# Joseph Romano

## Education

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| 2007–2012 | **Ph.D./M.S. in Mechanical Eng.**, *University of Pennsylvania*, Philadelphia, PA. |
| 2002–2007 | **B.S. in Computer Science with Honors**, *Johns Hopkins University*, Baltimore, MD. |
| 2002–2007 | **B.S. in Mechanical Eng. with Honors**, *Johns Hopkins University*, Baltimore, MD. |

## Ph.D. Thesis

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| Title | *Combining Tactile and Kinesthetic Information for Improvements in Human and Machine Haptic Systems* |
| Committee | Katherine Kuchenbecker, Vijay Kumar, Mark Yim, and Seungmoon Choi |

## Professional Experience

01/01/2017 - Today
**Director of Engineering**, *Berkshire Grey*, Bedford, MA.
Engineering organization development, architecture, and strategy. Grew engineering team from 7 to 300 employees. Led strategic decisionmaking for technical product development.

06/01/2015 - 01/01/2017
**Technical Founding Team**, *Berkshire Grey*, Waltham, MA.
Focused on customer deep-dive product definition and core technology development, including developing novel sensor/actuation components and feedback strategies for state-of-the-art manipulation and material transport systems.

09/01/2013 - 06/01/2015
**Research Scientist**, *Kiva Systems (Amazon Robotics)*, North Reading, MA.
Project lead for next-generation robotic developments within Amazon.com fulfillment centers.

01/10/2012 - 09/01/2013
**Senior Robotics Engineer**, *Rethink Robotics*, Boston, MA.
R&D for groundbreaking flagship product, Baxter, an interactive human-safe robot for manufacturing environments. Lead development for a variety of technical innovations including: interactive haptic feedback during robot task training, reactive motion control, robot tactile perception, force sensing and control, and dynamic modeling and calibration.[D3, D2]

Summer 2010
**Visiting Researcher**, *Willow Garage*, Menlo Park, CA.
Developed robot manipulation capabilities that are now core components of the ROS and PR2 robot framework.[A4]

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| 2006–2007 | **Research Engineer**, *Johns Hopkins University Haptics Group*, Baltimore, MD. |
| | Designed controllers for minimally invasive surgical systems, including steerable needles and snake-like robots.[A5] |
| Summer 2005 | **Engineering Intern**, *Department of Defense EOD*, Picatinny Arsenal, NJ. |
| | Reverse-engineered foreign munitions for the development of training simulations. Developed add-on components to allow the QinetiQ Talon and iRobot Packbot to better perform improvised explosive device (IED) detection and disarmament missions in the field. |

## Technical Skills

### Programming and Computer-related

Highly Experienced: C/C++, Python, OpenGL, ROS, Linux, Octave/MATLAB, CODESYS (function-block/ladder-logic)

Moderately Experienced: RTAI/Xenomai, Java, network administration

### Mechanical Design

Highly Experienced: Solidworks, Pro/E, rapid prototyping (3D and 2D)

Moderately Experienced: AutoCAD, CNC & manual mill/lathe

### Electrical

Highly Experienced: UL508A, NFPA, Safety standards, Industrial Controls

Moderately Experienced: embedded programming, motor drive circuitry, SPI/I2C, sensor integration, PCB design & fabrication

## Honors, Awards, and Professional Affiliations

### Honors and Awards

Under Armour Armour39 Wearable Technology Challenge Finalist, 2014

IEEE Haptics Symposium, Best Short Oral Presentation, 2010

UPenn Outstanding Teaching Assistant Award in Mechanical Engineering, 2008

ASME Maryland Regional Design Competition, $1^{st}$ Place Award, 2007

American College Hockey Association (ACHA) Academic All-American, 2006-2007

### Affiliations

Institute of Electrical and Electronics Eng. (IEEE), Robotics and Automation Society

Association for Computing Machinery (ACM)

American Society of Mechanical Engineers (ASME)

## Publications

### Journal Publications

[A1] Peter Wurman and Joseph M. Romano. The Amazon Picking Challenge 2015. *IEEE Robotics And Automation Magazine*, 22(3):10–12, September 2015.

[A2] Joseph M. Romano, Jordan P. Brindza, and Katherine J. Kuchenbecker. ROS Open-source Audio Recognizer: ROAR Environmental sound detection tools for robot programming. *Autonomous Robotics*, 34(3):207–215, 2013.

[A3] Joseph M. Romano and Katherine J. Kuchenbecker. Creating realistic virtual textures from contact acceleration data. *IEEE Transactions on Haptics*, 5(2):109–119, 2012.

[A4] Joseph M. Romano, Kaijen Hsiao, Günter Niemeyer, Sachin Chitta, and Katherine J. Kuchenbecker. Human-inspired robotic grasp control with tactile sensing. *IEEE Transactions on Robotics*, 27(6):1067–1079, 2011.

[A5] Robert J. Webster, Joseph M. Romano, and Noah J. Cowan. Mechanics of precurved-tube continuum robots. *IEEE Transactions on Robotics*, 25(1):67–78, 2009.

### Book Chapters

[B1] Katherine J. Kuchenbecker, Joseph M. Romano, and William McMahan. Haptography: Capturing and recreating the rich feel of real surfaces. In *Robotics Research: The 14th International Symposium ISRR*, volume 70 of *Springer Tracts in Adanced Robotics*, pages 245–260. Springer Berling/Heidelberg, 2010.

