback to guide fast arm motions. Accepted to IEEE World Haptics Conference, 2011.
- [C3] Peter Y. Huang, Jacquelyn A. Kunkel, Jordan Brindza, and Katherine J. Kuchenbecker. Haptically assisted golf putting through a planar four-cable system. Accepted to IEEE World Haptics Conference, 2011.
- [C4] Andrew A. Stanley and Katherine J. Kuchenbecker. Design of body-grounded tactile actuators for playback of human physical contact. Accepted to IEEE World Haptics Conference, 2011.
- [C5] Katherine J. Kuchenbecker, Jamie Gewirtz, William McMahan, Dorsey Standish, Paul Martin, Jonathan Bohren, Pierre J. Mendoza, and David I. Lee. VerroTouch: High-frequency acceleration feedback for telerobotic surgery. In Astrid M. L. Kappers, Jan B. F. van Erp, Wouter M. Bergmann Tiest, and Frans C. T. van der Helm, editors, *Haptics: Generating and Perceiving Tangible Sensations, Proc. EuroHaptics, Part I*, volume 6191 of *Lecture Notes in Computer Science*, pages 189–196. Springer, July 2010.
- [C6] Nils Landin, Joseph M. Romano, William McMahan, and Katherine J. Kuchenbecker. Dimensional reduction of high-frequency accelerations for haptic rendering. In Astrid M. L. Kappers, Jan B. F. van Erp, Wouter M. Bergmann Tiest, and Frans C. T. van der Helm, editors, *Haptics: Generating and Perceiving Tangible Sensations, Proc. EuroHaptics, Part II*, volume 6192 of *Lecture Notes in Computer Science*, pages 79–86. Springer, July 2010.
- [C7] Joseph M. Romano, Takashi Yoshioka, and Katherine J. Kuchenbecker. Automatic filter design for synthesis of haptic textures from recorded acceleration data. In *Proc. IEEE International Conference on Robotics and Automation*, pages 1815–1821, May 2010.
- [C8] Kyle N. Winfree, Joseph M. Romano, Jamie Gewirtz, and Katherine J. Kuchenbecker. Control of a high fidelity ungrounded torque feedback device: The iTorQU 2.1. In *Proc. IEEE International Conference on Robotics and Automation*, pages 1347–1352, May 2010.

- [C9] Pulkit Kapur, Mallory Jensen, Laurel J. Buxbaum, Steven A. Jax, and Katherine J. Kuchenbecker. Spatially distributed tactile feedback for kinesthetic motion guidance. In *Proc. IEEE Haptics Symposium*, pages 519–526, March 2010. Finalist for Best Poster Award.
- [C10] William McMahan, Joseph M. Romano, Amal M. Abdul Rahuman, and Katherine J. Kuchenbecker. High frequency acceleration feedback significantly increases the realism of haptically rendered textured surfaces. In *Proc. IEEE Haptics Symposium*, pages 141–148, March 2010.
- [C11] Quentin Lindsey, Neil Tenenholz, David I. Lee, and Katherine J. Kuchenbecker. Image-enabled force feedback for robotic teleoperation of a flexible tool. In *Proc. IASTED International Conference on Robotics and Applications*, pages 224–233, November 2009.
- [C12] Meng Yang, Jingwan Lu, Alla Safonova, and Katherine J. Kuchenbecker. GPU methods for real-time haptic interaction with 3D fluids. In *Proc. IEEE International Workshop on Haptic Audio-Visual Environments and Games (HAVE)*, pages 24–29, November 2009.
- [C13] William McMahan and Katherine J. Kuchenbecker. Haptic display of realistic tool contact via dynamically compensated control of a dedicated actuator. In *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems*, pages 3171–3177, October 2009.
- [C14] Katherine J. Kuchenbecker, Joseph M. Romano, and William McMahan. Haptography: Capturing and recreating the rich feel of real surfaces. Invited paper at International Symposium on Robotics Research, August 2009. To appear as a chapter in a Springer Tracts in Advanced Robotics book.
- [C15] Joseph M. Romano and Katherine J. Kuchenbecker. The AirWand: Design and characterization of a large-workspace haptic device. In *Proc. IEEE International Conference on Robotics and Automation*, pages 1461–1466, May 2009.
- [C16] Netta Gurari, Katherine J. Kuchenbecker, and Allison M. Okamura. Stiffness discrimination with visual and proprioceptive cues. In *Proc. IEEE World Haptics Conference*, pages 121–126, March 2009.
- [C17] Joseph M. Romano, Steve R. Gray, Nathan T. Jacobs, and Katherine J. Kuchenbecker. Toward tactilely transparent gloves: Collocated slip sensing and vibrotactile actuation. In *Proc. IEEE World Haptics Conference*, pages 279–284, March 2009.
- [C18] Kyle N. Winfree, Jamie Gewirtz, Thomas Mather, Jonathan Fiene, and Katherine J. Kuchenbecker. A high-fidelity ungrounded torque feedback device: The iTorqU 2.0. In *Proc. IEEE World Haptics Conference*, pages 261–266, March 2009.
- [C19] Katherine J. Kuchenbecker, David Ferguson, Michael Kutzer, Matthew Moses, and Allison M. Okamura. The Touch Thimble: Providing fingertip contact feedback during point-force haptic interaction. In *Proc. IEEE Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems*, pages 239–246, March 2008.
- [C20] Katherine J. Kuchenbecker, Netta Gurari, and Allison M. Okamura. Effects of visual and proprioceptive position feedback on human control of targeted movement. In *Proc. IEEE International Conference on Rehabilitation Robotics*, pages 513–524, June 2007.
- [C21] Jonathan P. Fiene and Katherine J. Kuchenbecker. Shaping event-based haptic transients via an improved understanding of real contact dynamics. In *Proc. IEEE World Haptics Conference*, pages 170–175, March 2007. Best Haptic Technology Paper Award.
- [C22] Katherine J. Kuchenbecker and Günter Niemeyer. Improving telerobotic touch via high-frequency acceleration matching. In *Proc. IEEE International Conference on Robotics and Automation*, pages 3893–3898, May 2006.
- [C23] Jonathan P. Fiene, Katherine J. Kuchenbecker, and Günter Niemeyer. Event-based haptic tapping with grip force compensation. In *Proc. IEEE Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems*, pages 117–123, March 2006.

