

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 everyday people solve real problems in their lives. Drawn to systems-level problems because their solutions often require cross-functional knowledge, collaboration, and conflict resolution. Thrives in high-ambiguity situations and especially enjoys early-stage product design and development.

WORK EXPERIENCE

Senior Applied Scientist

Amazon

Jun 2020 – Present

- Designed and led an overhaul of a robot motion controller to eliminate instability, resulting in a 10x reduction in path-following error.
- Built a new five-person science team focused on human-robot interaction. Directed science and managed projects. Resolved conflicts over resources shared with other teams. Delivered two new safety-critical features on schedule.
- Led high-ambiguity bringup of legacy autonomy software, known to be full of hidden hardware dependencies, on two new prototype robots. Delegated activities to a team of four. Delivered two months ahead of schedule.
- Leveraged bringup experience to define product and engineering requirements for the next hardware revision in the areas of motion control and human-robot interaction.
- Resolved leadership conflict about site selection for alpha deployment of new product by assembling a small team of scientists and engineers and using the available simulation tools to demonstrate that the preferred site was feasible with minor modification. The deployment went smoothly.
- Created analytics tool using Jupyter, Pandas, and Matplotlib for triaging motion planning failures. Deployed tool using Apache Airflow to run automatically whenever the robot fails in a production setting, allowing team members to triage bugs 20x faster than before.
- Interviewed 42 candidates (engineers, scientists, and managers) for scientific competencies and leadership skills.

Assistant Professor

Cornell University, Computer Science Department

Jul 2014 – May 2020

- Invented theory and methods for robot social navigation in pedestrian environments. Used Vicon motion capture system to measure participants' reaction to the robot. Demonstrated that human subjects were less surprised (lower acceleration) with the robot running our social navigation algorithm.
- Invented theory and methods for performing non-verbal collaboration in which robots reason about the implications

CONTACT INFO

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SKILLS

C++ C Python Jupyter
Matplotlib Numpy Pandas Bash
agile continuous integration
continuous deployment
technical writing public speaking
coaching providing feedback
reporting status
Linux ROS TCP/IP git GitHub
Jira Jenkins Grafana

EDUCATION

Ph.D. in Robotics

Carnegie Mellon University

Jan 2008 – Aug 2011

Thesis title: On the fundamental relationships among path planning alternatives

M.S. in Robotics

Carnegie Mellon University

Aug 2006 – Dec 2007

B.S. in Computer Science and History

Carnegie Mellon University

Aug 1995 – Dec 1999

of their actions on the whole team. Demonstrated these methods on robots running in a variety of physical and virtual settings. Showed increase in human safety, comfort, and efficiency.

- 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.
- 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.
- Educated the public about robotics through media interviews and lectures. Communicated complex ideas clearly by leveraging media training in approximately 20 interviews and public lectures.

Research Scientist

Massachusetts Institute of Technology, CSAIL

📅 Jul 2013 – Jun 2014

- Invented a system for robots working in teams with people to detect and correct failures by leveraging their collaboration with humans to ask people for help using natural language. This research won the Best Paper award at the top conference in robotics.

Postdoctoral Associate

Massachusetts Institute of Technology, CSAIL

📅 Aug 2011 – Jun 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. Publication nominated for Best Paper award.

Software Engineer

National Robotics Engineering Center

📅 Jul 2004 – Aug 2006

- Developed the Lattice Planner, a scalable motion planner for autonomous mobile robots. The planner has been used to guide planetary rovers, self-driving cars, and warehouse robots.
- Built a reference implementation of the Lattice Planner in C++ with suite of unit tests for researchers and industry.
- Designed and built a physics-based 3D vehicle simulator on a rapid prototyping schedule with a small team using Open Dynamics Engine (ODE).

ACHIEVEMENTS

- Published 52 peer-reviewed papers.
- Presented 44 invited talks away from my home institution.
- Top-tier performance rating (top 2% 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.