

# ALEXIS E. BLOCK

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## EDUCATION

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**Center for Learning Systems** Ph.D. Candidate July 2017 – Present  
*Max Planck Institute for Intelligent Systems* Stuttgart, Germany

Advisor: Katherine J. Kuchenbecker

*ETH Zurich* Zurich, Switzerland

ETH Zurich Educational Development Teaching Certificate

Advisors: Roger Gassert, Otmar Hilliges

**University of Pennsylvania** August 2015 – May 2017  
*M.S.E. in Robotics* Philadelphia, USA

Masters Thesis: How Should Robots Hug?

Thesis Advisor: Dr. Katherine J. Kuchenbecker

Overall GPA: 3.80/4.00

**University of Pennsylvania** August 2012 – May 2016  
*B.S.E. in Mechanical Engineering & Applied Mechanics* Philadelphia, USA

Cum Laude

Minor in Mathematics

Minor in Engineering Entrepreneurship

Overall GPA: 3.43/4.00

## RELEVANT COURSES

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<b>Graduate Level</b>	Computer Vision and Computational Photography, Feedback Control, Performance and Design of Unmanned Aerial Vehicles, Product Design, Introduction to Robotics, Design of Mechatronic Systems
<b>Undergraduate Level</b>	Machine Design and Manufacturing, Introduction to Mechanical Design, Statics & Strengths of Materials, Engineering Mechanics: Dynamics, Vibration of Mechanical Systems

## SELECTED HONORS AND AWARDS

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2020 Named a 2020 Rising Star in Mechanical Engineering  
2019 ROSCon Diversity Scholarship Recipient  
2018 **Selected as a 2019 HRI Pioneer**  
2017-2020 IMPRS-IS Associated Scholar  
2016 **Penn Alumni Association Student Award of Merit**  
2016 NSF Graduate Research Fellowship Honorable Mention  
2016 Selected to accompany Penn President in London to represent innovation and research  
2016 Cum Laude Graduation Honor  
2015-2016 Dean's List  
2012-2016 University Scholar for exceptional independent research  
2015 Birthright Excel Fellow for leaders in business and technology  
2010 Society of Experimental Test Pilots Award at the Intel International Science and Engineering Fair  
2009 2nd Place Air Force Award at the Intel International Science and Engineering Fair

## PUBLICATIONS

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### *Unpublished Papers (In Preparation and Under Review)*

- [U1] [Alexis E. Block](#), Sammy Christen, Otmar Hilliges, and Katherine J. Kuchenbecker. **Title removed for double blind review.** Under review for *ACM/IEEE International Conference on Human-Robot Interaction (HRI)*.
- [U2] [Alexis E. Block](#), Hasti Seifi, Otmar Hilliges, and Katherine J. Kuchenbecker. **User Responses to Robot Intra-Hug Gestures** In preparation for submission to *ACM Transactions on Human-Robot Interaction (THRI) Special Issue on Affect and Embodiment in HRI*.

### *Journal Articles*

- [J1] [Alexis E. Block](#) and Katherine J. Kuchenbecker. **Softness, Warmth, and Responsiveness Improve Robot Hug Quality.** *International Journal of Social Robotics*, October 2018. (Impact Factor = 2.559).

### *Peer-Reviewed Conference Papers*

- [C1] Jennifer C. T. Hui, [Alexis E. Block](#), Camillo J. Taylor, and Katherine J. Kuchenbecker. **Robust Tactile Perception of Artificial Tumors Using Pairwise Comparisons of Sensor Array Readings.** In *Proc. IEEE Haptics Symposium*, pages 305-312, Philadelphia, Pennsylvania, USA, April 2016.

