

# NINGHAN ZHONG

Personal Website: [ivaniz.github.io](https://ivaniz.github.io)

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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

- “Autonomous Navigation in Ice-Covered Waters with Learned Predictions on Ship-Ice Interactions”
  - **N. Zhong**, A. Potenza, and S. L. Smith
  - Under review for 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](#)]
- “System Design, Evaluation and Applications of Domain Term Extraction from Engineering Videos”
  - J. Li, **N. Zhong**, R. Kooper, and L. Angrave
  - ASEE 2023 IL-IN Section [[paper](#)]

## RESEARCH EXPERIENCE

**Autonomous Systems Lab** | generative AI, navigation among movable obstacles **Sept 2024 - Present**

Advisor: Prof. Stephen L. Smith

Department of Electrical and Computer Engineering, UWaterloo

- Researching motion planning for non-prehensile mobile robot navigation among movable obstacles
- Developing a learning pipeline with diffusion models for task-driven navigation among movable obstacles
- Exploring guided sampling approaches for generating high-reward obstacle interaction motions

**Autonomous Systems Lab** | deep learning, planning, autonomous navigations **Sept 2023 - Sept 2024**

- 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 currently under review for ICRA 2025 [[preprint](#)]

**Intelligent Motion Lab** | human modeling, perception, mobile robot teleoperation **May 2022 - Aug 2023**

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](#)]

**Human-Centered Autonomy Lab** | human-intention predictions, perception **Aug 2021 - May 2022**  
 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](#)]

**ClassTranscribe Development** | machine learning, HCI, Computer Vision **Dec 2020 - Dec 2021**  
 Advisor: *Prof. Lawrence Angrave* *Department of Computer Science, UIUC*

- Proposed a novel scene change detection model for lecture videos using a Support Vector Machine, where features are extracted and processed by a combination of Optical Character Recognition and Multi-Task Cascaded Convolutional Neural Network. The model achieves a 97% accuracy in detecting scene changes
- Researched to improve speech-to-text recognition by supplying technical keywords
- Work published in ASEE 2022 [[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 self-driving 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 any shape in point clouds for low-speed self-driving vehicles. The marking program can mark an area as large as 25 km<sup>2</sup> 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**