RACHEL MOAN

PhD Candidate at University of Illinois Urbana-Champaign
rmoan2@illinois.edu

EDUCATION

PhD in Computer Science, University of Illinois Urbana-Champaign August 2022 - August 2027 (Expected)
Relevant Coursework: Autonomous Driving, Robotics, Human-Robot interaction, 3D Computer Vision
Research Interests: Multi-agent path finding, multi robot motion planning, planning for robots in challenging or crowded environments, robot swarm coordination

B.S. in Computer Science, B.S. in Mathematics, Winthrop University August 2018 - May 2022
Magna Cum Laude, GPA: 3.8/4.0
Relevant Coursework: Machine Learning, Algorithms, Computer Science Theory, Linear Algebra, Partial Differential Equations, Probability and Statistics, Calculus I, II, and III

HONORS AND AWARDS

NSF GRFP Fellow April 2023 - Present
Undergraduate President's List (5 semesters)
Undergraduate Dean's List (2 semesters)

RESEARCH EXPERIENCE

PhD Researcher August 2022 - Present
University of Illinois Urbana-Champaign *Urbana, IL*

- Studied the multi robot path finding problem using a database of past solutions to aid in real-time planning. Developed an algorithm that sped up planning time, broadened the number of problems that MAPF can be used in, and halved the number of steps that robots spend idle. Published and presented at RSS 2024. (link to paper).
- Studied how to use a database of past planning problems for multi robot kinodynamic motion planning. Published initial version at Multi Robot Systems workshop at RSS 2025 (link to paper). Submitted paper to ICRA 2026, awaiting review.

Air Force Research Laboratory Scholar May 2025 - August 2025
Eglin Air Force Base *Eglin, FL*

- Developed an algorithm for motion planning using past experience in a 1v1 pursuer evader problem.
- Presented work in poster form at a Department of Defense research showcase.

Robotics Institute for Summer Scholars May 2021 - August 2021
Carnegie Mellon University *Pittsburgh, PA*

- Developed an algorithm to use teams of reconnaissance UAVs to effectively search an environment for search and rescue missions.
- Published in the RISS journal and presented our work both in video form and at a poster session.
- Assisted in compiling the RISS journal and helped with outreach initiatives.

Undergraduate Research in Robotics May 2020 - October 2020
University of South Carolina *Columbia, SC*

- Researched robot illusions and creating realistic simulations of reality for a robot.
- Published and presented research at ICRA 2021. (link to paper).

REU in Applied Computational Robotics May 2019 - September 2019
University of South Carolina *Columbia, SC*

- Designed and implemented a localization algorithm for a simple robot contained in a curved environment.
- Designed, implemented, and tested code for localization algorithm.
- Published and presented work at ICRA 2020 virtually. (link to presentation, link to paper).

CONFERENCE PUBLICATIONS

- Rachel A. Moan, Adam Sitabkhan, and Kris Hauser. "Discrete database guided multi-robot kinodynamic motion planning", In Proc. *Robotics Science and Systems Workshop on Multi Robot Systems*, 2025.
- Rachel A. Moan, Courtney McBeth, Marco Morales, Nancy Amato, Kris Hauser. "Experience-based multi-agent path finding with narrow corridors." In Proc. *Robotics Science and Systems*, 2024.
- Rachel A. Moan, Dylan A. Shell, Jason M. O'Kane. "Multiplexing Robot Experiments: Theoretical Underpinnings, Conditions for Existence, and Demonstrations." In Proc. *IEEE International Conference on Robotics and Automation*, 2021.
- Rachel A. Moan, Victor Montano, Aaron Becker, Jason M. O'Kane, "Aggregation and localization of simple robots in curved environments," In *Proc. IEEE International Conference on Robotics and Automation*, 2020.

TECHNICAL SKILLS

General skills: Robotics, Motion Planning, Path Finding, Trajectory Optimization, Machine Learning
Specific coding skills: Python, C++, Java, Casadi, ROS2, LaTeX, Unix, Mongo, SQL, Tensorflow, PyTorch, CSS

SERVICE AND LEADERSHIP

- Advised and managed an undergraduate research intern on multi robot kinodynamic planning using experience (Fall 2025).
- Mentored 3 undergraduate students on various Machine learning and Reinforcement learning topics in UIUC's Directed Reading Program (Dec 2022-Jan 2023, Dec 2025-Jan 2026).
- Volunteered teaching math at elementary schools in Rock Hill, SC (Spring 2022).
- Served as co-chair of a session at ICRA 2021.

WORK EXPERIENCE

Teaching Assistant, CS588 Autonomous Driving January 2025 - May 2025
University of Illinois Urbana-Champaign *Urbana, Il*

- Mentor groups of students on various self-driving car principles
- Assist students in labs and on projects involving the autonomous GEM e4 car
- Train students to operate the GEM e4

Computer Science and Math Tutor/ Lab Assistant January 2019 - May 2022
Winthrop University *Rock Hill, SC*

- Tutored students 1-on-1 in Discrete Math, Applied Calculus, Calculus I, and Calculus II.
- Tutored students 1-on-1 in Python and other general Computer Science concepts.
- Assisted over 30 students in python coding labs four times a week.

Peer Mentor August 2020 – May 2022
Winthrop University *Rock Hill, SC*

- Mentored and advised students during their first year of college.
- Co-taught the introductory university class of about 30 freshmen.