Aiden Weatherbee

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Education

2025-Current: Master of Science in Physics and Astronomy - York University, Toronto, Ontario
2019-2025: Bachelor of Engineering in Space Engineering - York University, Toronto, Ontario

Current Research

Developing simulations and control techniques for a formation flying mid-IR nulling interferometer at the Sun–Earth L2 point, linking mm-level formation-flying GNC to tip/tilt and OPD residuals to determine the achievable null depth, SNR, and exoplanet detection yield.

Interests & Lab Work

Building hardware-in-the-loop robotic testbeds for space applications at York's ASTROlab (Robotic gantry, visual motion capture, star-field walls, etc).

Past Research Experience

Capstone Project: CSA/MDA Balloon Mission

York University *Fall 2024 – Winter 2025*

- Part of a team of 6 designing a payload to measure stratospheric brightness with a CMOS camera for the CSA Stratos balloon RSOnar 3 mission.
- Collaborating with Dr. Michael Bazzocchi, CSA, MDA to align project goals with industry standards.

Research Project with Dr. Sarah Rugheimer

York University RAY award *Fall 2024 (4 months)*

- Created astronomy images, animations, and scientific visualizations for a JWST course.
- Processed images from JWST and Hubble using Python, PixInsight, Siril, and GIMP, creating a comprehensive tutorial for future students.

Research Project with Dr. Sarah Rugheimer & Dr. Elaina Hyde

York University RAY Award *Summer 2024 (4 months)*

- Created comprehensive instructions for capturing and analyzing exoplanet transits with Python, specifically designed for third-year PHYS3070 students.
- Extensively used York's 1-meter telescope to capture exoplanet transits, galaxies, variable stars, nebulae, etc.
- Produced detailed astronomy images and educational videos utilizing data from the JWST, Hubble, and York's telescope to support scientific visualization in astronomy education.

Research Project with Dr. George Zhu (Enhancement of Spacecraft Vision Code)

York University RAY award *Fall 2022 – Winter 2023 (8 months)*

- Enhanced spacecraft vision code for tracking and orientation estimation using a custom Convolutional Neural Network.
- Integrated the code with microcomputers such as the Nvidia Jetson Nano and Raspberry Pi.
- Collaborated with MDA on implementing vision algorithms for robotic spacecraft.

Research project with Dr. George Zhu (Robotics and Vision Code)

York University LURA award *Summer 2022 (4 months)*

- Developed RGBD camera vision code for spacecraft position estimation in collaboration with MDA.
- Designed force-sensing systems for robotic spacecraft gripping applications.
- Applied machine learning techniques for object recognition and tracking in space environments.

ESSENCE CubeSat Mission with Dr. George Zhu

York University *2019–2020 (1 year)*
Co-Lead of Mechanical Design Team

- Co-led the mechanical design team for a 3U CubeSat to monitor snow and ice coverage in Northern Canada.
- Focused on component selection, CAD modeling using SolidWorks, and thermal analysis using Siemens NX.
- Ensured compliance with all CSA standards for CubeSats.

Technical Skills

Programming Languages: Python (TensorFlow, Keras, NumPy, SciPy, Astropy); MATLAB.
Software Tools: STK, Basilisk, SolidWorks, Siemens NX, Blender, Fusion 360.
Robotics and Control Systems: RGBD vision systems, robotic arm control.
Machine Learning: Convolutional Neural Networks, data analysis, image processing.
Simulation and Analysis: Orbital mechanics, thermal/Structural analysis(FEM). **Image processing**: Astronomical image processing

Publications, Awards, and Honors

Paper in Prep: SX Phoenicius campaign at Allan I Carswell Observatory, a data based approach to re-analysis of historical observations. **Author**: Elaina Hyde, Aiden Weatherbee, et al., [other author order TBA]
LURA Research Award *2022*
RAY Research Awards *2022, 2023, 2024*
Dean's List *2020 – 2021*
York University Entrance Scholarship *2019*