Mark Hartigan
Georgia Institute of Technology
School of Aerospace Engineering
https://mchartigan.github.io/

Education

Georgia Institute of Technology, Atlanta, GA — Expected Graduation: May 2026
- Doctor of Philosophy in Aerospace Engineering — GPA: 4.00
- Focus on spacecraft guidance, navigation, and control

Purdue University, West Lafayette, IN — Graduated: May 2021
- BS in Aeronautics and Astronautics Engineering, minor Computer Science — GPA: 3.93
- Graduated Cum Laude through the Honors College; National Merit Scholar

Awards and Honors

- National Merit Scholarship – Purdue University — August 2017 – May 2021
- Dean's List and Semester Honors — Fall 2017 – Spring 2020
- Warren G. Koerner Scholarship (AAE merit-based scholarship) — July 2018, July 2019
- Northrop Grumman SPACE Award for Rocket Design — April 2019

Work Experience

Vestigo Aerospace, LLC | *Flight Software Designer* — May 2021 – August 2021
- Wrote flight software for a deployable dragsail, a commercial satellite deorbiting product for SmallSats
- Developed register-level firmware in C for a microcontroller, implementing multiple interfaces (SPI, UART)
- Presented in a code design review with subject matter experts to evaluate the software for flight

Northrop Grumman Corporation | *GNC Analysis Intern* — May 2020 – August 2020
- Performed GNC analysis on Commercial Resupply Service missions for the International Space Station
- Conducted independent research to study pseudospectral dynamic optimization and implemented separately within a C++ and Python model to generate propellant-optimal attitude maneuvers
- Developed an accurate rotational dynamics model in Simulink to simulate spacecraft attitude slews
- Analyzed steady-state attitude error between Star Trackers and its effect on mission requirements
- Wrote mass property calculation scripts to assist Monte Carlo analysis of Human Landing System designs
- Presented results for all the above and made data-based recommendations for improving future missions

GE Aviation | *Lean Six-Sigma Manufacturing Intern* — May 2019 – August 2019
- Applied lean six-sigma training to military turbine airfoil production lines to decrease lead time
- Leveraged lean practices across the manufacturing plant to improve quality and flow of the value stream
- Drafted a floorplan of the facility in AutoCAD 2018; created a system for continuous maintenance

The Fourth River Co. | *Engineering Intern* — May 2018 – August 2018
- Performed IT tasks on Windows and Linux operating systems and wrote programs to automate tasks
- Aided with engineering projects, including AutoCAD drafting, proposals, and report compilation
- Worked on construction sites with power tools installing and servicing fuel tank systems and piping

Research and Projects

Space Systems Design Lab | *Graduate Research Assistant* — August 2021 – Present
- Design, assemble, and test additively manufactured cold gas propulsion systems for CubeSat swarms
- Perform qualification testing of CubeSat propulsion system flight hardware for 3 federally-funded missions

Commented [SP1]: I'd recommend putting this near the top under education

Commented [MH2]: You can talk about the robustness etc in the interview

Commented [SP3]: It is a little redundant to state what programming languages/CAD programs/etc you used for each line item since you also have "Skills" section. I would do one or the other to make the CV more concise. You've got so much great stuff in this CV so the challenge is making sure that it is compact enough that the reader doesn't get fatigued

Commented [SP4]: Same as the first comment

Commented [SP5]: It is good that you put a strong emphasis on research since this is for grad school. I put the research section first on mine, but that might not work here since you've combined research and projects.

Commented [MH6]: I would say its assumed you are collaborating on this if you want the space for other details

- Design and analyze propulsion systems using SolidWorks for vibration, structural stability, and thermal properties

FEMTA Suborbital Flight Experiment | *Project Manager* August 2019 – May 2021

- Managed team of ~50 undergraduates through multiple stages in the engineering design cycle while coordinating mission details with NASA representatives and presenting research at institute conferences
- Designed system to measure thrust produced by a micropropulsion device using plasma spectroscopy
- Utilized a modified Linux kernel to develop mission-critical processes and software in C
- Developed an accurate system-wide model in SOLIDWORKS and machined flight hardware
- Performed vacuum chamber experiments to verify and validate flight hardware designs
- Designed (Kicad & LTSpice), tested, and manufactured custom PCBs for flight avionics

