# Ross A. Knepper

## *Curriculum Vitae*

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## Research Interests

Robotics, Autonomy, Artificial Intelligence, Robot Systems, Human-Robot Interaction, Manipulation, Motion Planing, Task Planning, Social Navigation, Multi-Modal Dialog, Natural Language for Robotics, Gesture for Robotics, Robot Learning, Distributed Robotics, Perception, Control.

## Experience

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|---|---|
| 2020–present | **Senior Applied Scientist**, Amazon. |
| 2014–2020 | **Assistant Professor**, Computer Science Dept., Cornell University. |
| 2013–2014 | **Research Scientist**, Distributed Robotics Lab, MIT. |
| 2011–2013 | **Postdoctoral Associate**, Distributed Robotics Lab, MIT. |
| 2004–2006 | **Software Engineer**, National Robotics Engineering Center, CMU. |
| 2000–2003 | **Systems Software Engineer**, Compaq Computer Corporation. |

## Education

**Ph.D., Robotics**, August 2011
Robotics Institute, Carnegie Mellon University, Pittsburgh, PA
Thesis title: *On the Fundamental Relationships Among Path Planning Alternatives*.
Advisor Matthew Mason

**M.S., Robotics**, December 2007
Robotics Institute, Carnegie Mellon University, Pittsburgh, PA
Advisor Matthew Mason

**B.S., Computer Science and Social History**, December 1999
Computer Science Dept., Carnegie Mellon University, Pittsburgh, PA
Minor in Robotics

## Selected Awards and Honors

Cornell

- Best Paper Award (Honorable Mention), ACM Conference on Human Factors in Computing Systems (CHI), for "Implicit Communication of Actionable Information in Human-AI teams", 2019.
- Amazon Research Award, 2019.
- Amazon Research Award, 2018.
- Graduate and Professional Student Assembly's Faculty Teaching, Advising, and Mentorship Award Nominee, 2018.
- Invited Speaker, National Academy of Engineering China-America Frontiers of Engineering Symposium, 2017.
- Best Technical Paper Award (Finalist), ACM/IEEE International Conference on Human-Robot Interaction (HRI), for "Implicit Communication in a Joint Action", 2017.
- Young Investigator Program Award, Air Force Office of Scientific Research, 2016.

- Invited Speaker, National Academy of Science Kavli Frontiers of Science Indonesian-American Symposium, 2016.
- Finalist, Rethink Robotics Video Challenge, for "CS 4752 Robotic Manipulation.", 2015.

MIT
- Best Paper Award, Robotics: Science and Systems (RSS) conference, for "Asking for Help Using Inverse Semantics", 2014.
- KUKA Innovation in Mobile Manipulation Award (Finalist), 2014.
- Best Automation Paper (Finalist), IEEE International Conference on Robotics and Automation (ICRA), for "IkeaBot: An Autonomous Multi-Robot Coordinated Furniture Assembly System", 2013.

## Teaching Experience

Cornell
- CS 4750: Foundations of Robotics
  Enrollment: 80 (Fall 2016), 57 (Fall 2017), 98 (Fall 2018), 87 (Fall 2019)
- CS 4752: Robotic Manipulation
  Enrollment: 36 (Spring 2015), 49 (Fall 2015)
- INFO 4410: Human Robot Interaction
  Enrollment: 18 (Spring 2015)
- CS 6751: Introduction to Robotic Mobile Manipulation
  Enrollment: 9 (Fall 2014), 15 (Spring 2016), 17 (Spring 2017), 9 (Spring 2018)

MIT
- 6.142: Robotics: Science and Systems 2
  Enrollment: 12 (Fall 2012)

## Publications

### Thesis

[1] **Ross A. Knepper**. "On the Fundamental Relationships Among Path Planning Alternatives". PhD thesis. Technical Report CMU-RI-TR-11-19: Robotics Institute, Carnegie Mellon University, Aug. 2011.

### Peer-Reviewed Journal Papers

[13] Christoforos Mavrogiannis, Patrícia Alves-Oliveira, Wil Thomason, and Ross A Knepper. "Social momentum: Design and evaluation of a framework for socially competent robot navigation". In: *ACM Transactions on Human-Robot Interaction* 11.2 (2022), pp. 1–37.

[12] Hadas Kress-Gazit, Kerstin Eder, Guy Hoffman, Henny Admoni, Brenna Argall, Ruediger Ehlers, Christoffer Heckman, Nils Jansen, Ross Knepper, Jan Křetínskỳ, et al. "Formalizing and guaranteeing human-robot interaction". In: *Communications of the ACM* 64.9 (2021), pp. 78–84.

[11] Christoforos Mavrogiannis and Ross A Knepper. "Hamiltonian coordination primitives for decentralized multiagent navigation". In: *International Journal of Robotics Research* 40.10–11 (2021), pp. 1234–1254.

[10] Chris Larson, Josef Spjut, **Ross Knepper**, and Robert Shepherd. "A Deformable Interface for Human Touch Recognition using Stretchable Carbon Nanotube Dielectric Elastomer Sensors and Deep Neural Networks". In: *Soft Robotics* 6 (2019).

[9] Christoforos I. Mavrogiannis and **Ross A. Knepper**. "Multi-Agent Path Topology in Support of Socially Competent Navigation Planning". In: *International Journal of Robotics Research* (2018).

[8] Huichan Zhao, Jonathan Jalving, Rukang Huang, **Ross A. Knepper**, Andy Ruina, and Robert Shepherd. "A Helping Hand: Soft Orthosis with Integrated Optical Strain Sensors and EMG Control". In: *IEEE Robotics and Automation Magazine* 23.3 (Sept. 2016), pp. 55–64.

