Hannah Lee

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Professional Summary

PhD student at the University of Illinois Urbana-Champaign specializing in constraint-based search algorithms for multi-robot task and motion planning. Currently working with Dr. Nancy M. Amato at the Parasol Lab and collaborating with MIT Lincoln Laboratory on distributed path planning for large-scale multi-robot systems. Expected graduation in May 2025, actively seeking roles in industry and government.

Education

Doctor Philosophy in Computer Science — Expected May 2025
University of Illinois at Urbana-Champaign — GPA: 3.94/4.0
- Thesis: Studies in Constraint-Based Search for Multi-Robot Planning
- Advisor: Nancy M. Amato

Bachelor of Science in Computer Science — Dec 2019
Colorado School of Mines — GPA: 3.95/4.0
- Major: Computer Science – Robotics and Intelligent Systems
- Minor: Electrical Engineering – Digital Systems

Awards and Honors

Graduate Awards and Honors:
- NSF Graduate Research Fellowship, National Science Foundation — May 2020 – Aug 2023

Undergraduate Awards and Honors:
- Summa Cum Laude, Colorado School of Mines — Dec 2019
- Faculty Choice Senior Award, Colorado School of Mines CS Dept. — Dec 2019
- Grace Hopper Celebration Research Scholarship, ACM-WP — Oct 2019
- National Dean's List, Colorado School of Mines — Aug 2016 – Dec 2019
- President's Scholarship, Colorado School of Mines — Aug 2016 – Dec 2019

Skills

Technical Experience:
- Task and Motion Planning
- Algorithms
- Computer Vision
- Multi-Robot Systems
- Artificial Intelligence
- Embedded Systems
- Robotics
- Machine Learning
- Software Engineering

Programming Languages & Frameworks:
- C++
- R
- MATLAB
- Python
- C
- ROS
- Java
- Bash/Shell Scripting
- Solidworks (Certified)

Research Interests

- Multi-Robot Task and Motion Planning
- Scalable Multi-Agent Systems
- Parallel Algorithms
- Distributed Multi-Robot Planning
- Navigation in Dynamic Environments
- Optimization Techniques for Robotics

Peer-Reviewed Publications

- **Lee, Hannah**, Zachary Serlin, Marco Morales, and Nancy M. Amato. "PRISM: Online Decentralized Multi-Agent Pathfinding with Rapid Information Sharing using Motion Constraints"
  - Submitted and under review for the *Workshop on the Algorithmic Foundations of Robotics (WAFR)*
- **Lee, Hannah**, James Motes, Marco Morales, and Nancy M. Amato. "An Analysis of Constraint-Based Multi-Agent Pathfinding Algorithms"
  - Submitted and under review for *IEEE Transactions on Robotics (T-RO)*
- **Lee, Hannah**, James Motes, Zachary Serlin, Marco Morales, and Nancy M. Amato. "Distributed Constraint-Based Search using Multi-Hop Communication", *Proceedings of the 2024 IEEE International Conference on Robotics and Automation (ICRA@40)*, 23-26 September 2024, Rotterdam.
  - Extended abstract presented at *ICRA@40*
- **Lee, Hannah**, James Motes, Marco Morales, and Nancy M. Amato. "Parallel Hierarchical Composition Conflict-Based Search for Optimal Multi-Agent Pathfinding." *IEEE Robotics and Automation Letters (RA-L)* 6, no. 4 (2021): 7001-7008.
  - Presented at the *2021 IEEE/RSJ International Conference on Intelligent Robotics and Systems (IROS)*
- Motes, James, Read Sandström, **Hannah Lee**, Shawna Thomas, and Nancy M. Amato. "Multi-robot task and motion planning with subtask dependencies." *IEEE Robotics and Automation Letters (RA-L)* 5, no. 2 (2020): 3338-3345.
  - Presented at the *2020 IEEE International Conference on Robotics and Automation (ICRA)*

Technical Experience

Graduate Research Assistant Aug 2020 – Present

Parasol Lab, University of Illinois at Urbana-Champaign

- Engineered innovative hybrid task and motion planning algorithms, enhancing scalability and performance for multi-robot systems.
- Integrated multithreading and parallel programming techniques to significantly boost the efficiency of hybrid algorithms.
- Developed advanced multi-robot path planning algorithms for online, decentralized environments, enabling real-time coordination.
- Co-led the Open-Source initiative to make the Parasol Planning Library (PPL) publicly accessible, contributing to the development of novel planning algorithms in C++.

Student Technical Assistant May 2023 – Present

MIT Lincoln Laboratory

- Designed novel algorithms to enhance collaboration in multi-robot systems, improving efficiency and coordination.
- Developed planning frameworks and hierarchies optimized for decentralized systems, online planning and dynamic environments.
- Led projects on coordinating teams of surface vehicles for wide-area ocean mapping and synchronizing drone swarms for complex tasks.

DREU Student Researcher May 2019 – Aug 2020

Parasol Lab, University of Illinois at Urbana-Champaign

- Participated in the Distributed Research Experience for Undergraduates (DREU), sponsored by the Computing Research Association for Widening Participation (CRA-WP).
- Developed Task and Motion Planning Conflict-Based Search for optimal multi-agent multi-task planning, solving complex payload transportation with heterogeneous robot teams.

Undergraduate Student Researcher Nov 2018 – Aug 2019

MInDS@Mines Lab, Colorado School of Mines

- MInDS: Machine learning, Informatics, and Data Science, led by Prof. Hua Wang.
- Collaborated with graduate students to apply machine learning techniques in deciphering complex interactions within diverse biological datasets.
- Developed innovative algorithms for analyzing large-scale, heterogeneous data, contributing to breakthroughs in biological data science.

