Department of Aerospace Engineering
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MARY DAHL

Education

2022–present **Candidate for a PhD in Aerospace Engineering**, *MIT*, Cambridge, MA.
Thesis: Autonomous and dynamic satellite remote sensing for Earth science

2020–2022 : **M.S. in Aerospace Engineering**, *MIT*, Cambridge, MA.
Thesis: Development of Structures and Methods for Safe On Orbit Robotic Assembly of Small Satellites

2016–2020 : **B.S. in Aerospace Engineering with a Minor in Creative Writing**, *MIT*, Cambridge, MA.

Research Experience

Oct 2023 – present ***Dynamic Targeting and Intelligent Instrumentation for Cloud Science***.
- Developed mission concept for onboard decision making and autonomous pointing for efficient maximization of scientific data collection by defining requirements for dynamic measurements and analyzing mission architectures.

June 2022 – Dec 2023 ***MITEI Seed Fund: Multi-Sensor Satellite Remote Sensing Framework for Emissions and Energy Infrastructure Monitoring***.
- Analyzed the needs of power companies to determine how best to utilize orbital assets to monitor power line infrastructure and predict wildfires. Recommended solutions that utilize measurements of underexplored radio frequency emissions.

May 2021 – May 2023 ***SEASALT: Satellite for Estimating Aquatic Salinity and Temperature***.
- Managed a team of engineers and students from MIT, Woods Hole Oceanographic Institute, and the Naval Research Laboratory to design a 6U satellite to measure ocean salinity through the use of a custom telescope optical system and regression algorithms.

Jan 2020 – May 2022 ***Matrix: Modular CubeSat Assembly***.
- Designed 3D-printed, compliantly designed, snap fit shells for CubeSat components that could be manipulated and assembled by a cartesian robot safely and efficiently in less than 4 minutes.
- Managed a team of undergraduate and graduate students to assemble a 1U CubeSat with a cartesian robot.

June 2020 – Dec 2021 ***SPRINT: Scheduling Planning Routing Inter-satellite Networking Tool***.
- Improved a tool for satellite task scheduling by restructuring user interfaces, performing analyses on performance, and modifying it to run on hardware.

Jan 2019 ***Princeton Satellite Systems***, *Winter Intern*, Plainsboro, NJ.
- Analyzed theoretical technology to convert waste heat from a fusion engine to usable power using semiconductors.

Industry Experience

June, 2019 – Aug 2019 ***SpaceX***, *Test Engineering Intern*, Hawthorne, CA.
- Developed and executed a large-scale pyrotechnics test as part of the Development Test Engineering Team to finalize the inclusion of a critical safety feature in the Dragon Crew Capsule.
- Designed and fabricated custom parts, organized assembly and instrumentation of a test stand, planned and oversaw a large-scale lift operation, and coordinated with three teams of stakeholders.

June, 2018 – Aug 2018 ***MIT Lincoln Laboratory***, *Intern*, Lexington, MA.
- Designed and fabricated a test stand for verifying performance of experimental microbolometer IR cameras in different weather conditions and a variety of temperatures for the Tactical Defense Systems Group.
- Defined system requirements based on user desires and used a combination of off-the-shelf and custom parts.

Teaching Experience

Feb 24 - now ***MIT Communication Lab***, *Communication Fellow*, Cambridge, MA.
- Developed technical communication resources for graduate students, including written how-to kits, blog posts, posters, and workshops.
- Tutored students one-on-one on improving any kind of technical communication, such as presentations, applications, resumes, and papers.

Feb – Aug 23 ***MIT Lincoln Laboratory***, *Beaverworks Summer Institute Lead Instructor*, Cambridge, MA.
- Managed a class of 19 high school students for a full day summer program to teach them the basics of satellite engineering, Python, and the use of amateur hardware such as Raspberry Pis, IMUs, radios, and solar panels.

Feb – Dec 21 ***MIT 16.83x: Space Systems Engineering***, *Teaching Assistant*, Cambridge, MA.
- Assisted in enhancing the undergraduate aerospace engineering capstone by developing new assignments, rubrics, and projects.

Jun – July 20 ***MIT Lincoln Laboratory***, *Beaverworks Summer Institute Teaching Assistant*, Remote.
- Adapted a class on the basics of satellite engineering to work in a virtual environment for 25 high school students by designing interactive labs and a final project.

Publications and Presentations

2025 **Mary Dahl** and Kerri Cahoy. Improving Cloud Observations by Autonomously Pointing Satellites. *IEEE IGARSS 2025*. Paper, to be published.

2025 Adam Bahlous-Boldi et al. (including **Mary Dahl**). Deployable Diffractive Optical Elements for Small Satellite Lidar Missions. *39th Annual Small Satellite Conference*. Paper, to be published.

2025 **Mary Dahl**, Sophie Bergkvist, and Kerri Cahoy. Satellite System Design and Algorithms for Targeted Cloud Measurements. *NASA Earth and Planetary Cloud Workshop 2025*. Poster, to be published.