[7] Mehmet Dogar, **Ross A. Knepper**, Andrew Spielberg, Changhyun Choi, Henrik I. Christensen, and Daniela Rus. "Multi-Scale Assembly with Robot Teams". In: *International Journal of Robotics Research* 34.13 (Nov. 2015).

[6] **Ross A. Knepper**, Stefanie Tellex, Adrian Li, Nicholas Roy, and Daniela Rus. "Recovering from Failure by Asking for Help". In: *Autonomous Robots* 39.3 (Oct. 2015), pp. 347–362.

[5] Thomas Howard, Mihail Pivtoraiko, **Ross A. Knepper**, and Alonzo Kelly. "Model-Predictive Motion Planning for Autonomous Mobile Robots". In: *IEEE Robotics and Automation Magazine* 21.1 (Mar. 2014), pp. 64–73.

[4] **Ross A. Knepper** and Matthew T. Mason. "Realtime Informed Path Sampling for Motion Planning Search". In: *International Journal of Robotics Research* 31.11 (Sept. 2012), pp. 1231–1250.

[3] **Ross A. Knepper**, Siddhartha S. Srinivasa, and Matthew T. Mason. "Toward a deeper understanding of motion alternatives via an equivalence relation on local paths". In: *International Journal of Robotics Research* 31.2 (Feb. 2012), pp. 168–187.

[2] Siddhartha S. Srinivasa, Dmitry Berenson, Maya Cakmak, Alvaro Collet, Mehmet R. Dogar, Anca D. Dragan, **Ross A. Knepper**, Tim Niemueller, Kyle Strabala, Mike Vande Weghe, and Julius Ziegler. "HERB 2.0: Lessons Learned From Developing a Mobile Manipulator for the Home". In: *Proceedings of the IEEE* 100.8 (Aug. 2012), pp. 2410–2428.

[1] Mihail Pivtoraiko, **Ross A. Knepper**, and Alonzo Kelly. "Differentially Constrained Mobile Robot Motion Planning in State Lattices". In: *Journal of Field Robotics* 26.3 (2009), pp. 308–333.

## Peer-Reviewed Conference Papers

[38] Claire Liang, Ross A Knepper, and Florian T Pokorny. "No map, no problem: a local sensing approach for navigation in human-made spaces using signs". In: *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*. 2020, pp. 6148–6155.

[37] Valts Blukis, Yannick Terme, Eyvind Niklasson, **Ross A. Knepper**, and Yoav Artzi. "Learning to Map Natural Language Instructions to Physical Quadcopter Control Using Simulated Flight". In: *Proceedings of the Conference on Robot Learning*. Osaka, Japan, Oct. 2019.

[36] Claire Liang, Julia Proft, Erik Andersen, and **Ross A. Knepper**. "Implicit Communication of Actionable Information in Human-AI teams". In: *Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI)*. **Best Paper Honorable Mention**. Glasgow, United Kingdom, May 2019.

[35] Christoforos I. Mavrogiannis, Alena Hutchinson, John Macdonald, Patrícia Alves-Oliveira, and **Ross A. Knepper**. "Effects of Distinct Robot Navigation Strategies on Human Behavior in a Crowded Environment". In: *Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction*. Daegu, South Korea, Mar. 2019.

[34] Wil Thomason and **Ross A. Knepper**. "A Unified Sampling-Based Approach to Integrated Task and Motion Planning". In: *Proceedings of the International Symposium on Robotics Research*. Hanoi, Vietnam, Oct. 2019.

[33] Valts Blukis, Nataly Brukhim, Andrew Bennett, **Ross A. Knepper**, and Yoav Artzi. "Following High-level Navigation Instructions on a Simulated Quadcopter with Imitation Learning". In: *Proceedings of the Robotics Science and Systems Conference*. Pittsburgh, USA, June 2018.

[32] Valts Blukis, Dipendra Misra, **Ross A. Knepper**, and Yoav Artzi. "Mapping Navigation Instructions to Actions with Position Visitation Prediction". In: *Proceedings of the Conference on Robot Learning*. Zurich, Switzerland, Oct. 2018.

[31] Christoforos I. Mavrogiannis and **Ross A. Knepper**. "Multi-Agent Trajectory Prediction and Generation with Topological Invariants Enforced by Hamiltonian Dynamics". In: *Proceedings of the Workshop on the Algorithmic Foundations of Robotics*. Mérida, Mexico, Dec. 2018.

[30] Christoforos I. Mavrogiannis, Wil Thomason, and **Ross A. Knepper**. "Social Momentum: A Framework for Legible Navigation in Dynamic Multi-Agent Environments". In: *Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction*. Chicago, USA, Mar. 2018.

[29] Euisun Yoon, Erik Andersen, Bharath Hariharan, and **Ross A. Knepper**. "Design Mining for Minecraft Architecture". In: *AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment*. Edmonton, Canada, Nov. 2018.

[28] Christoforos I. Mavrogiannis, Valts Blukis, and **Ross A. Knepper**. "Socially Competent Navigation Planning by Deep Learning of Multi-Agent Path Topologies". In: *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*. Vancouver, Canada, Sept. 2017.

[27] **Ross A. Knepper**, Christoforos I. Mavrogiannis, Julia Proft, and Claire Liang. "Implicit Communication in a Joint Action". In: *Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction*. **Best Paper Finalist**. Vienna, Austria, Mar. 2017.