[B2] Robert J. Webster III, John P. Swensen, Joseph M. Romano, and Noah J. Cowan. Closed-form differential kinematics for concentric-tube continuum robots with application to visual servoing. In Oussama Khatib, Vijay Kumar, and George Pappas, editors, *Experimental Robotics*, volume 54 of *Springer Tracts in Adanced Robotics*, pages 485–494. Springer Berling/Heidelberg, 2009.

### Conference Publications

[C1] Joseph M. Romano and Katherine J Kuchenbecker. Methods for robotic tool-mediated haptic surface recognition. In *Proc. IEEE Haptics Symposium*, pages 49–56, February 2014.

[C2] Stephen R. Gray, Joseph M. Romano, Jordan Brindza, Soonkyum Kim, Katherine J. Kuchenbecker, and Vijay Kumar. Planning manipulation and grasping tasks with a redundant arm. In *Proc. ASME 2011 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*, August 2011.

[C3] Nils Landin, Joseph M. Romano, William McMahan, and Katherine J. Kuchenbecker. Dimensional reduction of high-frequency accelerations for haptic rendering. In *Haptics: Generating and Perceiving Tangible Sensations*, volume 6192 of *Lecture Notes in Computer Science*, pages 79–86. Springer, July 2010.

[C4] Jordan M. Croom, Daniel C. Rucker, Joseph M. Romano, and Robert J. Webster III. Visual sensing of continuum robot shape using self-organizing maps. In *Proc. IEEE International Conference on Robotics and Automation*, pages 4591–4596, May 2010.

[C5] Joseph M. Romano, Takashi Yoshioka, and Katherine J. Kuchenbecker. Automatic filter design for synthesis of haptic textures from recorded acceleration data. In *Proc. IEEE International Conference on Robotics and Automation*, pages 1812–1821, May 2010.

[C6] Kyle N. Winfree, Joseph M. Romano, Jamie Gewirtz, and Katherine J. Kuchenbecker. Control of a high fidelity ungrounded torque feedback device: The itorqu 2.1. In *Proc. IEEE International Conference on Robotics and Automation*, pages 1347–1352, May 2010.

[C7]   William McMahan, Joseph M. Romano, Amal M. Abdul Rahuman, and Katherine J. Kuchenbecker. High frequency acceleration feedback significantly increases the realism of haptically rendered textured surfaces. In *Proc. IEEE Haptics Symposium*, pages 141–148, March 2010.

[C8]   Joseph M. Romano, Stephen R. Gray, Nathan T. Jacobs, and Katherine J. Kuchenbecker. Toward tactilely transparent gloves: Collocated slip sensing and vibrotactile actuation. In *Proc. IEEE World Haptics Conference*, pages 279–284, March 2009.

[C9]   Joseph M. Romano, Alla Safonova, and Katherine J. Kuchenbecker. Real-time graphic and haptic simulation of deformable tissue puncture. In *Proc. Medicine Meets Virtual Reality (MMVR17)*, January 2009.

[C10]  Robert J. Webster III, Joseph M. Romano, and Noah J. Cowan. Kinematics and calibration of active cannulas. In *Proc. IEEE International Conference on Robotics and Automation*, pages 3888–3895, May 2008.

[C11]  Joseph M. Romano, Robert J. Webster III, and Allison M. Okamura. Teleoperation of steerable needles. In *Proc. IEEE International Conference on Robotics and Automation*, pages 934–939, May 2007.

## Patents

[D1]   Katherine J. Kuchenbecker, Joseph M. Romano, William McMahan, and Nils Landin. Systems and methods for capturing and recreating the feel of surfaces. United States Patent 8988445, March 24 2015.

[D2]   Elaine Chen, Rodney Brooks, Chris Buehler, Matthew Williamson, Bruce Blumberg, Noelle Dye, Joseph Romano, and William Goodwin. User interface for robot training. United States Patent 8965576, February 24 2015.

[D3]   Matthew Williamson, Matthew DiCicco, and Joseph Romano. Constraining robotics manipulation with redundant degrees of freedom. United States Patent Application #61/701,900, September 17 2013.

## Posters and Demonstrations

[E1]   Joseph M. Romano and Pete Wurman. Amazon Picking Challenge. Lead organizer and designer of cooperative academia-industry robot challenge at ICRA conference, May 2015.

[E2]   Joseph M. Romano, Nils Landin, William McMahan, and Katherine J. Kuchenbecker. Texturepad: Realistic rendering of haptic textures. Hands-on demonstration presented at EuroHaptics, Amsterdam, the Netherlands, July 2010.

[E3]   Joseph M. Romano and Katherine J. Kuchenbecker. Realistic haptic contacts and textures for tablet computing. Hands-on demonstration presented at the Stanford Medical Innovation Conference on Medical Robotics, Stanford, California, April 2010.

[E4]   Joseph M. Romano and Katherine J. Kuchenbecker. Realistic haptic contacts and textures for tablet computing. Hands-on demonstration presented at IEEE Haptics Symposium, Boston, Massachusetts, March 2010. Award: Best Short Oral Presentation.

[E5]   Joseph M. Romano, Nathan Jacobs, and Stephen Gray. The haptic slip glove. Hands-on demonstration presented at IEEE World Haptics Conference, March 2009.

[E6]   Joseph M. Romano, Robert J. Webster III, Noah J. Cowan, and Allison M. Okamura. Teleoperation of steerable needles. Poster. Johns Hopkins University Engineering Research Center, National Science Foundation (NSF) Engineering Research Center (ERC) Symposium, 2007.