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Curriculum vitae last updated: February 4, 2020

EDUCATION

Ph.D. 2000 Mechanical Engineering, Stanford University, Stanford, California, USA
Dissertation: Haptic Exploration of Unknown Objects

M.S. 1996 Mechanical Engineering, Stanford University, Stanford, California, USA
Specialization: Robotics, Kinematics, and Controls

B.S. 1994 Mechanical Engineering, University of California, Berkeley, California, USA
With Honors

POSITIONS HELD

2015-present Professor, Mechanical Engineering Department, Stanford University

2011-2015 Associate Professor, Mechanical Engineering Department, Stanford University

2012-present Courtesy appointment, Computer Science Department, Stanford University

2011-2013 Research Professor, Department of Mechanical Engineering, Johns Hopkins University

2010-2011 Vice Chair, Department of Mechanical Engineering, Johns Hopkins University

2009-2010 Visiting Researcher, Kennedy Krieger Institute (sabbatical year)

2009-2011 Professor, Department of Mechanical Engineering, Johns Hopkins University

2007-2011 Associate Director, Laboratory for Computational Sensing and Robotics, Johns Hopkins University

2006-2009 Associate Professor, Department of Mechanical Engineering, Johns Hopkins University

2004-2009 Surgical Assistants Thrust Leader, NSF Engineering Research Center for Computer-Integrated Surgical Systems and Technology, Johns Hopkins University

2002-2011 Secondary Appointment in Computer Science, Johns Hopkins University

2000-2009 Faculty Member, NSF Engineering Research Center for Computer-Integrated Surgical Systems and Technology, Johns Hopkins University

2000-2006 Assistant Professor, Department of Mechanical Engineering, Johns Hopkins University

1994-2000 Graduate Research Assistant, Department of Mechanical Engineering, Stanford University

1999-2000 Adjunct Faculty Member, Math and Science Division, College of San Mateo, CA

1998 Teaching Fellow, Department of Mechanical Engineering, Stanford University

1996-1998 Research Engineer, Immersion Corporation, San Jose, CA

RESEARCH INTERESTS

My research focuses on developing the principles and tools needed to realize advanced robotic and human-machine systems capable of physical interaction. Topics of particular interest are: (1) Teleoperation: Devices, models, and control systems that allow human operators to manipulate environments that are remote in scale and/or distance. (2) Haptic systems: Devices, models, and control systems that enable compelling touch-based interaction with virtual environments, computers, and remote robots. (3) Robotic manipulation: Robots that physically manipulate their environment or their own shape, incorporating novel designs, sensors, and control systems. Application areas include surgery, simulation and training, rehabilitation, prosthetics, neuromechanics, exploration of hazardous and remote environments (e.g. space), design, and education.

AWARDS AND HONORS

- 2019 IEEE Robotics and Automation Society Distinguished Service Award
- 2019 “Soft robot that navigates through growth” named by the journal Science Robotics in the Ten Robotics Technologies of the Year for 2018
- 2018-2020 Stanford Fellow, Stanford University
- 2018 Tau Beta Pi Teaching Honor Roll, Stanford University
- 2018 Finalist, Best Paper in Human Robot Interaction, IEEE International Conference on Robotics and Automation
- 2018 Best Student Presentation Award, IEEE Haptics Symposium (student author: Sean Sketch)
- 2018 Gilbreth Lecturer, National Academy of Engineers
- 2017 ACM CHI Best Paper Award (among the top 1% of submissions to the SIGCHI 2017 conference)
- 2017 Johns Hopkins University Society of Scholars
- 2016-2021 Duca Family University Fellow in Undergraduate Education (Bass University Fellows Program), Stanford University
- 2014 National Academy of Engineers Frontiers of Engineering Symposium (invited speaker), Irvine, CA
- 2014 IEEE Haptics Symposium Best Student Paper Award (student author: Zhan Fan Quek)
- 2013 Medicine Meets Virtual Reality (MMVR) Conference Best Poster Award
- 2011-2015 Robert Bosch Faculty Scholar, Stanford University
- 2011 Gabilan Fellow, Stanford University
- 2011 IEEE Fellow
- 2009 IEEE Technical Committee on Haptics Early Career Award
- 2009 Women Scholars Lecture Series (invited speaker), University of Victoria, Canada
- 2008 Stanford Alumni Distinguished Scholar. Recognition for alumni from underrepresented groups with successful academic careers.
- 2008 American Association of Publishers Award for Excellence in Physical Sciences and Mathematics for the *Springer Handbook of Robotics* team
- 2008 Medicine Meets Virtual Reality (MMVR) Conference Best Poster Award

- 2007-2010 Decker Faculty Scholar, Johns Hopkins University. Awarded to a senior assistant professor or associate professor who exhibits exceptional achievement in his or her area of expertise. Provides flexible financial support to promote innovative research, teaching activities, and entrepreneurial thinking.
- 2007 National Academy of Engineers Frontiers of Engineering Symposium (invited speaker), Hamburg, Germany
- 2006 Finalist, Best Paper Award, IEEE/RSJ International Conference on Intelligent Robots and Systems
- 2005 Early Academic Career Award, IEEE Robotics and Automation Society
- 2005 Literati Club Award for Excellence, Outstanding Paper of the Year in Industrial Robot
- 2004 George E. Owen Teaching Award, Johns Hopkins University. Awarded annually for outstanding teaching and devotion to undergraduates.
- 2004 National Academy of Engineers Frontiers of Engineering Symposium (invited participant), Washington, D.C.
- 2004 National Science Foundation CAREER Award
- 2003 Whitaker Foundation Biomedical Engineering Grant (awarded to young investigators)
- 2003 Diversity Recognition Award, Johns Hopkins University
- 2000 Best Paper Award, American Society of Engineering Education Annual Conference
- 1999 American Society of Mechanical Engineers Auxiliary Parsons Scholarship
- 1999 National Science Foundation Science and Engineering Education Scholars Program (invited participant), Madison, Wisconsin
- 1999 National Science Foundation Dissertation Enhancement Award
- 1994-1997 National Science Foundation Graduate Fellowship
- 1993 Farbar Award, American Society of Mechanical Engineers
- 1993 Boeing Company Scholarship
- 1992 Pi Tau Sigma, Mechanical Engineering Honor Society
- 1992 University of California Japanese American Alumni Association Scholarship
- 1991 Levens Prize, University of California at Berkeley Mechanical Engineering
- 1990 Alumni Scholarship, University of California at Berkeley

PUBLICATIONS

Journal Articles

- [J1] M. M. Coad, R. P. Thomasson, L. H. Blumenschein, N. S. Usevitch, E. W. Hawkes, and A. M. Okamura. Retraction of soft growing robots without buckling. *IEEE Robotics and Automation Letters*, 2020.
- [J2] Lucia Gan, Laura Blumenschein, Zhe Huang, Allison M. Okamura, Elliot Wright Hawkes, and Jonathan Fan. 3d electromagnetic reconfiguration enabled by soft continuum robots. *IEEE Robotics and Automation Letters*, 2020.
- [J3] Y. Che, A. M. Okamura, and D. Sadigh. Efficient and trustworthy social navigation via explicit and implicit robot-human communication. *IEEE Transactions on Robotics*, *Accepted*, 2020.

- [J4] J. D. Greer, L. H. Blumenschein, R. Alterovitz, E. W. Hawkes, and A. M. Okamura. Robust navigation of a soft growing robot by exploiting contact with the environment. *International Journal of Robotics Research, Accepted*, 2020.
- [J5] M. Orta Martinez, C. M. Nunez, T. Liao, T. K. Morimoto, and A. M. Okamura. Evolution and analysis of Hapkit: An open-source haptic device for educational applications. *IEEE Transactions on Haptics*, 2019.
- [J6] P. B. Shull, T. Tan, H. M. Culbertson, X. Zhu, and A. M. Okamura. Resonant frequency skin stretch for wearable haptics. *IEEE Transactions on Haptics*, 12(3):247–256, 2019.
- [J7] C. M. Nunez, S. R. Williams, A. M. Okamura, and H. Culbertson. Understanding continuous and pleasant linear sensations on the forearm from a sequential discrete lateral skin-slip haptic device. *IEEE Transactions on Haptics*, 12(4):414–427, 2019.
- [J8] C. Rognon, M. Koehler, C. Duriez, D. Floreano, and A. M. Okamura. Soft haptic device to render the sensation of flying like a drone. *IEEE Robotics and Automation Letters*, 4(3):2524–2531, 2019.
- [J9] M. Koehler, A. M. Okamura, and C. Duriez. Stiffness control of deformable robots using finite element modeling. *IEEE Robotics and Automation Letters*, 4(2):469–476, 2019.
- [J10] S. Nisar, M. Orta Martinez, T. Endo, F. Matsuno, and A. M. Okamura. Effects of different hand-grounding locations on haptic performance with a wearable kinesthetic haptic device. *IEEE Robotics and Automation Letters*, 4(2):351–358, 2019.
- [J11] S. Kanjanapas, C. M. Nunez, S. R. Williams, A. M. Okamura, and M. Luo. Design and analysis of pneumatic 2-dof soft haptic devices for shear display. *IEEE Robotics and Automation Letters*, 4(2):1365–1371, 2019.
- [J12] Z. F. Quek, W. Provancher, and A. M. Okamura. Evaluation of skin deformation tactile feedback for teleoperated surgical tasks. *IEEE Transactions on Haptics*, 12(2):102–113, 2019.
- [J13] J. D. Greer, T. K. Morimoto, A. M. Okamura, and E. W. Hawkes. A soft, steerable continuum robot that grows via tip extension. *Soft Robotics*, 6(1), 2019.
- [J14] Y. Che, H. Culbertson, C.-W. Tang, S. Aich, and A. M. Okamura. Facilitating human-mobile robot communication via haptic feedback and gesture teleoperation. *ACM Transactions on Human-Robot Interaction*, 7(3):20, 2018.
- [J15] T. K. Morimoto, J. D. Greer, E. W. Hawkes, M. H. Hsieh, and A. M. Okamura. Toward the design of personalized continuum surgical robots. *Annals of Biomedical Engineering*, 46(10):1522–1533, 2018.
- [J16] H. Culbertson, S. Schorr, and A. M. Okamura. Haptics: The present and future of artificial touch sensations. *Annual Review of Control, Robotics and Autonomous Systems*, 1:385–409, 2018.
- [J17] Y. Kamikawa and A. M. Okamura. Comparison between force-controlled skin deformation feedback and hand-grounded kinesthetic force feedback for sensory substitution. *IEEE Robotics and Automation Letters*, 3(3):2174–2181, 2018.
- [J18] L. H. Blumenschein, L. Gan, J. Fan, A. M. Okamura, and E. W. Hawkes. A tip-extending soft robot enables reconfigurable and deployable antennas. *IEEE Robotics and Automation Letters*, 3(2):949–956, 2018.
- [J19] J. M. Walker, H. Culbertson, M. Raitor, and A. Okamura. Haptic orientation guidance using two parallel double-gimbal control moment gyroscopes. *IEEE Transactions on Haptics*, 11(2):267–278, 2018.
- [J20] E. W. Hawkes, L. H. Blumenschein, J. D. Greer, and A. M. Okamura. A soft robot that navigates its environment through growth. *Science Robotics*, 2(8):eaan3028, 2017. DOI: 10.1126/scirobotics.aan3028.

