

Heather Knight

hknight@cs.cmu.edu

<http://marilynmonrobot.com>

Education

2016 Ph.D. Thesis: “*Expressive Motion for Low Degree-of-Freedom Robots.*” Carnegie Mellon University, Robotics Institute, conducted under Professor Reid Simmons. (August 11, 2016)

Thesis Committee: Manuela Veloso, Aaron Steinfeld, Guy Hoffman (Cornell)

2008 M.S. Thesis: “*Real-time Social Touch Gesture Recognition.*” Massachusetts Institute of Technology, Department of Electrical Engineering and Computer Science, conducted under Professor Cynthia Breazeal.

2006 B.S. in Electrical Engineering and Computer Science with minor in Mechanical Engineering at Massachusetts Institute of Technology

Honors and Awards

- Tenure-track Assistant Professor Position at Oregon State University, Computer Science (Fall 2017)
- Post-doc at Stanford Center for Design Research under Wendy Ju (Fall 2016)
- National Science Foundation Graduate Research Fellowship, 2010-2014
- Cover, Wired UK, March, 2013
- Named to Forbes List’s *30 under 30 in Science*, 2011
- Awarded CMU Interdisciplinary Arts Award with Dan Wilcox, 2011
- TEDWomen Speaker, 2010
- Human Robot Interaction Pioneer, 2010
- British Video Music Award, OK GO, *This Too Shall Pass: Rube Goldberg Machine*, 2010

Exhibitions/Performances

The Robot Film Festival: an annual short-film festival (2011-2015) celebrating robot storytelling on screen, which I founded, and co-produce with Marek Michalowski and Chrys Wu.

- 5th Annual Robot Film Festival, Row House Cinema, Pittsburgh, November 7, 2015
- 4th Annual Robot Film Festival, hosted by Bot&Dolly, San Francisco, July 19, 2014
- 3rd Annual Robot Film Festival, hosted by Bot&Dolly, San Francisco, July 21, 2013
- 2nd Annual Robot Film Festival, 3LD Art & Technology Center, NYC, July 14, 2012
- 1st Annual Robot Film Festival, 3LD Art & Technology Center, NYC, July 16, 2011

The Cyborg Cabaret: A variety show featuring human performers, robotics and technology on stage. The sold-out show took place at the New Hazlett Theater on April 27, 2012 in Pittsburgh, PA. Supported by the Carnegie Mellon School of Art. Directed by Heather Knight and Dan Wilcox.

Silicon Comedy: A robot comedy performance created for TED-Women 2010 with over 600,000 views. Featuring Data the Robot and human-sidekick Heather Knight.

This Too Shall Pass (Rube-Goldberg Machine): One of the group leaders for VMA-winning music video featuring a Rube-Goldberg machine that we (Synnlabs) created for the band OK GO in 2010.

Syynlabs Halloween: A gallery of interactive art exhibitions at the Museum of Contemporary Art in Los Angeles, CA, created for their annual Halloween Party in 2009.

Stardust: Installation at the 2009 International Joint Conferences on Artificial Intelligence in Pasadena, CA, performing cell-phone tracking to control animated “comets in space” on a large outdoor display. Created with Dan Goods and Adam Harvey for NASA’s Jet Propulsion Laboratory.

The Cloud: An interactive sculpture with over 15,000 individually addressable optical fibers created by the MIT Mobile Experience Lab and installed at the Fortezza de Basso in Florence, Italy where I interned for the summer of 2008.

Cyberflora: An interactive robotic flower garden installed at Smithsonian-Cooper Hewitt Design Museum as part of their Fall 2003 Design Triennial. Created by Jeff Lieberman, Heather Knight, Dan McNaulty, Blake Brasher and Cynthia Breazeal.

Public Anenome: An interactive robot installation displayed in the Emerging Technologies exhibit at the 2002 SIGGRAPH conference. Created by Cynthia Breazeal’s Personal Robotics group.

Journal Articles

[1] Knight, H. and Simmons, R. Designing motions that express a robot’s thoughts, intentions, or feelings using the Laban Effort System. Under submission for *Journal of Social Robotics*, Springer, 2016.

[2] Knight, H. “Design and Policy Considerations of Human-Robot Partnerships.” *The Robots are Coming: Series on Civilian Robotics*. Brookings Institute, July 2014.

[3] Knight, H. “Eight Lessons learned about Non-verbal Interactions through Robot Theater.” *Social Robotics*. Springer Berlin-Heidelberg, 2011. 42-51.