### *Short Peer-Reviewed Conference and Workshop Papers and Abstracts*

- [S1] [Alexis E. Block](#), Otmar Hilliges, Roger Gassert, and Katherine J. Kuchenbecker. **Using Affective Touch for Emotional Support with a Hugging Robot.** In *Proc. of the Affect and Embodiment in HRI Workshop* held in conjunction with the ACM/IEEE International Conference on Human-Robot Interaction (HRI), Cambridge, UK, March 2020.
- [S2] [Alexis E. Block](#) and Katherine J. Kuchenbecker. **HuggieChest: An Inflatable Haptic Sensing Chest for a Hugging Robot.** In *Proc. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, November 2019. Workshop paper.
- [S3] [Alexis E. Block](#) and Katherine J. Kuchenbecker. **Inflatable Haptic Sensor for the Torso of a Hugging Robot** In *Proc. IEEE World Haptics Conference*, July 2019. Work-in-progress paper.
- [S4] [Alexis E. Block](#) and Katherine J. Kuchenbecker. **Emotionally Supporting Humans Through Robot Hugs.** In *Proc. of the HRI Pioneers Workshop* held in conjunction with the ACM/IEEE International Conference on Human-Robot Interaction (HRI), Chicago, Illinois, USA, March 2018
- [S5] [Alexis E. Block](#) and Katherine J. Kuchenbecker. **Physical and Behavioral Factors Improve Robot Hug Quality.** In *Proc. IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN)*, August 2017. Workshop paper.
- [S6] [Alexis E. Block](#) and Katherine J. Kuchenbecker. **How Should Robots Hug?** In *Proc. IEEE World Haptics Conference*, June 2017. Work-in-progress paper.
- [S7] Jennifer C. T. Hui, [Alexis E. Block](#), and Katherine J. Kuchenbecker. **Detecting Lumps in Simulated Tissue via Palpation with a BioTac.** In *Proc. IEEE World Haptics Conference*, June 2015. Work-in-progress paper.

## GRANTS

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### *Past*

1. TCH Innovation in Haptics  
*Inflatable Torso Sensor for a Hugging Robot*  
Role: Principal Investigator  
Sponsor: IEEE RAS Technical Committee on Haptics  
Dates: 30 November 2018 - 30 November 2019  
Co-PIs: None  
Funding: \$2,500

## MEDIA HIGHLIGHTS

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- December 2020** PM Magazin (German Science Magazine) is publishing an article titled “Touched by a Robot” about Alexis E. Block and HuggieBot 2.0
- 16 October 2020** The New York Times published an article titled “When We Can Hug Again, Will We Remember How It Works?” featuring with an interview with Alexis and discussion of HuggieBot
- 15 October 2020** Double Helix (Australian Science Magazine) published an article titled “The Comfort of Robot Hugs” about Alexis E. Block and HuggieBot 2.0
- 6 December 2019:** Stuttgarter Zeitung published an article with an interview of Alexis E. Block’s research and focused on the new version of HuggieBot 2.0, in German: “Ein Roboter spendet Trost”
- 27 May 2019:** The Robot Report published an article with an interview about Alexis E. Block’s research and recent invited talk: “ETH Zurich Researcher Works to Build Human-Machine Trust, One Robotic Hug at a Time”
- 26 May 2019:** STEM On Fire interviewed Alexis E. Block for their podcast to encourage high-school juniors and seniors and college freshmen and sophomores to study STEM
- 30 August 2018:** NowThis Future Media created a short video using experimental footage and a summary of the experimental procedure and results published in HRI Pioneers Paper that reached over 250,000 views
- 16 June 2018:** NPR (National Public Radio) HuggieBot was featured as a question on NPR’s “Wait Wait Don’t Tell Me” game show
- 15 June 2018:** The Paul Ross Show did an 11 minute interview with Alexis E. Block that was broadcast on TalkRadio in the UK
- 12 June 2018:** The Times (UK Newspaper) published an article written about HuggieBot featuring an interview with Alexis E. Block: “Feel the Love with a Robo-Hug That’s Better Than the Real Thing”
- 11 June 2018:** NBC News published an article written about HuggieBot featuring an interview with Alexis E. Block: “Why Scientists are Teaching this Burly Robot to Hug”
- 7 June 2018:** Digital Trends published an article written about HuggieBot featuring an interview with Alexis E. Block: “Forget Roomba, Your Most Important House Robot Could be the One that Hugs You”
- 5 June 2018:** IEEE Spectrum published a long article written about HuggieBot featuring an interview with Alexis E. Block: “The Importance of Teaching Robots to Hug”

## RESEARCH PRESENTATIONS

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### Invited Keynote Talks at Academic Conferences

1. “From Rosie to Baymax: Translating Our Most Huggable Characters To Real Life.” Keynote. EUROSIS International Conference on Science Fiction Prototyping. Ghent, Belgium. 1-3 April 2019.

## Academic Conferences and Workshops

1. “Emotionally Supporting Humans Through Robot Hugs.” Poster and Oral Presentation at the HRI Pioneers Workshop (held in conjunction with the ACM/IEEE International Conference on Human-Robot Interaction (HRI)). Chicago, IL, USA, 5-8 March 2018
2. “How Should Robots Hug?” Poster Presentation at the IEEE World Haptics Conference (WHC). Fuerstenfeldbruck (Munich), Germany, 6-9 June 2017
3. “Physical and Behavioral Factors Improve Robot Hug Quality.” Oral Presentation at the IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN) Workshop. Lisbon, Portugal, 28 August - 1 September 2017
4. “Characterizing Wall Effect Forces on Quadrotors towards Performing Work on Vertical Surfaces.” Army Research Lab Summer Graduate Student Symposium. Aberdeen MD, USA, 29 July 2016.
5. “A Study of Robotic Palpation for Automatic Characterization of Tumors Embedded in Simulated Tissue.” Columbia Undergraduate Science Journal’s Research Symposium. New York, NY, USA, 26 April 2015.