[26] Minae Kwon, Malte F. Jung, and **Ross A. Knepper**. "Human Expectations of Social Robots". In: *Late Breaking Report at the ACM/IEEE International Conference on Human-Robot Interaction*. Christchurch, New Zealand, Mar. 2016.

[25] Christoforos I. Mavrogiannis and **Ross A. Knepper**. "Decentralized Multi-Agent Navigation Planning with Braids". In: *Proceedings of the Workshop on the Algorithmic Foundations of Robotics*. San Francisco, USA, Dec. 2016.

[24] Wil Thomason and **Ross A. Knepper**. "Recognizing Unfamiliar Gestures for Human-Robot Interaction through Zero-Shot Learning". In: *Proceedings of the International Symposium of Experimental Robotics*. Tokyo, Japan, Oct. 2016.

[23] Javier Alonso-Mora, **Ross A. Knepper**, Roland Siegwart, and Daniela Rus. "Local Motion Planning for Collaborative Multi-Robot Manipulation of Deformable Objects". In: *Proceedings of the IEEE International Conference on Robotics and Automation*. Seattle, USA, May 2015.

[22] Abhishek Anand and **Ross Knepper**. "ROSCoq: Robots powered by constructive reals". In: *The 6th Conference on Interactive Theorem Proving*. Nanjing, China, Aug. 2015.

[21] Ian Lenz, **Ross A. Knepper**, and Ashutosh Saxena. "DeepMPC: Learning Deep Latent Features for Model Predictive Control". In: *Proceedings of the Robotics Science and Systems Conference*. Rome, Italy, July 2015.

[20] Mehmet Dogar, **Ross A. Knepper**, Andrew Spielberg, Changhyun Choi, Henrik I. Christensen, and Daniela Rus. "Towards Coordinated Precision Assembly with Robot Teams". In: *Proceedings of the International Symposium of Experimental Robotics*. Marrakesh and Essaouira, Morocco, June 2014.

[19] Laura Lindzey, **Ross A. Knepper**, Howie Choset, and Siddhartha S. Srinivasa. "The Feasible Transition Graph: Encoding Topology and Manipulation Constraints for Multirobot Push-Planning". In: *Proceedings of the Workshop on the Algorithmic Foundations of Robotics*. Istanbul, Turkey, Aug. 2014.

[18] Stefanie Tellex, **Ross A. Knepper**, Adrian Li, Daniela Rus, and Nicholas Roy. "Asking for Help Using Inverse Semantics". In: *Proceedings of the Robotics Science and Systems Conference*. **Best Paper**. Berkeley, USA, July 2014.

[17] Dan Feldman, Stephanie Gil, **Ross A. Knepper**, Brian Julian, and Daniela Rus. "K-Robots Clustering of Moving Sensors Using Coresets". In: *Proceedings of the IEEE International Conference on Robotics and Automation*. Karlsruhe, Germany, May 2013.

[16] Ross L. Hatton, **Ross A. Knepper**, Howie Choset, David Rollinson, Chaohui Gong, and Enric Galceran. "Snakes on a Plan: Toward Combining Planning and Control". In: *Proceedings of the IEEE International Conference on Robotics and Automation*. Karlsruhe, Germany, May 2013.

[15] **Ross A. Knepper**, Todd Layton, John Romanishin, and Daniela Rus. "IkeaBot: An Autonomous Multi-Robot Coordinated Furniture Assembly System". In: *Proceedings of the IEEE International Conference on Robotics and Automation*. **Best Automation Paper Finalist**. Karlsruhe, Germany, May 2013.

[14] **Ross A. Knepper** and Daniela Rus. "On the Completeness of Ensembles of Motion Planners for Decentralized Planning". In: *Proceedings of the IEEE International Conference on Robotics and Automation*. Karlsruhe, Germany, May 2013.

[13] **Ross A. Knepper**, Stefanie Tellex, Adrian Li, Nicholas Roy, and Daniela Rus. "Single Assembly Robot in Search of Human Partner: Versatile Grounded Language Generation". In: *Late Breaking Report at the ACM/IEEE International Conference on Human-Robot Interaction*. Tokyo, Japan, May 2013.

[12] Jue Wang, Fadel Adib, **Ross A. Knepper**, Dina Katabi, and Daniela Rus. "RF-Compass: Robot Object Manipulation using RFIDs". In: *MobiCom: International Conference on Mobile Computing and Networking*. Miami, USA, Oct. 2013.

[11] **Ross A. Knepper** and Daniela Rus. "Pedestrian-Inspired Sampling-Based Multi-Robot Collision Avoidance". In: *Proceedings of the IEEE International Symposium on Robot and Human Interactive Communication*. Paris, France, Sept. 2012.

[10] **Ross A. Knepper** and Matthew T. Mason. "Improved Hierarchical Planner Performance Using Local Path Equivalence". In: *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*. San Francisco, USA, Sept. 2011.

[9] **Ross A. Knepper** and Matthew T. Mason. "Realtime Informed Path Sampling for Motion Planning Search". In: *Proceedings of the International Symposium on Robotics Research*. Flagstaff, USA, Aug. 2011.

[8] **Ross A. Knepper**, Siddhartha S. Srinivasa, and Matthew T. Mason. "An Equivalence Relation for Local Path Sets". In: *Proceedings of the Workshop on the Algorithmic Foundations of Robotics*. Singapore, Dec. 2010.

[7] **Ross A. Knepper**, Siddhartha S. Srinivasa, and Matthew T. Mason. "Hierarchical Planning Architectures for Mobile Manipulation Tasks in Indoor Environments". In: *Proceedings of the IEEE International Conference on Robotics and Automation*. Anchorage, USA, May 2010.

