

# Utkarsh Sheel Anand

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## EDUCATION

### B.Eng. Aerospace Engineering (Space Systems Design)

Carleton University, Ottawa, ON

GPA: 10.43/12 (A-) | Dean's Honor List

## PROFESSIONAL EXPERIENCE

### National Research Council Canada | Co-op Student

May 2023 - August 2024

- Conducted aerodynamic shape optimization of S-duct intakes for boundary-layer ingesting engines using Computational Fluid Dynamics (CFD).
- Assisted in designing a low-cost anechoic chamber compliant with ISO 3745 and ISO 26101 for acoustic testing.
- Enhanced thermal efficiency of hybrid-electric aircraft battery cooling solutions through innovative microstructures and pin-fin designs.
- Co-authored a peer-reviewed paper, "Experimental Investigation of Enhanced Heat Sinks for Hybrid Electric Aircraft," selected for presentation at ASME Turbo Expo 2025, detailing advanced heat rejection systems for next-generation electric aircrafts.

### Multi-Domain Laboratory | Research Assistant

May 2022 - May 2023

Built an image processing system in MATLAB to monitor whale blow behavior for environmental sensing.

- Integrated software/hardware components for field-deployable sensing prototypes.

## TECHNICAL PROJECTS

### Weather Satellite Systems Design

- Developed a conceptual satellite mission in Sun-Synchronous Orbit through detailed subsystem modeling (power, thermal, ADCS, propulsion, communications) using SMAD III methodologies.
- Simulated link and power budgets with MATLAB and Satellite Toolbox; modeled S-band communication with QPSK modulation, access times, and eclipse power scenarios.
- Designed and analyzed autonomous control strategies via simulated reaction wheels, magnetorquers, and bipropellant thruster models to meet Nadir pointing and deorbiting requirements.

### Spacecraft Attitude Dynamics and Control

- Simulated 6-DOF spacecraft attitude dynamics in MATLAB/Simulink, implementing quaternion-based closed-loop control using reaction wheels and magnetorquers for Nadir pointing.
- Developed custom control and guidance blocks, including a Star Tracker model for quaternion sensing and attitude frame conversion, integrated into a real-time feedback loop.
- Designed and tuned controllers for attitude correction under external torque disturbances, including magnetic, aerodynamic drag, solar radiation pressure, and gravity gradient effects, validating performance through nonlinear simulations.

### Autonomous Control of a Quadrotor

- Developed autonomous guidance algorithms with PX4 and ROS/Gazebo, simulating orbital-like control using Artificial Potential Fields and sensor fusion for stable path tracking.

### Low-Cost Gas Chromatograph System

- Designed a cost-effective chromatography setup with Arduino-based control and MATLAB data analysis, achieving significant mass and cost savings for space-borne chemical analysis systems.

## SKILLS

- Satellite Systems: STK, MATLAB Satellite Toolbox, Power & Link Budgeting, Orbit Dynamics
- GNSS Tools: RTKLIB and GLAB (GNSS signal processing and positioning analysis)
- Programming & Analysis: Python, MATLAB, Simulink, C++, Arduino, ROS, Gazebo
- Modeling & Simulation: Simscape Multibody, ANSYS, SolidWorks, CATIA, Orbital Mechanics
- Control & Embedded Systems: Guidance/Navigation/Control, Sensor Fusion, Raspberry Pi
- Operating Systems & Tools: Linux, LabVIEW, Git, Microsoft Office
- Certifications:
  - STK Level 2 Certified
  - Coursera - Machine Learning Specialization (Neural Nets, CNNs, Supervised/Unsupervised Learning)