

# Chloe J. Long

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## EDUCATION

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**Ph.D. Aerospace Engineering Sciences – University of Colorado Boulder** 2019 – Present  
*Focus Area: Astrodynamics and Satellite Navigation Systems* Boulder, CO

GPA: 3.7 | Expected Graduation: 2024 | Advisor: Dr. Jay McMahon

**M.S. Aerospace Engineering Sciences – University of Colorado Boulder** 2019 – 2022  
*Focus Area: Astrodynamics and Satellite Navigation Systems* Boulder, CO

GPA: 3.7 | Advisor: Dr. Jay McMahon

**B.S. Mechanical Engineering – SUNY Binghamton** 2015 – 2019  
*Minor: Sustainable Engineering* Binghamton, NY

GPA: 3.68 | cum laude

## RESEARCH AND PROJECTS

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**Asteroid Tour Mission Design Tool** Aug 2021 – Present  
*Graduate Researcher at the Orbital Research Cluster for Celestial Applications Lab* Boulder, CO

- Developed multi-level asteroid target filtering approach incorporating both heuristics- and design variable based filtering
- Built a stochastic tree algorithm based on Rapidly exploring Random Tree for orbital tour construction
- Create preliminary asteroid tour design tool with emphasis on broad exploration of mission concepts
- Apply data science analysis techniques to inform future mission design tool development

**Binary Asteroid System Dynamical Analysis** Aug 2019 – Present  
*Graduate Researcher at the Orbital Research Cluster for Celestial Applications Lab* Boulder, CO

- Investigate effects of secondary shape change on binary YORP effect, tidal dissipation rate, and tidal forces
- Develop methodology to investigate bulk density and tidal forces using thermal modeling and BYORP simulation tools
- Build tool to constrain tidal forces of binary asteroids through ground- and space- based observational capabilities

**Dyson Sphere Asteroid Target Selection Tool** ~Jan 2022  
*Global Trajectory Optimization Challenge* CU Boulder Team

- Aided in the design and development of the target selection aspect of the Optimization Challenge project.

**Janus Mission Analysis** ~Jun 2021  
*Janus Mission* Boulder, CO

- Simulate Janus spacecraft trajectories from launch to asteroid flybys
- Mission extension analysis and asteroid candidate search

**Renewable Energy Solutions for Department of Defense: Class Project** Jan 2021 – May 2021  
*Designing for Defense Team, Joint Staff Innovation Group, Technical Consultant* Boulder, CO

- Led research effort into and assessment of mobile and dependable solutions for sustainable operations in remote region
- Served as technical advisor and aided undergraduate students in technical writing and presentation of options to reduce DoD reliance on fossil fuels

**Cubesat Deorbiting Mechanism** Aug 2018 – May 2019  
*Team Lead, Senior Capstone Project* Binghamton, NY

- Proposed and obtained funding for the sole aerospace-related Senior Capstone Project
- Successfully led a team of 6 engineering students in completing novel capstone project
- Designed and developed an origami-inspired mechanism that fits into the standard dimensions of a 3U Cubesat and efficiently deorbits the satellite
- Nominated for the MacDonald price for Excellence in Senior Design
- Advisors: Dr. Kirill Zaychik & Dr. Kaiyan Yu.

**Mechanical Recycling Compressor** May 2018  
*Junior Design Project* Binghamton, NY

- Design and technical documentation of recycling can lid add-on that automatically crushes cans without energy input

## WORK EXPERIENCE

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### CU Boulder – Department of Aerospace Engineering Sciences

Aug 2019 – Present

*Graduate Research Assistant*

*Boulder, CO*

- Asteroid Tour Mission Design Tool | **Languages:** Python, Matlab, Julia
- Binary Asteroid System Dynamical Analysis | **Languages:** Python, Matlab
- Janus Mission Analysis | **Languages:** Cosmographia, SPICE Toolkit, Python

### Airbus Americas

Aug 2019 – May 2020

*Engineering/Strategy Intern*

*Herndon, VA*

- Market and design research on autonomous aircraft systems with refueling capabilities
- Preliminary research on electric and hybrid passenger aircraft

### SUNY Binghamton – Mechanical Engineering Department

Jan 2018 – Mar 2019

*Undergraduate Research Assistant*

*Binghamton, NY*

- Assisted inkjet printing experiments using organic fluorescent semiconductor particle solutions to induce mono-crystallization on spin-coated substrate
- Conduct image processing of crystallization using dark field and fluorescent microscopy
- Advisor: Dr. Timothy Singler

