Nathan L. Butler

Graduate Research Assistant

(+1) 319-330-6155 | nathanbutler.nlb@gmail.com | linkedin.com/in/nlbutler | Website

EDUCATION

Oregon State University **Sep. 2023 - Present**
M.S. in Robotics; minor in Artificial Intelligence

Iowa State University **Aug. 2018 - May 2023**
B.S. in Mechanical Engineering; minors in Computer Science and Cyber-Physical Systems

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