- [C24] Katherine J. Kuchenbecker and Günter Niemeyer. Modeling induced master motion in force-reflecting teleoperation. In *Proc. IEEE International Conference on Robotics and Automation*, pages 348–353, April 2005.
- [C25] Katherine J. Kuchenbecker, Jonathan P. Fiene, and Günter Niemeyer. Event-based haptics and acceleration matching: Portraying and assessing the realism of contact. In *Proc. IEEE World Haptics Conference*, pages 381–387, March 2005.
- [C26] Katherine J. Kuchenbecker and Günter Niemeyer. Canceling induced master motion in force-reflecting teleoperation. In *Proc. ASME International Mechanical Engineering Congress and Exposition, Symposium on Advances in Robot Dynamics and Control*, volume 2, paper number 60049, November 2004. Best Student Paper Award.
- [C27] Katherine J. Kuchenbecker, William R. Provancher, Günter Niemeyer, and Mark R. Cutkosky. Haptic display of contact location. In *Proc. IEEE Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems*, pages 40–47, March 2004.
- [C28] Katherine J. Kuchenbecker, June Gyu Park, and Günter Niemeyer. Characterizing the human wrist for improved haptic interaction. In *Proc. ASME International Mechanical Engineering Congress and Exposition, Symposium on Advances in Robot Dynamics and Control*, volume 2, paper number 42017, November 2003.
- [C29] William R. Provancher, Katherine J. Kuchenbecker, Günter Niemeyer, and Mark R. Cutkosky. Perception of curvature and object motion via contact location feedback. In Paolo Dario and Raja Chatila, editors, *Robotics Research: the Eleventh International Symposium (ISRR 2003)*, volume 15 of *Springer Tracts in Advanced Robotics*, pages 456–465. Springer, 2005.

Education-Oriented Peer-Reviewed Conference Papers

- [E1] Mark Yim, Katherine J. Kuchenbecker, Paulo Arratia, John Bassani, Jonathan P. Fiene, Vijay Kumar, and Jennifer Lukes. A practice-integrated curriculum in mechanical engineering. In *Proc. ASEE Annual Conference and Exposition*, June 2008.
- [E2] Carol B. Muller, Elisa H. Barney Smith, Jennifer Chou-Green, T. Daniels-Race, A. Drummond, and Katherine J. Kuchenbecker. The power of external mentors for women pursuing academic careers in engineering and science: Stories of MentorNet ACE and its proteges and mentors. In *Proc. Women in Engineering Programs and Advocates Network (WEPAN) National Conference*, June 2007.

Short Peer-Reviewed Conference Papers and Abstracts

- [S1] William McMahan, Karlin Bark, Jamie Gewirtz, Dorsey Standish, Paul D. Martin, Jacquelyn A. Kunkel, Magalie Lilavois, Alexei Wedmid, David I. Lee, and Katherine J. Kuchenbecker. Tool vibration feedback may help expert robotic surgeons apply less force during manipulation tasks. Accepted for oral presentation at the Hamlyn Symposium on Medical Robotics, 2011.
- [S2] William McMahan, Jamie Gewirtz, Dorsey Standish, Paul Martin, Jacquelyn Kunkel, Magalie Lilavois, Alexei Wedmid, David I. Lee, and Katherine J. Kuchenbecker. VerroTouch: Vibrotactile feedback for robotic minimally invasive surgery. *The Journal of Urology*, 185(4, Supplement):e373, May 2011. Presented at the Annual Meeting of the American Urological Association.
- [S3] Katherine J. Kuchenbecker, Jamie Gewirtz, William McMahan, Dorsey Standish, Jonathan Bohren, Paul Martin, Alexei Wedmid, Pierre J. Mendoza, and David I. Lee. VerroTouch: A vibrotactile feedback system for minimally invasive robotic surgery. In *Proc. 28th World Congress of Endourology*, number PS8-14, September 2010.
- [S4] Joseph M. Romano, Alla Safonova, and Katherine J. Kuchenbecker. Real-time graphic and haptic simulation of deformable tissue puncture. In *Proc. Medicine Meets Virtual Reality*, January 2009.

- [S5] Meng Yang, Jingwan Lu, Zehua Zhou, Alla Safonova, and Katherine J. Kuchenbecker. A GPU-based approach for real-time haptic rendering of 3D fluids. In *Proc. SIGGRAPH Asia Conference*, December 2008.
- [S6] Amy Blank, Allison M. Okamura, and Katherine J. Kuchenbecker. Effects of proprioceptive motion feedback on sighted and unsighted control of a virtual hand prosthesis. In *Proc. IEEE Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems*, pages 141–142, March 2008.
- [S7] Katherine J. Kuchenbecker. Haptography: Capturing the feel of real objects to enable authentic haptic rendering (invited paper). In *Proc. Haptic in Ambient Systems (HAS) Workshop, in conjunction with the First International Conference on Ambient Media and Systems*, February 2008.
- [S8] Katherine J. Kuchenbecker, Netta Gurari, and Allison M. Okamura. Quantifying the value of visual and haptic position feedback in force-based motion control. In *Proc. IEEE World Haptics Conference*, pages 561–562, March 2007.
- [S9] Günter Niemeyer, Katherine J. Kuchenbecker, Raymond Bonneau, Probal Mitra, Andrew Reid, Jonathan Fiene, and Grant Weldon. THUMP: An immersive haptic console for surgical simulation and training. In *Proc. Medicine Meets Virtual Reality*, pages 272–274, January 2004. Best Poster Award.

