Hridai Ambati

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EDUCATION

Georgia Institute of Technology — Atlanta, Georgia
Bachelor of Science in Aerospace Engineering — May 2023 – Dec 2025
Minor in Scientific Engineering and Computing
GPA: 3.8

SKILLS

Framework Development	GNC	Multi-Agent Autonomy
Convex Optimization	Bayesian State Estimation	Cooperative Control
C++, Python, MATLAB	ROS 2, MuJoCo, SysML	Motion Planning

WORK EXPERIENCE

Aerospace Robotics Laboratory (SSDL - ARL) — Atlanta, Georgia
Undergraduate Researcher — Jan 2025 – Present

- Development of tools and frameworks for autonomous spacecraft testing and multi-agent mission design
- Conduct research in spacecraft guidance, navigation, and control within a space systems simulation laboratory
- Collaborate with faculty and graduate researchers on control algorithms, dynamics modeling, and optimization

Aerospace Systems Design Laboratory (ASDL) — Atlanta, Georgia
Undergraduate Researcher — Jan 2024 – May 2025

- Developed space system models through object-oriented programming and Systems Modeling Language
- Simulated closed-loop control system performance and validated thrust and propellant ascent models

PROJECT EXPERIENCE

Formation Flying Spacecraft Simulation Framework
SSDL Research — Jan 2025 – Present

- Developed a high-fidelity simulation framework using ROS 2 and MuJoCo to model multi-agent formation flight
- Simulated 5+ spacecraft with robotic arms, MOI, relative orbit, and contact dynamics using RK4 at 1 kHz
- Integrated C++/Python architecture with accelerometer, gyroscope, and camera fusion at 0.5 kHz via EKF/UKF
- Implemented GNC for pathfinding, cooperative control, and collision avoidance using convex optimization
- Added vision systems that will use neural networks to influence sensor fusion and improve state estimation

Spacecraft Performance Modeling and Analysis
ASDL Research — May 2024 – May 2025

- Modeled NASA Space Shuttle closed-loop control in Simulink with peak gimbal errors less than 5 degrees
- Created Saturn V 3-stage ascent model, thrust curves, and mass fractions matched velocity difference within 10%
- Developed a Falcon Heavy multi-stage thrust and propellant model to numerically reproduce ascent model

CAMPUS & COMMUNITY INVOLVEMENT

Georgia Tech Ramblin' Rocket - GNC — Aug 2024 – Present

- Collaborated on a comprehensive rocket GNC simulation architecture and class hierarchy in MATLAB
- Built environment models for 0-100 km altitudes and 0-35 m/s wind gusts and perturbations
- Developed inertial state estimation algorithms and IMU fusion to minimize RSME at 200 Hz
- Simulated LQR with 1000+ Monte Carlo runs varying aerodynamics, thrust, mass, and environmental conditions

RELEVANT COURSEWORK

Orbital Mechanics	Two-body/N-body, orbit determination, maneuvers, rendezvous
Optimal Guidance and Control	Variational methods, Pontryagin principle, LQR, numerical methods
Robotics and Autonomy	Planning and control, state estimation, SLAM, multi-robot systems