

RESEARCH INTERESTS

I am devoted to developing **robust, safe, and computationally scalable algorithms for autonomous systems**, including robots and autonomous vehicles. A deep understanding of the mathematics underlying autonomous systems is fundamental to my research philosophy.

EDUCATION

North Carolina State University (NCSU) Raleigh, NC
Ph.D. Student in Mechanical Engineering Aug. 2024—Current
Advisor: [Donggun Lee](#)

South China University of Technology (SCUT) Guangzhou, China
B.Eng. in Intelligent Manufacturing, GPA: 3.78/4.00 Sept. 2020—July 2024
Advisor: [Heng Wang](#)

– Thesis: On Magnetic Source Configuration and Pose Estimation Algorithm for Electromagnetic Tracking

SCHOLARSHIPS AND AWARDS

- University Graduate Fellowship (Top Entering Doctoral Students) 2024
- Outstanding Undergraduate Thesis (Top 2%) 2024
- Honorable Mention in *Mathematical Contest in Modeling* (Top 30%) 2023
- Undergraduate Internship Scholarship (Funded Internship in University of Alberta) 2022
- National First Prize in *Micro Sensing and Intelligent Technology Contest* (Top 5%) 2021

PUBLICATIONS

(* indicates co-first authors)

1. **X. Zhang**, G. Chenevert, Y. Su, F. M. Tariq, J. D'Sa, S. Bae, and D. Lee, "ZSG-MPPI: Robust Model-Predictive Path-Integral Method for Disturbance Handling", *IEEE Robotics and Automation Letters*, 2025
2. **X. Zhang***, S. Dong*, Y. Zeng, D. Liu, and H. Wang, "On Ambiguity in 6-DoF Magnetic Pose Estimation", Accepted by *IEEE/ASME Transactions on Mechatronics*, 2025

PATENTS

1. H. Wang, **X. Zhang**, S. Dong, D. Liu, Y. Zeng and S. Liu, "Electromagnetic Positioning System, Electromagnetic Positioning Method and Device", *No.CN118444243A*, *pending*
2. H. Wang, S. Wang, S. Liu, S. Dong and **X. Zhang**, "A Virtual Ultrasonography Simulator for Skill Training Using Magnetic-Inertial Probe Tracking", *No.CN116312122A*, *pending*

TEACHING

- **Teaching Assistant** at MAE 405 Dynamics and Controls Laboratory, NCSU Fall 2024; Spring 2025; Fall 2025
Instructor: [Joe Manning](#)

My Role: Led weekly laboratory sessions and guided students in applying theoretical concepts to hands-on experiments, including programming logic control, fundamental circuit design, and implementing PID controllers using analog circuitry.

SELECTED GRADUATE COURSES

MAE 521: Linear Systems Theory (**A**) MAE 522: Nonlinear Control (**A**), MAE 589: Advanced Optimal Control and Reinforcement Learning (**A**), MAE 589: Modern Robotics – Robot Dynamics and Legged Robots (**A**), ECE 572: Optimization and Algorithms (**A**), CSC 791: Advanced Robotics - Perception, Estimation, Control (**B+**), DSC 595: GenAI for Science: Using LLMs (**A+**)

SELECTED GRADUATE COURSE PROJECTS

(Video Demos)

- Learning-Based Stochastic Optimization for Robotics: Diffusion Policy Fall 2025
 - Stochastic Optimization, Denoising Diffusion Probabilistic Models, Diffusion Policy
- Variable-Impedance Optimal Ankle Joint Controller for Humanoid Walking Fall 2025
 - Humanoid Locomotion, Variable-Impedance Control, Residual Policy Learning
- Output Feedback and Feedback Linearization Controller for Magnetic Suspension Systems Fall 2025
 - Nonlinear Controller Design, Output-Feedback, Feedback Linearization
- Solving the Mobile Robot Wall-Following Problem by Q-learning Spring 2025
 - Wall-Following Problem, Q-Learning, ROS TurtleBot
- Navigation on Triton Robot via Monte Carlo Localization and Model Predictive Path Integral Control Spring 2025
 - ROS Stack, Simultaneous Localization and Mapping, Navigation Control
- Point-to-point Kinematic Control of the 3-Joint Robotic Arm in the Presence of Obstacles Fall 2024
 - Direct Optimization, Shooting-based Model Predictive Control, Robotic Kinematics, CasADi
- Building, Fine-tuning, and Deploying Large Language Models (LLMs) with Customized Dataset Fall 2024
 - GPT-2 Building and Fine-tuning, llama 3.1 (8b) Local Deploying and Fine-tuning

LANGUAGES AND TOOLS

- **Language:** Proficient in MATLAB, Python
- **Tools:** ROS1&2, Nav2, PyTorch, CasADi