Hands-On Demonstrations

- [D1] Andrew A. Stanley and Katherine J. Kuchenbecker. Body-grounded tactile actuators for playback of human physical contact. Hands-on demonstration to be presented at IEEE World Haptics Conference, Istanbul, Turkey, June 2011.
- [D2] Joseph M. Romano, Nils Landin, William McMahan, and Katherine J. Kuchenbecker. TexturePad: Realistic rendering of haptic textures. Hands-on demonstration presented at EuroHaptics, Amsterdam, the Netherlands, July 2010.
- [D3] Katherine J. Kuchenbecker, Jamie Gewirtz, William McMahan, Dorsey Standish, Paul Martin, Jonathan Bohren, Pierre J. Mendoza, and David I. Lee. VerroTouch: High-frequency acceleration feedback for telerobotic surgery. Hands-on demonstration presented at EuroHaptics, Amsterdam, the Netherlands, July 2010.
- [D4] Joseph M. Romano and Katherine J. Kuchenbecker. Realistic haptic contacts and textures for tablet computing. Hands-on demonstration presented at the Stanford Medical Innovation Conference on Medical Robotics, Stanford, California, April 2010.
- [D5] Dorsey Standish, Jamie Gewirtz, William McMahan, Paul Martin, and Katherine J. Kuchenbecker. High-frequency tactile feedback for the da Vinci surgical system. Hands-on demonstration presented at the Stanford Medical Innovation Conference on Medical Robotics, April 2010.
- [D6] Zhihao Jiang, Mohit Bhoite, and Katherine J. Kuchenbecker. The haptic board. Hands-on demonstration presented at IEEE Haptics Symposium, Boston, Massachusetts, March 2010.
- [D7] Saurabh Palan, Ruoyao Wang, Nathaniel Naukam, Edward Li, and Katherine J. Kuchenbecker. Tactile gaming vest (TGV). Hands-on demonstration presented at IEEE Haptics Symposium, Boston, Massachusetts, March 2010.
- [D8] Joseph M. Romano and Katherine J. Kuchenbecker. Realistic haptic contacts and textures for tablet computing. Hands-on demonstration presented at IEEE Haptics Symposium, Boston, Massachusetts, Best Teaser Award, March 2010.
- [D9] Dorsey Standish, Jamie Gewirtz, William McMahan, Paul Martin, and Katherine J. Kuchenbecker. High-frequency tactile feedback for the da Vinci surgical system. Hands-on demonstration presented at IEEE Haptics Symposium, Boston, Massachusetts, March 2010.

- [D10] Meng Yang, Jingwan Lu, Alla Safonova, and Katherine J. Kuchenbecker. GPU-based haptic rendering of 3D smoke. Hands-on demonstration presented at IEEE Haptics Symposium, Boston, Massachusetts, March 2010.
- [D11] Joseph M. Romano, Steve R. Gray, Nathan T. Jacobs, and Katherine J. Kuchenbecker. The SlipGlove. Hands-on demonstration presented at IEEE World Haptics Conference, Salt Lake City, Utah, March 2009.
- [D12] William McMahan and Katherine J. Kuchenbecker. Displaying realistic contact accelerations via a dedicated vibration actuator. Hands-on demonstration presented at IEEE World Haptics Conference, Salt Lake City, Utah, Proc. IEEE World Haptics Conference, pp. 613–614, March 2009. Best Hands-On Demonstration Award.
- [D13] Pulkit Kapur, Sunthar Premakumar, Steven A. Jax, Laurel J. Buxbaum, Amanda M. Dawson, and Katherine J. Kuchenbecker. Vibrotactile feedback system for intuitive upper-limb rehabilitation. Hands-on demonstration presented at IEEE World Haptics Conference, Salt Lake City, Utah, Proc. IEEE World Haptics Conference, pp. 621–622, March 2009.
- [D14] Kyle N. Winfree, Jamie Gewirtz, Thomas Mather, Jonathan Fiene, and Katherine J. Kuchenbecker. The iTorqU 1.0 and 2.0. Hands-on demonstration presented at IEEE World Haptics Conference, Salt Lake City, Utah, March 2009.
- [D15] Katherine J. Kuchenbecker, David Ferguson, Michael Kutzer, Matthew Moses, and Allison M. Okamura. The Touch Thimble. Hands-on demonstration presented at IEEE Haptics Symposium, Washington, D.C., March 2008.
- [D16] Katherine J. Kuchenbecker, Netta Gurari, and Allison M. Okamura. Comparing visual and haptic position feedback. Hands-on demonstration at IEEE World Haptics Conference, Tsukuba, Japan, March 2007.
- [D17] Katherine J. Kuchenbecker, Jonathan P. Fiene, and Günter Niemeyer. Event-based haptic feedback. Hands-on demonstration at IEEE World Haptics Conference, Pisa, Italy, March 2005.

PATENTS

1. K. J. Kuchenbecker, D. Standish, W. McMahan, and J. Gewirtz. Systems and methods for providing vibration feedback in robotic systems. United States and international patent applications PCT/US2011/023995, filed February 8, 2011.
2. M. Kochman and K. J. Kuchenbecker. System and method for determining stricture characteristics. Provisional United States patent application #61/410,030, filed November 4, 2010.
3. K. J. Kuchenbecker, J. Romano, W. McMahan, and N. Landin. Systems and methods for capturing and recreating the feel of surfaces. Provisional United States patent application #61/369,254, filed July 30, 2010.
4. G. Niemeyer, N. Tanner, K. J. Kuchenbecker, and J. Fiene. High frequency feedback in telerobotics and haptics. Provisional United States patent application #60/712,355, filed August 29, 2005.
5. B. G. MacGregor, et al. Partition panel with modular appliance mounting arrangement. United States Patent #6,851,226, issued February 8, 2005. International patents also issued.
6. A. Calder, L. Bayer, K. Kuchenbecker, and E. Froelich. Self-service terminal. European Patent #1,258,842, issued November 20, 2002. United States patent pending under application #10/101,582.