[6] **Ross A. Knepper** and Matthew T. Mason. "Path Diversity is Only Part of the Problem". In: *Proceedings of the IEEE International Conference on Robotics and Automation*. Kobe, Japan, May 2009.

[5] Michael S. Branicky, **Ross A. Knepper**, and James J. Kuffner. "Path and Trajectory Diversity: Theory and Algorithms". In: *Proceedings of the IEEE International Conference on Robotics and Automation*. Pasadena, USA, May 2008.

[4] **Ross A. Knepper** and Matthew T. Mason. "Empirical Sampling of Path Sets for Local Area Motion Planning". In: *Proceedings of the International Symposium of Experimental Robotics*. Athens, Greece, July 2008.

[3] Thomas M. Howard, **Ross A. Knepper**, and Alonzo Kelly. "Constrained Optimization Path Following of Wheeled Robots in Natural Terrain". In: *Proceedings of the International Symposium of Experimental Robotics*. Rio de Janeiro, Brazil, July 2006.

[2] **Ross A. Knepper** and Alonzo Kelly. "High Performance State Lattice Planning Using Heuristic Look-Up Tables". In: *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*. Beijing, China, Oct. 2006.

[1] Howie Choset, **Ross Knepper**, Joleen Flasher, Sean Walker, Andrew Alford, Dean Jackson, David Kortenkamp, Jaime J. Fernandez, and Robert R. Burridge. "Path Planning and Control for AERCam, a Free-Flying Inspection Robot in Space". In: *Proceedings of the IEEE International Conference on Robotics and Automation*. Detroit, USA, May 1999.

## Workshop Papers

[19] Niko Grupen and **Ross A. Knepper**. "Visual Primitives for Abductive Reasoning". In: *Robotics: Science and Systems Workshop on Combining Learning and Reasoning – Towards Human-Level Robot Intelligence*. Freiburg, Germany, June 2019.

[18] Claire Liang and Ross A. Knepper. *Minimalist Motion Planning Using Global Topological Guarantees*. Montreal, Canada, May 2019.

[17] Elizabeth Ricci and **Ross Knepper**. "A Bounded Suboptimal Environmental Monitoring Algorithm". In: *Robotics: Science and Systems Workshop on Informative Path Planning and Adaptive Sampling*. Freiburg, Germany, June 2019.

[16] Soham Sankaran and **Ross A. Knepper**. "Usability squared: Principles for doing good systems research in robotics". In: *Robotics: Science and Systems Workshop on Cloud and Fog Robotics in the Age of Deep Robot Learning*. Freiburg, Germany, June 2019.

[15] Wil Thomason and **Ross A. Knepper**. "A Flexible Sampling-Based Approach to Task and Motion Planning". In: *Robotics: Science and Systems Workshop on Robust Task and Motion Planning*. Freiburg, Germany, June 2019.

[14] Minae Kwon, Melissa Ferguson, Thomas Mann, and **Ross A. Knepper**. "An Exploration of Implicit Attitudes Towards Robots Using Implicit Measures". In: *Workshop on Explainable Robotic Systems*. Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction. Mar. 2018.

[13] Christoforos I. Mavrogiannis and **Ross A. Knepper**. "Decentralized navigation planning using multi-agent trajectory prediction governed by Hamiltonian dynamics". In: *Workshop on Multi-Robot Perception-Driven Control and Planning. Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*. Madrid, Spain, Oct. 2018.

[12] Minae Kwon, Melissa Ferguson, Thomas Mann, and Ross A. Knepper. "Forming and Updating Implicit Impressions of Robot Competence". In: *Workshop on Morality and Social Trust in Autonomous Robots*. Proceedings of the Robotics Science and Systems Conference. July 2017.

[11] Claire Liang, Julia Proft, and **Ross A. Knepper**. "Implicature-Based Inference for Socially-Fluent Robotic Teammates". In: *Workshop on Mathematical Models, Algorithms, and Human-Robot Interaction*. Proceedings of the Robotics Science and Systems Conference. July 2017.

[10] Christoforos Mavrogiannis, Valts Blukis, and **Ross A. Knepper**. "Inferring Strategies of Avoidance: Towards Socially Competent Navigation in Human Environments". In: *Workshop on Mathematical Models, Algorithms, and Human-Robot Interaction*. Proceedings of the Robotics Science and Systems Conference. July 2017.

[9] Wil Thomason and **Ross A. Knepper**. "Exploiting Heterogeneity in Robot Teams Through a Formalism of Capabilities". In: *Workshop on Heterogeneity and Diversity for Resilience in Multi-Robot Systems*. Proceedings of the Robotics Science and Systems Conference. July 2017.

[8] Wil Thomason and **Ross Knepper**. "Toward Contextual Grounding of Unfamiliar Gestures for Human-Robot Interaction". In: *First International Workshop on Adaptive Shot Learning for Gesture Understanding and Production*. IEEE Conference on Automatic Face and Gesture Recognition. Arlington, Va., USA, May 2017.

[7] Minae Kwon, Malte F. Jung, and **Ross A. Knepper**. "Human Expectations of Social Robots". In: *Workshop on Challenges and best practices to study HRI in natural interaction settings*. Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction. Christchurch, New Zealand, Mar. 2016.

[6] Christoforos I. Mavrogiannis and **Ross A. Knepper**. "Interpretation and Communication of Pedestrian Intentions Using Braid Groups". In: *Workshop on Intention Recognition in HRI*. Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction. Christchurch, New Zealand, Mar. 2016.

