Vincent W. Hill

673 Country Club Drive APT1013, Simi Valley, CA 93065 • (770) 862-0344 • vwhill@crimson.ua.edu

EDUCATION

The University of Alabama — Tuscaloosa, Alabama
Doctor of Philosophy — Expected August 2022

The University of Alabama — Tuscaloosa, Alabama
Master of Science in Aerospace Engineering and Mechanics — May 2020

The University of Alabama — Tuscaloosa, Alabama
Bachelor of Science in Mechanical Engineering — December 2017

RESEARCH EXPERIENCE

Dissertation Research — *August 2020—Present*

- Implemented a Python simulation testbed for multi-agent, multi-target GNC algorithm development
- Designed a simultaneous target assignment and trajectory optimization algorithm for UAS swarm operations
- Developed a probabilistic, measurement-based autonomous mission planning algorithm for UAS swarm operations using a random finite set multi-target tracking framework

PROJECT EXPERIENCE

Guidance, Navigation, and Controls Engineer — *May 2020—Present*
AeroVironment, Inc. — *Simi Valley, CA*

- Developed and tested GNC algorithms for large high-altitude long-endurance (HALE) UAS
- Designed an H_∞ robust control law to govern flexible wing shape through only control surface deflections
- Designed a PI control law for autonomous landing with minimal instrumentation
- Designed an LQR control law to stabilize a system mode predicted to become unstable in stratospheric flight
- Wrote flight test cards to evaluate control law performance
- Primary flight crew member for 13 flight hours to date, 3 as GNC Officer and 10 as Flight Dynamics Officer
- Conducted Monte Carlo simulations to analyze uncertainty & failure mode effects on control system performance
- Participated in 60 hours of flight test crew simulator training to date

Graduate Coursework Projects — *August 2018—Present*

- Conducted flight envelope trim analysis of an F-16 wind tunnel model
- Designed and tested a coupled guidance-control algorithm through Linear-Quadratic Regulator (LQR) and Linear Quadratic Integrator (LQI) optimal control schemes, respectively.
- Derived the equations of motion and designed an LQR control system for an inverted pendulum with cart
- Estimated the position of a mobile rover using differential GNSS
- Developed Python code for UAV navigation with loose INS/GPS integration

Graduate Research Assistant — *May 2019—November 2019*
The University of Alabama — *Tuscaloosa, Alabama*

- Front line researcher on a project partnering with NASA civil servants
- Performed parametric analysis of an Urban Air Mobility aircraft model for design optimization
- Conducted aerodynamic analysis using AVL and OpenVSP

Research Technician — *March 2018—July 2018*
The University of Alabama – Remote Sensing Center — *Tuscaloosa, Alabama*

- Research technician on US$1 million project funded by Copenhagen University and Alfred Wegener Institute
- Led a team of undergraduate and graduate students to manufacture a ground-penetrating radar system
- System was completed and deployed to Greenland's EastGRIP research station in July 2018

Co-Op (Four Terms) — *January 2015—August 2017*
Delta Air Lines – Operations Support Engineering — *Atlanta, Georgia*

- Served as a first responder for a 24/7 operations support engineering hotline
- Authored over 100 unique aircraft repair technique substantiations which are subject to FAA audit
- Directed Delta maintenance technicians during on-site disposition of severe aircraft damages

LEADERSHIP

Professional Development Committee Chair *August 2019—May 2020*
The University of Alabama – Graduate Student Association
- Organized and moderated two professional development events, a research grant writing experts' panel and a life as a new professor discussion panel

Alumni Mentor *July 2019—May 2020*
MentorUPP
- Partnered with two mechanical engineering upperclassmen to develop concrete plans to achieve realistic goals
- Provided advice on resume building, study habits, grad school admissions, and job searches
- Under my direction, senior mentee received fully funded offer to his first-choice MS program
- Junior mentee received offer from his first-choice company for a summer 2020 internship

TEACHING

Graduate Teaching Assistant *August 2018—May 2020*
The University of Alabama
- Grader for two classes per semester
- Gave a total of 15 lectures on elementary glider design, technical writing, dynamics, and fluid mechanics

AWARDS

Graduate Student of the Year *April 2020*
The University of Alabama – Graduate Student Association

REFEREED CONFERENCE PROCEEDINGS

1. Weihua Su, Wei Song, and **Vincent Hill**. "Real-Time Hybrid Simulation and Experiment for Aeroelastic Testing of Flexible Wings", AIAA SciTech 2019 Forum, AIAA SciTech Forum, (AIAA 2019-2032) https://doi.org/10.2514/6.2019-2032
2. Ryan W. Thomas, **Vincent W. Hill**, and Jordan D, Larson. "Hierarchical GNC for High Cardinality Random Finite Set Based Teams with Autonomous Mission Planning", AIAA SciTech 2021 Forum, AIAA SciTech Forum, to be published
3. **Vincent W. Hill**, Ryan W. Thomas, and Jordan D, Larson. "Autonomous Situational Awareness for UAS Swarms", IEEE Aerospace 2021 Forum, IEEE Aerospace Forum, to be published
4. **Vincent W. Hill**, Jason Mukherjee, Derek Lisoski, Oliver Chiang, Brian P. Danowsky, and Stephen Haviland. "In-Flight Stability Analysis and Envelope Clearance of a Solar-Powered HALE UAS with CIFER", AIAA Aviation 2021 Forum, AIAA Aviation Forum, to be published