GRANTS AND CONTRACTS

Current

1. NSF CAREER #IIS-0845670: “Haptography: Capturing and Recreating the Rich Feel of Real Surfaces.” Katherine J. Kuchenbecker (PI), University of Pennsylvania. Funded via American Recovery and Reinvestment Act (ARRA). Amount to Penn: \$499,495. July 15, 2009, through June 30, 2014.
2. NSF #IIS-0915560: “HCC: Small: Modular Tactile Feedback for Whole-Body Motion Guidance.” Katherine J. Kuchenbecker (PI), University of Pennsylvania. Amount to Penn: \$500,000. July 1, 2009, through June 30, 2012. Two \$16,000 REU supplements for summer 2010 and summer 2011.
3. ARL RCTA: “Robotics Collaborative Technology Alliance.” General Dynamics Robotic Systems (Lead), with approximately forty PIs from the University of Pennsylvania, Carnegie Mellon University, University of Central Florida, Florida A & M University, California Institute of Technology/Jet Propulsion Laboratory, Foster-Miller, Boston Dynamics, and General Dynamics Robotic Systems. \$129,700,000 total for the first five years. Amount to Penn: \$9,836,112. July 1, 2010 through June 30, 2015.
4. DARPA ARM-S: “DHARMA: Dexterous Hand-Arm Robotic Manipulation Autonomy.” Wes Huang (PI, iRobot), Vijay Kumar (Manipulation lead, Penn), Rod Grupen (Perception lead, UMass-Amherst), Kostas Daniilidis (Perception lead, Penn), Max Likhachev (Co-PI, Penn), Katherine J. Kuchenbecker (Co-PI, Penn), Dan Lee (Co-PI, Penn), and Chris Geyer (Co-PI, iRobot). Total award: approximately \$1,000,000. July 1, 2010, through September 30, 2011, with possible extensions.
5. Willow Garage PR2 Beta Program: “PR2GRASP: From Perception to Reasoning to Grasping.” Maxim Likhachev (PI), Kostas Daniilidis (Co-PI), Katherine J. Kuchenbecker (Co-PI), Vijay Kumar (Co-PI), Daniel D. Lee (Co-PI), Jianbo Shi (Co-PI), Camillo Jose Taylor (Co-PI), and Mark Yim (Co-PI), University of Pennsylvania. Amount to Penn: One PR2 two-handed mobile robot (equipment only). July 1, 2010, through June 30, 2012.

Completed

1. Pennsylvania Department of Health: Heath Research Formula Funds (Tobacco Funds): “Vibrotactile and Auditory Feedback for Robotic Minimally Invasive Surgery.” Katherine J. Kuchenbecker (PI) and David I. Lee (Co-PI), University of Pennsylvania. Amount to Penn: \$75,000. July 1, 2010, through December 31, 2010.
2. NSF CRI #CNS-0855210: “II-EN: Mobile Manipulation.” Maxim Likhachev (PI), Katherine J. Kuchenbecker (Co-PI), Daniel Lee (Co-PI), Jianbo Shi (Co-PI), and Kostas Daniilidis (Co-PI), University of Pennsylvania. Amount to Penn: \$298,050. September 1, 2009, through August 31, 2010.
3. Subcontract from Pennsylvania Department of Health: Health Research Formula Fund (Tobacco Funds), Moss Rehabilitation Research Institute: “Development of a Low Cost Haptic Virtual Environment for Upper Limb Rehabilitation.” Steven Jax (PI), Laurel Buxbaum (Co-PI), and Katherine J. Kuchenbecker (Co-PI). Amount to Penn: \$10,041 plus equipment. January 1, 2009, through December 31, 2009.
4. Subcontract from NSF #EEC-9731748, ERC: Engineering Research Center for Computer-Integrated Surgical Systems and Technology (CISST), Johns Hopkins University, Russell Taylor (PI): “Haptic Effects of Nonideal Slave Dynamics in Robotic Surgery.” Amount to Penn: \$19,976. September 1, 2007, through June 30, 2008.

TECHNICAL TALKS AND SEMINARS

1. “VerroTouch: Tool Contact Acceleration Feedback for Telerobotic Surgery.” Invited presentation, Workshop on Haptics in Surgical Robotics, IEEE World Haptics Conference, Istanbul, Turkey. To be given June 21, 2011.

