Ninghan Zhong

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EDUCATION

B.S. in Computer Science | **University of Illinois at Urbana-Champaign**   Aug 2018 - May 2022
Graduated with the Highest Honors   GPA: 3.97 / 4.0

MASc in Electrical and Computer Engineering | **University of Waterloo**   Aug 2023 - Aug 2025
                                                                                                                            GPA: 90.33 / 100

COURSEWORK

Machine Learning, Robot Perception & Manipulation, Reinforcement Learning, Algorithms & Data Structures

SELECTED PUBLICATIONS

- "Bench-NPIN: Benchmarking Non-prehensile Interactive Navigation"
    - **N. Zhong**, S. Caro*, A. Iskandar*, M. Ramesh*, and S. L. Smith
    - **Under Review for IROS 2025** [preprint][project page]

- "Autonomous Navigation in Ice-Covered Waters with Learned Predictions on Ship-Ice Interactions"
    - **N. Zhong**, A. Potenza, and S. L. Smith
    - **ICRA 2025** [preprint][project page]

- "Attentiveness Map Estimation for Haptic Teleoperation of Mobile Robot Obstacle Avoidance and Approach"
    - **N. Zhong** and K. Hauser
    - **IEEE RA-L 2024** [paper]

- "Hierarchical Intention Tracking for Robust Human-Robot Collaboration in Industrial Assembly Tasks"
    - Z. Huang*, Y. J. Mun*, X. Li[†], Y. Xie[†], **N. Zhong**[†], W. Liang, J. Geng, T. Chen, and K. Driggs-Campbell
    - **ICRA 2023** [paper]

RESEARCH EXPERIENCE

Generative Skill Chaining for Interactive Navigation | **generative modeling, planning under uncertainty**
Advisor: Prof. Stephen L. Smith   *Department of Electrical and Computer Engineering, UWaterloo*

- Conducting research on motion planning for mobile robot interactive navigation
- Designing a generalizable generative framework for skill learning and long-horizon chaining
- Investigating principled approaches to uncertainty modeling for robust operations in cluttered environments

Benchmarking Non-prehensile Interactive Navigation | **reinforcement learning, motion planning**
- Developed a suite of simulated environments, each with varying levels of complexity, to benchmark non-prehensile interactive navigation in cluttered settings
- Proposed a novel set of evaluation metrics that capture unique aspects of interactive navigation
- Trained and evaluated multiple state-of-the-art learning-based policies in interactive navigation
- Work under review for IROS 2025 [preprint]

Predictive Path Planning for ASV Navigation | **machine learning, planning, autonomous navigations**
- Proposed a deep learning framework that predicts the coarse dynamics of ice obstacles for ASV navigations

- Presented a novel approach that seamlessly integrates the learned model into a graph-search planner
- Designed an integrated predictive planner with a constant-factor theoretical guarantee for ASV navigations in ice-covered waters, reducing both collisions and travel distances
- Work accepted by ICRA 2025 [preprint]

Attentiveness Estimation for Mobile Robot Teleoperation | **human modeling, obstacle avoidance, haptics**

Advisor: Prof. Kris Hauser   *Department of Computer Science, UIUC*

- Proposed a real-time human spatial attentiveness estimation model by combining visual saliency detection with computational working memory theories to optimize haptic feedback for mobile robot teleoperation
- Proposed an integrated perception pipeline that performs simultaneous environment mapping and human attentiveness estimation using a depth camera
- Experiments showed the proposed framework reduced teleoperation task completion time by 11%, human control effort by 19%, and obstacle collisions by 16%
- Work published in IEEE RA-L 2024 [paper]

Intention-Aware Human-Robot Collaboration | **human-intention predictions, robot perception**

Advisor: Prof. Katherine Driggs-Campbell   *Electrical and Computer Engineering Department, UIUC*

- Assisted with developing a robot control framework with hierarchical human-intention predictions for industrial assembly tasks
- Implemented an algorithm to localize target assembly parts in the robot workspace based on vision input from the robot wrist camera
- Work published in ICRA 2023 [paper]

INTERNSHIP

Golden Ridge Robotics | **Computer Vision & Algo. Intern** - *C++, ROS, OpenCV, PCL*   **May 2021 - Jul 2021**
- Developed an obstacle detection and localization model for low-speed sightseeing autonomous vehicles. The model combines UV disparity algorithms and point cloud projection to locate all detected obstacles and estimate their dimensions. The model achieves an accuracy of less than 30% relative error in obstacle dimension estimations and less than 12% relative error in distance estimations
- Developed a 3D autonomous navigation environment marking program that allows users to mark obstacles and driving areas with arbitrary shapes in point clouds for low-speed sightseeing autonomous vehicles. The marking program can mark an area as large as 25 km^2 with a decimeter-level accuracy

HONORS

- International Master's Award of Excellence $12,500 CAD   **University of Waterloo, Nov 2023**
- The Highest Honors at graduation   **UIUC, Spring 2022**
- UIUC Dean's List (7 Semesters)   **UIUC, Fall 2018 - Spring 2020, Spring 2021 - Spring 2022**
- James Scholars (2 Semesters)   **UIUC**, **Fall 2021, Spring 2022**

PROFESSIONAL SKILLS

Software/Tools   ROS, PyTorch, Mujoco, OpenAI Gym, Docker, Rviz, OpenCV
Programming Languages   C++, C, Python, JavaScript, Java, C#

TEACHING EXPERIENCE
- Undergraduate Teaching/Lab Assistant   **Principles of Safe Autonomy, UIUC, Spring 2022**
- Teaching Assistant   **Discrete math II, University of Waterloo, Spring 2024**