- [J21] N. Gurari, A. M. Okamura, and K. J. Kuchenbecker. Perception of force and stiffness in the presence of low-frequency haptic noise. *PLOS One*, 12(6):e0178605, 2017. <https://doi.org/10.1371/journal.pone.0178605>.
- [J22] S. B. Schorr and A. M. Okamura. Three-dimensional skin deformation as force substitution: Wearable device design and performance during haptic exploration of virtual environments. *IEEE Transactions on Haptics*, 10(3):418–430, 2017.
- [J23] T. K. Morimoto, E. W. Hawkes, and A. M. Okamura. Design of a compact actuation and control system for flexible medical robots. *IEEE Robotics and Automation Letters*, 2(3):1579–1585, 2017.
- [J24] G. Gerboni, J.D. Greer, P.F. Laeseke, G.L. Hwang, and A. M. Okamura. Highly articulated robotic needle achieves distributed ablation of liver tissue. *IEEE Robotics and Automation Letters*, 2(3):1367–1374, 2017.
- [J25] A. A. Stanley and A. M. Okamura. Deformable model-based methods for shape control of a haptic jamming surface. *IEEE Transactions on Visualization and Computer Graphics*, 23(2):1029–1041, 2017.
- [J26] H. E. B. Russell, L. K. Harbott, I. Nisky, S. Pan, A. M. Okamura, and J. C. Gerdes. Motor learning affects car-to-driver handover in automated vehicles. *Science Robotics*, 1(1):eaah5682, 2016. DOI: 10.1126/scirobotics.aah5682.
- [J27] T. K. Morimoto and A. M. Okamura. Design of 3-d printed concentric tube robots. *IEEE Transactions on Robotics*, 32(6):1419–1430, 2016.
- [J28] T. K. Adebar, J. D. Greer, P. F. Laeseke, G. L. Hwang, and A. M. Okamura. Methods for improving the curvature of steerable needles in biological tissues. *IEEE Transactions on Biomedical Engineering*, 63(6):1167–1177, 2015.
- [J29] J. M. Walker, N. Colonnese, and A. M. Okamura. Noise, but not uncoupled stability, reduces realism and likeability of bilateral teleoperation. *IEEE Robotics and Automation Letters*, 1(1):562–569, 2016.
- [J30] K. A. Nichols and A. M. Okamura. A framework for multilateral manipulation in surgical tasks. *IEEE Transactions on Automation Science and Engineering*, 24(2):68–77, 2016.
- [J31] N. Colonnese and A. M. Okamura. Stability and quantization error analysis of haptic rendering of virtual stiffness and damping. *International Journal of Robotics Research*, 35(9):1103–1120, 2016.
- [J32] N. Colonnese, A. F. Siu, C. M. Abbott, and A. M. Okamura. Rendered and characterized closed-loop accuracy of impedance-type haptic displays. *IEEE Transactions on Haptics*, 8(4):434–446, 2015.
- [J33] S. B. Schorr, Z. F. Quek, I. Nisky, W. Provancher, and A. M. Okamura. Tactor-induced skin stretch as a sensory substitution method in teleoperated palpation. *IEEE Transactions on Human-Machine Systems*, 45(6):714–726, 2015.
- [J34] Z. F. Quek, S. B. Schorr, I. Nisky, W. R. Provancher, and A. M. Okamura. Sensory substitution and augmentation using 3-degree-of-freedom skin deformation feedback. *IEEE Transactions on Haptics*, 8(2):209–221, 2015.
- [J35] M. F. Rotella, I. Nisky, M. Koehler, M. D. Rinderknecht, A. J. Bastian, and A. M. Okamura. Learning and generalization in an isometric visuomotor task. *Journal of Neurophysiology*, 113:1873–1884, 2015.
- [J36] K. A. Nichols and A. M. Okamura. Methods to segment hard inclusions in soft tissue during autonomous robotic palpation. *IEEE Transactions on Robotics*, 31(2):344–354, 2015.
- [J37] A. A. Stanley and A. M. Okamura. Controllable surface haptics via particle jamming and pneumatics. *IEEE Transactions on Haptics*, 8(1):20–30, 2014.
- [J38] N. Colonnese and A. M. Okamura. M-width: Stability, noise characterization and accuracy of rendering virtual mass. *International Journal of Robotics Research*, 34(6):781–798, 2015.

- [J39] Z. F. Quek, S. B. Schorr, I. Nisky, W. R. Provancher, and A. M. Okamura. Augmentation of stiffness perception with a 1-degree-of-freedom skin stretch device. *IEEE Transactions on Human-Machine Systems*, 44(6):731–742, 2014.
- [J40] D. I. Grow, A. J. Bastian, and A. M. Okamura. Testing models of cerebellar ataxia via dynamics simulation. *Robotica*, 32(8):1383–1397, 2014.
- [J41] T. K. Adebar, A. E. Fletcher, and A. M. Okamura. 3D ultrasound-guided robotic needle steering in biological tissue. *IEEE Transactions on Biomedical Engineering*, 61(12):2899–2910, 2014.
- [J42] I. Nisky, M. H. Hsieh, and A. M. Okamura. Uncontrolled manifold analysis of arm joint angle variability during robotic teleoperation and freehand movement of surgeons and novices. *IEEE Transactions on Biomedical Engineering*, 61(12):2869–2881, 2014.
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- [J47] I. Nisky, A. M. Okamura, and M. H. Hsieh. Effects of robotic manipulators on movements of novices and surgeons. *Surgical Endoscopy*, 28(7):2145–2158, 2014.
- [J48] M. M. Ankarali, H. T. Sen, A. De, A. M. Okamura, and N. J. Cowan. Haptic feedback enhances rhythmic motor control by reducing variability, not convergence rate. *Journal of Neurophysiology*, 111:1286–1299, 2014.
- [J49] T. L. Gibo, A. J. Bastian, and A. M. Okamura. Grip force control during virtual object interaction: Effect of force feedback, accuracy demands and training. *IEEE Transactions on Haptics*, 7(1):37–47, 2014.
- [J50] A. J. Blank, A. M. Okamura, and L. L. Whitcomb. Task-dependent impedance and implications for upper-limb prosthesis control. *International Journal of Robotics Research*, 3(6):827–846, 2013.
- [J51] T. L. Gibo, S. E. Criscimagna-Hemminger, A. M. Okamura, and A. J. Bastian. Cerebellar motor learning: Are environment dynamics more important than error size? *Journal of Neurophysiology*, 110(2):322–333, 2013.
- [J52] T. L. Gibo, A. J. Bastian, and A. M. Okamura. Cerebellar ataxia impairs modulation of arm stiffness during postural maintenance. *Journal of Neurophysiology*, 110(7):1611–1620, 2013.
- [J53] N. Bhanpuri, A. M. Okamura, and A. J. Bastian. Predictive modeling by the cerebellum improves proprioception. *Journal of Neuroscience*, 33(36):14301–14306, 2013.
- [J54] D. De Lorenzo, Y. Koseki, E. De Momi, K. Chinzei, and A. M. Okamura. Coaxial needle insertion assistant with enhanced force feedback. *IEEE Transactions on Biomedical Engineering*, 60(2):379–389, 2013.
- [J55] S. K. Charles, A. M. Okamura, and A. J. Bastian. Does a basic deficit in force control underlie cerebellar ataxia? *Journal of Neurophysiology*, 109(4):1107–1116, 2013.

- [J56] N. Gurari, K.J. Kuchenbecker, and A. M. Okamura. Perception of springs with visual and proprioceptive motion cues: Implications for prosthetics. *IEEE Transactions on Human-Machine Systems*, 43(1):102–114, 2013.
- [J57] J. C. Gwilliam, M. Bianchi, L. Su, and A. M. Okamura. Characterization and psychophysical studies of an air-jet lump display. *IEEE Transactions on Haptics*, 6(2):156–166, 2013.
- [J58] N. Bhanpuri, A. M. Okamura, and A. J. Bastian. Active force perception depends on cerebellar function. *Journal of Neurophysiology*, 107:1612–1620, 2012.
- [J59] A. Majewicz, S. Marra, M. van Vledder, M. Ling, M. A. Choti, D. Y. Song, and A. M. Okamura. Behavior of tip-steerable needles in ex vivo and in vivo tissue. *IEEE Transactions on Biomedical Engineering*, 59(10):2705–2715, 2012.
- [J60] K. B. Reed, A. Majewicz, V. Kallem, R. Alterovitz, K. Goldberg, N. J. Cowan, and A. M. Okamura. Robot-assisted needle steering. *Robotics and Automation Magazine*, 18:35–46, 2011.
- [J61] T. Yamamoto, N. Abolhassani, S. Jung, A. M. Okamura, and T. N. Judkins. Augmented reality and haptic interfaces for robot-assisted surgery. *International Journal of Medical Robotics and Computer Assisted Surgery*, 8(1):45–56, 2012.
- [J62] A. M. Okamura, M. J. Mataric, and H. I. Christensen. Medical and healthcare robotics: Achievements and opportunities. *IEEE Robotics and Automation Magazine*, 17(3):26–37, 2010.
- [J63] S. Misra, K. B. Reed, B. W. Schafer, K. T. Ramesh, and A. M. Okamura. Mechanics of flexible needles robotically steered through soft tissue. *International Journal of Robotics Research*, 29(13):1640–1660, 2010. DOI: 10.1177/0278364910369714.
- [J64] S. Misra, K. T. Ramesh, and A. M. Okamura. Modeling of nonlinear elastic tissues for surgical simulation. *Computer Methods in Biomechanics and Biomedical Engineering*, 13(6):811–818, 2010.
- [J65] A. Blank, A. M. Okamura, and K. J. Kuchenbecker. Identifying the role of proprioception in upper-limb prosthesis control: Studies on targeted motion. *ACM Transactions on Applied Perception*, 7(13):15, 2010.
- [J66] K. B. Reed, A. M. Okamura, and N.J. Cowan. Modeling and control of needles with torsional friction. *IEEE Transactions on Biomedical Engineering*, 56(12):2905–2916, 2009.
- [J67] S. Misra, K. J. Macura, K. T. Ramesh, and A. M. Okamura. The importance of organ geometry and boundary constraints for planning of medical interventions. *Medical Engineering and Physics*, 31(2):195–206, 2009.
- [J68] A. M. Okamura. Haptic feedback in robot-assisted minimally invasive surgery. *Current Opinion in Urology*, 19(1):102–107, 2009.
- [J69] G. D. Hager, A. M. Okamura, P. Kazanzides, L. L. Whitcomb, G. Fichtinger, and R. H. Taylor. Surgical and interventional robotics Part III: Surgical assistance systems. *IEEE Robotics and Automation Magazine*, 15(4):84–93, 2008.
- [J70] G. Fichtinger, P. Kazanzides, A. M. Okamura, G. D. Hager, L. L. Whitcomb, and R. H. Taylor. Surgical and interventional robotics Part II: Surgical CAD-CAM systems. *IEEE Robotics and Automation Magazine*, 15(3):94–102, 2008.
- [J71] S. Misra, K. T. Ramesh, and A. M. Okamura. Modeling of tool-tissue interactions for computer-based surgical simulation: A literature review. *Presence: Teleoperators and Virtual Environments*, 17(5):463–491, 2008.
- [J72] P. Kazanzides, G. Fichtinger, G. D. Hager, A. M. Okamura, L. L. Whitcomb, and R. H. Taylor. Surgical and interventional robotics Part I: Core concepts, technology and design. *IEEE Robotics and Automation Magazine*, 15(2):122–130, 2008.

