# Alex Meredith

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## Education

**Massachusetts Institute of Technology** — **Cambridge, MA**
**Master's of Science in Aerospace Engineering (GPA: 5.0/5.0)** — **June 2021 – present**

*Relevant Coursework*: Satellite Engineering; Spacecraft and Aircraft Sensors & Instrumentation; Representation, Inference and Reasoning in AI; Underactuated Robotics

**Massachusetts Institute of Technology** — **Cambridge, MA**
**Bachelor's of Science in Aerospace Engineering (GPA: 5.0/5.0)** — **August 2017 – June 2021**

*Relevant Coursework*: Space Systems Engineering, Feedback Control Systems, Dynamics, Communications Systems & Networks, Introduction to Machine Learning, Elements of Software Construction

## Research Experience

**MIT STARLab** — **Cambridge, MA**
***Graduate Research Assistant*** — **June 2021 – Present**

- Developing fast algorithms that exploit orbital symmetry for colocating satellite data from microwave soundings and radio occultations
- Designing convolutional neural networks (CNNs) that identify clouds in satellite images from visible-spectrum and long-wave infrared cameras
- Optimizing planning and trajectory optimization algorithms for underactuated CubeSats using magnetorquer-only control

**MIT STARLab** — **Cambridge, MA**
***Undergraduate Researcher*** — **June 2020 – June 2021**

- Designed and wrote Extended Kalman Filter for CubeSat attitude determination in MATLAB
- Developed physics-based sandbox environment for testing attitude determination and control algorithms using Simulink
- Worked on extending existing magnetorquer-only control algorithms to handle predictable disturbance torques from the space environment and uneven thrust from CubeSat propulsion systems

## Publications

Kacker, Shreeyam., **Meredith, Alex**., Cahoy, Kerri., & Labrèche, Georges. "Machine Learning Image Processing Algorithms Onboard OPS-SAT", in 34th Annual Small Satellites Conference, Logan, 2022.

Kacker, Shreeyam., **Meredith, Alex**., Kusters, Joe., Tomio, Hannah., Felt, Violet., & Cahoy, Kerri. "On-orbit rule-based and deep learning image segmentation strategies", in AIAA SCITECH 2022 Forum, p. 0646. 2022.

do Vale Pereira, Paula., Garcia, Madeline., Schroeder, Madeleine., Caldelas, Humberto., Lindsay, Charles., Choi, Alex., Pfrang, Kaila., Gagnon, Amelia., **Meredith, Alex**., .... & Cahoy, Kerri. "BeaverCube: Coastal Imaging with VIS/LWIR CubeSats", in 34th Annual Small Satellites Conference, Logan, 2020.

## Conference Presentations

**Meredith, Alex**., Leroy, Stephen., and Cahoy, Kerri. "Rotation Method for Efficient Collocation-Finding", at IEEE GRSS workshop on Remote Sensing Data Management Technologies in GeoScience 2022 (presented solo).
Kacker, Shreeyam., **Meredith, Alex**., Kusters, Joe., Tomio, Hannah., Felt, Violet., & Cahoy, Kerri. "On-orbit rule-based and deep learning image segmentation strategies", at AIAA SCITECH Forum 2022 (co-presented with Shreeyam Kacker).

## Awards

- National Science Foundation Graduate Research Fellowship (2022)
- NASA Space Technology Graduate Research Opportunities fellowship (declined) (2022)
- Best presentation award at IEEE RSDM-GeoSci workshop (2022)
- Henry Webb Salisbury Award for superior academic performance (2021)
- Wings Club Foundation Scholarship (2020)
- Intercollegiate Rowing Association All-Academic Team (2019)
- Rewriting the Code Fellow (2018)
- National Merit Scholar (2017)

## Outreach Presentations

**Meredith, Alex**. "Pursuing graduate research in engineering as a woman", to BIO3898 (Women in Science), Department of Biology, Seattle Pacific University, 2022 (updated from 2021 presentation).
**Meredith, Alex**. "Pursuing graduate research in engineering as a woman", to BIO3898 (Women in Science), Department of Biology, Seattle Pacific University, 2021.

## Work Experience

**E-Space** **Beverly, MA**
***Control Systems Engineering Intern*** **June 2021 – August 2021**

- Developed Python simulation modeling orbital environment, disturbance torques, actuators, and attitude determination sensors to design & evaluate magnetorquer-only (underactuated) attitude control system
- Wrote, tested and speed-optimized nonlinear optimization algorithm for planning underactuated slews in C++
- Presented my work on E-Space's attitude control system to VCs who later invested $50M in the company

**Analytical Graphics, Inc.** **Exton, PA**
***Engineering Intern*** **June 2020 – August 2020**

- Designed CubeSat power system, attitude control system, and optical communications payload and modeled these subsystems using Systems Tool Kit (STK) and STK partner products
- Worked with two other interns to design a CubeSat communications constellation for disaster-relief workers and modeled it in STK
- Completed STK Grandmaster Certification & STK Master Integration Certification

**Microsoft** **Redmond, WA**
***Software Engineering Intern*** **June 2019 – August 2019**

- Web-scraped Twitter and did machine learning on datasets of scraped tweets to identify cybersecurity threats in real-time using Python and TensorFlow
- Designed and implemented an internal website using .NET framework to display tweets representing cyberthreat and other cybersecurity-related data in an easy-to-use interface

***Explorer Intern*** **June 2018 – August 2018**

- Worked with two other interns to design and implement a data monitoring dashboard in PowerBI, using full Azure stack

## Skills

**Programming Languages**: Python, MATLAB, C++, Java, C, JavaScript, HTML/CSS, MySQL, Assembly (RISC-V)
**Software & Frameworks**: STK, ODTK, Keras, Tensorflow, Microsoft Office, Azure, Visual Studio, and PowerBI; BlueSpec