## Academic Presentations

1. “HuggieBot 2.0: A More Huggable Robot.” CLS Annual Fellows Retreat Presentation. Insel Reichenau, Germany, 16 October 2018.
2. “Do You Want to Hug a Robot?” MPI-IS Retreat Science Slam Presentation. Wertach, Germany, 31 January 2018.
3. “Physical and Behavioral Factors Improve Robot Hug Quality.” CLS Annual Fellows Retreat Presentation. Stoos, Switzerland, 5 October 2017.
4. “Physical and Behavioral Factors Improve Robot Hug Quality.” Robotics Masters Thesis Defense. Philadelphia, PA, USA. 1 May 2017.
5. “HuggieBot: Advancing Human-Robot Interaction to Improve Mental Health.” CLS Interview Presentation. Tuebingen, Germany, 19 January 2017.
6. “PoDSaR: Portable Distributed Search and Report.” Mechanical Engineering and Applied Mechanics Senior Design Presentations. Philadelphia, PA, USA, 18 April 2016
7. “Detecting Lumps in Simulated Tissue via Palpation with a Biotac.” University Scholars Research Talk. Philadelphia, PA, USA, 4 September 2015
8. “A Study of Robotic Palpation for Automatic Characterization of Tumors Embedded in Simulated Tissue.” University Scholars Research Talk. Philadelphia, PA, USA, 5 September 2014

## Invited Talks for Broader Audiences

1. “Let Your Passion be the Innovator of Your Own Life Cycle.” Session in the Jewish Changemakers Fellowship Program. Invited Guest Speaker. Zoom. 7 July 2020 and 4 August 2020.
2. “Man and the Machine.” Berlin Science Week. Invited Guest Speaker. Berlin, Germany. 7 November 2019.
3. “Society 2.0: Understanding The Human-Robot Connection in Improving the World. A Fireside Chat: Oliver Mitchell and Alexis E. Block.” SOSA NYC and Birthright Israel Excel Fireside Chat. Invited Guest Speaker. New York, New York, USA. 16 May 2019.
4. “How HuggieBot Took the Internet by Storm.” Exelerate18, Birthright Israel Excel Annual Summit. Invited talk. New York, New York, USA. 2-4 November 2018.

5. "Our Penn: Let the Conversations Begin." Penn Compact 2020: Inclusion, Innovation, and Impact. Invited Guest Speaker. London, England, 7 March 2016
6. "The Importance of Funding Independent Student Research." Penn Parent Salon. Invited Guest Speaker. Los Angeles, CA, USA, October 20 2015

## RESEARCH ADVISING

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### *Undergraduate*

Christoph Ricklin: Bachelor Thesis student at ETH, Fall 2019

## PROJECT AND RESEARCH EXPERIENCE

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### **GRASP Lab, Haptics Group**

May 2014 – May 2017

- How Should Robots Hug? - Masters Thesis September 2016 – May 2017  
 Advised by Dr. Katherine J. Kuchenbecker
  - Through hardware and software upgrades, I warmed and softened the outside of the Willow Garage PR2 (Personal Robot 2), endowed it with tactile sensors, and enabled it to match the desired pressure and duration for a perfect hug.
- Automatic Palpation May 2014 – May 2016
  - Worked on a system that allows surgeons to palpate tissue in minimally invasive surgery and discern in real time the approximate size and location of tumors and other abnormalities

### **Summer Internship Projects**

- UAVs on Walls - ARL May 2016 – September 2016
  - Characterized the wall effect forces on quadrotors towards getting them to perform useful work on vertical surfaces.

### **Undergraduate Course Projects**

September 2013 – May 2016

- PoDSaR - Senior Capstone August 2015 – May 2016
  - Served as team leader of the project for the entire year
  - Developed a robust, portable, distributive, search and report robotic platform to canvas buildings after collapses, find and relay the path to reach victims, and report on several conditions inside the building. A four-person interdisciplinary senior design project hosted in the MEAM department.
  - Finalists for the 2016 Penn President's Innovation Prize (along with one other team member).
- Robockey September 2015 – December 2015
  - As part of a three-person team, I designed, built, and programmed three fully autonomous robots to play hockey. All programming was done in C and ran on an ARM based microcontroller. The robots communicated wirelessly with a game controller, localized themselves on a rink using a modified Wii sensor, and sensed the puck on the court using IR phototransistors.
- Gamma Type Stirling Engine September 2013 – December 2013
  - Independently designed and manufactured all components for this engine manually from stock material. Achieved a maximum speed of 1200 rpm.