- [J73] C. E. Reiley, T. Akinbiyi, D. Burschka, D. C. Chang, A. M. Okamura, and D. D. Yuh. Effects of visual force feedback on robot-assisted surgical task performance. *Journal of Thoracic and Cardiovascular Surgery*, 135(1):196–202, 2008.
- [J74] M. Mahvash, L. Voo, D. Kim, K. Jeung, and A. M. Okamura. Modeling the forces of cutting with scissors. *IEEE Transactions on Biomedical Engineering*, 55(3):848–856, 2008.
- [J75] M. Mahvash and A. M. Okamura. Friction compensation for enhancing transparency of a teleoperator with compliant transmission. *IEEE Transactions on Robotics*, 23(6):1240–1246, 2007.
- [J76] J. J. Abbott and A. M. Okamura. Pseudo-admittance bilateral telemanipulation with guidance virtual fixtures. *International Journal of Robotics Research*, 26(8):865–884, 2007.
- [J77] A. M. Okamura. Robotics with a human touch: Haptics and medical applications. *Journal of the Robotics Society of Japan (Special Issue on Women in Robotics)*, 24(5):26–28, 2006.
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- [J79] J. J. Abbott and A. M. Okamura. Stable forbidden-region virtual fixtures for bilateral telemanipulation. *ASME Journal of Dynamic Systems, Measurement and Control*, 128:53–64, 2006.
- [J80] R. J. Webster III, T. E. Murphy, L. N. Verner, and A. M. Okamura. A novel two-dimensional tactile slip display: Design, kinematics and perceptual experiment. *ACM Transactions on Applied Perception*, 2(2):150–165, 2005.
- [J81] J. J. Abbott and A. M. Okamura. Effects of position quantization and sampling rate on virtual wall passivity. *IEEE Transactions on Robotics*, 21(5):952 – 964, 2005.
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- [J83] D. Kragic, P. Marayong, M. Li, A. M. Okamura, and G. D. Hager. Human machine collaborative systems for microsurgical applications. *International Journal of Robotics Research*, 24(9):731–742, 2005.
- [J84] A. Bettini, P. Marayong, S. Lang, A. M. Okamura, and G. D. Hager. Vision assisted control for manipulation using virtual fixtures. *IEEE Transactions on Robotics*, 20(6):953–966, 2004.
- [J85] A. M. Okamura. Methods for haptic feedback in teleoperated robot-assisted surgery. *Industrial Robot*, 31(6):499–508, 2004.
- [J86] B. T. Bethea, A. M. Okamura, M. Kitagawa, T. P. Fitton, S. M. Cattaneo, V. L. Gott, W. A. Baumgartner, and D. D. Yuh. Application of haptic feedback to robotic surgery. *Journal of Laparoendoscopic and Advanced Surgical Techniques*, 14(3):191–195, 2004.
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- [J88] P. Marayong and A. M. Okamura. Speed-accuracy characteristics of human-machine cooperative manipulation using virtual fixtures with variable admittance. *Human Factors*, 46(3):518–532, 2004.
- [J89] O. Gerovich, P. Marayong, and A. M. Okamura. The effect of visual and haptic feedback on computer-assisted needle insertion. *Computer-Aided Surgery*, 9(6):243–249, 2004.
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- [J91] S. Greenish, V. Hayward, T. Steffen, V. Chial, and A. M. Okamura. Measurement, analysis and display of haptic signals during surgical cutting. *Presence: Teleoperators and Virtual Environments*, 11(6):626–651, 2002.

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Book Chapters/Collections

- [B1] A. M. Okamura. Haptics in robot-assisted minimally invasive surgery. In R. Patel, editor, *Minimally Invasive Surgical Robotics*, volume 1, pages 317–340. World Scientific Group, 2018.
- [B2] B. Hannaford and A. M. Okamura. Chapter 42: Haptics. In B. Siciliano and O. Khatib, editors, *Springer Handbook of Robotics*, pages 1063–1084. Springer, 2016.
- [B3] D. I. Grow, A. J. Bastian, and A. M. Okamura. Robotic assistance for cerebellar reaching. In Panagiotis Artemiadis, editor, *Neuro-Robotics: From Brain Machine Interfaces to Rehabilitation Robotics*, volume 2 of *Trends in Augmentation of Human Performance*, chapter 12, pages 317–343. Springer, 2014.
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Invited/Non-refereed/Short Conference Articles and Abstracts

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- [I23] N. Bhanpuri, A. M. Okamura, and A. J. Bastian. Cerebellar predictions underlie the improvement of proprioceptive precision in active versus passive movements. In *Society for Neuroscience Annual Meeting*, Washington, DC, Nov 12-16 2011.

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- [I28] N. H. Bhanpuri, A. M. Okamura, and A. J. Bastian. The cerebellum contributes to constant and dynamic load perception but not position perception. In *Neural Control of Movement Annual Conference*, Naples, Florida, April 20 - 25 2010.
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- [I48] N. V. Thakor, D. Ye, O. Gerovichev, C. M. Sauer, H. M. Mozaffari-Naeini, and A. M. Okamura. Memsurgery: A test-bed for sensory augmentation and assistive technology for vascular surgery. In *Biomedical Engineering: Recent Developments*, 2002.
- [I49] D. Verma and A. M. Okamura. Tele-assessment of surgical aptitude using a virtual reality simulator for vitreo-retinal surgery. In *American Telemedicine Association 7th Annual Meeting & Exposition*, Los Angeles, CA, June 3 2002.
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PATENTS

1. A. A. Stanley, A. M. Okamura, and J. C. Gwilliam. Visual and touch interaction display, 2014. U.S. patent application number PCT/US2014/021668. (Stanford ref. S12-428/PCT)
2. A. M. Okamura, T. Yamamoto, and B. Vagvolgyi. Environment property estimation and graphical display, 2009. U.S. patent application number 61/106,683. (JHU ref. P10476-02)
3. R. J. Webster III, A. M. Okamura, N. J. Cowan, R. H. Taylor. An active cannula for bio-sensing and surgical intervention, 2005. U.S. patent application number 60/736,789. (JHU ref. 4873)
4. R. J. Webster III, A. M. Okamura, N. J. Cowan, G. S. Chirikjian, K. Y. Goldberg, and R. Alterovitz. Distal bevel-tip needle control device and algorithm, 2005. U.S. patent application number 11/436,995. (JHU ref. 4690)

INVITED PRESENTATIONS

1. Applied Mechanics Colloquium, Harvard University, December 11, 2019
2. Bay Area Robotics Symposium, Berkeley, CA, November 15, 2019
3. Plenary Speaker, ASME Dynamic Systems and Control Conference, Park City, UT, October 9, 2019
4. Toyota Research Institute, SAIL-Toyota Center for AI Research, Mountain View, CA, September 19, 2019
5. Department of Mechanical Engineering Seminar, University of Illinois Urbana-Champaign, September 17, 2019
6. Stanford School of Engineering Sierra Camp Weekend, Fallen Leaf Lake, Lake Tahoe, CA, May 2, 2019
7. College of Engineering Distinguished Lecture, University of California, Davis, CA, April 15, 2019
8. SENSORIUM, Enhancing the World of Perception, Stanford School of Medicine, Stanford, CA, April 13, 2019
9. Freudenstein Lecture, Department of Mechanical Engineering, Columbia University, New York, NY, March 29, 2019
10. ABC Robotics Center, Ben-Gurion University of the Negev, Beer-Sheva, Israel, March 27, 2019
11. Karniel Computational Motor Control Workshop, Ben-Gurion University of the Negev, Beer-Sheva, Israel, March 25, 2019
12. eWear Annual Affiliates Meeting, Stanford, CA, February 20, 2019
13. Facebook Reality Labs, Redmond, WA, February 7, 2019
14. Pixel Festival, Stanford Online High School, Stanford, CA, February 2, 2019
15. Contextual Robotics Forum: Healthcare Robotics, University of California, San Diego, CA, November 11, 2018
16. Workshop on Shape Changing Robotic Structures and Interfaces, IEEE/RSJ International Conference on Intelligent Robots and Systems, Madrid, Spain, October 5, 2018
17. Plenary Speaker, Ubiquitous Robots Conference, Honolulu, HI, June 26, 2018
18. Robotics Seminar, Department of Electrical Engineering and Computer Science, Berkeley, CA, June 15, 2018
19. Workshop on Active Touch for Perception and Interaction, IEEE International Conference on Robotics and Automation, Brisbane, Australia, May 25, 2018

20. Media Arts and Technology Seminar, University of California Santa Barbara, Santa Barbara, CA, April 16, 2018
21. Workshop on Medical VR and AR, Stanford Center for Image System Engineering, Stanford University, Stanford, CA, April 5, 2018
22. Robotics Seminar, Purdue University, West Lafayette, IN, March 23, 2018
23. Stanford Biosciences Council, Stanford University, Stanford, CA, February 8, 2018
24. Gilbreth Lecture, National Academy of Engineers National Meeting, Beckman Center, Irvine, CA, February 8, 2018
25. Clayman Institute for Gender Research, Stanford University, Stanford, CA, February 1, 2018
26. Neural Computation and Engineering Connection, University of Washington, Seattle, WA, January 19, 2018
27. Special Robotics Colloquium, University of Washington, Seattle, WA, January 18, 2018
28. Stanford Robotics Seminar, Stanford University, Stanford, CA, January 12, 2018
29. Stanford Engineering Venture Fund Group, Palo Alto, CA, December 6, 2017
30. Bay Area Robotics Symposium, Berkeley, CA, November 17, 2017
31. Alphabet X, Mountain View, CA, November 15, 2017
32. Department of Electrical and Computer Engineering, Cornell University, Ithaca, NY, October 23, 2017
33. Silicon Valley Forum panel on “Search and Rescue: How Robots are Changing Recovery & Relief”, Computer History Museum, Mountain View, CA, October 16, 2017
34. Stanford Engineering Alumni, Stanford University, Stanford, CA, October 13, 2017
35. Keynote Speaker, World Robot Conference, Beijing, China, August 23, 2017
36. Key Laboratory of Virtual Reality Technology and Systems, Beihang University, Beijing, China, August 22, 2017
37. International Workshop on Intelligent Robots and Systems, Beijing Institute of Technology, Beijing, China, August 22, 2017
38. Keynote Speaker, 39th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, July 11, 2017
39. Keynote Speaker, SAILORS Program, Stanford University, Stanford, CA, June 30, 2017
40. Keynote Speaker, IEEE World Haptics Conference, Munich, Germany, June 8, 2017
41. MnDrive Distinguished Speaker, University of Minnesota, Minneapolis, MN, April 21, 2017
42. MediaX Conference: Sense-Making & Making Sense, Stanford University, Stanford, CA, April 20, 2017
43. Mechanical Engineering Department, Johns Hopkins University, Baltimore, MD, April 3, 2017
44. Mechanical Engineering Distinguished Colloquium, University of British Columbia, Vancouver, Canada, March 30, 2017
45. Robotics Seminar, Oregon State University, Corvallis, OR, March 3, 2017
46. Siemens Technology & Innovation Council, Half Moon Bay, CA, February 15, 2017
47. Stanford eWear Symposium, Stanford, CA, February 9, 2017

48. NASA Ames Intelligent Robotics Group, Mountain View, CA, February 3, 2017
49. IdeasLab Speaker, Science Hub Speaker, Tipping Point Session Leader, and Davos Insights Panelist, World Economic Forum Annual Meeting Davos, Switzerland, January 16-19, 2017
50. Keynote Speaker, IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechanics, Singapore, June 28, 2016
51. Osaka University, Osaka, Japan, May 24, 2016
52. Department of Mechanical and Aerospace Engineering, Princeton University, Princeton, NJ, November 13, 2015
53. Bay Area Robotics Symposium, Berkeley, CA, October 23, 2015
54. IEEE/RSJ International Conference on Intelligent Robots and Systems, Workshop on Navigation and Actuation of Flexible Instruments in Medical Applications, Hamburg, Germany, October 2, 2015
55. Plenary Speaker, International Symposium on Robot and Human Interactive Communication, Kobe, Japan, September 1, 2015
56. Keynote Speaker, American Society of Biomechanics Annual Meeting, Columbus, OH, August 5, 2015
57. Ford Research and Innovation Center, Palo Alto, CA, July 30, 2015
58. IEEE World Haptics Conference Workshop on Cutaneous Feedback for Teleoperation in Medical Robotics, Chicago, IL, June 22, 2015
59. IEEE International Conference on Robotics and Automation Workshop on Shared Frameworks for Medical Robotics Research, Seattle, WA, May 30, 2015
60. IEEE International Conference on Robotics and Automation Government Forum, Seattle, WA, May 28, 2015
61. IEEE International Conference on Robotics and Automation Workshop on Challenges in Virtual Reality, Seattle, WA, May 26, 2015
62. IEEE Women in Leadership Conference, San Jose, CA, April 25, 2015
63. System X, Stanford, CA, April 23, 2015
64. CSAIL, Massachusetts Institute of Technology, Boston, MA, April 7, 2015
65. Texas A&M Robotics Symposium, College Station, TX, January 22, 2015
66. Max Plack Institute for Intelligent Systems, Stuttgart, Germany, December 15, 2014
67. Stanford-Berkeley Robotics Symposium, Stanford, CA, October 17, 2014
68. Workshop on Sensorimotor Control and Surgical Robotics, IEEE/RSJ International Conference on Intelligent Robots and Systems, Chicago, IL, September 18, 2014
69. Keynote Speaker, IEEE/RSJ International Conference on Intelligent Robots and Systems, Chicago, IL, September 15, 2014
70. National Academy of Engineering, Frontiers of Engineering, Irvine, CA, September 11, 2014
71. Surgical Robotics Summer School, Pittsburgh, PA, July 21, 2014
72. Robotics: Science and Systems Conference, Workshop on Women in Robotics, Berkeley, CA, July 12, 2014
73. Stanford Women's Leadership Conference, Stanford, CA, April 5, 2014.