2. “Human-Inspired Robotic Grasp Control with Tactile Sensing.” Invited presentation, Workshop on Mobile Manipulation, IEEE International Conference on Robotics and Automation, Shanghai, China. May 13, 2011.
3. “Three Good Reasons to Buy an Accelerometer.” Invited seminar, Laboratory for Computational Sensing and Robotics, Johns Hopkins University, Baltimore, Maryland. April 27, 2011.
4. “Haptics: Touch Feedback for Robotic Surgery, Tablet Computers, and More.” Invited seminar, Women in Human-Computer Interaction Lecture Series, Iowa State University, Ames, Iowa. April 14, 2011.
5. “Haptics: Touch Feedback for Robotic Surgery, Tablet Computers, and More.” Distinguished lecture, Drexel IEEE Graduate Forum’s Annual Research Symposium, Drexel University, Philadelphia, Pennsylvania. March 3, 2011.
6. “High-Fidelity Haptic Interfaces: Haptography, VerroTouch, StrokeSleeve, and Tactile Grasping.” Invited seminar, Center for Injury Research and Prevention at The Children’s Hospital of Philadelphia, Philadelphia, Pennsylvania. February 15, 2011.
7. “High-Fidelity Haptic Interfaces: Haptography, VerroTouch, StrokeSleeve, and Tactile Grasping.” Invited seminar, Institute for Research on Cognitive Science, University of Pennsylvania, Philadelphia, Pennsylvania. January 21, 2011.
8. “High-Fidelity Haptic Interfaces: Haptography, VerroTouch, StrokeSleeve, and Tactile Grasping.” Invited seminar, Center for Robotics and Intelligent Machines, Georgia Institute of Technology, Atlanta, Georgia. November 23, 2010.
9. “Robotics in the 21st Century: From the Lab to the OR and Back.” Invited seminar, Anesthesiology Grand Rounds, Main Line Health Anesthesia Departments (Lankenau, Bryn Mawr, and Paoli Hospitals), Philadelphia, Pennsylvania. November 16, 2010.
10. “Creating Realistic Virtual Textures from Contact Acceleration Data.” Invited seminar, Mechanical Engineering Department, University of Maine, Orono, Maine. October 1, 2010.
11. “Creating Realistic Virtual Textures from Contact Acceleration Data.” Invited seminar, Department of Mechanical Engineering and Applied Mechanics, University of Pennsylvania, Philadelphia, Pennsylvania. September 23, 2010.
12. “High-Fidelity Haptic Interfaces for Surgical Applications.” Invited seminar, Neurosurgery Grand Rounds, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania. August 12, 2010.
13. “High-Fidelity Haptic Interfaces for Medical Applications.” Invited seminar, Center for Simulation, Advanced Education, and Innovation, Children’s Hospital of Philadelphia, Philadelphia, Pennsylvania. July 21, 2010.
14. “VerroTouch: High-Frequency Acceleration Feedback for Telerobotic Surgery.” Paper presentation, EuroHaptics Conference, Amsterdam, the Netherlands. July 8, 2010.
15. “High-Fidelity Haptic Feedback for Robotic Surgery.” Invited presentation, Medical Robotics Innovation Forum, Stanford Medical Innovation Conference on Medical Robotics, Stanford University, Stanford, California. April 10, 2010.
16. “High-Fidelity Haptic Feedback: Haptography, VerroTouch, and Stroke Sleeve.” Invited seminar, Robotics Lab, Stanford University, Stanford, California. April 9, 2010.
17. “High-Fidelity Haptic Feedback for Robotic Surgery: Haptography and VerroTouch.” Invited seminar, Intuitive Surgical, Inc., Sunnyvale, California. April 9, 2010.
18. “New Trends in Medical Robotics and Haptic Feedback.” Invited seminar, Lankenau Hospital, Philadelphia, Pennsylvania. February 23, 2010.

19. “High-Fidelity Haptic Interfaces for Real, Remote, and Virtual Environments.” Invited seminar, Qinetiq North America/Foster-Miller, Waltham, Massachusetts. November 20, 2009.
20. “GPU Methods for Real-Time Haptic Interaction with 3D Fluids.” Paper presentation, IEEE International Workshop on Haptic Audio-Visual Environments and Games, Lecco, Italy. November 7, 2009.
21. “Haptography: Capturing and Recreating the Rich Feel of Real Interactions.” Invited paper presentation, International Symposium on Robotics Research, Lucerne, Switzerland. August 31, 2009.
22. “Haptography: Creating Authentic Haptic Feedback from Recordings of Real Interactions.” Invited presentation (Early Career Spotlight Talk), Robotics: Science and Systems Conference, Seattle, Washington. July 1, 2009.
23. “High-Fidelity Haptic Feedback for Surgical Teleoperation.” Invited seminar (delivered twice), Electrical Engineering Department, University of Calgary, and Neurosurgery Department, Foothills Hospital, Calgary, Alberta. May 1, 2009.
24. “Overview of Current Research: High-Fidelity Haptic Interfaces for Real, Remote, and Virtual Environments.” Invited seminar, Robotics Program, Engineering and Systems Division, SRI International, Menlo Park, California. February 10, 2009.
25. “Application: Haptics.” Invited presentation, Workshop on Contact Models for Manipulation and Locomotion, IEEE International Conference on Robotics and Automation, Pasadena, California. May 19, 2008.
26. “The Touch Thimble: Providing Fingertip Contact Feedback During Point-Force Haptic Interaction.” Paper presentation, IEEE Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems, Reno, Nevada. March 13, 2008.
27. “Rendering Realistic Contact with Virtual Surfaces Via Event-Based Haptic Feedback.” Invited presentation, Workshop on Integration of Haptics in Virtual Environments: from Perception to Rendering, IEEE Virtual Reality Conference, Reno, Nevada. March 8, 2008.
28. “Realistic Haptic Feedback for Virtual Environments and Teleoperation.” Invited seminar, City College of New York, New York, New York. February 7, 2008.
29. “Effects of Visual and Haptic Position Feedback on Human Control of Targeted Movement.” Paper presentation, IEEE International Conference on Rehabilitation Robotics, Noordwijk, Netherlands. June 12, 2007.
30. “High-Frequency Acceleration Matching for Realistic Haptic Interaction.” Invited seminar, Somatosensory Group, Krieger Mind/Brain Institute, Johns Hopkins University, Baltimore, Maryland. November 29, 2006.
31. “Characterizing and Controlling the High-Frequency Dynamics of Haptic Interfaces.” Invited seminar, ERC-CISST Seminar Series, Johns Hopkins University, Baltimore, Maryland. October 11, 2006.
32. “Characterizing and Controlling the High-Frequency Dynamics of Haptic Interfaces.” Doctoral defense, Department of Mechanical Engineering, Stanford University, Stanford, California. May 30, 2006.
33. “Improving Telerobotic Touch Via High-Frequency Acceleration Matching.” Paper presentation, IEEE International Conference on Robotics and Automation, Orlando, Florida. May 18, 2006.
34. “Characterizing and Controlling the High-Frequency Dynamics of Haptic Interfaces.” Invited seminar, Department of Mechanical Engineering and Applied Mechanics, University of Pennsylvania, Philadelphia, Pennsylvania. April 13, 2006.