### **Independent Studies**

September 2009 – May 2012

- Battle Bots September 2011 – May 2012
  - As part of a three-person team, I created a remote-controlled, armed, and armored robot to fight in a combat elimination tournament. I was responsible for the electrical wiring, CAD, machining, and assembly of the robot.
- Ionic Propulsion September 2009 – May 2010

- Independently developed a novel ionic engine to demonstrate the principles of ionic propulsion in the Earth’s atmosphere.
- Improved upon the previous year’s engine design to be 2.5 times more power efficient by integrating nano-science with ionic propulsion.

## WORK EXPERIENCE

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### ETH Zurich

Zurich, Switzerland

- Teaching Assistant, Human Computer Interaction August 2019 – February 2020
- Teaching Assistant, Human Computer Interaction August 2018 – February 2019

### University of Pennsylvania

Philadelphia, USA

- Private Tutor (Dynamics, Physics, Calculus, ACT Prep) August 2016 – May 2017
- Research Assistant, GRASP Lab, Haptics Group May 2014 – May 2017
- Teaching Assistant, Project Management, ESE544 January 2017 – May 2017
- Teaching Assistant, Mechatronics, MEAM510 August 2016 – December 2016
- Grader, Vibrations, MEAM321 January 2016 – May 2016
- Advancing Women in Engineering Assistant September 2012 – May 2017
  - Collaborated with the director to develop a variety of STEM programs and activities for college freshmen female engineers, high school, and middle school students to stimulate interest in STEM.

### Army Research Lab

Aberdeen Proving Grounds, USA

- Summer Researcher May 2016 – September 2016

### Ernst & Young - Hacktics

Tel Aviv, Israel

- Summer Intern June 2015 – September 2015
  - Created a database and GUI for accessing client information. Secured the application so employees (hackers) could not gain unauthorized access. Collaborated with hackers and assisted in vulnerability penetration testing. Wrote technical reports of the status of security for clients. Conducted all work in Hebrew.

### Kapur and Associates

Glendale, USA

- Year-Long Intern August 2011 – June 2012
  - Learned AutoCad at this civil engineering company. Independently designed a section of a highway.

## PROFESSIONAL SERVICE

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### Conference Organization

- ACM/IEEE International Conference on Human-Robot Interaction
  - 2019 HRI Pioneers General Chair March 2018 - March 2019

### Peer Reviews

- Conference Paper Reviews
  - ACM/IEEE International Conference on Human-Robot Interaction (HRI) October 2019
  - IEEE World Haptics Conference (WHC) March 2019
- Journal Paper Reviews
  - International Journal of Social Robotics July 2020
  - International Journal of Human-Computer Studies June 2020
  - IEEE Robotics and Automation Letters March 2020
  - Computer Animation and Virtual Worlds December 2019

**LEADERSHIP & TECHNICAL SKILLS**

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**Max Planck ETH Center for Learning Systems**

- Center for Learning Systems Ph.D. Program
  - Co-founder of Student Representatives organization 16 October 2018
  - Elected Student Representative October 2018 - July 2020
- Max Planck Institute for Intelligent Systems
  - Co-founder and co-leader Athena Female Scientists’ Group September 2017 - July 2018
  - Elected Ph.D. Representative December 2017 - July 2018

**University of Pennsylvania**

- Advancing Women in Engineering Board
  - Student Advisor September 2012 – May 2017
- Zeta Tau Alpha Sorority
  - Rho Gamma 2015 & 2016 Recruitment Seasons
  - Secretary January 2014 – December 2014
  - Academic Chair January 2013 – December 2013
- Quaker Girls Dance Team
  - Finance Chair September 2013 – May 2016
  - Choreographer September 2012 – May 2012
- Orthodox Community at Penn
  - Social Chair September 2013 – May 2015

**Computer Languages & Programs**

MATLAB, Java, VB.NET, HTML/CSS, SQL, LaTeX, AutoCad, C/C++, Python, G-Code, COMSOL, Solidworks, Simulink

**Machines & Hardware**

Manual Mill, Laser Cutter, Manual Lathe, Makerbot 3D Printer, ProtoTRAK CNC Mill, Arduino, M2 Microcontroller

**Language Skills**

English (Fluent), Hebrew (Proficient), German (A1), French (A1)