[5] Christoforos I. Mavrogiannis and **Ross A. Knepper**. "Towards Socially Competent Navigation of Pedestrian Environments". In: *Workshop on Social Trust in Autonomous Robots*. Proceedings of the Robotics Science and Systems Conference. Ann Arbor, USA, June 2016.

[4] **Ross A. Knepper**. "On the Communicative Aspect of Human-Robot Joint Action". In: *Workshop: Toward a Framework for Joint Action, What about Common Ground?* Proceedings of the IEEE International Symposium on Robot and Human Interactive Communication. New York, USA, Aug. 2016.

[3] Wil Thomason and **Ross A. Knepper**. "Recognizing Unfamiliar Gestures for Human-Robot Interaction through Zero-Shot Learning". In: *Workshop on Model Learning for Human-Robot Communication*. Proceedings of the Robotics Science and Systems Conference. Ann Arbor, USA, June 2016.

[2] **Ross A. Knepper**, Dishaan Ahuja, Geoffrey Lalonde, and Daniela Rus. "Distributed Assembly with AND/OR Graphs". In: *Workshop on AI Robotics*. Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems. Chicago, USA, Sept. 2014.

[1] **Ross A. Knepper** and Daniela Rus. "Human-Inspired Distributed Collision Avoidance". In: *Workshop on Many-Robot Systems: Crossing the Reality Gap*. Proceedings of the IEEE International Conference on Robotics and Automation. St. Paul, USA, May 2012.

### Technical Reports

[5] Valts Blukis, Ross A Knepper, and Yoav Artzi. "Few-shot object grounding and mapping for natural language robot instruction following". In: *arXiv preprint arXiv:2011.07384* (2020).

[4] Elizabeth A Ricci, Madeleine Udell, and Ross A Knepper. "An Information-Theoretic Approach to Persistent Environment Monitoring Through Low Rank Model Based Planning and Prediction". In: *arXiv preprint arXiv:2009.01168* (2020).

[3] Soham Sankaran and Ross A. Knepper. "Usability Squared: Principles for doing good systems research in robotics". In: *arXiv preprint arXiv:1906.06775* (2019).

[2] Laura Lindzey, Howie Choset, Siddhartha Srinivasa, and Ross A. Knepper. *Multirobot Pushing — How Many Robots are Sufficient?* Tech. rep. CMU-RI-TR-12-15. Robotics Institute, Carnegie Mellon University, May 2012.

[1] Mihail Pivtoraiko, **Ross A Knepper**, and Alonzo Kelly. *Optimal, Smooth, Nonholonomic Mobile Robot Motion Planning in State Lattices*. Tech. rep. CMU-RI-TR-07-15. Robotics Institute, Carnegie Mellon University, May 2007.

## Invited Talks

[44] Workshop on Human-Multi-Robot Systems Challenges for Real World Applications IEEE International Conference on Intelligent Robots and Systems (IROS), Kyoto, Japan, October 27, 2022.

[43] Mechanical Engineering Seminar, Department of Mechanical Engineering, Columbia University, New York, NY, USA, October 14, 2019.

[42] Robotics Seminar, Robotics Institute, Carnegie Mellon University, Pittsburgh, PA, USA, September 6, 2019.

[41] Robotics Seminar, University of Leeds, Leeds, United Kingdom, May 10, 2019.

[40] LAAS-CNRS, Toulouse, France, May 7, 2019.

[39] Robotics Seminar, Massachusetts Institute of Technology, Cambridge, MA, USA, April 19, 2019.

[38] Robotics and Autonomous Systems Seminar, Stanford University, Palo Alto, CA, USA, April 12, 2019.

[37] University of California, Berkeley, CA, USA, April 10, 2019.

[36] Robotics Colloquium, University of Washington, Seattle, WA, USA, March 1, 2019.

[35] Microsoft Research, Redmond, WA, USA, February 28, 2019.

[34] NSF CPS PI meeting, Alexandria, VA, USA, November 15, 2018.

[33] Exhibition and Benchmarking of Task and Motion Planners Workshop, Robotics: Science and Systems conference (RSS), Pittsburgh, PA, USA, June 30, 2018.

[32] Workshop on Models and Representations for Natural Human-Robot Communication, Robotics: Science and Systems conference (RSS), Pittsburgh, PA, USA, June 29, 2018.

[31] Towards a framework for Joint Action: What about Theory of Mind? Workshop, Robotics: Science and Systems conference (RSS), Pittsburgh, PA, USA, June 29, 2018.

[30] Emerging Topic: Human-AI Collaboration, AAAI Conference on Artificial Intelligence, February 5, 2018.

[29] Intelligent Systems Center Seminar Series, Applied Physics Laboratory, Johns Hopkins University, February 1, 2018.

[28] GRASP Seminar Series, University of Pennsylvania, January 26, 2018.

[27] Computer Science Seminar, Colorado School of Mines, January 18, 2018.

[26] Workshop on Synergies Between Learning and Interaction, IEEE International Conference on Intelligent Robots and Systems (IROS), September 28, 2017.

[25] National Academy of Engineering (NAE), China-America Frontiers of Engineering Symposium, Shanghai, China, June 23, 2017.

[24] Department of Computer Science Seminar Series, University of Rochester, Rochester, NY, USA, October 24, 2016.

[23] Workshop on Perspectives on Analysis and Design of Human-Centered Robotics, IEEE International Conference on Intelligent Robots and Systems (IROS), Daejeon, Korea, October 10, 2016.

[22] Workshop on Human-Robot Collaboration: Towards Co-Adaptive Learning Through Semi-Autonomy and Shared Control, IEEE International Conference on Intelligent Robots and Systems (IROS), Daejeon, Korea, October 10, 2016.