35. "Realistic Haptic Feedback for Virtual Environments and Teleoperation." Invited seminar, University of British Columbia, Vancouver, Canada, January 30; University of California, Riverside, February 6; University of California, Santa Cruz, February 8; University of Pennsylvania, February 14; Johns Hopkins University, February 16; Northwestern University, February 20; Cal Poly San Luis Obispo, February 27; Tufts University, March 2; University of Maryland, College Park, March 9; University of Michigan, Ann Arbor, March 21; Carnegie Mellon University, March 23; Massachusetts Institute of Technology, April 5; Columbia University, April 12; Duke University, April 17; Georgia Tech, April 18, 2006.
36. "Modeling Induced Master Motion in Force-Reflecting Teleoperation." Paper presentation, IEEE International Conference on Robotics and Automation, Barcelona, Spain. April 19, 2005.
37. "Event-Based Haptics and Acceleration Matching: Portraying and Assessing Realism of Contact." Paper presentation, IEEE World Haptics Conference, Pisa, Italy. March 20, 2005.
38. "Canceling Induced Master Motion in Force-Reflecting Teleoperation." Paper presentation, International Mechanical Engineering Congress and Exposition, Dynamic Systems and Controls Division, Symposium on Advances in Robot Dynamics and Control, Anaheim, California. November 18, 2004.
39. "Haptic Display of Contact Location." Paper presentation, IEEE Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems, Chicago, Illinois. March 27, 2004.
40. "Characterizing the Human Wrist for Improved Haptic Interaction." Paper presentation, International Mechanical Engineering Congress and Exposition, Dynamic Systems and Controls Division, Symposium on Advances in Robot Dynamics and Control, Washington, D.C. November 19, 2003.

EDUCATIONAL PRESENTATIONS AND WORKSHOPS

1. "Please Touch! Haptic Technology for Games, Surgery, and More." Master lecture for high-school-age participants in the Summer Academy in Applied Science and Technology (SAAST), University of Pennsylvania, Philadelphia, Pennsylvania. To be given July 22, 2011.
2. "Haptics: Touch-Based Interaction." Workshop and lab tour, IRCS Undergraduate Summer Workshop on Cognitive Science, University of Pennsylvania, Philadelphia, Pennsylvania. To be given June 6, 2011.
3. "Penn Haptics Research: Touch Feedback for Robotic Surgery, Tablet Computers, and More." Guest lecture, MEAM 348: Mechanical Engineering Design Laboratory, University of Pennsylvania, Philadelphia, Pennsylvania. March 21, 2011.
4. "Penn Haptics Research: Touch Feedback for Robotic Surgery, Tablet Computers, and More." Technical presentation and hands-on demonstrations for high-school-age participants in the Robotics Leadership Academy at GRASP, University of Pennsylvania, Philadelphia, Pennsylvania. February 17, 2011.
5. "Haptics: Touch-Based Interaction with Real, Remote, and Virtual Environments." Guest lecture, EMTM 695: Robotics, Executive Masters in Technology and Management program, University of Pennsylvania, Philadelphia, Pennsylvania. February 4, 2011.
6. "Haptics: Touch Feedback for Robotic Surgery, Tablet Computers, and More" Online seminar (webinar) for the Penn Alumni Association. November 9, 2010.
7. "Earning an NSF Graduate Research Fellowship." Panel presentation, School of Engineering and Applied Science, University of Pennsylvania, Philadelphia, PA. October 5, 2010.
8. "Mechanical Engineering in Action!" Two hands-on design activities for PennGEMS: Girls in Engineering Math and Science Camp, University of Pennsylvania, Philadelphia, Pennsylvania. August 3 and 4, 2010.
9. "Haptics: Touch-Based Interaction." Workshop and lab tour, IRCS Undergraduate Summer Workshop on Cognitive Science, University of Pennsylvania, Philadelphia, Pennsylvania. June 16, 2010.

