

# Sebastian Escobar

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## Education

University of Colorado Boulder

**M.S, Aerospace Engineering – Autonomous Systems & Robotics**

**Aug 2025 – May 2026**

GPA: 3.93

- Thesis: *Safe Execution of Autonomous Systems using TPOs & Certified Learning.* Developing a framework that integrates advanced Timed Partial Order planning with certified neural network training for control synthesis.
  - Advisor: Morteza Lahijanian | ARIA Systems

**B.S, Aerospace Engineering**

**Aug 2021 – May 2025**

GPA: 3.73 – Cum Laude | Minor in Electrical Engineering.

## Experience

Laboratory for Atmospheric and Space Physics (LASP) | Boulder, CO

**Mission Planner & Autonomy Engineer**

**Jan 2023 – Current**

- Designed and implemented an autonomous constraint-based task planning framework in Python for SPRITE & MANTIS NASA CubeSat missions, eliminating manual scheduling conflicts and optimizing uplink windows.
  - Scaled the planning engine to support three concurrent missions. Currently formalizing as LASP's standard CubeSat planning framework for all future LEO satellites.
- Developed a Python pipeline that uses parallel computing and advanced algorithms to fit pixel behavior patterns and eliminate background noise from spectral images captured by the CUTE CubeSat. Journal Paper written.

Arkisys | Long Beach, CA

**Embedded Flight Systems Engineer Intern**

**May 2025 – August 2025**

- Built and implemented the C flight software integrated flight system for the Cutter space vehicle, integrating multi-CPU architectures, sensors, and actuators for autonomous flight operations.
- Designed a fault-tolerant, multi node Ethernet communication backbone for the Cutter & Port vehicles, implementing hardware time synchronization (IEEE 1588 PTP) to maintain network utilization below 30% during critical operations.

## Projects

**Cooperative Air-Ground Robot Localization (MATLAB)**

- Developed a centralized LKF, EKF, and UKF framework for joint state estimation of a UAV-UGV system fusing GPS data with inter-agent range & bearing measurements. Validated via Monte Carlo NIS/NEES statistics.

**Kinodynamic Motion Planning for High-Speed Gliders (C++)**

- Developed a C++ motion planning library implementing the Stable Sparse RRT\* (SST) algorithm with non-linear 12 variable state dynamics for optimized flight path and planning under varying conditions.
- Optimized the planner to handle high-dimensional constraints (wind fields, obstacle detection) while achieving asymptotic optimality and sub 10s planning times.

**Adaptive Multi-Objective Autonomous Underwater Vehicle (Julia)**

- Developed a Pareto-optimal AUV decision system in Julia using MDPs, Q-learning, and Transformer models, achieving robust performance across conflicting mission objectives.

**INPASS: Intelligent Navigation for Swarm Systems (C++ / ROS 2)**

- Helped develop a multi-robot autonomous system with uncertainty propagation and proximity-based localization, optimizing its behavior via C++, Python, and ROS 1 & ROS 2.
- Validated experimentally on two Clearpath Jackal UGVs in a laboratory experiment, utilizing a Vicon motion capture system for real-time ground-truth analysis and performance benchmarking.

## Skills & Interests

**Technical Skills:** C++, C, Python, MATLAB, Julia, Linux, Git. **Robotics & Autonomy:** ROS1/2, Motion Planning, State Estimation, SLAM, Pytorch, Tensorflow. **Interests:** Basketball, Gym, Dogs, Music, Football, Beach.