74. University of Texas, Austin, TX, March 11, 2014.
75. South by Southwest (SXSW), Austin, TX, March 10, 2014.
76. Perspectives in Assisted Technology course, Stanford University, Stanford, CA, February 4, 2014.
77. 2nd Annual Symposium on Brain Surgery Simulation, Mount Sinai Medical Center, New York, NY, November 9, 2013.
78. Google X, Mountain View, CA, November 1, 2013.
79. Eidgenossische Technische Hochschule Zurich (ETHZ), Zurich, Switzerland, October 18, 2013.
80. Ecole Polytechnique Fdrale de Lausanne (EPFL), Lausanne, Switzerland, October 17, 2013.
81. National Robotics Initiative PI Meeting, National Science Foundation, Arlington, VA, October 1, 2013.
82. Mechanical Engineering Department, University of Michigan, Ann Arbor, MI, September 17, 2013.
83. Department of Urology Research Conference, Stanford Medical School, Stanford, CA, August 26, 2013.
84. “We the Geeks” Google+ Hangout on Robots, Hosted by the White House Office of Science and Technology Policy, August 9, 2013.
85. TEDx Stanford, Stanford University, Stanford, CA, May 11, 2013.
86. Women’s Community Center, Women in Research Seminar Series, Stanford University, Stanford, CA, February 28, 2013.
87. Jet Propulsion Laboratory, Pasadena, CA, February 21, 2013.
88. Perspectives in Assisted Technology course, Stanford University, Stanford, CA, February 19, 2013.
89. Innovation Masters Series: Design Thinking and the Art of Innovation, Stanford University, Stanford, CA, December 13, 2012.
90. Immersion Corporation, San Jose, CA, November 27, 2012.
91. Simulation in Medical Education Seminar Series, Center for Immersive and Simulation-Based Learning, Stanford School of Medicine, Stanford, CA, November 15, 2012.
92. Stanford Robotics Club, Stanford University, Stanford, CA, October 22, 2012.
93. Department of Mechanical Engineering Graduate Seminar, University of Colorado, Boulder, CO, September 6, 2012.
94. Workshop on Algorithmic Frontiers in Medical Robotics: Manipulation in Uncertain, Deformable, Heterogenous Environments, Robotics: Science and Systems Conference, Sydney, Australia, July 9, 2012.
95. Innovation Masters Series: Design Thinking and the Art of Innovation, Stanford University, Stanford, CA, June 21, 2012.
96. Noise and Rhythm: Harnessing the Complexity of Medicine and Robotics, Wyss Institute Symposium, Harvard Medical School, Boston, MA, June 8, 2012.
97. Image-Guided Interventions Symposium, Stanford University, Stanford, CA, May 24, 2012.
98. Pathways to Clinical Needle Steering Workshop, IEEE International Conference on Robotics and Automation, St. Paul, MN, May 18, 2012.
99. Robotics Colloquium, University of Washington, Seattle, WA, May 4, 2012.
100. Willow Garage, Menlo Park, CA, March 26, 2012.

101. 4th Japan-U.S.A. Joint Workshop on Development of Model-based Assistive Robotic Technologies for Medicine and Rehabilitation, San Francisco, CA, March 9, 2012.
102. Tutorial on Best Practices for Teaching Haptics, IEEE Haptics Symposium, Vancouver, BC, Canada, March 4, 2012.
103. Women's Perspectives course, Stanford University, Stanford, CA, February 9, 2012.
104. Perspectives in Assisted Technology course, Stanford University, Stanford, CA, February 2, 2012.
105. Biomechanics Seminar, Stanford University, Stanford, CA, November 7, 2011.
106. Workshop on Methods for Safer Surgical Robotics Procedures, IEEE/RSJ International Conference on Intelligent Robots and Systems, San Francisco, CA, September 30, 2011.
107. 3rd Japan-U.S.A. Joint Workshop on Development of Model-based Assistive Robotic Technologies for Medicine and Rehabilitation, San Francisco, CA, September 26, 2011.
108. Intuitive Surgical, Inc., Sunnyvale, CA, August 29, 2011.
109. Christie Lecture, Department of Mechanical Engineering, Johns Hopkins University, Baltimore, MD, May 5, 2011.
110. W. M. Keck Center for Interdisciplinary Bioscience Training Seminar, Rice University, Houston, TX, April 15, 2011.
111. IDEAS (Innovation, Design, and Emerging Alliances in Surgery): Opportunities and Challenges in Surgical Robotics Workshop, Beth Israel Deaconess Medical Center, Boston, MA, April 9, 2011.
112. 2nd Japan-U.S.A. Joint Workshop on Development of Model-based Assistive Robotic Technologies for Medicine and Rehabilitation, San Francisco, CA, March 18, 2011.
113. Department of Mechanical Engineering Seminar, University of Maryland, College Park, MD, April 1, 2011.
114. Department of Mechanical Engineering Seminar, University of Maryland, Baltimore County, Baltimore, MD, February 11, 2011.
115. Department of Electrical Engineering and Computer Science Seminar, University of California at Berkeley, Berkeley, CA, April 15, 2010.
116. Robotics and Intelligent Machines Seminar, Georgia Institute of Technology, Atlanta, GA, February 17, 2010.
117. Controls, Robotics, and Embedded Systems Seminar, University of California at Berkeley, Berkeley, CA, January 28, 2010.
118. Department of Mechanical Engineering Distinguished Lecture Series, Stanford University, Stanford, CA, January 27, 2010.
119. 50 Years of Robotics Celebration, University of Pennsylvania, Philadelphia, PA, December 10, 2009.
120. Space Science Telescope Institute, Johns Hopkins University, Baltimore, MD, December 1, 2009.
121. National Advisory Council meeting, National Institute for Biomedical Imaging and Bioengineering, National Institutes of Health, Bethesda, MD, September 11, 2009.
122. Peter Wall Institute for Advanced Studies, Joint Colloquium on Haptics, University of British Columbia, Vancouver, BC, Canada, June 30, 2009.
123. Bioengineering Department Seminar, Stanford University, Stanford, CA, May 18, 2009.

124. ICRA Workshop on Advanced Sensing and Sensor Integration in Medical Robotics, Kobe, Japan, May 13, 2009.
125. RoboFest: A Celebration of Robotics at the GRASP Lab (symposium honoring Ruzena Bajcsy), University of Pennsylvania, Philadelphia, PA, April 22, 2009.
126. Society of Women Engineers Student Chapter Meeting, Johns Hopkins University, Baltimore, MD, March 9, 2009.
127. Department of Mechanical Engineering Seminar, Boston University, Boston, MA, March 6, 2009.
128. Department of Mechanical Engineering Seminar, University of Victoria, Victoria, Canada, February 26, 2009.
129. Women Scholars Public Lecture, University of Victoria, Victoria, Canada, February 25, 2009.
130. Department of Surgery Seminar, University of California at San Diego, San Diego, California, January 21, 2009.
131. Winter School on Medical Robotics and Computer-Integrated Interventional Medicine, Johns Hopkins University, Baltimore, Maryland, January 16, 2009.
132. NSF CISST ERC Graduation Celebration, Johns Hopkins University, Baltimore, Maryland, January 12, 2009.
133. ERC-CISST/Laboratory for Computational Sensing and Robotics Professional Development Seminar, Johns Hopkins University, Baltimore, Maryland, November 12, 2008.
134. Center for Adaptive Neural Systems, Arizona State University, Tempe, Arizona, October 21, 2008.
135. Workshop on Surgical Robotics, Second IEEE RAS-EMBS International Conference on Biomedical Robotics and Biomechanics, Scottsdale, Arizona, October 19, 2008.
136. Department of Mechanical Engineering, Tufts University, Medford, Massachusetts, October 2, 2008.
137. Plenary talk, Performance Metrics for Intelligent Systems Workshop, National Institute of Standards and Technology, Gaithersburg, Maryland, August 19, 2008.
138. NSF/ JST US-Japan Robotics Workshop on Safety, Security, and Society, San Francisco, California, August 15, 2008.
139. Center for Intelligent Machines, Electrical and Computer Engineering, McGill University, Montreal, Canada, July 10, 2008.
140. 5th Annual Innovations in the Surgical Environment Conference, University of Maryland Medical Center, Baltimore, Maryland, June 27, 2008.
141. Meyerhoff Scholars Bridge Program, University of Maryland Baltimore County, Johns Hopkins University, Baltimore, Maryland, June 24, 2008.
142. Department of Mechanical Engineering, Massachusetts Institute of Technology, Boston, Massachusetts, June 2, 2008.
143. IEEE Baltimore Section Annual Awards Dinner, Baltimore, Maryland, May 14, 2008.
144. Willow Garage, Inc., Palo Alto, CA, May 6, 2008.
145. Laboratory for Computational Sensing and Robotics Seminar, Johns Hopkins University, Baltimore, Maryland, April 30, 2008.
146. Booz Allen Hamilton Distinguished Colloquium in Electrical and Computer Engineering, University of Maryland, College Park, Maryland, March 28, 2008.

147. American Society of Mechanical Engineers, Baltimore Section Meeting, Baltimore, Maryland, February 21, 2008.
148. Scientific Computing Applications in Surgical Simulation of Soft Tissues, Institute for Pure and Applied Mathematics, Los Angeles, California, January 10, 2008. (My presentation was given by S. Misra.)
149. International Symposium on Robotics Research, Hiroshima, Japan, November 29, 2007.
150. Department of Mechanical Engineering, University of Delaware, Newark, DE, October 19, 2007.
151. School of Health, Physical Education, and Recreation, University of Nebraska at Omaha, Omaha, Nebraska, August 24, 2007.
152. Department of Robotic Systems, Deutsches Zentrum für Luft- und Raumfahrt (DLR), Munich, Germany, July 17, 2007.
153. Institute of Automatic Control Engineering, Technischen Universität München, Munich, Germany, July 16, 2007.
154. Meyerhoff Scholars Bridge Program, University of Maryland Baltimore County/Johns Hopkins University, Baltimore, MD, June 26, 2007.
155. 10th German-American Frontiers of Engineering Symposium, National Academy of Engineers/Alexander Van Humboldt Foundation, Hamburg, Germany, April 26, 2007. (My presentation was given by J. J. Abbott.)
156. Workshop on Computer-Integrated Surgery and Interventional Robotics, International Conference on Robotics and Automation, Rome, Italy, April 10, 2007.
157. Immersion Medical, Gaithersburg, MD, March 15, 2007.
158. Robotics and Controls Seminar, University of Washington, Seattle, WA, March 2, 2007.
159. MARC Scholars Program, University of Maryland, Baltimore County, Baltimore, MD, February 20, 2007.
160. Bodian Seminar, Krieger Mind-Brain Institute, Johns Hopkins University, Baltimore, MD, December 4, 2006.
161. Technion-JHU symposium, Johns Hopkins University, Baltimore, MD, October 30, 2006.
162. IEEE-RAS/IFRR School of Robotics Science on Haptic Interaction, September 27, 2006.
163. Sciences, technologies et applications haptiques, Université Pierre et Marie Curie, September 25, 2006.
164. GRASP Laboratory, University of Pennsylvania, Philadelphia, PA, Dec. 2, 2005.
165. Faculty Workshop on Academic Publishing, Morgan State University, Baltimore, MD, May 17, 2005.
166. Johns Hopkins University Alumni College, Johns Hopkins University, Baltimore, MD, May 6, 2005.
167. Engineering Research Center for Computer-Integrated Surgical Systems and Technology, Johns Hopkins University, Baltimore, MD, May 4, 2005.
168. Houston Society for Engineering in Medicine and Biology, Houston, TX, Feb. 10, 2005. (Keynote Speaker for Robotics)
169. CIMIT Forum on Haptics, CIMIT, Boston, MA, Nov. 23, 2004.
170. Department of Mechanical and Aerospace Engineering, Cornell University, Ithaca, NY, Nov. 2, 2004.
171. Workshop on Issues and Approaches to Task Level Control, 2004 IEEE/RSJ International Conference on Intelligent Robots and Systems, Sendai, Japan, September 28, 2004.

