

# BRADEN K. OH, CV

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## ACADEMIC HISTORY

- **Olin College of Engineering** - B.S. Engineering Physics, anticipated graduation: May 2023
  - *Olin Scholarship*: Half-tuition, four-year merit scholarship
  - *Societies*: Olin Rocketry (co-founder), Olin Satellite + Spectrum Technology & Policy Group
  - GPA: 3.94/4.0
- **La Canada High School** - High School Diploma, June 2017
  - Academic GPA: 4.61/4.0

## AWARDS & HONORS

- **Co-Chair, SIGBOVIK 2022** - Co-chair of Carnegie Mellon University's SIGBOVIK conference. Held online, April 2022.
- **Massachusetts Space Grant Undergraduate Research Awards** — Spring 2021, Summer 2021, Fall 2021.
- **BOW Consortium Presidential Innovation Grant** — Full funding grant for 2021 Hall thruster research project.
- **ASEE 2020 Aerospace Division Distinguished Student Paper Award** - Awarded by the American Society of Engineering Education for publication of a paper in 2020. See publications section for paper details.
- **BSA Eagle Scout** - Awarded December 2012

## TECHNICAL EXPERIENCE

### **Busek Co. Inc. — May-Aug 2022**

*Upcoming internship developing in-space solar electric Hall effect thrusters*

### **Olin Satellite + Spectrum Technology & Policy (OSSTP) Group, Research Team Lead — Aug 2020-present**

*Space systems and telecommunications research laboratory*

- **Currently:** Leading a team performing rate calculations and developing mitigation strategies for radiation-induced single event effects in avionics on board the multi-university SWARM-EX CubeSat mission.
- **Previously:**
  - Designed, manufactured, and strength tested a solder-based electro-mechanical joint for affixing the circuit boards of CubeSat dual-deployable solar panels directly to structural hinges and without fasteners.
  - Contacted and secured in-kind donation of spacecraft wire harnessing components from Glenair Inc. for SWARM-EX; designed spacecraft interconnect harness and wrote accompanying system diagrams.
  - Built radiation environment model, performed total ionizing dose (TID) analysis, and wrote mitigation plan that included avionics shielding requirements for SWARM-EX.
  - Conducted interference-to-noise (I/N) compliance validation calculations for the OneWeb satellite constellation; co-authored a paper reporting the results of I/N compliance calculations for multiple satellite constellations.
  - Delivered orbital debris assessment report (ODAR) and accompanying NASA DAS re-entry simulation for SWARM-EX.
  - Wrote a Python link budget and power flux density (PFD) calculator for orbital spacecraft; later worked on a team to develop an interactive GUI for the tool.

### **Olin College, Hall Effect Thruster Research Team Lead — Fall 2018, Fall 2021-present**

*Undergraduate team developing electric/plasma based in-space propulsion engines*

- Founded and led two undergraduate teams that each designed and fabricated a Hall effect thruster (HET).
- Wrote independent study curriculums that incorporated topics across physics, electrical and mechanical engineering, computational modeling, and manufacturing.
- Conducted analyses to determine crucial design parameters, such as combining physics principles to derive a discrete estimate for the mean free path of propellant atoms prior to ionization via electron bombardment.
- Initiated and conducted all correspondence with experts from NASA, MIT and Busek Co; secured all funding, in-kind, and laboratory resources.
- **Current: 50mm Electromagnet Hall Thruster (Fall 2021-present)**
  - Assembled multidisciplinary team of 6 students from Olin and Wellesley Colleges and Brandeis University.
  - Lead-authored a BOW Presidential Innovation Grant proposal that won full funding (\$2,566).
  - Lead-authored research paper abstract submitted in Nov. 2021 to the International Electric Propulsion Conference.
  - Coordinated live-fire testing operations in the MIT Space Propulsion Lab, scheduled for early 2022.
- **Previous: 19.5mm Permanent Magnet Hall Thruster (Fall 2018)**
  - Founded a multidisciplinary team of 4 Olin College students and faculty advisor.
  - Created all CAD models and manufacturing diagrams.
  - Coordinated external manufacturing of metallic components with engineers at C. Lal Alloys.
  - Manufactured cathode and collaboratively manufactured Boron Nitride components in Olin's machine shop.
  - Lead authored an award-winning paper published by ASEE in 2020.

