**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
* Conducted Monte Carlo simulations to analyze uncertainty & failure mode effects on control system performance
* Wrote flight test cards to evaluate control law performance
* 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
* 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**

**PEER-REVIEWED JOURNAL PUBLICATIONS**

1. **Vincent W. Hill**, Ryan W. Thomas, and Jordan D. Larson, "Autonomous Situational Awareness for Robotic Swarms in High-Risk Environments," in *IEEE Transactions on Robotics*, in review. Preprint: arXiv:2105.04764 [cs.ro], May 2021.

**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. **Vincent W. Hill**, Ryan W. Thomas, and Jordan D. Larson, “Autonomous Situational Awareness for UAS Swarms,” in *IEEE Aerospace 2021*. Preprint: arXiv:2104.08904 [cs.ro], Apr. 2021.
3. **Vincent W. Hill**, Jason Mukherjee, Derek Lisoski, Brian P. Danowsky, and Stephen Haviland. "In-Flight Stability Analysis and Envelope Clearance of the Sunglider Solar HALE UAS", *AIAA Aviation 2021 Forum*, AIAA Aviation Forum, accepted
4. **Vincent W. Hill** and Jordan D. Larson, “Multi-Sensor Fusion for Multi-Object Tracking and Cooperative Navigation Using Random Finite Sets,” in *IEEE Aerospace 2022*, accepted