Conference Papers

[4] H. Knight, R. Thielstrom, M. Veloso and R. Simmons. “How Path Shape Illustrates a Mobile Robot’s Attitude Toward Its Goal.” In Proceedings of the *International Conference on Intelligent Robots and Systems (IROS ’16)*, October 9-14, 2016, Daejeon, Korea.

[5] H. Knight and R. Simmons. “Laban Head-Motions Convey Robot State: A Call for Robot Body Language.” In Proceedings of the *International Conference on Robotics and Automation (ICRA ’16)*, May 16-21 2016, Stockholm, Sweden.

[6] Knight, H, Veloso, M. and Simmons, R. “Taking Candy from a Robot: Speed Features and Candy Accessibility Predict Human Response.” In Proceedings of *International Conference on Robot and Human Interactive Communication (Ro-Man ’15)*, September 2015 in Kobe, Japan.

[7] Knight, H and Simmons, R. “Expressive Motion with X, Y and Theta: Laban Effort Features for Mobile Robots.” In Proceedings of the *International Symposium Robot and Human Interactive Communication (Ro-Man ’14)*, August 2014 in Edinburgh, Scotland.

[8] Knight, H. and Simmons, R. “Estimating Human Interest and Attention via Gaze Analysis.” In Proceedings *International Conference on Robotics and Automation (ICRA ’13)*, May 2013 in Karlsruhe, Germany.

[9] Knight, H., Toscano, R., Steele, W. D., Chang, A., Wang, Y. and Breazeal, C. “Real-time Touch Gesture Recognition for a Sensate Robot.” In Proceedings of the *International Conference on Intelligent Robots and Systems (IROS ’09)*, October 2009 in St. Louis, Missouri.

[10] Harvey, A. and Knight, H. "Anti-Paparazzi Fashion." In Proceedings of the *International Symposium on Wearable Computing* (ISWC '09), September 2009 in Linz, Austria.

[11] Knight, H., Lee, J. and Ma, H. "Chair Alarm for Patient Fall Prevention based on Gesture Recognition and Interactivity" In Proceedings of *IEEE International Conference on Engineering in Medicine and Biology Society* (EMBC '08), August 2008 in Vancouver, Canada.

Extended Abstracts

[12] Knight, H and Simmons, R. "Layering Laban Effort Features on Robot Task Motions." Late Breaking Report at *International Conference on Human Robot Interaction* (HRI '15), March 2015 in Portland, Oregon.

[13] Knight, H., Simmons, R.. "Designing an Expressive Motion System for a Robot that Needs Your Help." Extended Abstract for *Women in Robotics Workshop* at the *International Conference on Robotics, Science and Systems* (RSS '14), July 2014 in Berkeley, California.

[14] Knight, H. and Wilcox, D. "The Cyborg Cabaret: A Human-Machine Variety Show Exploring our Relationships with Machines." *Workshop on Robotics and Performing Arts: Reciprocal Influences* at the International Conference of Robotics and Automation (ICRA '12), May 2012

[15] Knight, H. "Acting Lesson with Robot: Emotional Gestures." Video for the *International Conference on Human-Robot Interaction* (HRI '12), March 2012, in Boston, Massachusetts.

[16] Knight, H. and Simmons, R. "Tracking Aggregate vs. Individual Gaze Behaviors during a Robot-led Tour Simplifies overall Engagement Estimates." Late Breaking Report for the *International Conference on Human-Robot Interaction* (HRI '12), March 2012 in Boston, Massachusetts.

[17] Knight, H. "Devilishly Charming Robots and Charismatic Machines." HRI Young Pioneers Workshop at the *International Conference on Human-Robot Interaction* (HRI '11), March 2011 in Lausanne, Switzerland.

[18] Knight, H., Divvala, S. and Satkin, S. "A Saavy Robot Standup Comic: Realtime Learning through Audience Tracking." Work-in-progress paper for the *International Conference on Tangible and Embedded Interaction* (TEI '11), January 2011, in Funchal, Portugal.

[19] Knight, H., Chang, A., Steele, W. D., Toscano, R. Wang, Y. and Breazeal, C. "Robot Design Rubrics for Social Gesture Categorization and User Studies with Children." Presented in Workshop on *How to Integrate Social Robots into Society* at the *International Conference on Human Robot Interaction* (HRI '09), March 2009 in San Diego, California.

Technical Experience

Aldebaran Robotics: Field Applications Engineer, Spring 2010.

Syynlabs: Technology-based Artist and Engineer¹, 2009-2010.

NASA / Jet Propulsion Lab: Stellar Interferometry Software & Robotics, 2008-2010.

MIT Mobility Lab: The Cloud, Interactive Sculpture Software. Summer 2008. Florence, Italy.

