WILLIAM FARLESSYOST

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EDUCATION

Purdue University 2025
Agricultural and Biological Engineering, Ph.D.
Majors: Computational Science & Engineering, Ecological Sciences & Engineering

University of North Carolina Asheville 2020
Mechatronics Engineering, B.S.E. (Jointly Awarded from NCSU-UNCA) *Summa cum laude*
Applied Mathematics B.A. *Summa cum laude*

WORK EXPERIENCE & RESEARCH

Graduate Research Assistant, Purdue University Aug. 2020 - Present
Sustainable Industrial-Natural Coupled Systems Group, PI: Shweta Singh, Ph.D.

- Applied SINDy for system identification and improving mechanistic models in chemical processes, including an algae batch reactor case study.
- Modeled material flow networks using liquid time constant neural networks, performing robustness and sensitivity analysis over climate scenarios, and minimized sensor requirements.
- Compared material economies of Indiana and Illinois using PIOT-Hub for rapid mapping of physical input-output tables.

Undergraduate Research Assistant, UNCA. Aug. 2019 - Jan. 2020
Undergraduate Research in Controls

- Validated and implemented a quadrotor UAV control system enabling it to track and softly land on a moving base using fiducial-tag recognition and sensor fusion in ROS and Simulink.

Undergraduate Research Assistant, UNCA Aug. 2019 - May 2020
Undergraduate Research in Robotics (NSF-Funded)

- Developed an apprenticeship learning system for a UR3e robot arm with RG2 gripper to sort unobserved objects, integrating ROS packages, motion planning with MoveIt!, and simulation in Gazebo.

Mechatronics Senior Design Project, UNCA Aug. 2019 - May 2020
NASA Lunabotics Challenge

- Designed and built two autonomous double Ackermann steered mining robots for the 2020 NASA Lunabotics Competition (event canceled due to COVID-19), implementing software for SLAM, path planning, and control.

Undergraduate Research Assistant, University of Nevada, Reno June 2019 - Aug. 2019
NSF-REU on Collaborative Human-Robot Interaction

- Developed multi-task convolutional neural networks in TensorFlow for multi-label classification and regression to recognize social traits in facial images.

Undergraduate Research Assistant, UNCA Sept. 2017 - May 2019
Undergraduate Research in Robotics

- Developed a Jenga-playing robot for reinforcement learning research, involving mechanical and electrical design, ROS implementation, motion planning with MoveIt!, and simulation in Gazebo.

IEEE Robotics Competition, UNCA Oct. 2017 - May 2018
SouthEast Conference IEEE Hardware Competition

· Designed and built an autonomous robot with a state machine for navigation to complete tasks in an arena.

PUBLICATIONS & PRESENTATIONS

Farlessyost W, Singh S. "Resilience Dynamics in Coupled Natural-Industrial Systems: A Surrogate Modeling Approach for Assessing Climate Change Impacts on Industrial Ecosystems." *Manuscript in Review.* Journal of Industrial Ecology.

Farlessyost W, Singh S. "Improving Mechanistic Model Accuracy with Machine Learning Informed Physics." *Poster Presentation, Conference Proceedings.* Foundations of Computer Aided Process Design, 2024.

"Modelling Dynamics of Material Flows in Coupled Industrial Processes Using Data-Driven System Identification." *Poster Presentation.* Gordon Research Conference on Circular Economy, 2022.

Farlessyost W, Singh S. Reduced order dynamical models for complex dynamics in manufacturing and natural systems using machine learning. Nonlinear Dynamics. 2022; 110 (2), 1613-1631

"A Hybrid Mechanistic-Machine Learning Approach to Identify Dynamical Models for Sustainability Assessment of Manufacturing Processes: A Soybean Diesel Process Case Study." *Poster Presentation.* American Institute of Chemical Engineers Annual Meeting, 2021.

"Sustainability and Resiliency Assessment for Industrial Synergies between Renewable Energy and Chemical Production." *Oral Presentation.* American Institute of Chemical Engineers Annual Meeting, 2021.