Software Intern June – Aug 2018

Ricoh USA, Inc.

- Redesigned an automated testing platform using JavaScript and Django to simulate and evaluate the efficiency, accuracy, and quality of cutsheet printer outputs.
- Enhanced efficiency and functionality by optimizing database operations, reducing redundant testing, and streamlining the user interface for a better user experience.

Computer Science Capstone Project May – June 2018

Uber Technologies, Inc.

- Developed a proof-of-concept mobile application that verifies user locations by generating and comparing 3D models from 2D images.
- Automated image processing using Python and built a mobile application in Java to capture images and send them to a testing server.
- Leveraged openMVG, openSFM, and MeshLab libraries to analyze 2D images and construct accurate 3D models.

Summer Intern Present

Computer Science Department, Colorado School of Mines

- Organized CS career events for high school students and presented at STEM Fairs in Denver elementary schools.
- Led summer camps for middle school students, teaching coding in Racket, Java (for video game programming and Finch robots), and Python (sensor systems and basic circuits).
- Conducted K-12 teacher workshops, including Python training for middle school teachers, managing CS Unplugged sessions for elementary teachers, and organizing the Computer Science Professional Development Week.

Teaching Experience

Lead Instructor May 2022 – Present
Instructor Aug 2021 – May 2022
Teaching Assistant Jan – Aug 2021

AI4ALL

- AI4ALL: A program dedicated to expanding AI education to underrepresented groups, aiming to diversify the AI workforce.
- Lead Instructor for Ignite AI (2024 – Present) and Discover AI (2021 – 2023): Spearheaded courses that teach foundational AI and ML concepts, alongside critical discussions on ethics, tailored for undergraduates from a wide range of backgrounds.
- Mentored and guided new AI4ALL instructors, providing support and sharing best practices to ensure effective teaching and engagement.
- Designed and delivered interactive workshops and educational content for the Discover AI course, contributing to its success across all participating campuses.

Adjunct Professor Jan – May 2020

Computer Science Department, Colorado School of Mines

- Instructor for CSCI 261: Programming concepts: Taught a class of 60 students, providing a comprehensive introduction to programming with a focus on C++.
- Developed and organized course materials, including lectures, assignments, and assessments, ensuring the content was accessible and engaging for students from diverse academic backgrounds.
- Taught fundamental programming concepts in C++, including basic data structures and algorithms, tailored to meet the learning needs of students.
- Fostered a supportive learning environment by offering regular office hours, personalized feedback, and additional resources to help students grasp complex concepts and succeed in the course.

Teaching Assistant Jan 2017 – May 2020

Computer Science Department, Colorado School of Mines

- Teaching Assistant for CSCI 101: Introduction to Computer Science (Jan 2017 – May 2018) and CSCI 262: Data Structures (Aug 2018 – May 2020).
- Supported classroom instruction by assisting the instructor in delivering lectures and addressing student questions.
- Managed record keeping tasks, including tracking attendance, grading assignments, and maintaining accurate records of student performance.
- Contributed to the development of classroom materials, such as lecture slides, handouts, homework assignments, and exam questions, enhancing the learning experience for students.
- Provided one-on-one and group assistance to students, helping them with homework, projects, and exam preparation, and ensuring they understood key concepts in programming and data structures.

Teaching Assistant Aug 2017 – Dec 2018

Web Manager Jan 2018 – Dec 2019

DECTech, Colorado School of Mines

- DECTech (Discover, Explore, Create Technology) is a program designed to inspire and engage grade school girls by exposing them to STEM topics and potential careers in science and technology.
- Led weekly interactive activities, teaching a wide range of STEM topics, including programming, engineering principles, and scientific concepts, fostering curiosity and enthusiasm for STEM among young learners.
- Managed and maintained the DECTech website, ensuring that program information, resources, and updates were accessible and up to date, contributing to the program's outreach and communication efforts.

Professional Activities

Conference Presentation:

- *International Conference on Robotics and Automation (ICRA@40)* 2024
- *International Conference on Intelligent Robots and Systems (IROS)* 2021
- *International Conference on Robotics and Automation (ICRA)* 2020
- *Grace Hopper Celebration of Women in Computing* 2019

Conference Participation:

- *Air, Missile, and Maritime Defense Technologies (AMMDT) Conference* 2023, 2024
- *International Conference on Intelligent Robots and Systems (IROS)* 2023
- *CMD-IT/ACM Richard Tapia Conference* 2021
- *NSF RESET Conference* 2021

Reviewer Roles:

- Reviewer for *IEEE Robotics and Automation Letters (RA-L)* 2019 – Present
- Reviewer for *IEEE International Conference on Robotics and Automation (ICRA)* 2019 – Present
- Reviewer for *IEEE International Conference on Intelligent Robots and Systems (IROS)* 2020 – Present
- Reviewer for the *Workshop on the Algorithmic Foundations of Robotics (WAFR)* 2024 – Present

Professional Memberships:

- IEEE Graduate Student Member 2020 – Present
- Member of IEEE Robotics and Automation Society (RAS) 2020 – Present
- Member of Colorado School of Mines ACM-W 2018 – 2019

Research Mentorships:

- iCAN Students:
  - Azhar Karypbayeva 2021
  - Ana Elissa Cabrera 2022-2023
- CS STARS:
  - Athena Zheng 2022
  - Rachel Wei 2022
  - Mia Erdenebileg 2022 – 2024
  - Anushka Kansal 2022 – 2023
  - Nikhila Puppal 2022 – 2024
  - Melissa Aninagyei-Bonsu 2022 – 2024
- DREU and Open-Sourcing Students:
  - Tavie Kittredge 2022
  - Sam Pasquesi 2022 – 2023
  - Brad Yang 2022 – 2024