[21] Kavli Frontiers of Science Indonesian-American Symposium, Malang, Indonesia, August 4, 2016.

[20] Lightning talk and poster, 4th International Conference on Computational Sustainability, Ithaca, NY, USA, July 6, 2016.

[19] Workshop on Human-Robot Interaction, INRIA, Paris, France, July 21, 2016.

[18] Workshop on Planning for Human-Robot Interaction: Shared Autonomy and Collaborative Robotics, Robotics: Science and Systems conference (RSS), Ann Arbor, MI, USA, June 18, 2016.

[17] World Robot Conference, Beijing, China, November 23, 2015.

[16] AI for Human-Robot Interaction, AAAI Fall Symposium, Alexandria, VA, USA, November 12, 2015.

[15] Robotics Presentations, AAAI Conference on Artificial Intelligence, Austin, TX, USA, January 29, 2015.

[14] Computer Science Colloquium, Cornell University, Ithaca, USA. April 17, 2014.

[13] Computer Science Colloquium, University of Texas, Austin, USA. April 10, 2014.

[12] Mechanical Engineering and Materials Science Seminar, Yale University, New Haven, USA. March 26, 2014.

[11] Computer Science and Engineering Seminar, University of Minnesota Twin Cities, Minneapolis, USA. March 14, 2014.

[10] Computer Science Seminar, University of Massachusetts Amherst, Amherst, MA, USA. March 11, 2014.

[9] Computer Science Colloquium, University of Colorado, Boulder, USA. March 6, 2014.

[8] Woodruff School of Mechanical Engineering Seminar, Georgia Institute of Technology, Atlanta, USA. February 27, 2014.

[7] Department of Computer Science Colloquium, Rutgers University, New Brunswick, NJ, USA. February 25, 2014.

[6] Robotics Colloquium, University of Washington, Seattle, USA. November 7, 2013.

[5] School of Computer Science, Carnegie Mellon University, Pittsburgh, USA. April 16, 2012.

[4] Robotics Engineering Colloquium, Worcester Polytechnic Institute, Worcester, MA, USA. March 1, 2012.

[3] Robotics and Intelligent Machines Seminar Series, Georgia Institute of Technology, Atlanta, USA. January 18, 2012.

[2] Rice University, Houston, USA. May 17, 2011.

[1] Computer Science and Artificial Intelligence Laboratory, Massachusetts Institute of Technology, Cambridge, MA, USA. April 27, 2011.

## Funding

Cornell

- **ONR** N00014-18-S-F009, "Modeling and Planning with Human Impressions of Robots", 2019–2023
  PI, Total award: $2,594,913, Knepper award: $1,318,220.
- **NSF National Robotics Initiative** IIS-1925100, "Integrating Robotic and AI Technologies to Support Embodied Collaborative Design", 2019–2022
  Co-PI, Total award: $1,499,555, Knepper award: $140,090.
- **Amazon Research Award**, "Learning High-level Robot Behaviors by Predicting State Visitation Distributions", 2019–2020
  PI, Award amount: $80,000.
- **Amazon Research Award**, "Transferring Policies from Simulation to Real World Manipulation", 2018–2019
  PI, Award amount: $78,300.
- **AFOSR Young Investigator Program** FA9550-17-1-0109, "Enabling Robust Persistent Autonomy in Robots", 2017–2019
  PI, Award amount: $360,000.
- **NSF Cyber Physical Systems** CCF-1646417, "Coordinated Action Among Independent Mobile Cyber-Physical Systems", 2016–2020
  PI, Award amount: $799,995.
- **Cornell University Seed Grant**, "Towards a New Robotic Manipulation Formalism for the Real World", 2016–2017
  PI, Award amount: $100,000.
- **NSF Cyber-Human Systems** IIS-1563705, "Improving Distributed Teamwork Through Mobile Robotic Telepresence Systems", 2016–2020
  Co-PI, Total award: $1,272,000, Knepper award: $176,342.
- **ONR** N00014-16-1-2080, "Dexterous Manipulation Specification Via Language and Context Constraints", 2016–2019
  PI, Total award: $1,050,000, Knepper award: $691,565.
- **HIT Robot Group**, 2015–2016, PI, Award amount: $76,409.

- **NSF Cyber-Human Systems** IIS-1526035, "Collaborative Research: Modeling Social Context to Improve Human-Robot Interaction", 2015–2018
  Cornell PI, Total award: $500,000, Knepper award: $250,000.
- **Intel Education Grant**, 2015, PI, Award amount: $75,000.

## Outreach

- 4-H Career Explorations: Design and supervision of a three-day-long robotics project for high school students from underserved communities, 2016–2019.
- Lecture at CATALYST Academy, 2017.

## Professional Service

**Open Source Contributor**

- **ROS** the robot operating system, 2012–2013.
- **JFS for Linux** journaling filesystem, 2000–2003.
- **Linux Kernel** Alpha architecture, 1999–2003.

**Committees**

- **Publicity chair** Robotics: Science and Systems (RSS), 2017
- **Co-chair** IEEE RAS Technical Committee on Robot Learning, 2015–2018.

**Organizer**

- **Co-organizer** Northeast Robotics Colloquium (NERC) October 29–30, 2016, Cornell University, Ithaca, NY, USA.
- **Co-organizer** Workshop on negative results in experimental robotics: learning the right lessons from robots. Robotics: Science and Systems (RSS) conference, 2015.