Farlessyost W, Grant K-R, Davis SR, Feil-Seifer D, Hand EM. The Effectiveness of Multi-Label Classification and Multi-Output Regression in Social Trait Recognition. Sensors. 2021; 21(12):4127.

"Experimental Validation of a Control Law for an Unmanned Aerial Vehicle Landing on a Moving Base." *Oral Presentation* (University of North Carolina Asheville Fall Undergraduate Research Symposium, 2019).

"The Effectiveness of Multi-Label Classification and Multi-Output Regression in Social Trait Recognition." *Invited Presentation* (Mathematical Association of America NC State Dinner, 2019), *Poster Presentation* (University of Nevada, Reno Summer Undergraduate Research Symposium, 2019).

"Vibrational Response of a Wheeled-Legged Robot of Differing Structural and Geometric Attributes." *Poster Presentation* (University of North Carolina Asheville Spring Undergraduate Research Symposium, 2019).

TEACHING

Graduate Teaching Assistant, Purdue University Jan. 2021 - May 2021
Statistical Modeling & Quality Enhancement (Purdue ChE-32000)

· Held weekly help sessions, taught course labs, graded HW and exams.

Undergraduate Teaching Assistant, NCSU Jan. 2020 - May 2020
Principles of Automatic Control (NCSU MAE-435)

· Held two help sessions weekly, facilitated end of semester control design project.

Undergraduate Teaching Assistant, NCSU Jan. 2019 - May 2019
Intro. to Computer Systems (NCSU ECE-109)

· Taught a weekly 2-hour lab section, held two help sessions weekly.

Undergraduate Teaching Assistant, NCSU Aug. 2018 - Dec. 2018
Engineering Thermodynamics (NCSU MAE-201)

· Held two help sessions weekly.

Undergraduate Teaching Assistant, NCSU Jan. 2018 - May 2018
Analytical Foundations of ECE (NCSU ECE-220)

· Taught two 3-hour lab sections every week, held two help sessions weekly, graded weekly lab write-ups and programs.

Undergraduate Teaching Assistant, NCSU Jan. 2017 - Dec. 2017
Engineering Statics (NCSU MAE-206)

· Held two help sessions weekly, worked as flipped-class facilitator to answer student questions.

TECHNICAL SKILLS & EXPERTISE

Programming Languages:	C/C++, MATLAB, Python, R, Bash/Shell Scripting
Machine Learning Frameworks:	TensorFlow, PyTorch, Scikit-learn, LTC-NN, LSTM, RNN, CNN, SINDy, Fuzzy Learning Methods
Software & Tools:	ASPEN Plus/Dynamics, SimaPro, ROS, Gazebo, MoveIt!, Simulink, Verilog, SolidWorks, BioCro, AutoCAD, Git, SQL
Data Analysis & Modeling:	Statistical Process Control, Multivariate Statistics, Time Series Analysis, Regression Modeling, Traditional System Identification
Domain-Specific Expertise:	DMFA, LCA, Climate Impacts Modeling, Circular Economy Analysis, Process Simulation, Supply Chain Resilience

ACADEMIC ACHIEVEMENTS & AWARDS

Graduate Research Fellowship Program 2022-2025
National Science Foundation

Award for Departmental Professionalism and Academic Excellence 2020
Joint NCSU-UNCA Mechatronics Department

Top Math Student Award 2020
UNCA Department of Mathematics

Meritorious Award 2019
SIMIODE Challenge Using Differential Equations Modeling

CLUBS & ORGANIZATIONS

Logistics Committee – Purdue ESE Symposium Aug. 2021 - May 2022
Member

· Coordination of guest speakers for Purdue's 2022 Ecological Sciences & Engineering (ESE) annual symposium.

Mechatronics Ambassadors Program April 2017 - May 2020
Chair of University Outreach Committee

· Worked with other departments on campus to provide opportunities and resources to mechatronics students as well as students majoring in other STEM fields.

UNCA IEEE Chapter Aug. 2016 - May 2020
Member

· Involved with chapter's hardware competition team, skill share events, and engineering outreach on campus.