10. "Introduction to Haptics: Touch-Based Interaction with Real, Remote, and Virtual Environments." Guest lecture, CIS 563: Physically Based Animation, University of Pennsylvania, Philadelphia, Pennsylvania. March 29, 2010.
11. "Haptics: Touch Feedback for Robotic Surgery and More." Workshop, Society of Women Engineers (SWE) Region E Conference, University of Pennsylvania, Philadelphia, Pennsylvania. March 20, 2010.
12. "Haptics: Touch-Based Interaction with Real, Remote, and Virtual Environments." Guest lecture, EMTM 695: Robotics, Executive Masters in Technology and Management program, University of Pennsylvania, Philadelphia, Pennsylvania. October 30, 2009.
13. "Earning an NSF Graduate Research Fellowship." Panel presentation, School of Engineering and Applied Science, University of Pennsylvania, Philadelphia, PA. October 16, 2009.
14. "Mechanical Engineering in Action!" Two hands-on design activities for PennGEMS: Girls in Engineering Math and Science Camp, University of Pennsylvania, Philadelphia, Pennsylvania. August 6 and 7, 2009.
15. "Haptography: Capturing and Recreating the Rich Feel of Real Surfaces." Master lecture for high-school-age participants in the Summer Academy in Applied Science and Technology (SAAST), University of Pennsylvania, Philadelphia, Pennsylvania. July 24, 2009.
16. "Please Touch! Haptic Technology for Games, Surgery, and More." Keynote speech, RobotGames Competition, University of Calgary, Calgary, Alberta. May 2, 2009.
17. "Past, Present, and Future Research." Guest lecture, MEAM 348: Mechanical Engineering Design Laboratory, University of Pennsylvania, Philadelphia, Pennsylvania. March 30, 2009.
18. "Introduction to Haptics: Touch-Based Interaction with Real, Remote, and Virtual Environments." Guest lecture, CIS 563: Physically Based Animation, University of Pennsylvania, Philadelphia, Pennsylvania. March 2, 2009.
19. "Haptics: Touch-Based Interaction with Real, Remote, and Virtual Environments." Lecture for participant parents, Science and Technology Series, Center for Talented Youth Robotics Program, University of Pennsylvania, Philadelphia, Pennsylvania. November 15, 2008.
20. "Haptics: Touch-Based Interaction with Real, Remote, and Virtual Environments." Guest lecture, EMTM 695: Robotics, Executive Masters in Technology and Management program, University of Pennsylvania, Philadelphia, Pennsylvania. October 31, 2008.
21. "Earning an NSF Graduate Research Fellowship." Panel presentation, School of Engineering and Applied Science, University of Pennsylvania, Philadelphia, PA. October 10, 2008.
22. "Mechanical Engineering in Action!" Hands-on design activity for PennGEMS: Girls in Engineering Math and Science Camp, University of Pennsylvania, Philadelphia, Pennsylvania. August 7, 2008.
23. "Haptics: Touch-Based Interaction with Real, Remote, and Virtual Environments." Master lecture for high-school-age participants in the Summer Academy in Applied Science and Technology (SAAST), University of Pennsylvania, Philadelphia, Pennsylvania. July 25, 2008.
24. "Haptics: Touch-Based Interaction with Real, Remote, and Virtual Environments." Guest lecture, EMTM 695: Robotics, Executive Masters in Technology and Management program, University of Pennsylvania, Philadelphia, Pennsylvania. October 26, 2007.

ADVISING

Post-Doctoral Fellows

Karlin Bark, Ph.D., September 2010 through present.
L'Oréal Post-doctoral "For Women in Science" Fellowship (\$60,000 research grant) 2011–2012.

Doctoral Students

Timothy Herrmann, 2011 through present.
Ph.D. Student in Systems Engineering.
On leave of absence 2011–2012.

Heather Culbertson, 2010 through present.
Ph.D. Student in Mechanical Engineering and Applied Mechanics.
NSF Graduate Research Fellowship 2011–2014.

Rebecca Pierce, 2010 through present.
Ph.D. Student in Mechanical Engineering and Applied Mechanics.
NSF Graduate Research Fellowship 2011–2014.

William McMahan, 2008 through present.
Ph.D. Student in Mechanical Engineering and Applied Mechanics.

Joseph M. Romano, 2007 through present.
Ph.D. Candidate in Mechanical Engineering and Applied Mechanics.

Masters Thesis Students

Ernest (Ted) Gomez, 2011 through 2012.
M.S. Student in Translational Research.

David Wang, 2011 through present.
M.S. Student in Bioengineering.

Pulkit Kapur, 2008 through 2010.
M.S. in Mechanical Engineering and Applied Mechanics. Now at SensAble Technologies.
"StrokeSleeve: Spatially Distributed Tactile Feedback for Kinesthetic Motion Guidance."

Kyle N. Winfree, 2008 through 2009.
M.S. in Robotics. Now a Ph.D. student at the University of Delaware.
"An Ungrounded Haptic Torque Feedback Device: The iTorqU."

Many additional graduate students work in my lab without writing a thesis. Research is performed for independent study course credit, for hourly pay, or on a volunteer basis. Many of these projects begin in my graduate-level course on haptics and culminate in publication of a conference paper.

Undergraduate Research Students

Over 30 undergraduate researchers have been recruited and mentored since 2007. The majority have been University of Pennsylvania undergraduate students in Mechanical Engineering and Applied Mechanics or Bioengineering. Research is performed for independent study course credit, for hourly pay, or on a volunteer basis. Many of the undergraduate researchers have been co-authors on papers or abstracts, and several of them have gone on to Ph.D. research with competitive national fellowships.

Design Projects

2010-2011: "High-Fidelity Mannequin Chest for CPR Training" by Michael Boyle, Nihar Dharamsey, Simon Healey, Nihar Naik, and Andrew Stanley. MEAM senior design project co-advised by Matt Maltese. Couloucondis prize for best presentation of a senior design project. Tied for fourth place overall in SEAS senior design competition.

2009-2010: “TriTrax: High-Traction Triangular Wheel” by Jeronimo von Wuthenau. Integrated Product Design master’s thesis project.

2009-2010: “Robotic Self-Feeder for Children with Cerebral Palsy” by Cynthia Ericksen, Mallory Jensen, Monica Sachs, and Monica Thomas. MEAM senior design project.

2008-2009: “Tactile Vision” by Amal Abdul Rahuman, David Argudo, Sameer Kirtane, and Haresh Tilani. Joint MEAM and BE senior design project.

2008-2009: “Haptic Compass for the Visually Impaired” by Brian Hylton and Sumito Ahuja. MEAM senior design project.

2008-2009: “ROGER: Rapidly Orienting Green-Eyed Robot” by Kate Chovanetz, Matthew MacMillan, and Travis Van Schoyck. MEAM senior design project co-advised by Mark Yim. Couloucondis prize for best presentation of a senior design project.

Thesis and Exam Committees

2011: Dissertation proposal committee for Chris Thorne, Paul White, and Joe Romano. Departmental qualifying exams for three students.

2010: Dissertation committee for Netta Gurari (Johns Hopkins University). Departmental qualifying exams for one student.

2009: Departmental qualifying exams for two students.

2008: Departmental qualifying exams for three students.

