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Nathaniel Hamilton

Graduate Research Assistant

nphamilton.github.io

GitHub: nphamilton
LinkedIn: nphamilton
Google Scholar: c7TBV-cAAAAJ

- Machine learning researcher with a strong background in Safe Reinforcement Learning (SRL) and critically analyzing existing implementations, which has lead to an in-depth study on how run time assurance impacts the training and performance SRL agents that is currently under review.
- Research focuses on using reinforcement learning to develop control policies for autonomous systems that are adaptive, optimal, robust, and safe.
- Creative and self-motivated individual with a detail-oriented mindset, analytical skills, and proven ability to meet tight deadlines by working in a fast-paced work environment.

Skills

Programming Languages	Arduino, C, C++, Java, MATLAB, Python
Tools & Frameworks	Git, LaTeX, MarkDown, NumPy, Pandas, Pytorch, ROS, Seaborn
Quantitative Research	mathematical optimization, mathematical modeling
AI Background	Behavior Cloning, Deep Reinforcement Learning, Imitation Learning, Machine Learning, Neural Network Control, Safe Reinforcement Learning
Embedded Hardware	Arduino, JetsonTX2, pixhawk, RaspberryPi

Technical Experience

Graduate Research Assistant **May 2017 — Present**
Vanderbilt University *Nashville, TN*

- Conducted research centering on problems related to the safety and reliability of machine learning enabled autonomous systems in connection with the DARPA Assured Autonomy project.
- Demonstrated work on unmanned underwater vehicles, a 1/10 scale autonomous race car, and unmanned aerial vehicles.
- Learned effective technical writing skills demonstrated by 10 publications in top conferences and journals.

Autonomy Technology Research (ATR) Center Summer Internship **Summer 2019, 2020, & 2021**
Wright State University *Dayton, OH*

- Completed 5 projects (two earned best written documentation) while mentoring undergraduate researchers/collaborators.
- Communicated complex research findings to peers and key decision makers within the Air Force Research Laboratory.

Formula 1/10 Autonomous Racing **March 2019 — Present**
Vanderbilt University *Nashville, TN*

- Built a 1/10 scale autonomous car platform, equipped with LIDAR and stereoscopic cameras, for designing and testing experimental AI controllers as well as competing in multiple racing competitions with my team.
- Developed hands-on experience with vehicle systems in design, development, and testing of ML-trained controllers; published in ICAA 2022.

NSF Student CPS-VO Challenge **May 2018 and 2019**
Vanderbilt University *Marana, AZ*

- Lead and co-lead a team of undergraduate students to compete in a quadrotor search-and-rescue competition.
- Students had 1 week to design and prepare for 3-day competition; achieved 3rd place both years.

National Science Foundation (NSF) Research Experience for Undergraduates (REU) Research Assistant **Summer 2016**
University of Arizona *Tucson, AZ*

- Designed and implemented autonomous velocity controller deployed on full-scale car alongside 21 other human-controlled cars in infinite traffic loop experiment; published in Journal on Transportation Research April 2018

Education

Ph.D. in Electrical Engineering, *Vanderbilt University* Expected Graduation: Summer 2022
M.S. in Electrical Engineering, *Vanderbilt University* May 2020
B.S. in Electrical and Computer Engineering, *Lipscomb University* May 2017
National Defense Science and Engineering Graduate (NDSEG) Fellowship, Department of Defence 2019 — 2022
Presidential Scholarship, Lipscomb University 2013 — 2017

Activities

IEEE Aerospace & Electronic Systems (AES) Society Dayton Chapter virtual speaker event, Invited Speaker October 2021
Formula 1/10 Autonomous Racing, Competitor April 2019, October 2019
Pen Pals with a Purpose, Mentor Fall 2018 - Spring 2020
Air Force Research Laboratory's Safe & Secure Systems and Software Symposium (S5), Poster Presenter July 2017