**Editorial Duties**

- **Program Committee Member**, IEEE/ACM International Conference on Human-Robot Interaction (HRI) 2018–2019.
- **Associate Editor**, International Conference on Intelligent Robots and Systems (IROS) 2014–2016.
- **Associate Editor**, International Conference on Robotics and Automation (ICRA) 2012–2013, 2016–2017.
- **Associate Editor**, IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN), 2016.

**Reviewing Activities**

- International Journal of Robotics Research (IJRR)
- IEEE Transactions on Robotics (TRO)
- International Journal of Social Robotics
- Journal of Artificial Intelligence Research (JAIR)
- Robotics and Autonomous Systems Journal
- Autonomous Robots Journal
- Robotics: Science and Systems Conference (RSS)
- IEEE International Conference on Robotics and Automation (ICRA)
- IEEE International Conference on Intelligent Robots and Systems (IROS)

- ACM/IEEE International Conference on Human-Robot Interaction (HRI)
- ACM Conference on Human Factors in Computing Systems (CHI)
- Conference on Artificial Intelligence (AAAI)
- International Joint Conference on Artificial Intelligence (IJCAI)
- International Symposium on Experimental Robotics (ISER)
- International Symposium on Robotics Research (ISRR)
- Workshop on the Algorithmic Foundations of Robotics (WAFR)
- International Conference on Field and Service Robotics (FSR)
- Neural Information Processing Systems Conference (NIPS)
- NSF panelist and external reviewer (multiple programs - CISE directorate)

## Departmental Service

Cornell
- Founding Organizer, Robotics Seminar, Department of Computer Science, 2015–2019.
- Faculty Search Committee. Department of Computer Science, 2014–2015, 2018–2019.
- Faculty Search Committee. Department of Electrical and Computer Engineering, 2017–2018.
- Graduate Admissions Committee, Department of Computer Science, 2016–2018.
- Organizer, Artificial Intelligence Seminar, Department of Computer Science, 2015–2018.

Carnegie Mellon
- Ph.D. Admissions Committee. Robotics Institute, 2009–11.

## University Service and Mentorship

Cornell
- Faculty advisor, Cornell Battlebots Team, 2019.
- Faculty advisor, software subteam, Autonomous Bicycle Project Team, 2017–2019.
- Faculty advisor, Solar Airship Team, 2016–2019.
- Founder and organizer, Grant-Writing Bootcamp for mentoring junior faculty, Department of Computer Science, 2016-2018.
- Member, Advisory Committee for Engineering Student Project Teams, 2016–2017.
- Faculty advisor, software subteam, Cornell University Autonomous Underwater Vehicle Project Team, 2015–2019.
- Faculty advisor, Hammock Enthusiasts' Club, 2015–2019.

## Professional Memberships

- Institute of Electrical and Electronics Engineers (IEEE)
- Robotics and Automation Society (IEEE RAS)
- Association for Computing Machinery (ACM)
- Sigma Xi

## Doctoral Students Graduated

Cornell

2. Christoforos Mavrogiannis. Mechanical Engineering Field, 2014–2019, Thesis title: "Motion Planning for Socially Competent Robot Navigation".

1. Ian Lenz. Computer Science Field, 2014–2016, Thesis title: "Deep Learning for Robotic Perception and Control".

## Masters of Science Students Graduated

Cornell

2. Sydney Zink. Computer Science Field, 2016–2018, Thesis title: "Mine Over Matter: Gaming Google 'Quick, Draw!' Data to Explore Theory of Mind in Autism".
1. Elijah Lee, Mechanical Engineering Field, 2014–2015.

## Postdoctoral Associate Supervision

Cornell

– Abhishek Anand. Computer Science, jointly supervised, 2016–2018.

## Thesis Committees Completed (not chair)

Cornell Ph.D.

20. D. Sawyer Elliott, Mechanical Engineering Field, Thesis title: "Momentum Control Systems and Their Application in Robotic Systems", Chair: Mason Peck, 2019.
19. Catherine Wong, Mechanical Engineering Field, Thesis title: "Robot Controllers: Online and Offline Adaption, and Automatic Code Transfer", Chair: Hadas Kress-Gazit, 2018.
18. Gangyuan Jing, Mechanical Engineering Field, Thesis title: "High-Level Control of Modular Robot Systems", Chair: Hadas Kress-Gazit, 2018.
17. Bryan Peele, Mechanical Engineering Field, Thesis title: "Imparting Dexterity, Touch, and Visual Expression in Soft Robotics", Chair: Rob Shepherd, 2017.
16. Chris Larson, Mechanical Engineering Field, Thesis title: "Deformable Media for Visual and Tactile Interfaces", Chair: Rob Shepherd, 2017.
15. Abhishek Anand, Computer Science Field, Thesis title: "Trust in Proof Assistants : Opportunities and Limitations", Ph.D., Chair: Bob Constable, 2016.
14. Jonathan DeCastro, Mechanical Engineering Field, Ph.D., Chair: Hadas Kress-Gazit, 2016.
13. Benjamin Reinhardt, Mechanical Engineering Field, Thesis title: "Induction Couplers: Contactless On-Orbit Actuation for Space Robotics", Ph.D., Chair: Mason Peck, 2015.

Cornell M.S.