INSTRUCTION AND COURSE DEVELOPMENT

Undergraduate Courses

Engineering Mechanics: Dynamics This sophomore-level lecture course investigates the motion of bodies and the forces involved in their motion, focusing on particle and rigid body models. Students attend lectures and recitation, complete weekly problem sets, do individual dynamic simulation problems using Matlab, and take three examinations. *MEAM 211 at the University of Pennsylvania: 68 students in Spring 2010, and 58 students in Spring 2011.*

Introduction to Mechanics Lab (new course) This freshman-level laboratory class investigates the concepts of classical mechanics through weekly hands-on experiments, many of which use Matlab and a custom camera-based motion-capture system. Each week, students read the lab workbook, take an in-class pre-lab quiz, work through the lab’s activities in teams of three, and complete a follow-on post-lab assignment. *MEAM 147 at the University of Pennsylvania: 38 students in Fall 2007, 71 students in Fall 2008, 70 students in Fall 2009, and 78 students in Fall 2010.*

I have also taught a three-week version of this class in a summer program that helps prepare incoming undergraduate students for college-level engineering classes. *FPF at the University of Pennsylvania: 15 students in Summer 2008, 14 students in Summer 2009, and 13 students in Summer 2010.*

Assorted Other Topics (as a teaching assistant) I worked as a teaching assistant for eight quarters as a graduate student at Stanford University. Five quarters were spent as a TA in the Product Realization Laboratory, teaching mechanical design and manufacturing in affiliation with the ME 203 course. The other courses I helped teach were Computer-Aided Design and Prototyping (ME 213), Control System Design and Simulation (E 206), Statics (E 14), and Dynamics (E 15).

Graduate Courses

Haptic Interfaces (new course) This course provides an introduction to research in the field of haptics, which involves human interaction with real, remote, and virtual objects through the sense of touch. The course includes lectures, written and hands-on homework assignments, research paper discussion and presentation, and semester-long team projects. Many of these student projects lead to further research and conference publications. *MEAM 625 at the University of Pennsylvania: 19 students in Spring 2008, 14 students in Spring 2009, and 28 students in Fall 2010.*

PROFESSIONAL SERVICE

Program Committees, Review Panels, and Conference Organization

- 2011 Co-chair (with Marcia O'Malley and Yasu Yokokohji), special session on "Haptic Interfaces," IEEE Conference on Intelligent Robots and Systems (IROS).
- 2011 Track Co-chair (with Charlie Kemp and Cara Stepp), "Human-Robot Interaction and Robot-aided Living for a Healthier Tomorrow," IEEE Engineering in Medicine and Biology Society Conference (EMBC.)
- 2011 Associate Editor, IEEE World Haptics Conference.
- 2011 Associate Editor, IEEE International Conference on Robotics and Automation (ICRA).
- 2010 One National Science Foundation proposal review panel.
- 2010 Publicity Chair, Robotics: Science and Systems. Helped plan the conference, designed the conference poster and flyer, drafted the call for papers and the call for participation, and distributed these posters, flyers, and calls worldwide.
- 2010 Co-Chair of Posters, Demonstrations and Exhibits, IEEE Haptics Symposium. Wrote and distributed the call for hands-on demonstrations, reviewed demonstration submissions, and coordinated the presentation of posters, demonstrations, and exhibits at the conference venue.
- 2010 Program Committee, IEEE Haptics Symposium. Recruited reviewers, checked reviews, reviewed submitted papers, and made recommendations on paper acceptance.
- 2009 Two National Science Foundation proposal review panels.
- 2009 National Institutes of Health proposal reviews.
- 2008 Program Committee, IEEE Haptics Symposium (held biannually).
- 2008 One National Science Foundation proposal review panel.

Reviews

Journal paper reviews: IEEE Transactions on Haptics, IEEE Transactions on Robotics, International Journal of Robotics Research, IEEE Transactions on Visualization and Computer Graphics, IEEE/ASME Transactions on Mechatronics, IEEE Transactions on Instrumentation and Measurement, IEEE Transactions on Neural Systems and Rehabilitation Engineering, Presence: Teleoperators and Virtual Environments, ASME Journal of Computing and Information Science in Engineering, ACM Transactions on Applied Perception.

Conference paper reviews: In addition to the conference program committees listed earlier, occasional reviews are provided for numerous annual and biannual conferences, including IEEE World Haptics Conference (WHC), IEEE International Conference on Robotics and Automation (ICRA), IEEE Virtual Reality (VR), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), IEEE/RAS-EMBS International Conference on Biomedical Robotics and Biomechatronics (BioRob), EuroHaptics (EH), ASME Dynamic Systems and Controls Conference (DSC), International Symposium on Robotics Research (ISRR).

Companies

Member, Board of Directors, MentorNet, a 501(c)(3) non-profit focused on e-Mentoring for diversity in engineering and science.

Professional Society Memberships

Institute for Electrical and Electronic Engineers (IEEE), Robotics and Automation Society
American Society of Mechanical Engineers (ASME), Dynamic Systems and Controls Division
Association for Women in Science (AWIS)
Society of Women Engineers (SWE)

UNIVERSITY SERVICE

Department of Mechanical Engineering and Applied Mechanics at the University of Pennsylvania

Search Committee, Department Chair for Mechanical Engineering and Applied Mechanics (Spring 2011–present)

Search Committee, Associate Director for Integrated Product Design masters program (Fall 2010–present)

Graduate Admissions Committee (2007–2008, 2010)

Website Redesign Committee (2008–2010)

Senior Design Committee (2008–2010)

School of Engineering and Applied Science at the University of Pennsylvania

Faculty Advisor for the Society of Women Engineers Student Chapter (2009–present)

Faculty Advisory Board, Advancing Women in Engineering (2007–present)

Library Redesign Committee (2008–2009)

University of Pennsylvania

Faculty Advisor for TCPW, the Trustees' Council on Penn Women (2009–present)

Faculty Liaison, Trustees' Committee on Student Life (2009–2010)

Numerous presentations to alumni, industrial partners, and prospective donors, plus interviews and lab tours for internal and external audiences