Aldebaran Robotics: CDD in Sensor Design and Electronics. Spring 2007. Paris, France.

MIT Media Lab: Research Assistant for Prof. Cynthia Breazeal of the Personal Robotics Group and Prof. Deb Roy of Cognitive Machines, 2002-2007

- THE HUGGABLE: robot companion with affective touch. Sensate Skin. 2006-2007

¹ One of the project leads for Ok Go Rube Goldberg Machine video.

- Trisk: robot that constructs language by sensing environment. Head Designer, 2004-2005
- Cyberflora: Interactive robotic flower garden for Cooper-Hewitt Design Museum, 2002-2003

Siemens: Finite Element Analysis. Summer 2004. Munich, Germany.

MIT Artificial Gravity Lab: Conducted artificial gravity experiments. Fall 2001.

Patents

Interactive systems employing robotic companions. Stiehl, W. D., Breazeal, C., Lee, J. K., Maymin, A. Z., Knight, H., Toscano, R. L., & Cheung, I. M. (2014). *U.S. Patent No. 8,909,370*.

Wheelchair alarm system and method. Knight, H. M. C., Lee, J. K., Ma, H., & Kattany, L. (2012). *U.S. Patent No. 8,203,454*.

Service

Special Session Chair of *HRI-Ait* at the International Conference on Human-Robot Interaction (HRI '17), March 6-9 2017 in Vienna, Austria.

Workshop Co-Organizer of *Design for HRI* Workshop, International Conference on Human-Robot Interaction (HRI '16), March 7, 2017 in Christchurch, New Zealand.

Program Committee, AAIL Video Competition, International Conference of Artificial Intelligence, 2016.

Workshop Organizer of *Art and Robotics: Freud's Unheimlich and the Uncanny Valley*, at International Conference of Robotics and Automation (ICRA '13), with Ken Goldberg and Pericle Salvini. May 10, 2013 in Karlsruhe, Germany.

Academic Chair at *RoboGames* for two years, curating a speaker series and student poster session during 30+ robot competitions April 22-23, 2012 and April 15-26, 2011 in San Mateo, CA.

Organizing Committee Member for *HRI Young Pioneers Workshop* at the International Conference on Human-Robot Interaction (HRI '12), March 5, 2012 in Boston, MA.

Invited Talks

Invited talk: "Interactions with non-anthropomorphic platforms" at RSS Workshop on Embodied Experience and Movement Observation for Roboticians in Ann Arbor, MI, June 18, 2016.

Keynote: "Charismatic Robots" at Smartcon in Istanbul, Turkey, May, 31, 2016.

Invited talk: "Algorithms for Charismatic Robots" at Worcester Polytech Institute, University of California, Southern California, New York University, Simon-Fraser University, Oregon State University, Spring 2016.

Keynote: "Charismatic Robots" at Thinking Digital in London, UK, March 3, 2016.

Social Robotics talk at Volkswagen Future Research in Wolfsburg, Germany, November 13, 2015.

Social Robotics talk at Volkswagen Future Research in Wolfsburg, Germany, November 13, 2015.

Keynote: "Charismatic Machines and Robot Comedy" at Google Israel's Annual Summit in Tel Aviv, Israel, October 29, 2015

Robot Comedy, *European Communication Summit*, Brussels, Belgium, June 25, 2015

Panel: "Robots Everywhere: Is it good for us?" at *BBC World Changing Ideas Summit* with Kate Darling, Andrea Thomaz and Fernando Orellana in New York, NY, October 21, 2014.

Chatham University's *Think Big Forum*. Part of "Women Who Think and Create" speaker series in Pittsburgh, PA. October 14, 2014.

Robot Comedy, *Beakerhead Science Festival*, Calgary, Canada. September 10, 2014.

SXSW panel: "Future Robot Workforce" with Dawn Tilbury, Hendrik Christenson and Elena Messina. Part of IEEE *Technology for Humanity* speaker series in Austin, TX. March 7, 2014.

New School's *Robot Dialogs* event, with Peter Asaro, Lynn Hershman and Wendall Wallach in New York, NY. January 29, 2014.

Keynote: "The Unconventional Communications of Moving Machines: Robots in Human Environments" at *Robotics Alley Conference* in Minneapolis, MN. November 12, 2013.

"Charismatic Machines," at University of Pennsylvania's MEAM Seminar, Philadelphia. October 15, 2013.

Robot Comedy at *Drones & Aerial Robotics Conference* at NYU, New York, NY, October 11, 2013.

Keynote: "The Rise of Charismatic Machines" at the *Association for Unmanned Vehicles and Systems International* conference in Washington, DC. August 15, 2013.

