



Nathan L. Butler

Graduate Research Assistant

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EDUCATION

Oregon State University

M.S. in Robotics; minor in Artificial Intelligence

Sep. 2023 - Present

Iowa State University

B.S. in Mechanical Engineering; minors in Computer Science and Cyber-Physical Systems

Aug. 2018 - May 2023

PROFESSIONAL EXPERIENCE

Graduate Research Assistant, [Robotic Decision Making Lab](#), Oregon State Univ.

Sep. 2023 – Present

- Developed hybrid decentralized planning algorithm that enables multi-robot team to integrate local and global information, published at ICRA 2025
- Implemented and trained transformer-based information parsing model to provide communication-efficient behavioral coordination to multi-robot team to achieve distributed coordination without explicit communication
- Collaborating on multi-university grant to develop coordination algorithms for teams of underwater robots
- Designing modular hardware package to provide autonomy to a variety of autonomous surface vehicle platforms

Undergraduate Research Assistant, [ABE Automation and Robotics Lab](#), Iowa State Univ.

Jan. 2022 - Jul. 2023

- Integrated robotic arm into field robot system to support dexterous crop data sampling techniques
- Updated design of mobile data collection robot by introducing modular, removable base to reduce recharging downtime
- Developed mechanical components for heat dispersion and weatherproofing for custom stereo camera with LED array, integrated 12 units into field robots

Systems Director, [Cardinal Space Mining Club](#)

Aug. 2018 - May 2023

- Oversaw systems engineering activities including requirements development, interface tracking, trade-off studies, and verification testing, leading to 1st place performance at [NASA Lunabotics 2023](#)
- Led development of new regolith storage and offload subsystems for 2022 robot, resulting in TRL 9 system
- Designed, implemented, and deployed mining control loop to achieve 1st place mining competition performance
- Communicated systems engineering activities to NASA Lunabotics competition judges in written technical reports that placed 2nd (2021, 2022) and 1st (2023) nationally

Mechanical Engineering Co-Op, Seed Tech. and Innovation Team, [Corteva Agriscience](#)

May 2021 - Dec. 2021

- Upgraded capabilities of product verification station with faster indexing and computer vision to process 8X more units
- Utilized CAD and 3D-printing skills to develop solutions for grasping and manipulating components of irregular geometry
- Collaborated with innovation and safety teams to test and refine ergonomic product packaging machine

Intern, Intelligent Control & Autonomy Group, [NASA Glenn Research Center](#)

Jan. 2021 - May 2021

- Modeled physical responses of electrical hardware components as Simulink blocks and added components to NASA's [Electrical Modeling and Thermal Analysis Toolbox](#) for use in realistic digital twins of electric aircraft propulsion systems
- Developed multiple example Simulink models with accompanying tutorial documentation to reduce learning curve for new toolbox users

ADDITIONAL PROJECTS

MERL for Constrained Coordination: Multiagent Evolutionary RL for training agents in tightly coupled tasks with sparse rewards

Bravo MPC: Model Predictive Control for Reach Bravo robotic arm

Multiagent Routing as COP: Constraint Optimization Problem formulation with solver for multiagent orienteering

Robot Moisture Sensor: ROS-based hardware implementation of plant-probing robot

DQN for Task Scheduling: Deep Q-Network for multi-robot task scheduling

Crop Row Robot Steering: AE+CNN approach for robot steering commands from visual data within crop rows

Danfoss Lettuce Harvester: Robotic lettuce harvester concept developed in collaboration with national multidisciplinary team

SKILLS & TOOLS

Software: Python (PyTorch, TorchRL), ROS/ROS2, Linux, SolidWorks, MATLAB/Simulink, GitHub, Docker

Mechanical: Rapid Prototyping, 3D Printing, Metal Fabrication, Wood Fabrication

Algorithms & Control: Learning-Based Control (DL, RL, EA), Path Planning, MPC, PID, IK

Soft Skills: Research & Analysis, Robotic Frameworks, Systems Engineering, Project Management, Technical Communication

AWARDS & HONORS

Iowa State University Outstanding Senior in Mechanical Engineering

May 2023

PUBLICATIONS

1. N. Butler and G. Hollinger. "Hybrid Decentralization for Multi-Robot Orienteering with Mothership-Passenger Systems," To appear in Proceedings of 42nd International Conference on Robotics and Automation (ICRA), May 2025.
2. Butler, N., Hollinger, G., Garwood, J., Si, Y., & Stewart, A. "Pseudo-Centralized Mission Planning for Under-Ice Robotic MOTHERSHIPS [Poster]," Second Northwest Robotics Symposium, April 2024

PROFESSIONAL ASSOCIATIONS & AFFILIATIONS

- IEEE Student Member
- IEEE Robotics and Automation Society Member
- Tau Beta Pi Honor Society Member