

SUMMARY

Robotics engineer with hands-on experience in real-time control, dynamics modeling, and autonomous navigation. Skilled in developing AI-driven control algorithms and ROS-based autonomy systems. Seeking roles in robotics software engineering.

EDUCATION

MS in Aerospace Engineering. The University of Texas at Austin (Austin, TX) May 2025

Thesis: Terrain Adaptation for Autonomous Navigation and Model Predictive Control

BS in Engineering Physics. University of Central Arkansas (Conway, AR) May 2023

Thesis: Investigating MEMS Accelerometer Calibration Techniques

SKILLS

- **Programming:** C++, Python, MATLAB
- **Software Tools:** PyTorch, ROS & ROS 2, Conda, Git, Docker, VS Code, Linux, Unity, Gazebo
- **Robotics & Control:** sampling-based MPC, path planning, system dynamics modeling, navigation algorithms
- **Machine Learning:** Supervised learning for system dynamics modeling. Data collection/processing and model tuning.

EXPERIENCE

Oden Institute for Computational Engineering and Sciences, The University of Texas at Austin (Austin, TX)

Research Engineer / Scientist Associate

May 2025 - present

- Leading integration of a custom 1/6-scale high-speed RC truck, developing a ROS-based autonomy stack that supports LiDAR, camera, IMU, radio control, and real-time telemetry.
- Developed ML-based dynamics models and a real-time adaptation algorithm for terrain-aware MPC control, validated on wheeled robots driving across turf and ice during waypoint navigation missions.
- Built a BeamNG-ROS interface and demonstrated high-speed path following for simulated racecars using MPPI control with a Neural ODE dynamics model (trained on driving data via ML).
- Designing Python-based robotics software for Raspberry Pi-powered 1/10 and 1/16 RC platforms, implementing motor control, sensor integration, and autonomy modules for high school robotics education.
- Software engineer on UT Austin's performer team for an on-going DARPA program. Created a ROS package that enables an LLM to infer object navigation goals from textual task prompts.

Graduate Research Assistant

Sep 2024 - May 2025

- Developed learning-based vehicle dynamics models for wheeled robots, establishing a foundation for terrain-adaptive MPC under unknown surface conditions.
- Validated MPC-based terrain adaptation in Unity. Demonstrated reliable waypoint tracking across multi-terrain environments with unmodeled friction.
- Built ROS and Docker infrastructure to support autonomous navigation research in Isaac and Habitat.

Graduate Research Assistant

Sep 2023 - May 2024

- Developed an optimization algorithm that enables autonomous vehicles to understand the "personalities" of human drivers and predict their future trajectories.
- Developed real-time planning algorithms for outdoor delivery robots that ensure safe and predictable driving using formal verification of LLM-generated Python code.

Aeronautics Research Intern. NASA Ames Research Center (Mountain View, CA)

June - Aug 2024

- Designed efficient aircraft trajectories using A* and Dijkstra's algorithms for global path planning.
- Integrated multi-objective optimization into the planner to balance fuel efficiency, time, and mission constraints.

Robotics Engineering Intern. NASA Langley Research Center (Hampton, VA)

June - Aug 2022

- Simulated and analyzed the dynamic behavior of a soft, "C"-shaped robotic gripper for autonomous in-space assembly.
- Achieved millimeter accuracy in motion prediction under variable torques using physics models in ROS/Gazebo.

Research Assistant. University of Central Arkansas, Dept. of Physics & Astronomy (Conway, AR) Oct 2021 - April 2022

- Designed trajectory and attitude control algorithms for a fixed-wing UAV using PID and IMU data.
- Programmed embedded software for real-time sensor logging, servo motor control, and radio communication.

ACADEMIC PROJECTS

Quadrotor Path Planning Competition. (UT Austin) Jan - May 2024

- Designed GNC algorithms (state estimation, motion planning, and feedback control) for autonomous quadrotor drones.
- Simulated high-fidelity flight dynamics to ensure safe trajectory planning through a complex obstacle course.

Vision-Based Autonomous Driving via Supervised Learning. (UCA) Aug 2022 - May 2023

- Built a ground robot that autonomously navigates an obstacle course using computer vision and machine learning.
- Trained supervised models to map camera inputs to steering commands using PyTorch.
- Achieved 1st place in the Autonomous Vehicle Challenge (2023 Arkansas Space Grant Consortium Symposium).

PUBLICATIONS

1. Risk-Aware Routing for Uncrewed Aircraft Contingency Management. Bulusu, et al. (2025). AIAA Aviation Forum and Ascend. ([Link](#)).
2. Online Adaptation of Terrain-Aware Dynamics for Planning in Unstructured Environments. **Ward**, et al. (2025). RSS 2025 Workshop on Resilient Off-Road Autonomous Robotics. ([Link](#)).
3. Active Inverse Learning in Stackelberg Trajectory Games. **Ward**, et al. (2025). American Control Conference. ([Link](#)).
4. Fine-Tuning Language Models Using Formal Methods Feedback: A Use Case in Autonomous Systems. Yang, et al. (2024). Conference on MLSys. ([Link](#)).
5. A Hybrid Soft Material Robotic End-Effector for Reversible In-Space Assembly of Strut Components. Hammond, et al. (2023). *Frontiers in Robotics and AI*. ([Link](#)).

HONORS

Cockrell School of Engineering Graduate Fellowship (UT Austin)	2023, 2024
Arkansas Space Grant Consortium Workforce Development Award (UCA)	June 2022
UCA Distinguished Scholarship	2019 - 2023
Arkansas Governor’s Distinguished Scholarship (UCA)	2019 - 2023