## NASA Jet Propulsion Laboratory — Summers 2017 & 2018

*Systems engineering internships on robotic NASA flagship missions to Mars and Europa*

- **Mars 2020/Perseverance Entry Descent & Landing Intern (2018)**
  - Wrote and performed flight software system verification test procedures in a flight system hardware testbed.
  - Developed automation capabilities for Entry, Descent, and Landing (EDL) simulation engines.
  - Delivered Python scripts to perform autonomous state configuration of a simulated spacecraft and documentation for all source code, in addition to software test procedure and anomaly report.
- **Europa Fault Protection Intern (2017)**
  - Wrote interactive data visualization software to aid in fault tree analysis (FTA).
  - Analyzed the use of SysML as a tool to model spacecraft fault protection systems.
  - Wrote high-level FTA templates for lab-wide use (used by Europa Clipper, Europa Lander, and Psyche mission teams).
  - Delivered SysML training document and cost/benefit analysis, standalone visualizer application and source code, and Excel FTA templates for four mission phases.

## NASA CubeQuest Challenge, Team Lead & Systems Engineer — 2014-2017

*Centennial Challenge program commissioning teams to build CubeSats capable of achieving lunar orbit*

- Founded and led a team of ~40 high school students from across the country.
- Trade-studied COTS CubeSat propulsion and optical communication technologies and led subsystem design teams.
- Lead-authored a technical design document package submitted to first CubeQuest tournament.
- Coordinated product acquisition and shipping efforts for crowdfunding campaign.
- Secured approximately \$650,000 of in-kind support and eventual merger with MIT team.

## PUBLICATIONS

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- **Coordinating Development of the SWARM-EX CubeSat Swarm Across Multiple Institutions**
  - Published in the proceedings of the 2021 Small Satellite Conference (SSC), 2021. Second author.
- **Undergraduate Demonstration of a Hall Effect Thruster: Self-Directed Learning in an Advanced Project Context**
  - Presented at the American Society of Engineering Education (ASEE) Virtual Annual Conference, 2020. First author.
  - Earned the Aerospace Division's Distinguished Student Paper Award.

## SUBMITTED WORKS

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- **Estimating the Probability that the Explosion of an Ink Sphere Produces a Dictionary**
  - Mathematics Magazine, Mathematics Association of America (MAA), *paper submitted Jan. 2022*
  - Refereed paper will be published, pending acceptance.
- **3U CubeSat Hinge Design and Analysis for Dual Deployable Solar Panels**
- **Analysis of Single Event Effects in Small Satellites**
  - CubeSat Developers Workshop (CDW) 2022, *abstracts submitted Dec. 2021*.
  - Will present conference posters, pending acceptance.
- **Design, Fabrication, and Testing of an Undergraduate Hall Effect Thruster**
  - International Electric Propulsion Conference (IEPC) 2022, *abstract submitted Nov. 2021*.
  - Will lead-author full conference paper, pending acceptance.
- **Interference-to-Noise (I/N) Compliance Validation of Telesat, OneWeb and SpaceX's 2020 Ka-Band NGSO FCC Processing Round Applications**
  - International Journal of Satellite Communications and Networking, *paper submitted Oct. 2021*.
  - Refereed paper will be published, pending acceptance.

## SELF-DIRECTED COURSE PROJECTS

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White papers and/or video clips available at [vaguesalutations.github.io](https://vaguesalutations.github.io)

- **Cat Toy Laser-based Free Space Optical Communications Link**
  - Designed and built analog transmitter and receiver circuits and wrote waveform encoder/decoder scripts in Python for an amplitude-modulated laser radio that transmits data using a red laser purchased at a pet store.
- **Free-falling RC Car Attitude Control System**
  - Developed a PID control system for a remote controlled car that uses quad-copter motors to spin 3D-printed reaction wheels which spin while the car is in free fall, leveling the car to land flat on its wheels.
- **Carbon Fiber Rocket Body Tube Winder**
  - Built the power and command bus and co-designed the control algorithm for a single-axis, dual-motor carbon fiber filament winder capable of winding small rocket body tubes at specific helical angles.
  - Manufactured and strength tested carbon fiber tubes at helical angles of 10°, 25°, and 40° under a diametrically applied compressive load; yield strengths for ~30g tubes exceeded 5.5 MPa.

## SKILLS

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**Software** Python;  $\text{\LaTeX}$ ; STK L1 Certified; NASA DAS; TRAD OMERE; software documentation.

**Fabrication** Rapid prototyping w/ laser cutter/3D printer; manual & CNC mill; plasma cutter; JPL ESD environment certification (Summer 2017); LDS Bishop's Storehouse system certification for forklift operation (Fall 2020).

**CAD** Drafting manufacturing drawings, Fusion 360 CAD/CAM, Solidworks, Autodesk Inventor Certified User.