Design and Analysis of a Spacecraft Propulsion System August 2020 – December 2020

AAE 33900: Aerospace Propulsion

- Planned a deep space mission to deploy a research probe on Europa – similar to the Europa Clipper – with a focus on the design and analysis of propulsion systems used (from launch vehicle to delta-V engine)

Creating a Social Networking Platform August 2020 – December 2020

CS 30700: Software Engineering

- Constructed a social media site with similar functionality to Twitter, Facebook, or Reddit from the ground up
- Managed the project using Agile methodology by implementing month-long design sprints followed by reviews and planning meetings
- Developed a frontend using a combination of React.js, HTML, and CSS in conjunction with a Node.js backend utilizing Google's Firebase database and hosting services

Purdue Orbital | *Avionics Design Lead* September 2018 – August 2020

- Led software team creating flight computers for a Level 2 rocket launched from a balloon platform
- Developed a flight computer on a Raspberry Pi platform after prototyping using Arduinos
- Wrote software, modified Linux architecture, and integrated sensors to achieve mission specifications
- Applied signal processing techniques to clean data and achieve accurate telemetry for missions
- Worked with other subteams and the FAA to coordinate a mission test with Raven Aerostar

Mentorship Experience

Honors First Year Engineering | *Teaching Assistant* August 2018 – May 2021

- Wrote autograders for Python and MATLAB assignments to deploy on remote Gradescope servers
- Helped design a GUI using PyQt5 for TAs to manage and answer student questions pertaining to projects
- Aided learning in class by providing guidance to students, assisting the professors, and grading work

Engineering Mentor Corps | *First Year Engineering Mentor* August 2020 – December 2020

- Mentored 12 First-Year Engineering students by organizing virtual meetings, providing advice, professional development planning help, and directing them towards campus resources

Honors College Mentor April 2018 – October 2019

- Mentored a group of freshmen in a first-year Honors College "Evolution of Ideas" course
- Encouraged collaboration, created group norms, and fostered a psychologically safe environment
- Learned leadership skills to improve group dynamics, identify implicit biases, and support diversity

Conference Presentations

Hartigan, M., Degener, M., (2021). "Using Plasma Spectroscopy to Measure Thrust of Micropropulsion Systems". In *Spring 2021 AAE Research Symposium Series*. West Lafayette, IN.

Commented [MH7]: Damb I didn't know it was that many! wow

Commented [SP8]: Just another example of the first comment

Commented [MH9]: I would say that verification and validatin testing could be covered in your current research job if you wanted to get rid of this bullet (unless vacuum testing is a good skill to include here)

Commented [SP10]: Is this a personal project or a class project? It isn't clear what this was done for

Commented [SP11]: Same as the above comment

Commented [SP12]: This sounds cool

Commented [SP13]: These two might be able to be combined to reduce the number of bullets points for this item

Lumpp, B., Ayhan, D., Deperna, J., **Hartigan, M.**, Hawn, E., Johnson, A., Kinsella, J., Kracke-Bock, C., Patel, J., (2020). "Zero-Gravity Testing of a FEMTA Thruster Through Plasma Spectroscopy". In *Fall 2020 Purdue Undergraduate Research Conference*. West Lafayette, IN.

Lumpp, B., Chow, J., Deperna, J., **Hartigan, M.**, Johnson, A., Kinsella, J., (2020). "Developing a Numerical Model of the FEMTA Propellant Management Experiment". In *Fall 2020 Purdue Undergraduate Research Conference*. West Lafayette, IN.

Chow, J., Czech, C., Degener, M., Franks, .N, Govindhan, A., **Hartigan, M.**, Kiddy, S., Kracke-Bock, C., Lumpp, A., Lumpp, B., Menon, A., Patel, R., Shahin, T., Soberg, J., Yu, Y., (2020). "Suborbital Testing of a Small Satellite Propulsion System". In *Spring 2020 Purdue Undergraduate Research Conference*. West Lafayette, IN.