172. Workshop on Multi-point Interaction in Robotics and Virtual Reality, 2004 IEEE International Conference on Robotics and Automation, New Orleans, LA, April 27, 2004.
173. Workshop on Educational Robotics, 2004 IEEE International Conference on Robotics and Automation, New Orleans, LA, April 27, 2004.
174. New Techne Symposium, The Johns Hopkins University, Baltimore, MD, April 9, 2004.
175. Robotics Seminar, University of California at Berkeley, Berkeley, CA, March 5, 2004.
176. Robotics Seminar, Stanford University, Stanford, CA, March 4, 2004.
177. Mechanical Engineering Womens Seminar, Stanford University, Stanford, CA, March 4, 2004.
178. Controls Seminar, University of Michigan, Ann Arbor, MI, February 6, 2004.
179. Controls and Robotics Seminar, University of Washington, Seattle, WA, January 9, 2004.
180. Workshop on Reality-based Modeling of Tissues for Simulation and Robot-Assisted Surgery, 2003 IEEE/RSJ International Conference on Intelligent Robots and Systems, Las Vegas, NV, October 31, 2003.
181. Department of Mathematical Sciences, Johns Hopkins University, Baltimore, MD, October 9, 2003.
182. Multi-Disciplinary Minimally Invasive Surgery Conference, Johns Hopkins Medical Institutions, Baltimore, MD, June 25, 2003.
183. Robotics and Energetic Machines Group, Oak Ridge National Laboratories, Oak Ridge, TN, May 12, 2003.
184. IEEE Engineers Week Dinner, IEEE Baltimore Chapter, Baltimore, MD, April 9, 2003.
185. School of Electrical and Computer Engineering, Purdue University, West Lafayette, Indiana, February 6, 2003.
186. Intuitive Surgical, Inc., Sunnyvale, CA, December 20, 2002.
187. Laboratory for Human and Machine Haptics, Massachusetts Institute of Technology, Cambridge, MA, December 17, 2002.
188. Advanced Information Technology Branch, Naval Research Laboratory, Washington, DC, November 18, 2002.
189. Department of Mechanical Engineering, University of Maryland Baltimore County, Baltimore, MD, November 1, 2002.
190. Society of Women Engineers, Johns Hopkins University Student Section, Baltimore, MD, February 28, 2002.
191. WashCAS (Metropolitan Washington DC Computer-Assisted Surgery Society), Washington, DC, February 19, 2002.
192. Department of Mechanical Engineering, University of Wisconsin, Madison, WI, October 11, 2001.
193. Department of Mechanical Engineering and Mechanics, Drexel University, Philadelphia, PA, September 28, 2001.
194. Institute for Mathematics and its Applications, Workshop on Haptics, Virtual Reality, and Human Computer Interaction, Minneapolis, MN, June 14, 2001.
195. Krieger Mind-Brain Institute, Johns Hopkins University, Baltimore, MD, October 30, 2000.
196. TIMC/IMAG Laboratory, Grenoble, France, October 24, 2000.

197. INRIA, SHARP Project, Grenoble, France, October 23, 2000.
198. Department of Mechanical Engineering, Johns Hopkins University, Baltimore, MD, September 28, 2000.
199. Center for Computer Integrated Surgical Systems and Technology, Johns Hopkins University, Baltimore, MD, September 27, 2000.
200. Workshop on Reality-based Modeling and Applications in Reverse Engineering, Computer Graphics, and VR, 2000 IEEE International Conference on Robotics and Automation, San Francisco, CA, April 28, 2000.
201. Department of Mechanical Engineering, University of California at Berkeley, April 10, 2000.
202. Department of Mechanical Engineering, University of Washington, Seattle, WA, March 30, 2000.
203. Department of Mechanical Engineering, University of Utah, Salt Lake City, UT, March 23, 2000.
204. Department of Mechanical Engineering, Johns Hopkins University, Baltimore, MD, March 9, 2000.
205. Department of Mechanical Engineering, University of Illinois, Urbana-Champaign, IL, March 2, 2000.
206. Department of Mechanical Engineering, California State University, San Jose, February 18, 2000.
207. Stanford Workshop on Manufacturing Education 99 (Interactive Learning: Games and Simulations for Teaching of Manufacturing), Alliance for Innovative Manufacturing, Stanford University, Stanford, CA, June 14, 1999.
208. Human Computer Interface Technology Seminar, Department of Computer Science, Stanford University, Stanford, CA, November 19, 1998.
209. Computer Science Robotics Seminar, Department of Computer Science, Stanford University, Stanford, CA, November 10, 1997.
210. Design Theory and Methodology Forum, Department of Mechanical Engineering, Stanford University, Stanford, CA, April 30, 1997.

ADVISING

Doctoral and Pre-doctoral Students

- Jasmin Palmer, Ph.D. student, Stanford Mechanical Engineering expected 2025.
- Catie Cuan, Ph.D. student, Stanford Mechanical Engineering expected 2024.
- Kyle Yoshida, Ph.D. student, Stanford Mechanical Engineering expected 2024. Stanford Graduate Fellow.
- Nathaniel Agharese, Ph.D. student, Stanford Mechanical Engineering expected 2023.
- Zonghe Chua, Ph.D. student, Stanford Mechanical Engineering expected 2023.
- Brian Do, Ph.D. student, Stanford Mechanical Engineering expected 2023. NSF Graduate Fellow.
- Negin Heravi, Ph.D. student, Stanford Mechanical Engineering expected 2022. Co-advised with Jeannette Bohg. NSF Graduate Fellow.
- Mike Salvato, Ph.D. student, Stanford Mechanical Engineering expected 2022. Co-advised with Jeannette Bohg.
- Cara Nunez, Ph.D. student, Stanford Bioengineering expected 2022. NSF Graduate Fellow.
- Sophia Williams, Ph.D. student, Stanford Electrical Engineering expected 2022. NSF Graduate Fellow.

- Cara Gonzalez Welker, Ph.D. student, Stanford Bioengineering expected 2020. NSF Graduate Fellow.
- Margaret Coad, Ph.D. student, Stanford Mechanical Engineering expected 2020.
- Nathan Usevitch, Ph.D. student, Stanford Mechanical Engineering expected 2020.
- Cole Simpson, Ph.D. student, Stanford Mechanical Engineering expected 2020. NSF Graduate Fellow.
- Julie Walker, Ph.D. student, Stanford Mechanical Engineering expected 2020. NSF Graduate Fellow, Stanford Graduate Fellow.
- Melisa Orta Martinez, Ph.D. student, Stanford Mechanical Engineering expected 2020.
- Margaret Koehler, Ph.D. student, Stanford Mechanical Engineering expected 2019. NSF Graduate Fellow. “” Now at Intuitive Surgical, Inc. (started 2019).
- Darrel Deo, Ph.D. Mechanical Engineering, Stanford University, 2019. NSF Graduate Fellow, Stanford Bio-X Fellow. “Movement Representation in Human Motor Cortex and Applications to Brain-Computer Interface Control.” Now a postdoc at Stanford University with Krishna Shenoy and Jaimie Henderson (started 2019).
- Laura Blumenschein, Ph.D. student, Stanford Mechanical Engineering expected 2021. NSF Graduate Fellow. “Design and Modeling of Soft Growing Robots.” Now a postdoc at Stanford University with Allison Okamura (started 2019).
- Jake Suchoski, Ph.D. Mechanical Engineering, Stanford University, 2019. “The Role of Skin Deformation Feedback in Haptic Perception of Virtual Objects.” Now at Intuitive Surgical, Inc. (started 2019).
- Sean Sketch, Ph.D. Mechanical Engineering, Stanford University, 2019. Stanford Interdisciplinary Graduate Fellow. “Proprioception in the Upper Limb of Non-Disabled and Stroke-Impaired Populations.” Now at Intuitive Surgical, Inc. (started 2019).
- Yuhang Che, Ph.D. Mechanical Engineering, Stanford University, 2018. “Proactive Communication for Human-Robot Interaction.” Now at Waymo (started 2019).
- Joseph Greer, Ph.D. Mechanical Engineering, Stanford University, 2018. “Modeling, Estimation, and Control for Navigation of Flexible Continuum Robots.” Now at Facebook Reality Labs (started 2018).
- Tania Morimoto, Ph.D. Mechanical Engineering, Stanford University, 2017. NSF Graduate Fellow. “Patient-Specific Design of Concentric Tube Robots.” Now a professor at University of California, San Diego (started 2018).
- Samuel Schorr, Ph.D. in Mechanical Engineering, Stanford University, 2017. NSF Graduate Fellow. “Fingerpad Skin Deformation for Sensory Substitution of Force in Teleoperation and Virtual Reality.” Now at Intuitive Surgical, Inc. (started 2017).
- Andrew Stanley, Ph.D., in Mechanical Engineering, Stanford University, 2016. NSF Graduate Fellow. “Haptic Jamming: Controllable Mechanical Properties in a Shape-Changing Interface.” Now at Facebook Reality Labs (started 2017).
- Zhan Fan Quek, Ph.D. in Mechanical Engineering, Stanford University, 2015. A*STAR Singapore Fellowship. “Sensory Substitution and Augmentation of Forces and Torques using Tactile Skin Deformation Feedback.” Now at A*STAR (started 2015).
- Troy Adebare, Ph.D. in Mechanical Engineering, Stanford University, 2015. NSERC Alexander Graham Bell Canada Graduate Scholarship. “Ultrasound-Guided Robotic Needle Steering for Percutaneous Interventions in the Liver.” Now at Intuitive Surgical, Inc. (started 2015).
- Nick Colonnese, Ph.D. in Mechanical Engineering, Stanford University, 2015. “Stability and Transparency of Bilateral Teleoperators and Haptic Displays.” Now at Facebook Reality Labs (started 2015).

- Kirk Nichols, Ph.D. in Mechanical Engineering, Stanford University, 2015. “A Multilateral Manipulation Software Framework for Human-Robot Collaboration in Surgical Tasks.” Now at Intuitive Surgical (started 2015).
- Ann Majewicz, Ph.D. in Mechanical Engineering, Stanford University, 2014. NSF Graduate Fellow. “Robotic Needle Steering: Design and Evaluation for Clinical Application”. Now a Professor at University of Texas, Dallas (started 2014).
- Tricia Gibo, Ph.D. in Mechanical Engineering, Johns Hopkins University, 2013. NSF Graduate and Link Fellow. (Co-advised with A. J. Bastian) “Control and Learning of Dynamics in Human Movement”. Now a Postdoc at TU Delft (started 2014).
- Jim Gwilliam, Ph.D. in Biomedical Engineering, Johns Hopkins University, 2013. NSF Graduate Fellow. (Co-advised with S. S. Hsiao) “Tactile Sensing and Display for Robot-Assisted Minimally Invasive Surgery: Detecting Lumps in Soft Tissue”. Now at ICU Medical (started 2015).
- Tom Wedlick, Ph.D. in Mechanical Engineering, Johns Hopkins University, 2013. DHS, NDSEG, and NSF Graduate Fellow. “Robotic Needle Insertion: Modeling and Novel Insertion Techniques”. Now at Exponent (started 2013).
- Nasir Bhanpuri, Ph.D. in Biomedical Engineering, Johns Hopkins University, 2012. NIH Pre-doctoral fellowship, Ruth L. Kirschstein National Research Service Award. (Co-advised with A. J. Bastian). “Cerebellar internal models contribute to action and perception”. Now a Clinical Informatics Data Scientist at Virta Health (started 2016).
- Amy Blank, Ph.D. in Mechanical Engineering, Johns Hopkins University, 2012. NSF Graduate Fellow. (Co-advised with L. L. Whitcomb). “Proprioceptive Motion Feedback and User-Selectable Impedance Systems for Upper-Limb Prosthesis Control”. Now at Barrett Technologies (started 2015).
- David Grow, Ph.D. in Mechanical Engineering, Johns Hopkins University, May 2011. NIH NRSA Fellow. “Robotic Assistance for Rehabilitation of Coordination Deficits”. Now a Professor at New Mexico Tech (started 2011).
- Tomonori Yamamoto, Ph.D. in Mechanical Engineering, Johns Hopkins University, January 2011. “Applying Tissue Models in Teleoperated Robot-Assisted Surgery”. Now an engineer at EndoMaster in Singapore (started 2012).
- Netta Gurari, Ph.D. in Mechanical Engineering, Johns Hopkins University, October 2010. NSF Graduate Fellow. “Characterization of Human Perception Using Haptic Systems and Implications for Upper-Limb Prosthetics”. Now a Research Professor at Rehabilitation Institute of Chicago (started 2016).
- Sarthak Misra, Ph.D. in Mechanical Engineering, Johns Hopkins University, June 2009. “Realistic Tool-Tissue Interaction Models for Surgical Simulation and Planning”. Now a Professor at the University of Twente, Enschede, The Netherlands (started 2009).
- Lawton Verner, Ph.D. in Mechanical Engineering, Johns Hopkins University, June 2009. NDSEG and NSF Graduate Fellow. “Sensor/Actuator Asymmetries in Telemanipulators”. Now an engineer at Intuitive Surgical Inc. (started 2009).
- Robert J. Webster, III, Ph.D. in Mechanical Engineering, Johns Hopkins University, December 2007 (Co-advised with N. J. Cowan). NDSEG and NSF Graduate Fellow. “Design and Mechanics of Continuum Robots for Surgery”. Now a Professor in Mechanical Engineering at Vanderbilt University (started 2008).
- Panadda (Nim) Marayong, Ph.D. in Mechanical Engineering, Johns Hopkins University, August 2007. “Motion Control Methods for Human-Machine Cooperative Systems”. Now a Professor in Mechanical Engineering at California State University Los Angeles (started 2007).