"Charismatic Machines and Robot Comedy," NEXT Stage presentation at SXSW. Part of IEEE Speaker Series at in Austin, TX. March 10, 2013.

SXSW panel: "Comedy Tech: How Funny Stuff Shapes our Future" with Alf LaMont, Joel Warner and Peter McGraw at *South by Southwest Conference* in Austin, TX. March 9, 2013.

"Social Robots, Cyborg Cabarets, and More," at Carnegie Science Center in Pittsburgh, PA. Part of *SciTech Middle School Program*. March 5, 2013.

Robot Theater panel with Hiroshi Ishiguro at The Japan Society to accompany the *Seinendan Theater Company + Osaka University: Robot Theater* double-act play in NYC. February 5, 2013.

Keynote: "Is Robot and Human Interaction Entertaining or Creepy?" at Robotics Alley Conference in Minneapolis, MN. November 13, 2012.

Robot Comedy, *Robot Hall of Fame* induction ceremony in Pittsburgh, PA. October 23, 2012.

Part of the "Nifty Fifty" speaker series at the *USA Science and Engineering Festival*. Great Falls High School in Maryland. April 26, 2012.

Keynote talk: "The Marriage of Tech and Entertainment" at *Wired UK Conference* in London, UK. October 14, 2011.

"Tech Narratives & Robotic Futures," presentation for *World Maker Faire* at New York Hall of Science in New York, NY, September 17, 2011.

"Why Prometheus loves Robots (How technology creators might be the next Greek Gods)," talk at *Eyeo Festival* in Minneapolis, MN, June 28, 2011.

Part of "Cool Jobs" speaker series at the *World Science Festival* in NY, New York. June 4, 2011.

"Robots and Animism" talk at Thinking Digital Conference in New Castle, UK. May 25, 2011.

Robot comedy, *TEDxCMU* with dramaturgy Professor Michael Chemers. April 4, 2011.

Robot Comedy, Steve Harvey Show, August 24, 2012

“Robotic Touch: Capacitive Sensing to Understand Human Body Language” talk at *Botacon0* in New York, NY, December 11, 2010.

“Silicon Comedy” presentation at *TEDWomen* in Washington, DC. December 9, 2010.

“Built to Fail: Rube Goldberg Machine Infatuation,” including installation and video at *Pop!Tech* 2010 in Camden, Maine, October 20, 2010.

“When Social Robots Dream in the Cloud,” talk at O’Reilly Media’s *Web 2.0 Expo* in New York, NY. September 30, 2010.

“How to Make Robots more Social,” featured talk at *Ignite LA*, Los Angeles, CA. July 21, 2009.

“Exploring Human-Robot Relationships,” talk at *Mindshare LA* in Los Angeles, CA. May 21, 2009.

Media

How to Create Your Own Friends, *Popular Science*, September 2015

<http://www.popsci.com/features/how-to-be-an-expert-in-anything/>

Ginger the robot wants to make you LOL, *CNN*, October 29, 2014

<http://www.cnn.com/2014/10/29/tech/ginger-the-robot/index.html>

Why Humans Will Eventually Think of Robots as Friends, *Business Insider*, August, 9, 2014

<http://www.businessinsider.com/heather-knight-social-robotics-paper-2014-8>

Heather Knight is a Missionary for Social Robotics, *Make Magazine*, June 26, 2014

<http://makezine.com/2014/06/26/heather-knight-is-a-missionary-for-social-robotics/>

Bleep, Boop, Zing! *Hemispheres Magazine*, *United Airlines*, June 2014

<http://www.hemispheresmagazine.com/2014/06/01/bleep-boop-zing/#cl5GpBjeRtsw3Sd.97>

How to raise a personable robot, *London Financial Times*, June 5, 2014

<http://www.ft.com/intl/cms/s/0/02336dd0-e58a-11e3-8b90-00144feabdc0.html#axzz3t2UlrV4P>

Why robots need personalities, *BBC*, May 1, 2014

<http://www.bbc.com/future/story/20140501-why-robots-need-personalities>

Why the Rise of the Robot Workforce Is a Good Thing, *Wall Street Journal*, March 10, 2014

<http://blogs.wsj.com/atwork/2014/03/10/why-the-rise-of-the-robot-workforce-is-a-good-thing/>

10 inspirational women engineers and scientists, *EDN Network*, March 7, 2014

<http://tinyurl.com/he2wnol>

A New Era of Robotics & Artificial Intelligence, *WNYC The Takeaway*, January 30, 2014

<http://www.thetakeaway.org/story/future-robots-robotics-artificial-intelligence/>

