

# ROSS A. KNEPPER, PH.D.

- Technical leader who solves the hardest problems in AI for robots and autonomous systems.
- Passionate about building robot systems that help people solve real problems in their lives.
- Drawn to systems-level problems involving cross-functional collaboration and conflict resolution.
- Thrives in high-ambiguity situations and enjoys early-stage product design and development.

## WORK EXPERIENCE

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### Senior Applied Scientist

#### Amazon

📅 June 2020 – Present

Technical leader for motion planning, motion control, and human-robot interaction teams.

- Developed new motion control architecture to eliminate instability. Reduced path-following error by 10x.
- Optimized motion controller for modularity and testability. Isolation from autonomy system saved a month of development time blocked on other system bugs.
- Built tools to generate and analyze repeatable velocity profiles in development, testing, and production. Reduced validation time from a week to an hour.
- Created analytics tool for triaging motion planning failures. Tool ran after failure in a production setting, allowing team members to triage bugs 20x faster than before. Helped reduce backlog and refocus engineers on project work.
- Led a team of four on high-ambiguity bringup of legacy autonomy software, known to contain hidden hardware dependencies, on two new prototype robots. Delivered two months ahead of schedule, which enabled early hardware down-select and saved money and developer time.
- Leveraged bringup experience to define product and engineering requirements for the next hardware revision in the areas of motion control and human-robot interaction.
- Built a new five-person science team focused on human-robot interaction. Directed science and managed projects. Delivered two new safety-critical features on schedule.
- Conducted hiring and development activities to improve performance of engineers, scientists, and managers.

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### Assistant Professor

#### Cornell University, Computer Science Department

📅 July 2014 – May 2020

Interdisciplinary researcher and teacher in a top computer science department.

- Invented theory and methods for robot social navigation in pedestrian environments.

## CONTACT INFO

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🌐 [linkedin.com/in/raknepper](https://www.linkedin.com/in/raknepper)

## SKILLS

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C++ C Python Jupyter  
Matplotlib Numpy Pandas Bash  
Linux ROS TCP/IP git GitHub  
Jira Jenkins Grafana LaTeX  
motion planning motion control  
human-robot interaction mobile robots  
autonomous vehicles robotics AI  
agile analytics continuous integration  
continuous deployment simulation  
technical writing public speaking  
coaching providing feedback

## EDUCATION

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Doctor of Philosophy (Ph.D.), Robotics

#### Carnegie Mellon University

📅 January 2008 – August 2011

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Master of Science (M.S.), Robotics

#### Carnegie Mellon University

📅 August 2006 – December 2007

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Bachelor of Science (B.S.),  
Computer Science and Social History

#### Carnegie Mellon University

📅 August 1995 – December 1999

- Invented theory and methods for performing non-verbal collaboration in which robots reason about the implications of their actions on the whole team.
- Created a new university-wide rigorous introductory undergraduate robotics course. Increased course evaluation scores by 30% over four years.
- Scaled the course by migrating projects from physical robot hardware to simulation. Provided VMware cloud instances running CoppeliaSim integrated with ROS. Achieved 4x scaling of enrollment to 75–100 students per offering.
- Supported graduate education and research program for 11 students in my lab by obtaining an average \$1.2M per year in grant funding from government and industry.
- Educated the public about robotics through media interviews and lectures. Communicated complex ideas clearly by leveraging media training.

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## Research Scientist

### Massachusetts Institute of Technology, CSAIL

📅 July 2013 – June 2014

- Invented a system for robots working in teams with people to detect and correct failures by asking people for help using natural language. Won Best Paper award at the top robotics conference.

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## Postdoctoral Associate

### Massachusetts Institute of Technology, CSAIL

📅 August 2011 – June 2013

- Created a multi-robot system for airplane wing assembly for Boeing. Demonstrated the system in the lab assembling Ikea furniture and delivered the software to the customer.

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## Software Engineer

### National Robotics Engineering Center

📅 July 2004 – August 2006

- Developed the Lattice Planner, a motion planner for autonomous mobile robots, which has been used to guide planetary rovers, self-driving cars, and warehouse robots.
- Built a reference implementation of the Lattice Planner in C++ with a suite of unit tests.

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## Systems Software Engineer V

### Hewlett-Packard Company

📅 January 2000 – December 2003

- Developed and maintained operating system kernel for Tru64 Unix. Improved task performance for key customer by 40x.

# ACHIEVEMENTS

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- Published 52 peer-reviewed papers.
- Presented 44 invited talks away from my home institution.
- Top-tier performance rating (top 20% of the organization). Amazon, 2021.
- Best Paper Award (Nomination), for “Implicit Communication of Actionable Information in Human-AI teams”, 2019.
- Amazon Research Award, 2019.
- Amazon Research Award, 2018.
- Invited Speaker, National Academy of Engineering Symposium, 2017.
- Best Technical Paper Award (Finalist), for “Implicit Communication in a Joint Action”, 2017.
- Young Investigator Award, Air Force Office of Scientific Research, 2016.
- Invited Speaker, National Academy of Science Symposium, 2016.
- Best Paper Award, for “Asking for Help Using Inverse Semantics”, 2014.
- KUKA Innovation in Mobile Manipulation Award (Finalist), 2014.
- Best Automation Paper (Finalist), for “IkeaBot: An Autonomous Multi-Robot Coordinated Furniture Assembly System”, 2013.