Annika Thomas

E-mail: annikat@mit.edu
Web: annika-thomas.github.io

SUMMARY Robotics researcher specializing in real-time perception, localization, and multi-agent autonomy, with experience designing, publishing, and deploying C++/Python systems for field-relevant robotic platforms.

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA — September 2021 - Present
Ph.D. Candidate in Mechanical Engineering (Robotics)
S.M. in Mechanical Engineering (Controls)

Columbia Engineering, New York, NY — September 2019 - May 2021
B.S. in Mechanical Engineering

The College of Idaho, Caldwell, ID — September 2016 - May 2019
B.S. in Mathematics and Physics

SKILLS

Programming & Systems: Python, C++, CUDA, Linux, Git, Docker, Bash
Robotics & Perception: SLAM, Localization, Multi-Agent Systems, Mapping & Reconstruction, Pose Estimation, Computer Vision, ROS (1/2)
Machine Learning: PyTorch, Deep Learning, Optimization, Probabilistic Modeling
Hardware & Prototyping: Arduino, Raspberry Pi, Sensor Integration

RELEVANT EXPERIENCE

MIT Aerospace Controls Laboratory — May 2023-Present, Cambridge, MA
Ph.D. Student (Supervisor: Jonathan P. How)

- Designed and deployed real-time perception and localization pipelines for autonomous robots operating in unstructured environments, supporting long-duration, large-scale mapping experiments.
- Developed segmentation- and language-assisted mapping methods, enabling open-set localization across diverse viewpoints and environmental conditions.
- Built a large-scale, multi-agent Gaussian Splatting SLAM system, emphasizing global consistency, scalability, and robustness across agents.
- Built and maintained research-grade C++/Python infrastructure on Linux, including tooling for debugging, evaluation, and large-scale experimental analysis.

MIT Lincoln Laboratory, Group 76 — May-Aug 2022, Lexington, MA
Engineering Intern, Control and Autonomous Systems

- Implemented object detection, obstacle avoidance, and trajectory planning algorithms for autonomous vehicles in real-time systems.
- Developed and validated state-space models for dynamic systems under real-time constraints.

Additional Experience

MIT STAR Laboratory Jun 2022-May 2023, Cambridge, MA
S.M. Student (Supervisor: Kerri Cahoy)

- Led system integration of a 3U CubeSat with onboard AI for image segmentation and task planning under power and compute constraints.
- Collaborated across mechanical, electrical, and software teams to validate flight-ready autonomy components.

MIT Precision Motion Control Laboratory Aug 2021-May 2023, Cambridge, MA
S.M. Student (Supervisor: David Trumper)

- Designed and modeled feedback control systems for a novel magnetically levitated reaction sphere.
- Implemented and validated control algorithms in simulation with an emphasis on system stability and robustness.

Selected Publications

[1] VISTA: Monocular Segmentation-Based Mapping for Appearance and View-Invariant Global Localization.
Hannah Shafferman, **Annika Thomas**, Jouko Kinnari, Michael Ricard, Jose Nino, Jonathan P. How. *Robotics and Automation Letters*, 2026.

[2] GRAND-SLAM: Local Optimization for Globally Consistent Large-Scale Multi-Agent Gaussian SLAM.
Annika Thomas, Aneesa Sonawalla, Alex Rose, Jonathan P How. *Robotics and Automation Letters*, 2025.

[3] SOS-Match: Segmentation for Open-Set Robust Correspondence Search and Robot Localization in Unstructured Environments.
Annika Thomas*, Jouko Kinnari*, Parker C. Lusk, Kota Kondo, Jonathan P. How. *International Conference on Intelligent Robots and Systems (IROS)*, 2024.

Awards & Recognition

De Flores Prize for Outstanding Ingenuity and Creative Judgement, MIT 2025
James Means Award for Excellence in Space Systems Engineering, MIT 2025
Second Place in Lunar Autonomy Challenge, NASA, Johns Hopkins APL 2025
Finalist, PhD Communication Competition, Amazon Robotics 2025
Best Lightning Talk, MIT SpaceTech Conference 2025
Finalist, Best Paper in Safety, Security and Rescue Robotics, IROS 2023
Graduate Research Fellowship Program (GRFP), NSF 2023

Leadership

NASA Lunar Autonomy Challenge, MIT Sep 2024 – May 2025
Team Lead for a 12-person robotics team developing autonomous multi-agent mapping, localization, planning, and perception systems in a simulated lunar environment.

NASA RASC-AL Lunar/Mars Analog, MIT Aug 2023 – May 2024
Operations Lead responsible for integrating multi-agent robotics and AI systems for autonomous surface operations.

Graduate Residential Assistant, MIT Aug 2023 – Present
Provide mentorship and academic support for approximately 30 students and assist with coordination of residence operations and programming.