Jake J. Abbott, Ph.D. in Mechanical Engineering, Johns Hopkins University, August 2005. “Virtual Fixtures for Bilateral Telem Manipulation”. Now a Professor of Mechanical Engineering at the University of Utah (started 2008).

Masters Thesis/Research Students

Lizmarie Comenencia Ortiz, M.S. in Mechanical Engineering, Stanford University, 2016. NSF Graduate Fellow. Now a Ph.D. student at Stanford University.

Michele Rotella, M.S. in Mechanical Engineering, Stanford University, 2013. NSF Graduate Fellow. Now studying at University of Delaware to obtain a doctorate in Physical Therapy.

Alex Burtness, M.S. in Mechanical Engineering, Johns Hopkins University, 2010. “Evaluation of Haptic Feedback Methods for Teleoperated Explosive Ordnance Disposal Robots”. Now in the U.S. Navy.

Carol E. Reiley, M.S. in Computer Science, Johns Hopkins University, 2007. “Evaluation of Augmented Reality Alternatives to Direct Force Feedback in Robot-Assisted Surgery: Visual Force Feedback and Virtual Fixtures”. Now a Ph.D. student advised by Gregory D. Hager at Johns Hopkins University.

Sunipa Saha, M.S. in Biomedical Engineering, Johns Hopkins University, 2006. “Appropriate Degrees of Freedom of Force Sensing in Robot-Assisted Minimally Invasive Surgery”. Now at Medtronic.

Tope Akinbiyi, M.S. in Mechanical Engineering, Johns Hopkins University, 2005. (co-advised with Russell H. Taylor). “Intelligent Instruments and Visual Force Feedback in Laparoscopic Minimally Invasive Surgery”. Now in the M.D. program at Mount Sinai School of Medicine.

Todd Murphy, M.S. in Mechanical Engineering 2004. “Towards Objective Surgical Skill Evaluation with Hidden Markov Model-based Motion Recognition”. Now at Intuitive Surgical, Inc.

Chad Schneider, M.S. in Mechanical Engineering 2004. “Systems for Robotic Needle Insertion and Tool-Tissue Interaction Modeling”. First at Key Technologies, Inc., now independent consulting.

Masaya Kitagawa, M.S. in Mechanical Engineering 2003. “Indirect Feedback of Haptic Information for Robot-Assisted Telem Manipulation”. Now at National Instruments.

Christina Simone, M.S. in Mechanical Engineering 2002. “Modeling of Needle Insertion Forces for Percutaneous Therapies”. Now at Naval Surface Warfare Center.

Postdoctoral Fellows/Senior Lab Members

Laura Blumenschein, 2019-present. Ph.D. Stanford University 2019.

Caitlyn Seim, 2019-present. Ph.D. Georgia Tech 2019.

Fabio Stroppa, 2019-present. Ph.D. Scuola Superiore Sant’Anna 2018.

Mine Sarac, 2019-present. Ph.D. Scuola Superiore Sant’Anna 2018.

Giada Gerboni, 2016-2019. Ph.D. Scuola Superiore Sant’Anna 2016. Now at Intuitive Surgical, Inc. (started 2019).

Matthew Gilbertson, 2017-2018. Ph.D. Massachusetts Institute of Technology 2016. Now at Lockheed Martin (started 2018).

Heather Culbertson, 2015-2017. Ph.D. University of Pennsylvania 2015. Now an Assistant Professor in Computer Science at University of Southern California (started January 2017).

Kamran Shamaei, 2014-2015. Ph.D. Yale 2014. Now at Think Surgical (started October 2015).

Ryder Winck 2013-2014. Ph.D. Georgia Institute of Technology 2012. Now an Assistant Professor in Mechanical Engineering at Rose-Hulman Institute of Technology (started August 2014).

Ilan Nisky 2011-2014. Ph.D. Ben Gurion University of the Negev 2011. Now an Assistant Professor in Biomedical Engineering at Ben Gurion University of the Negev (started August 2014).

Ali Shahdi 2013-2013. Ph.D. McMaster University 2010. Previously Post-doctoral Principal Researcher/Project Manager, CSIR, and Post-doctoral R&D Fellow, Quanser Inc. Now at a start-up company (started May 2013).

Steven Marra was supported on my projects as a research scientist, 2010-2011. Ph.D. Johns Hopkins University 2001. Postdoc and lecturer at Dartmouth College Thayer School of Engineering and Dartmouth-Hitchcock Medical Center Section of Vascular Surgery 2001-2007. Senior Research and Design Engineer, Director, Clinical Trials Affairs, M2S, Inc., 2007-2009. Now a Senior Lecturer at Johns Hopkins University (started July 2011).

Paul Griffiths 2008-2010. Ph.D. University of Michigan 2008. Now an engineer at Intuitive Surgical Inc. (started November 2010).

Steven Charles 2008-2010 (co-supervised with A. J. Bastian). Ph.D. Massachusetts Institute of Technology 2008. Now an Assistant Professor in Mechanical Engineering at Brigham Young University (started July 2010).

Erion Plaku 2008-2009 (co-supervised with Gregory D. Hager and Noah J. Cowan). Ph.D. Rice University 2008.

Sam Song 2008-2009 (co-supervised with Peter Kazanzides, Louis L. Whitcomb, and Gabor Fichtinger). Ph.D. Imperial College of London, U. K. 2005. Postdoc University of British Columbia, Canada 2006. Research Scientist Western Pennsylvania Hospital, Pittsburgh 2006-2008. Now an Associate Research Professor in the Engineering Research Center for Computer-Integrated Surgical Systems and Technology at Johns Hopkins University.

Kyle Reed 2007-2009 (co-supervised with Noah J. Cowan). Ph.D. Northwestern University 2007. Currently an Assistant Professor in Mechanical Engineering at the University of South Florida (started August 2009).

Katherine J. Kuchenbecker 2006-2007. Ph.D. Stanford University 2006. Was a tenured Associate Professor in Mechanical Engineering and Applied Mechanics at University of Pennsylvania (started July 2007), and now a Director of the Max Planck Institute for Intelligent Systems (started 2018).

Mohsen Mahvash, 2004-2006. Ph.D. McGill University 2002. Assistant Research Professor at Johns Hopkins University in 2007. Currently an Assistant Research Professor supervised by Pierre Dupont at Boston University, Boston MA (started September 2007).

Jessica R. Crouch 2003-2004. Ph.D. University of North Carolina-Chapel Hill 2003. Currently an Adjunct Assistant Professor in Computer Science at Old Dominion University (since September 2004).

Sung-Ouk Chang 2003-2004. Ph.D. Pusan University Korea 2003. Currently a research engineer with Samsung (started September 2004).

Visiting Students and Scholars

Sang-Goo Jeong, 2019-2020. Ph.D. student, KOREATECH, Korea.

Dangxiao Wang, 2018-2019. Professor, Beihang University, China.

Carine Rognon, 2018-2019. Ph.D. student, EPFL, Switzerland.

Christian Duriez, 2018-2019. Research Director at INRIA, France.

Pete Shull, 2018, Assistant Professor, Shanghai Jiaotong University, China.

Elliot Hawkes, 2017, Assistant Professor, University of California, San Diego.

Yasuhisa Kamikawa, 2017, Sony, Japan.

Sajid Nisar, 2017-2018. Ph.D. student, Kyoto University, Japan.

Nima Enayati, 2017. Ph.D. student, Politecnico di Milano, Italy.

Yu Sun, 2017-2018, Professor, Department of Computer Science, University of South Florida.

Yoshihiro Kuroda, 2016, Assistant Professor, Osaka University, Japan.

Mike Rinderknecht, 2012-2013. Ph.D. student, ETH Zurich, Switzerland.

William Provancher, 2012-2013. Associate Professor, Department of Mechanical Engineering, University of Utah.

Yoshihiro Kuroda, 2012-2013. Assistant Professor, Dept. of Medical Science and Bioengineering, Osaka University, Japan.

Dana Damian, 2011-2012. Ph.D. student, Computer Science, University of Zurich, Switzerland.

Yoshihiko Koseki, 2010-2011. Researcher, Surgical Assist Technology Group (SAT), National Institute of Advanced Industrial Science and Technology (AIST), Japan.

Danilo de Lorenzo, 2011-2012. Ph.D. student, Bioengineering Department, Politecnico di Milano, Italy.

Matteo Bianchi, 2011-2012. Ph.D. student, Interdepartmental Research Center “E.Piaggio”, Politecnico di Milano, Italy.

Jakob Kemper, 2004-2005. M.S. student, TU Munich, Germany. (co-advised with Gabor Fichtinger)

Undergraduate Students

At Stanford University: Research is performed for course credit, pay (either through an REU supplement to an NSF grant or from the ME Department SURI program), or volunteer participation. The following Stanford undergraduate students have performed research in the lab: Sarah Cabrerros (Sum2014), Nina Jimenez (Sum2014), Caroline Fong (Sum2014), Sanjay Srinivas (Sum2014), Akzl Pultorak (Sum2014), Jeanny Wang (Sum2014), Caroline Abbott (Sum2014), Iris Yan (Sum2014), Michael Lin Yang (UC Berkeley, Sum2014), Alexa Siu (Georgia Tech, Sum 2014), Matt Weber (W2013-S2014), Kenji Hata (W2014-Sum2014), Arushi Raghuvanshi (W2014-S2014), Jaih Hunter-Hill (Sum2013), Adam Genecov (Sum2013), Joshua Siegel (Sum2013), Margaret Koehler (Sum2012, A2012, W2013), Denis Lin (Sum2012), Margaret Chapman (S2012).

At Johns Hopkins University: Over 50 undergraduate researchers were advised/mentored from 2000-2011. The majority have been Johns Hopkins University undergraduate students in Mechanical Engineering, Biomedical Engineering, Computer Science, and Electrical Engineering. Research is performed for course credit, pay (either through an REU supplement to an NSF grant or directly from a research grant), or volunteer participation. Approximately two undergraduate research students per year have been from other institutions; they typically come to JHU for the summer through the REU program of the Engineering Research Center for Computer-Integrated Surgical Systems and Technology (R. Etienne-Cummings is PI of the REU supplements/site grants). About a third of the undergraduate researchers have been co-authors on papers or abstracts, and many of them have gone on to Ph.D. research and received competitive national fellowships (e.g., NSF, NDSEG).

Thesis and Oral Exam Committees

2014 (including planned): Robert Wilson (Stanford Ph.D.), Sonny Chan (Stanford Ph.D.), Jeamin Koo (Stanford Ph.D.), Santhi Elayaperumal (Stanford Ph.D.), Paul Theodosis (Stanford Ph.D.), Reuben Brewer (Stanford Ph.D.), Wisit Jirattigalachote (Stanford Ph.D.), Ann Majewicz (Stanford Ph.D.)