12. Yifan Tang, Mechanical Engineering Field, Chair: Guy Hoffman.
11. Gulai Shen, Mechanical Engineering, Chair: Silvia Ferrari.
10. Yifeng Shi, Mechanical Engineering, Chair: Silvia Ferrari.
9. Yiwen (Owen) Hua, Mechanical Engineering Field, M.S., Chair: Kirstin Petersen, 2018.
8. Yawen Deng, Mechanical Engineering Field, M.S., Chair: Kirstin Petersen, 2018.
7. Zeyu Liu, Mechanical Engineering Field, M.S., Chair: Silvia Ferrari, 2018.
6. Min Zheng, Mechanical Engineering Field, M.S., Chair: Silvia Ferrari, 2018.
5. Yichen Zhou, Mechanical Engineering Field, M.S., Chair: Mark Campbell, 2018.
4. Elijah Lee, Mechanical Engineering Field, M.S., Chair: Brian Kirby, 2015.

Cornell B.A.

3. Minae Kwon, Department of Psychology, "Forming and Updating Implicit Attitudes Toward Robots", Magna Cum Laude, Chair: Melissa Ferguson, 2017.

External

2. Claudia Perez D'Arpino, *Massachusetts Institute of Technology*, Department of Electrical Engineering and Computer Science, Thesis title: "Hybrid Learning for Multi-Step Manipulation in Collaborative Robotics", Ph.D., Chair: Julie Shah, 2019.

1. Yu-Han Lyu, *Dartmouth College*, Department of Computer Science, Thesis title: "Implications of Motion Planning: Optimality and $K$-Survivability", Ph.D., Chair: Devin Balkcom, 2016.

## M.Eng. Project Supervision

Cornell

- Rebecca Adara, M.Eng., 2017–2018.
- Kevin Hui and Alan Wu, "HRI: Building an Interactive Scrabble Robot", M.Eng., 2017.
- Willie Xu, "Creating a Controls System for an Autonomous Blimp", M.Eng., 2017.
- Paul Ammann, M.Eng., 2017.
- Ben Anderson, "Robotic Hand Design", M.Eng., 2017.
- Achintya Sakthi Sankarraman, Kirill Rudenko, Sayge Schell, "Robotics Education", M.Eng., 2017.
- Chang Jiao, Elly Nakahara, and Sayge Schell, "Robotics Education", M.Eng., 2016.
- Heting Liu, "Moon Pointer", 2016.
- Gabriel Abrams, Yuanyuan "Amy" Chen, and Lingjun "Linda" Pei, "Baxter K12 Program Educational Tool", M.Eng., 2016. **Received CS M.Eng. Project Award.**
- Ashish Bhatnegar and Samuel Giampa, "Trust Building and Deception in Human-Robot Cooperation", M.Eng., 2016.
- Zhuo "Andy" Li, "Robotic Torsion Gripper for Furniture Assembly", M.Eng., 2016.
- Yuhao "Collin" Qian, "Robot Navigation Stack for Social Navigation", M.Eng., 2016.
- Derek Faust, "Environment-Assisted Manipulation", M.Eng., 2015.
- Daniel Nam, "Pedestrian Environment Simulator and Predicting Algorithm", M.Eng., 2015.

## Undergraduate Project Supervision

Cornell

- Sofie Halpern, Arpit Kalla, Dilan Lakhani, Stanley Lin, Michelle Loven, Daisy Zhang. Ikeabot 2.0, 2019.
- Erika Hauschild, Yue (Olivia) Li, Noah Thompson, Josh Zheng. An embodied robot system for playing Hanabi, 2019
- Eugene Kim, Youngjin Kim. A theory of team collaboration for Hanabi, 2018–2020.
- Matthew Luebbers. Fall foliage prediction, 2017.
- Claire Liang. Implicature as a collaborative strategy in the game Hanabi, 2016.
- Chelsea Sidrane, Undergraduate Thesis, 2016.
- Rebecca Adara, Tejas Advait, Amrit Amar, Rohan Basavaraju, Rachel Brotherton, Joo Yeon Chae, Imani Chilongani, Ryan Curtis, Priyanka Dilip, Matthew DiStefano, Zoe Du, Austin Joa, Sattvik Kansal, Hon Wei Khor, Ian Kranz, Eashaan Kumar, Sophie Lan, Darwin Li, Henry Li, Zhilong Li, Matthew Luebbers, Alex Lui, Trevor MacDonald, Abrahm Magana, Ryan Meredith, Vignesh Nandakumar, Karan Newatia, Kyra Patton, Elena Pertsalis, Alice Pham, Han Ren, Akshat Singh, Aditya Shah, Stephen Stover, Alexander Ueki, Alexander Volkov, Yanrui Wang, Shuqing (Coco) Wu, Emma Xu, Haoyun Xu, Willie Xu, Ashley Xue, Helen Yang, Henry Zheng, Catherine Zhou, Autonomous Solar-Powered Airship, 2016–2019.
- Vitchyr Pong, Samantha Chen, Katey Huddleston, Melody Li, Alyssa Trigg, Parsing Ikea Instructions, 2015–2016.

- Yogisha Dixit, Daryl Sew, Samantha Chen, Liele Getachew, Shiv Malhotra, Zachary Vinegar, Detecting and Tracking Human Pedestrians, 2015–2018.
- Alexander Volkov and Ian Kranz, Miniature Autonomous Car, 2015–2016.
- Minae Kwon, Lydia Holley, Andrew Matsumoto, Elizabeth Yam, Managing Human Expectations of Robots, 2014–2020.
- Maheer Iqbal, Haptic Robot Control Interface, 2014–2015.

MIT

- Dishaan Ahuja, Geoff Lalonde, Multi-Robot Distributed Assembly Planning, 2012–2014.
- José Pacheco, KUKA youBot Inverse Kinematics, 2012–2013.
- John Romanishin, Undergraduate Thesis Title: "Development of a Robotic Torque Application Gripper for Automated Furniture Assembly", 2012.

October 25, 2022