Vincent W. Hill

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EDUCATION

The University of Alabama *Tuscaloosa, AL*
- **Doctor of Philosophy** *Expected May 2023*
- **Master of Science in Aerospace Engineering and Mechanics** *May 2020*
- **Bachelor of Science in Mechanical Engineering** *December 2017*

EXPERIENCE

Guidance, Navigation, and Control Engineer *May 2020—Present*
AeroVironment, Inc. *Moorpark, CA*
- Developed and tested GNC algorithms for large high-altitude long-endurance (HALE) UAS
- Designed a control law to govern flexible wing shape through only control surface deflections
- Developed a Kalman Filter data fusion algorithm to improve aircraft height above ground level estimates
- Designed a control law for autonomous landing with minimal instrumentation
- Designed a control law to stabilize a system mode predicted to become unstable in stratospheric flight
- Conducted Monte Carlo simulations to analyze uncertainty & failure mode effects on control system performance
- Wrote flight test cards to evaluate control law performance
- Primary flight test crew member for 13 flight hours to date
- Participated in 60 hours of flight test crew simulator training to date

Dissertation Research *June 2020—Present*
- Implemented a Python simulation testbed for multi-agent, multi-target GNC algorithm development
- Developed a probabilistic, measurement-based autonomous mission planning algorithm for UAS swarm operations using a random finite set multi-object tracking framework
- Developed an algorithm for multi-sensor fusion and cooperative navigation for decentralized robotic swarms

Graduate Coursework Projects *August 2018—May 2021*
- Designed an H_∞ robust control law for active gust rejection of a flexible aircraft
- Developed Python code for UAV navigation with loose INS/GPS integration and the extended Kalman Filter
- Estimated the position of a mobile rover using differential GNSS
- Designed and tested a coupled guidance-control algorithm for a lateral aircraft model
- Derived the equations of motion and designed a control system for an inverted pendulum with cart

Research Technician *March 2018—July 2018*
The University of Alabama – Remote Sensing Center *Tuscaloosa, AL*
- Technician on climate change research program
- Led a team 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, GA*
- 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 *August 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. Ryan Thomas, **Vincent Hill**, and Jordan Larson. "Hierarchical GNC for High Cardinality Random Finite Set Based Teams with Autonomous Mission Planning," AIAA 2021-0268. *AIAA SciTech 2021 Forum*. January 2021.
2. **V. W. Hill**, R. W. Thomas, and J. D. Larson, "Autonomous Situational Awareness for UAS Swarms," *2021 IEEE Aerospace Conference (50100)*, 2021, pp. 1-6, doi: 10.1109/AERO50100.2021.9438461.
3. **Vincent Hill**, Jason Mukherjee, Derek Lisoski, Brian Danowsky, and Stephen Haviland. "In-Flight Stability Analysis and Envelope Clearance of the Sunglider Solar HALE UAS," AIAA 2021-2796. *AIAA AVIATION 2021 FORUM*. August 2021.
4. **Vincent W. Hill** and Jordan D. Larson, "Multi-Sensor Fusion for Decentralized Cooperative Navigation Using Random Finite Sets," in *IEEE Aerospace 2022*, accepted.