Alexander Burns

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EDUCATION

Stanford University **Palo Alto, CA**
M.S. Aerospace Engineering – Space Rendezvous Laboratory (SLAB) *Expected June 2028*

University of California, San Diego **San Diego, CA**
B.S. Aerospace Engineering – Specializations: Astrodynamics, Controls | GPA: 3.96/4.00 | Magna Cum Laude *June 2026*

Relevant Coursework: Aerodynamics, Aerospace Structures, Computational Fluid Dynamics, Controls, Fluid Mechanics, GNC, Heat Transfer, Material Science, Orbital Mechanics, Propulsion, Space Propulsion, Solid Mechanics, Thermodynamics, Vibrations

PROFESSIONAL EXPERIENCE

Starfish Space **Seattle, WA**
Intern, GNC Engineer *June – September 2026*

- Developing GNC and computer vision software for autonomous satellite rendezvous, proximity operations, and docking (RPOD) using Python/C++, including synthetic imagery generation, ML model training, and 6-dof Monte Carlo simulation analysis.

Planet Labs **San Francisco, CA**
Intern, Spacecraft Systems Engineer *June – September 2025*

- Validated that previously un-characterized ferromagnetic materials on the Block II payload had insignificant impact on GNC control authority and satellite pointing by modeling theoretical fields in **FEMM** and computing an equivalent magnetic dipole moment.
- Supported the SQM build campaign by performing root-cause corrective analysis (RCCA) during vibration and TVAC tests, identifying root causes of response shifts and modeling system behavior in **MATLAB** and **Python** to validate design margins.
- Developed a spacecraft power and drag simulation framework to evaluate generation and consumption profiles for LEO imaging satellites, accounting for sun fraction, attitude slews, operations, and GEO relay pointing constraints. Integrated results with Monte Carlo derived drag parameters from **OpenFOAM** to evaluate GEO pointing implications on lifetime prop consumption.

ViaSat **Carlsbad, CA**
Intern, Satellite Operations Specialist *June 2023 – June 2025*

- Performed trajectory optimization with the Flight Dynamics team to maintain orbital drift by predicting GEO perturbations and calculating station-keeping maneuvers to minimize prop consumption during nominal operations and transfer orbits.

ORGANIZATIONS

Large-Scale Design Optimization Laboratory ***March 2025 - Present***

- Applied **Nonlinear Model Predictive Control** to concurrently optimize quadrotor design and GNC algorithms, developing a holistic vehicle and trajectory model integrating system performance, mission requirements, and dynamic constraints.
- Improved solver convergence by implementing a segment-wise warm-starting strategy, enabling stable, computationally efficient solutions across randomized racecourse configurations that previously stalled or diverged.

Yonder Dynamics | *URC Mechanical Team Member* ***October 2023 – April 2025***

- Led design reviews within the mechanical team, using **SolidWorks** assemblies to ensure seamless integration with electrical and software requirements, promoting cross-disciplinary collaboration and ensuring optimal rover performance.
- Designed, tested, and manufactured an improved rover elbow joint through **Ansys Mechanical**, achieving a 15% weight reduction by optimizing stress distributions and removing excess material, resulting in minimal backlash and improved load-bearing capacity.

Triton Racing | *FSAE Aerodynamics Team Member* ***February - July 2023***

- Designed and tested a rapid-detachment system for the aero kit using **Ansys FEA**, integrating breakaway mounts and quick-release fasteners calibrated to disengage at predefined stress thresholds, preventing secondary structural damage during failure.

PROJECTS

Gradient-Free Optimization of a Blended Wing Body ***January – March 2026***

- Implemented **Particle Swarm Optimization** with global-best topology to maximize cruise L/D of a BWB aircraft subject to structural, stability, and airport wingspan constraints – achieving a constraint-satisfying L/D of 25.30 via bound refinement.
- Characterized design space sensitivity through a latin hypercube **Monte Carlo** simulation across ±40% design parameter variations, revealing that overstressed configurations emerge before wingspan constraints, eliminating the need for a folding wing design.

Vortex-Cooled Rocket Engine Cold-Flow Simulation ***March 2025 – June 2025***

- Led a mesh refinement study through **Ansys Fluent** for Mach 2.54 compressible, turbulent-flow conditions to evaluate nozzle performance, achieving convergence within 0.2% of extrapolated theoretical values for velocity flux through engine exit.

SKILLS

Software: MATLAB/Simulink, Python, SolidWorks, Ansys Fluent (Certified)/Mechanical, C++, JavaScript, Linux, Office, JIRA, Git