Amy Katherine Strong

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Education

Ph.D. Mechanical Engineering 2021 – Present
Duke University, GPA: 3.92 *Advisor: Dr. Leila Bridgeman*

MS Mechanical Engineering 2018 – 2021
Auburn University, GPA: 3.9 *Advisors: Dr. David Bevly, Dr. Scott Martin*

BME Mechanical Engineering 2014 – 2018
Auburn University, GPA: 3.6

Research Interests

My research interests involve using **robust control theory** to analyze and characterize **deep learning** techniques. I aim to enforce stability and robustness on learned controllers so that they can be used on **safety critical autonomous systems –** such as medical robotics.

Journal Articles

- **Amy Strong***, Ethan J. LoCicero, Leila J. Bridgeman. Dissipative Imitation Learning for Discrete Dynamic Output Feedback Control with Sparse Data Sets. In *International Journal of Robust and Nonlinear Control*, 2023. (Submitted)
- Ethan J. LoCicero, **Amy Strong**, Leila Bridgeman. Stochastic Dissipativity for Systems with Probabilistic Input Delays. In *International Journal of Robust and Nonlinear Control,* 2023. (In Progress)
- Siobhan Rigby Oca, **Amy Strong**, Jiselle Havas, Daniel M. Buckland, and Leila J. Bridgeman. Development and Testing of a Durable and Novel Breast Phantom for Robotic Autonomous Ultrasound Systems. In *Journal of Medical Robotics Research*, 2022. Link

Peer Reviewed Conference Papers

- **Amy Strong***, Ethan J. LoCicero*, and Leila J. Bridgeman. Dissipative Imitation Learning for Robust Dynamic Output Feedback. In *Conference on Decision and Control*, December 2022. Link.
- **Amy Strong**, Scott Martin, and David Bevly. Utilizing Hidden Markov Models to Classify Maneuvers and Improve Estimates of an Unmanned Aerial Vehicle. In *Modelling, Estimation, and Controls Conference*, 2021. Link.
- Lorenzo Cremaschi, Ellen Harges, Burak Adanur, and **Amy Strong**. Frost Nucleation and Frost Growth on Hydrophobic and Hydrophilic Surfaces for Heat Exchanger Fin Structures. In *17th International Refrigeration and Air Conditioning Conference*, 2018.

Conference Presentations and Posters

- **Amy Strong**, Siobhan Rigby Oca, Daniel M. Buckland, and Leila J. Bridgeman. Autonomous Ultrasound Scanning for Complex, Deformable Tissue. In *Military Health System Research Symposium*, September 2022. (Poster).
- **Amy Strong**, Nathan Hogaboom, Alicia Koontz, and Michael Boninger. Development of an Upperlimb Musculoskeletal Wheelchair Propulsion Model to Analyze the Influence of Axle Position on Shoulder Moments. In *American Society of Biomechanics Conference,* 2018. (Poster).

Teaching Experience

Model Predictive Control (TA) Spring 2023
Introduction to Robotics (TA, Guest Lecturer) Fall 2022
System Dynamics and Controls (TA, Guest Lecturer) Spring 2020, Fall 2020, Spring 2021

Awards and Achievements

NSF Traineeship: Advancement of Surgical Technologies: 2022 – 2023
Burroughs Wellcome Fund Fellowship: 2022
Duke University Pratt-Gardner Graduate Fellowship: 2021
Auburn University Mechanical Engineering Undergraduate Research Stipend: 2017 – 2018
HERL ASPIRE REU Paper Competition Winner: 2017
O'Neal Austin Best Student Award: 2017
Auburn University Presidential Scholarship: 2014 – 2018

Research Experience

Bridgeman Lab: Duke University
Graduate Research Assistant: 2021 – Present

- Applying robust control theory to imitation learned controllers to guarantee stability.
- Tuning and design of contact force control for an autonomous robotic ultrasound system.

Autonomy for Hypersonics (A4H): Sandia National Laboratories
Graduate R&D Intern: 2020 – 2022

- Employed deep learning methods to learn constraints of a high-fidelity dynamic model.
- Performed hyperparameter sweeps and data consolidation for a Generative Adversarial Network.

GPS and Vehicle Dynamics Laboratory (GAVLAB): Auburn University
Graduate Research Assistant: 2018 – 2021

- Utilized system dynamics to perform time series classification via Hidden Markov Models.
- Implemented nonlinear estimation methods to track highly non-linear systems using radar measurements.
- Improved Extended Kalman Filter state estimation with information from HMMs.

High Performance Integrated Building Energy Systems and Technologies Lab: Auburn University
Undergraduate Research Assistant: 2017 – 2018

- Created an image processing protocol to determine frost height from videoscope images.
- Trained in lab procedure – calibrating thermocouples, operating wind tunnel, frost growth measurement.

Human Engineering Research Labs (HERL): University of Pittsburgh
Undergraduate Research Intern, Summer Research Experience for Undergraduates: 2017

- Created an upper extremity musculoskeletal model of wheelchair propulsion in OpenSim to study effects of wheelchair set up on transverse, sagittal, frontal, and net shoulder moments using VICON data.

Skills

Programming Languages: Python, MATLAB, C++
Software: Git, Latex, Robot Operating System (ROS)

Relevant Coursework

Machine Learning	Optimal Estimation and Control	Intro to Medical Robotics
Deep Learning	Feedback Control for Dynamic Systems	Convex Optimization
Reinforcement Learning	Model Predictive Control	Flight Dynamics
Advanced Topics: Deep Learning	Nonlinear Systems and Control	Vehicle Dynamics
Robot Learning	Multivariable Control of Uncertain Systems	Advanced Dynamics
Information Theory	Software for Sensors and Systems	State Variable Analysis
Probability and Stochastic Processes		