2024 Adam Bahlous-Boldi et al. (including **Mary Dahl**). BeaverCube II: Using AI-Optimized Processors on Earth-Observing CubeSats for Autonomous Image Analysis and Intelligent Data Handling. *38th Annual Small Satellite Conference*

2024 **Mary Dahl** and Kerri Cahoy. Machine Learning Algorithm and Multi Sensor Suite for Orbital Power Line Management and Wildfire Prediction. *AIAA SciTech 2024*

2023 **Mary Dahl**, Christine Page, Kerri Cahoy, and Evana Gizzi. Developing Intelligent Space Systems: a Survey and Rubric for Future Missions. in *37th Annual Small Satellite Conference*.

2023 **Mary Dahl**. "Build a CubeSat: A Collaborative, Hands-On Program for High School Students at MIT," in *SmallSat Education Conference*. Presentation.

2022 **Mary Dahl**. "Development of Structures and Methods for Safe On Orbit Robotic Assembly of Small Satellites," *Massachusetts Institute of Technology*. Thesis.

2022 Ezinne Uzo-Okoro, **Mary Dahl,** and Kerri Cahoy. Ground-based 1U CubeSat Robotic Assembly Demonstration. *Journal of Small Satellites, Volume 11*.

2022 Sean McCarthy et al. (including **Mary Dahl**). Satellite for Estimating Aquatic Salinity and Temperature (SEASALT) - A Scientific Overview. *36th Annual Small Satellite Conference*.

2022 Shreeyam Kacker et al. (including **Mary Dahl**). Satellite for Estimating Aquatic Salinity and Temperature (SEASALT) a Payload and Instrumentation Overview. *36th Annual Small Satellite Conference*.

2021 **Mary Dahl**, Juliana Chew, and Kerri Cahoy. Optimization of SmallSat Constellations and Low Cost Hardware to Utilize Onboard Planning. *ASCEND 2021*.

2020 Ezinne Uzo-Okoro, Christian Haughwout, Emily Kiley, **Mary Dahl**, and Kerri Cahoy. Ground-Based 1U CubeSat Robotic Assembly Demonstration. *34th Annual Small Satellite Conference*.

2020 Ezinne Uzo-Okoro, Daniel Erkel, Prakash Manandhar, **Mary Dahl**, Emily Kiley, Kerri Cahoy, and Olivier De Weck. Optimization of On-Orbit Robotic Assembly of Small Satellites. *ASCEND 2020*.

2019 Charles Swanson, Michael Paluszek, Stephanie Thomas, and **Mary Dahl**. Direct thermal energy conversion via tuned thermal emitter and photovoltaic band gap. *70th International Astronautical Congress 2019*.

Honors

May 2024 MathWorks Fellowship

May 2023 MathWorks Fellowship

May 2023 MIT AeroAstro Outstanding Graduate Student Leadership Recognition Award

May 2022 Actor for *The V.E.R.S. Project*, 2022 Webby Award in Best Social Gaming Experience

April 2022 MIT AeroAstro Community Recognition Graduate Teaching Assistantship Award

Leadership

Mar 2023 – present **Queer Advocacy Space in AeroAstro**, *Executive Board Member*, Cambridge, MA.
- Advocated for the needs of queer students in the Aerospace Engineering department by hosting teaching events, running social events, and performing community outreach.

Jan 2021 – Jan 2024 **Graduate Association of Aeronautics and Astronautics**, *Social Chair, Graduate Student Council Representative*, Cambridge, MA.
- Planned and ran social events for approximately 300 graduate students, including off-campus trips, office trick-or-treating, coffee socials, and new student mixers.
- Worked with the interdisciplinary Graduate Student Council to advocate for the needs of AeroAstro students during the transition back to in-person instruction and activities.

Jan 2017 – May 2020 **MIT Shakespeare Ensemble**, *Technical Director, Producer, Actor*, Cambridge, MA.
- Recruited and lead teams of 20+ students to put together productions of theater shows by managing requirements, deadlines, and conflicts.
- Coordinated the full-day technical setup by managing students across multiple teams to complete set construction, lighting and sound setup, audience arrangements, and backstage preparations.

April 2017 – Dec 2019 **MIT Next House Dormitory Exec**, *Vice President, Social Chair*, Cambridge, MA.
- Managed student needs by working with an executive board to improve life for students at the dorm, such as by building infrastructure and securing funds for organized student group activities and running housewide meetings to understand student problems and discuss solutions.
- Implemented events for residents, including day trips, Pi Day fundraiser, and inter-dorm parties.

Sept 2016 – Nov 2019 **MIT Next Haunt**, *Producer, Assistant Producer, Build Director*, Cambridge, MA.
- Lead a team to design and construct a wooden, two-story haunted house escape room, featuring crawl tunnels, props for implementing jump scares, and electronic puzzles.
- Conducted operation of event for multiple weekends by coordinating "zombie" actors, properly timing hint delivery for optimal experiences, and rapidly responding to unexpected problems.

Professional Development

Aug 2023 NASA/CCS/KISS Summer School, "Using Satellite Observations to Advance Climate Models"

Sep – Mar 19 Gordon-MIT Engineering Leadership Program