Robert Pendergrast

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EDUCATION

School of Engineering and Applied Sciences at Columbia University New York

Bachelor of Science in Computer Science | ***GPA:*** *3.96/4.0* Anticipated May 2026

- **Relevant Courses:** Data Structures and Algorithms, Advanced Programming, Artificial Intelligence, Deep Learning for Computer Vision, Fundamentals of Computer Systems, Embedded Systems, Introduction to Databases

WORK EXPERIENCE

Astranis **San Francisco, CA**

Software Engineer - Hardware Integration Team June 2025 – Present

- Designed and tested C++ microcontroller **firmware** to read and translate quadrature signals - implemented on flatsat gimbal hardware emulators.
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- More to come!

Columbia University School of Engineering and Applied Sciences **New York, NY**

Student Employee May 2025 – Present

- Worked as one of four students on developing Columbia University's Aerospace Engineering Program
- Responsible for curriculum development, professor acquisition, and program accreditation.

Columbia University Department of Computer Science **New York, NY**

Undergraduate Researcher February 2025 – Present

- Built a novel command sequencer with the **F Prime framework** by implementing a **bpf bytecode** based runtime designed to improve software efficiency in large satellite constellations.
- Utilized **CMak**e libraries to construct an environment capable of handling an llvm-bpf runtime within F Prime.

Columbia Space Initiative **New York, NY**

Lead Engineer – CubeSat Team May 2025 – Present

- Led the development of a flatsat by coordinating hardware and software integration.
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- Oversaw the final integration and testing of a 1U satellite scheduled for launch in early 2026.

Lead Flight Software Engineer – CubeSat Team September 2023 – May 2025

- Oversaw the development of flight-safe **embedded c++** code utilizing the **F Prime** flight software framework.
- Architected the flight-software development for the 6U optical satellite by defining component topologies.
- Integrated a Sony Spresense camera peripheral with the **Pysquared Circuit-Python** library to enable image taking from space.

Director of Operations March 2024 – April 2025

- Coordinated with the executive board to organize weekly general body meetings, including a video conference with the international space station.

Space Dynamics Laboratory **Albuquerque, NM**

Satellite Systems Engineer May 2023 – August 2023

- Constructed a **systems engineering design** for an 3U imaging CubeSat by performing budget analyses for multiple satellite subsystems in a team of 4 people.
- Optimized communication and link budgets by modeling radio and transceiver output with **MATLAB Simulink**.
- Streamlined satellite mission development timelines by writing a detailed mission plan, subject to review by US Air Force and NASA engineers.

PROJECTS

N-Body Computational Accelerator

- Designed and built an **FPGA-based hardware accelerator** used to compute N-Body simulations of up to 512 celestial objects with **64-bit floating point precision.**
- Wrote custom hardware to create a **pipelined leapfrog integrator algorithm** using **System Verilog** and **Intel Quartus**.
- Built **Linux device drivers** to handle IO reading and writing to the accelerator and to a VGA visualization display.
- Defined a **custom protocol** to handle **polling** across the system's software-hardware interface.
- Selected by Professor Stephen Edwards as his **favorite** project of the semester.

Deforestation Classification and Segmentation

- Developed an **image classification model** to classify deforestation regions in the Amazon rainforest by fine-tuning **ResNet50** and **Vision Transformer** network architectures in **Pytorch**.
- Curated a **custom dataset** from open-source satellite imagery; divided into training, testing, and validation splits.
- Implemented a custom Python script with **OpenCV** to locate and **segment deforestated areas** within a larger image.

SKILLS

- Software: GitHub, Microsoft Suite, and Google Suite
- Programming Languages: Python, C, C++, System Verilog
- Tools: Git, Pytorch, OpenCV, F-Prime, CMake, Quartus, OpenHTF, Jira, CMake, Bazel,
- Other: Systems-Thinking, Leadership, Teamwork, Learning, Writing