- 2013: Barrett Heyneman (Stanford Ph.D.), James Gwilliam (JHU Ph.D.), Kirstin Talvala (Stanford Ph.D.), Adam Leeper, (Stanford Ph.D.)
- 2012: Nasir Bhanpuri (JHU Ph.D.), Danilo De Lorenzo (Politecnico di Milano Ph.D.), Varun Ganapathi (Stanford Ph.D.), Kelleher Guerin (JHU GBO), Laura Santos-Carreras (EPFL Ph.D.), Matteo Bianchi (University of Pisa Ph.D.), Pete Shull (Stanford Ph.D.), Seokchang Ryu (Stanford Ph.D.), Dan Walker (Stanford Ph.D.), Adam Jungkunz (Stanford Ph.D.), Dan Aukes (Stanford Ph.D.), Amy Blank (JHU Ph.D.), Tom Wedlick (JHU Ph.D.), and departmental qualifying exams in the areas of controls and robotics
- 2011: Krisada (Mick) Kritayakirana (Stanford Ph.D.), John Swenson (JHU Ph.D.), Heidi Weeks (JHU GBO), Zachary Pezzementi (JHU Ph.D.), Nasir Bhanpuri (JHU GBO), and departmental qualifying exams in the area of controls and robotics.
- 2010: Christina Fuentes (JHU Ph.D.), Netta Gurari (JHU Ph.D.), Tomonori Yamamoto (JHU Ph.D.), Thomas Wedlick (JHU GBO), Carol Reiley (JHU GBO), and departmental qualifying exams in the area of robotics.
- 2009: Sarthak Misra (JHU Ph.D.), Lawton Verner (JHU Ph.D.), Nasir Bhanpuri (JHU GBO), Amy Blank (JHU GBO), Ehsan Dehghan (University of British Columbia Ph.D.), and departmental qualifying exams in the area of robotics.
- 2008: Timothy Edmunds (Rutgers Ph.D.), Wooram Park (JHU Ph.D.), Vinutha Kallem (JHU Ph.D.), Gregory Fischer (JHU Ph.D.), Stephen Martin (JHU Ph.D.), Christina Fuentes (JHU Thesis Proposal in Neuroscience), and departmental qualifying exams in the area of robotics.
- 2007: Ankur Kapoor (JHU Ph.D.), Panadda Marayong (JHU Ph.D.), Robert Webster (JHU Ph.D.), Aniruddha Chatterjee (JHU M.S.), Yoonju Cho (JHU M.S.), Carol Reiley (JHU M.S.), Lawton Verner (JHU GBO), Sarthak Misra (JHU GBO), Netta Gurari (JHU GBO), and departmental qualifying exams in the area of robotics.
- 2006: Melanie Palomeres (JHU Ph.D.), Jinseob Kim (JHU Ph.D.), Sunipa Saha (JHU M.S.), Robert Webster (JHU GBO), Wooram Park (JHU GBO), Aris Skliros (JHU GBO), Brian Weibeler (JHU GBO), Henry Lin (JHU GBO), and departmental qualifying exams in the area of robotics.
- 2005: Jake Abbott (JHU Ph.D.), Tabish Mustufa (JHU M.S.), Takintope Akinbiyi (JHU M.S.), Jakob Kemper (TUM M.S.), Jack Li (JHU M.S.), and departmental qualifying exams in the area of robotics.
- 2004: Yu Zhou (JHU Ph.D.), Alexandru Patriciu (JHU Ph.D.), Anonymous (Ph.D.), Todd Murphy (JHU M.S.), Chad Schneider (JHU M.S.), Guanqi Ye (JHU GBO), Panadda Marayong (JHU GBO), Emad Boctor (JHU GBO), Ralf Philipp (JHU GBO), Jason Corso (JHU GBO), Ming Li (JHU GBO), and departmental qualifying exams in the area of robotics.
- 2003: Kiezo Miyahara (JHU Ph.D.), Jackrit Suthakorn (JHU Ph.D.), Masaya Kitagawa (JHU M.S.), Adam Schuyler (JHU GBO), James Kinsey (JHU GBO), Francesco Tenore (JHU GBO), Jatin Chhugani (JHU GBO), and departmental qualifying exams in the area of robotics.
- 2002: Sangyoon Lee (JHU Ph.D.), David Smallwood (JHU Ph.D.), Anonymous (Ph.D.), Christina Simone (JHU M.S.), and departmental qualifying exams in the area of robotics.
- 2001: David Stein (JHU Ph.D.), Yunfeng Wang (JHU Ph.D.), and departmental qualifying exams in the area of robotics.

INSTRUCTION AND COURSE DEVELOPMENT

Stanford University Courses (2012-present)

ME20N: Haptics: Engineering Touch (Freshman IntroSem) Students in this class learned how to build, program, and control haptic devices, which are mechatronic devices that allow users to feel virtual or remote environments. In the process, students gained an appreciation for the capabilities and limitations of human touch, developed an intuitive connection between equations that describe physical interactions and how they feel, and gained practical interdisciplinary engineering skills related to robotics, mechanical engineering, electrical engineering, bioengineering, and computer science. In-class laboratories give students hands-on experience in assembling mechanical systems, making circuits, programming Arduino microcontrollers, testing their haptic creations, and using Stanford's student prototyping facilities. The final project for this class involved creating a novel haptic device that could be used to enhance human interaction with computers, mobile devices, or remote-controlled robots. *Stanford University: Autumn 2013. 21 students.*

Online course: Introduction to Haptics Similar to ME20N above, but without the project and taught online. Special open-hardware haptic devices (Hapkit, <http://hapkit.stanford.edu>) were designed and distributed to the remote students. Demonstrated the potential for hands-on labs in an online learning environment. Student retention and success were approximately 75% – much higher than typical online courses. *Taught via Stanford University's OpenEdX platform: Autumn 2013. 102 students.*

ENGR 105: Feedback Control Design Design of linear feedback control systems for command-following error, stability, and dynamic response specifications. Root-locus and frequency response design techniques. Examples from a variety of fields. Some use of computer aided design with MATLAB. In 2013 and 2014 I introduced a small laboratory component in place of traditional simulation assignments. *Stanford University: Winter 2012, 2013, 2014. Approximately 85 students per year.*

ME 327: Design and Control of Haptic Systems (new course) Study of the design and control of haptic systems, which provide touch feedback to human users interacting with virtual environments and teleoperated robots. Focus is on device modeling (kinematics and dynamics), synthesis and analysis of control systems, design and implementation, and human interaction with haptic systems. Coursework includes homework/laboratory assignments and a research-oriented project. Directed toward graduate students and advanced undergraduates in engineering and computer science. *Stanford University: Fall 2012, Spring 2014. 20-30 students per year.*

ME 328: Medical Robotics (new course) Study of the design and control of robots for medical applications. Focus is on robotics in surgery and interventional radiology, with introduction to other healthcare robots. Delivery is through instructor lectures and weekly guest speakers. Coursework includes homework and laboratory assignments, an exam, and a research-oriented project. Directed toward graduate students and advanced undergraduates in engineering and computer science; no medical background required. *Stanford University: Spring 2012, 2013. Approximately 22 students per year.*

CS/ME 571: Surgical Robotics Seminar Surgical robots developed and implemented clinically on varying scales. Seminar goal is to expose students from engineering, medicine, and business to guest lecturers from academia and industry. engineering and clinical aspects connected to design and use of surgical robots, varying in degree of complexity and procedural role. *Stanford University: Spring 2012, 2013. Approximately 40 students per year. Co-taught with Federico Barbagli.*

Johns Hopkins University Courses (2000-2011)

Freshman Curriculum Reform From 2006 to 2010, led the Johns Hopkins University Mechanical Engineering Department's effort to re-design the freshman curriculum as a highly integrated physics and mechanical engineering sequence. This includes three year-long courses: Freshman Experiences in Mechanical Engineering I & II, Introduction to Mechanics I & II, and Mechanical Engineering Freshman Laboratory I & II. Developed high-level structure for all three courses. Created a laboratory sequence that alternates related physics and engineering laboratories. Developed new set of physics/mechanics laboratories using a computer-vision-based tracking system.

Freshman Experiences in Mechanical Engineering I & II (modified course) An overview of the field of mechanical engineering along with topics that will be important throughout the mechanical

engineering program. This one-year course includes applications of mechanics, elementary numerical analysis, programming in Matlab, use of computer in data acquisition, analysis, design, and visualization, technical drawing, the design process and creativity, report preparation, teamwork, and engineering ethics. *Johns Hopkins University: Fall 2007, Spring 2008, Fall 2008, Spring 2009, Fall 2010. Approximately 35 students per semester in 2007-2008, 58 in 2008-2009, and 55 in 2010.*

Mechanical Engineering Freshman Laboratory I & II (new course) Hands on laboratory complementing Freshman Experiences in Mechanical Engineering and Introduction to Mechanics, including experiments, mechanical dissections, and design experiences distributed throughout the year. Experiments are designed to give students background in experimental techniques as well as to reinforce physical principles. Mechanical dissections connect physical principles to practical engineering applications. Design projects allow students to synthesize working systems by combining mechanics knowledge and practical engineering skills. *Johns Hopkins University: Fall 2007, Spring 2008, Fall 2008, Spring 2009. Approximately 35 students per semester in 2007-2008, 58 in 2008-2009, and 55 in 2010.*

Mechatronics (modified course) This interdisciplinary course include lectures, lab assignments, and projects that teach the student to design and build mechatronic devices, building on the themes of Robot Sensors and Actuators. We expand on the topics of mechanism design, motors and sensors, interfacing and programming microprocessors, mechanical prototyping, and creativity in the design process. Course labs and projects are performed in small student groups. Each group develops a microprocessor-controlled electromechanical device, such as a mobile robot or art-making machine. *Johns Hopkins University: Fall 2006. Approximately 20 students.*

Design and Analysis of Dynamic Systems (new course) Modeling and analysis of damped and undamped, forced and free vibrations in single and multiple degree-of-freedom linear dynamical systems. Introduction to stability and control of linear dynamical systems. Designed and implemented a new set of labs incorporating the Haptic Paddle (<http://www.haptics.me.jhu.edu/research/paddle/paddle.html>). *Johns Hopkins University: Spring 2002, 2003, 2004, 2005, 2006; lab portion only Spring 2007, 2008. Approximately 40 students per year. Also at Stanford University: called Dynamic Systems (modified course), co-taught with P. Mitiguy, Fall 1998. Approximately 60 students.*

Robot Sensors and Actuators Introduction to modeling and hands-on use of actuators and sensors in mechatronic design. A microprocessor is used for control. Course work includes weekly lectures and hands-on laboratory exercises in which the students construct and use various mechatronic sensors and actuators. The cumulative laboratory sequence concludes with students integrating sensor and actuator knowledge they have developed in a final project. *Johns Hopkins University: Fall 2004. Approximately 65 students.*

Introduction to Robotics Graduate level introduction to robotics with emphasis on the mathematical tools for describing the kinematics and dynamics of robot arms. Topics include the geometry and mathematical representation of rigid body motion, forward and inverse kinematics of articulated mechanical arms, trajectory generation, manipulator dynamics, actuation, sensing and design issues, manipulator control, and additional special topics such as medical robotics, motion planning, and physics-based manipulation. *Johns Hopkins University: Fall 2002, 2003. Approximately 15 students per year.*

Haptic Systems for Teleoperation and Virtual Reality (new course) Graduate-level introduction to the field of haptics, focusing on virtual environments that are displayed through the sense of touch. Topics covered included introduction to haptics, human haptic sensing and control, sensing and actuation of haptic interfaces, grounded and ungrounded feedback, tactile displays, rigid and deformable virtual surfaces, surface property rendering, dynamic simulation, reality-based modeling, psychophysics, human factors, and applications in entertainment, education and training, scientific visualization, simulated surgery, and teleoperation. The course began with lectures and assignments, and then transitioned to reading and discussion of research papers, presentations, and course projects of the students own design. *Johns Hopkins University: Fall 2000, 2001, 2003, 2006, Spring 2009, Spring 2011. Approximately 12 students per year until 2006, 25 students in 2009, 24 students in 2011.*