A Robot Walks into a Bar..., *The New Yorker*, December 10, 2013

<http://www.newyorker.com/tech/elements/a-robot-walks-into-a-bar>

25 Women in Robotics You Need to Know About, *Robohub*, October 15, 2013

<http://robohub.org/25-women-in-robotics-you-need-to-know-about/>

Robot Film Festival hopes to make bots friendlier by telling happier stories, *Motherboard*, July 15, 2013

<http://tinyurl.com/q9r3ry8>

Data the Comedy Robot, *GQ*, June 2013

<http://www.gq.com/story/data-the-comedy-robot-june-2013>

Cover, *Wired UK*, April 2013

<http://www.wired.co.uk/magazine/archive/2013/04/our-friends-electric/the-inventor>

Cyborg Cabaret: Right this way, your robot's waiting, *Pittsburgh Post-Gazette*, April 27, 2012

<http://www.post-gazette.com/music/2012/04/27/What-to-do-this-weekend-Cyborg-Cabaret-Right-this-way-your-robot-s-waiting/stories/201204270247>

Robot Combat League: Heather Knight Tells Us About Her Experiences on the Show, *IEEE Spectrum*, March 19, 2013

<http://spectrum.ieee.org/automaton/robotics/humanoids/heather-knight-talks-robot-combat>

Beauty and the 'bot, *New York Post*, March 10, 2013

<http://nypost.com/2013/03/10/beauty-and-the-bot/>

Knight gets "Medieval" on Robot Combat League, *RI Press Release*, February 15, 2013

http://www.ri.cmu.edu/news_view.html?news_id=287&fcode=1&menu_id=383

I Tell Stories With Robots, *CNN Next List*, January 2013

<https://vimeo.com/37876219> & <https://vimeo.com/37876252>

Meet the Woman Who's Giving Machines Their Personality, *Oprah Magazine*, November 2012.

<http://www.oprah.com/spirit/Heather-Knight-Robots-Interfacing-With-Humans>

What a Mechanical Performance! Bravo! *New York Times*, July 5, 2012.

<http://www.nytimes.com/2012/07/08/theater/robot-and-human-actors-take-bows-together.html>

Submit to the Robots! ... Or At Least To Their Film Festival, *Singularity Hub*, May 22, 2012

<http://tinyurl.com/6uznprx>

The Cyborg Cabaret Invades Pittsburgh This Friday, *The Creators Project*, April 25, 2012

<http://thecreatorsproject.vice.com/blog/the-cyborg-cabaret-invades-pittsburgh-this-friday>

A Researcher and a Robot Walk into A Bar, *Wall Street Journal*, April 20, 2012

<http://www.wsj.com/articles/SB10001424052702304432704577349860916159278>

Good Robots Make Jobs, *NPR Marketplace*, March 27, 2012

<http://www.marketplace.org/topics/tech/robots-ate-my-job/good-robots-make-jobs>

Roboticist sees improvisation through machine's eyes, *CNN*, Feb 4, 2012

<http://www.cnn.com/2012/02/03/living/creativity-improvisation-intelligence-heather-knight/>

Rising Stars Of Science: The Forbes 30 under 30 in Science, *Forbes*, December 19, 2011

<http://www.forbes.com/pictures/mkg45giif/heather-knight-chief-executive-graduate-student-marilyn-monrobot-carnegie-mellon-28/>

TV Interview: Fareed Zakaria GPS, *CNN*, September 4, 2011

<http://edition.cnn.com/videos/world/2011/09/04/gps-what-world-data.cnn>

A Red Carpet Premiere for Robot-kind, *MIT Technology Review*, July 28, 2011

<http://www.technologyreview.com/view/424848/a-red-carpet-premiere-for-robot-kind/>

Innovation Agents: Heather Knight, Social Robotist, *Fast Company*, February 7, 2011
<http://www.fastcompany.com/1724799/innovation-agents-heather-knight-social-robotist>

League of Extraordinary Nerds, *Fast Company*, January 10, 2011
<http://www.fastcompany.com/1715016/syyn-labss-league-extraordinary-nerds>

Cover, *New Scientist*, December 2010
<http://www.marilynmonrobot.com/publications/robothespians/>

Robot, robot, wherefore art thou robot? *New Scientist*, December 22, 2010
<https://www.newscientist.com/article/mg20827920.400-robot-robot-wherefore-art-thou-robot>

Heather Knight's Rube Goldberg Machine Infatuation, *PopTech*, October 20, 2010
http://poptech.org/popcasts/heather_knights_rube_goldberg_infatuation

World's First Robot Census, *MIT Technology Review*, October 11, 2010
<http://www.technologyreview.com/view/421165/worlds-first-robot-census>