Graphics in Engineering (new course) Freshman-level introduction to engineering graphics and communications. Prepared and presented lectures and laboratories on sketching, orthographic projection and standard views, engineering drawing and practices, geometric relationships, descriptive geometry, 3-D graphics, using AutoCAD, introduction to design and documentation. Developed and directed student design projects and final presentations. *College of San Mateo: Fall 1999, Spring 2000. Approximately 15 students per year.*

PROFESSIONAL SERVICE

International Program, Editorial, and Review Committees

- 2018-present Editor-in-Chief, IEEE Robotics and Automation Letters
 - 2015-2018 Deputy Editor-in-Chief, IEEE Robotics and Automation Letters
 - 2015-2018 Editor, International Journal of Robotics Research
 - 2011-2018 National Institutes of Health (NIH) ad hoc reviewer
 - 2014 National Science Foundation (NSF) panelist
 - 2014-2017 Editor-in-Chief, IEEE International Conference on Robotics and Automation (ICRA)
 - 2013 Editor, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
 - 2013 National Science Foundation (NSF) ad hoc reviewer
 - 2013 Natural Sciences and Engineering Research Council (NSERC) Canada ad hoc reviewer
 - 2012 National Science Foundation (NSF) Panel
 - 2011-2014 Associate Editor, IEEE Transactions on Haptics
 - 2011 Associate Editor, World Haptics Conference
 - 2011 International Conference on Rehabilitation Robotics (ICORR) Scientific Committee
 - 2010-2011 Guest Editor, IEEE Transactions on Haptics – Special Issue on Haptics in Medicine and Clinical Skill Acquisition
 - 2010 National Science Foundation (NSF) graduate research fellowship review panel
 - 2010-2012 Editor, IEEE International Conference on Robotics and Automation
 - 2010 Senior Program Committee, IEEE International Conference on Robotics and Automation
 - 2009 Area Chair, Robotics: Science and Systems Conference
 - 2009 Associate Editor, World Haptics Conference
 - 2009 National Science Foundation (NSF) proposal review panel and ad-hoc reviewer
 - 2008 National Institutes of Health (NIH), NIBIB Training Grant Panel
 - 2008 Video Proceedings program committee, IEEE International Conference on Robotics and Automation
 - 2007-2010 Associate Editor, IEEE Transactions on Haptics
 - 2007-2010 Co-chair, program and organizing committee, Symposium on Haptic Interfaces for Virtual Environments and Teleoperator Systems (held biannually)

- 2007 Scientific Review Committee, Medical Image Computing and Computer-Aided Intervention (MICCAI)
- 2007 Program Committee, Robotics: Science and Systems
- 2007 Co-chair, special sessions committee, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- 2006 Video Proceedings co-Chair, IEEE International Conference on Robotics and Automation
- 2005 Program committee, World Haptics Conference
- 2004 National Science Foundation (NSF) proposal review panel
- 2004 Program committee, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- 2005 National Institutes of Health (NIH), Bio-Computing and Health Informatics Study Section (ad hoc member of review panel)
- 2005 National Science Foundation (NSF) review panel
- 2004 Program committee, Medical Image Computing and Computer-Aided Intervention (MICCAI)
- 2004 Program committee, Eurohaptics
- 2003-2006 Program and organizing committee, Haptics Symposium (three-year term)
- 2003 Program committee, IEEE International Conference on Robot-Human Communication (RO-MAN)
- 2003 Program committee, Eurohaptics
- 2003 Program committee, Medical Image Computing and Computer-Aided Intervention (MICCAI)
- 2003 National Science Foundation (NSF) review panel

Administrative and Organizational Committees

- 2016-present IEEE RAS Publication Activities Board
 - 2016 IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechanics Awards committee
 - 2014 IEEE/RSJ International Conference on Intelligent Robots and Systems Awards committee
 - 2014 Member, IEEE Robotics and Automation Society Administrative Committee
- 2012-13 Robotics Roadmap Committee. Revised a report that identifies the future impact of robotics on the economic, social, and security needs of the USA, outlines scientific and technological challenges, and documents a technological roadmap to address them. Report presented to congress in 2013.
 - 2011 IEEE Robotics and Automation Society IEEE Fellow evaluation committee
 - 2011 IEEE/RSJ International Conference on Intelligent Robots and Systems Awards committee
 - 2010 IEEE Robotics and Automation Society Fellow Evaluation committee
 - 2009 IEEE Robotics and Automation Magazine Editor-in-Chief Search committee
 - 2009 IEEE Robotics and Automation Society Awards Nomination committee

- 2008-2010 CCC/CRA Robotics Roadmap Committee. Developed a report released May 2009 at the Robotics Congressional Caucuss briefing of the 111th Congress. The report identifies the future impact of robotics on the economic, social, and security needs of the USA, outlines scientific and technological challenges, and documents a technological roadmap to address them. <http://www.us-robotics.us/reports/CCC Report.pdf>
- 2008 Co-organized (with Nancy Amato) the second IEEE RAS Fellowship for gender diversity in robotics and automation
- 2008 IEEE Robotics and Automation Society Awards Nomination committee
- 2007 Editor-in-Chief Search Committee, IEEE Transactions on Haptics
- 2007 Awards committee chair, World Haptics Conference
- 2007 Co-founded and co-organized (with George Bekey) the first IEEE RAS Fellowship for a female graduate student in robotics and automation
- 2006-present Vice Chair for Finance, IEEE Technical Committee on Haptics
 - 2006 Founding Member, IEEE Technical Committee on Haptics
- 2006-2007 Originated and led the organization of the first IEEE RAS Birds of a Feather Lunch for Women at ICRA 2007. Co-organizers were Danica Kragic, Nancy Amato, Mihoko Otake, Aude Billard, and Robin Murphy. Over 100 people attended the event, which included presentations and a discussion panel with Q & A session.
- 2006-2007 Member, Haptics Journal Steering Committee. Result: Founding of the IEEE Transactions on Haptics.
- 2006-2007 Membership co-Chair, IEEE Robotics and Automation Society
 - 2005 Awards committee, World Haptics Conference
- 2004-2005 Member, IEEE Robotics and Automation Society Administrative Committee
 - 2004 Awards Committee, Haptics Symposium
 - 2002 Local Arrangements Vice Chair, 2002 IEEE International Conference on Robotics and Automation

Professional Memberships

- Institute for Electrical and Electronic Engineers (IEEE): Robotics and Automation Society, Computer Society, and Engineering in Medicine and Biology Society
- American Society of Mechanical Engineers (ASME)
- Society for Neuroscience
- American Physiological Society (APS)
- American Society for Engineering Education (ASEE)
- Association for Women in Science (AWIS)
- Society of Women Engineers (SWE)
- Washington Area Computer Aided Surgery Society (WashCAS)
- Pi Tau Sigma

Reviews

Journal paper reviews: IEEE Transactions on Robotics, IEEE Transactions on Haptics, IEEE Transactions on Biomedical Engineering, IEEE Transactions on Systems, Man, and Cybernetics, IEEE Journal of Oceanic Engineering, IEEE Transactions on Information Technology in Biomedicine, IEEE Computer Graphics and Applications, IEEE Transactions on Industrial Electronics, IEEE/ASME Transactions on Mechatronics, ASME Journal of Dynamic Systems, Measurement and Control, ASME Journal of Mechanical Design, ASME Journal of Applied Mechanics, ACM Transactions on Applied Perception, International Journal of Robotics Research, Robotics and Autonomous Systems, Haptics-e: The Electronic Journal of Haptics Research, International Journal of Human-Computer Studies, Human Factors, Computerized Medical Imaging and Graphics, Journal of Biomechanics.

Conference paper reviews: In addition to the conference program committees listed earlier, occasional reviews are provided for numerous annual and biannual conferences, including IEEE International Conference on Robotics and Automation, IEEE/RSJ International Workshop on Intelligent Robots and Systems, Robotics: Science and Systems, IEEE Conference on Rehabilitation Robotics, Medical Image Computing and Computer-Aided Intervention, IEEE Engineering in Medicine and Biology Conference, IEEE International Conference on Automation and Robotics, American Control Conference, ASME Design Automation Conference, ASME IMECE Conference (Dynamic Systems and Control Division), Workshop on Robot-Human Communication, Symposium on Haptics for Virtual and Teleoperator Environments, World Haptics Conference, Eurohaptics Conference.

Organization of Workshops and Tutorials

CCC Workshop on Next Generation Robotics, San Francisco, CA, March 11, 2016. (Co-organizer)

Roadmapping Workshop for Medical and Healthcare Robotics, Los Angeles, CA, July 23, 2012. (Co-organizer)

Tutorial on Best Practices for Teaching Haptics, IEEE Haptics Symposium, March 4, 2012. (Organizer)

Workshop on Advanced Sensing and Sensor Integration in Medical Robotics, IEEE International Conference on Robotics and Automation, May 13, 2009. (Co-organizer)

Needle Steering: Recent Results and Future Opportunities, 11th International Conference on Medical Image Computing and Computer Assisted Intervention, September 6, 2008. (Co-organizer)

NSF/ JST US-Japan Robotics Workshop on Safety, Security, and Society, San Francisco, California, August 15, 2008. (Area leader for medical robotics)

CCC/CRA Roadmapping Workshop for Medical and Healthcare Robotics, Washington, DC, June 19-20, 2008. (Co-organizer)

Reality-Based Modeling of Tissues for Simulation and Robot-Assisted Surgery, IEEE/RSJ International Conference on Intelligent Robots and Systems, October 31, 2003. (Co-organizer)

ONR Workshop on Human and Machine Haptics, December 7-9, 1997. (Co-organizer)

UNIVERSITY SERVICE

Stanford University

Policy Planning Board (2015-2016)

School Growth Planning Committee, School of Engineering (2014-2015)

Faculty Advisory Board, Center for the Advancement of Womens Leadership (2013-present)

Faculty Women's Forum Steering Committee (2013-2015)

Mechanical Engineering Department Product Design Faculty Search Committee Co-Chair (2013-2014)

Mechanical Engineering Department Graduate Admissions Committee (2011-present); Chair (2014-2016)

Mechanical Engineering Department ad hoc Space Committee (2013-2014)

Society of Women Engineers student chapter, acting advisor (2012-2013)

Mechanical Engineering Department Biomechanics Faculty Search Committee (2011-2012)

Johns Hopkins University

Vice Chair, Department of Mechanical Engineering (2010-2011) – Chair of Undergraduate Curriculum Committee, Chair of Undergraduate Program Committee, member of Graduate Program Committee, member of ABET committee, Chair of Lecturer Search Committee

Graduate Admissions Committee, Department of Mechanical Engineering (2000-2001, 2004-2005, Chair: 2007-2009)

Curriculum Committee, Department of Mechanical Engineering (2007-2009)

Machine Shop/Undergraduate Laboratories Committee, Department of Mechanical Engineering (2004-2009)

Undergraduate Recruiting Committee, Department of Mechanical Engineering (2000-2003, 2004-2007, Chair: 2004-2007)

Student Affairs Committee, Department of Mechanical Engineering (2002-2003, 2004-2007, 2008-2009)

Web/Publicity Committee, Department of Mechanical Engineering (2000-2004, Chair: 2002-2004)

Associate Director, Laboratory for Computational Sensing and Robotics (2007-2011). Worked alongside other robotics faculty to define the organization and administration for this new interdisciplinary center. Worked closely with architects to design the physical infrastructure for LCSR in a new building, and coordinated several phases of moving into the new space.

Thrust Leader, Engineering Research Center for Computer-Integrated Surgical Systems and Technology (2004-2010)

Faculty Advisor for the Johns Hopkins University Society of Women Engineers Student Chapter, 2001-2009
HopkinsOne Faculty Advisory Committee (2008-2009)

Search Committee for the Chair of the Biomedical Engineering Department (2006-2007)

Numerous presentations to alumni, industry partners, and prospective donors, organized by the Whiting School of Engineering and the Johns Hopkins University Development Offices (2000-2011)

PERSONAL

Born July 9, 1972, Fontana, California, USA. Married, two children.