### SUNY Binghamton – Engineering Design Division

Aug 2016 – May 2018

*Undergraduate Course Assistant*

*Binghamton, NY*

- Assisted freshmen engineering students in learning to use various programs, including MATLAB, SolidEdge, LTSpice, and Arena
- Procured research projects – topics include American Education System, Educational Diversity
- Advisor: Dr. Koenraad Gieskes

### National Aeronautics and Space Administration

Jun 2016 – Aug 2016

*Research Intern*

*Kennedy Space Center*

- Utilized OpenRocket and flight computer to predict, collect, analyze flight data
- Determined effects of design and air quality on flight, presented on findings of research

## LEADERSHIP AND VOLUNTEER

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### Chair of Graduate Student Advisory Board

July 2022 – Present

*College of Engineering and Applied Sciences*

*Boulder, CO*

- Lead team of graduate students to collect and analyze student data and determine highest priority student needs (typ. for campus safety, inter- and intra- department community, and campus resources inc. physical and mental health services)
- Develop and execute multi-level agenda with specific initiatives to address needs, coordinating between many groups inc. CEAS Graduate Program Director, Graduate Chair, CU Police Department, Undergraduate and Graduate Student Governments
- Re-invigorate Board through ground-up restructuring incl. revising founding documents, advancing cross-departmental recruitment initiative, and coordinating between CEAS program leads and managers

### Graduate Consultant for Anti-Racism and Representation Committee

Nov 2020 – May 2021

*Advisory Committee to the Graduate and Professional Student Government*

*Boulder, CO*

- Research anti-racism initiatives within CU and other universities to inform GPSG on how to become an actively anti-racist student organization
- Determine resources and avenues of support that GPSG can provide to marginalized graduate students inc. scholarship for DEI student leaders in need

### Student Consultant for CEAS Faculty Search Committee

Dec 2020 and Dec 2022

*College of Engineering and Applied Sciences*

*Boulder, CO*

- Assist in the CEAS hiring process as an Aerospace Graduate Student Representative
- Coordinate with faculty and graduate student representatives to review applications

### Senior Advisor and Coordinator for Diversity, Equity, Inclusion (DEI)

Oct 2020 – Dec 2021

*Aerospace Graduate Student Organization (AGSO)*

*Boulder, CO*

- Helped to write and circulate open letter to the Aerospace department, urging the administration to recognize the systemic racism present in both academia and the Aerospace field and to begin rectifying the inequity in our own institution through a list of actions listed (214 signatures in support, leading to a meeting with department chair)
- Student leader in the departmental DEI effort, ultimately leading to the creation of the standing faculty committee (Inclusive Culture Committee) meant to ensure a safe and inclusive departmental culture

- Opened up avenue for advocating for marginalized graduate students by creating and serving in AGSO DEI Coordinator position, continued service as senior advisor in Fall 2021

**Outreach Chair**

Oct 2019 – Oct 2020

*Aerospace Graduate Student Organization (AGSO)*

*Boulder, CO*

- Assisted AGSO in outreach to new and marginalized students, particularly during Graduate Visit Day
- Coordinate with faculty and administration to host informative events

**Founder and Logistical Lead of the Brookie Owens Outreach Program (Ask A Brookie)** Oct 2019 – Oct 2020

*Brooke Owens Fellowship*

- Founded a free and accessible outreach program to provide support for younger students interested in pursuing careers in aerospace
- Served as a logistical lead - oversaw program operations, managed subteams, increased program reach
- The program continues on to help students today!

**Founder and President of the BING SPACE Community**

May 2018 – May 2019

*SUNY Binghamton*

*Binghamton, NY*

- Started and served as president of Binghamton University’s first aerospace organization
- Oversaw two student chapters - The Mars Society + Students for the Exploration and Development of Space
- Coordinated and hosted the first New York State Space Symposium 2019 (120 students in attendance, with huge turnaround in aerospace enthusiasm!)

**PULSE Marketing Director**

Nov 2016

*Start-up Team*

*Binghamton, NY*

- Aided in the design and marketing of PULSE app

**PUBLIC PRESENTATIONS AND SPEAKING**

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*Conference Presentations*

**Addressing Sustainability through Top-Down Policy Changes**

Jan 2022

C.J. Long, J. Faulk, I. Neunzig

Enabling Sustainability Through Aerospace Technology, Idea Challenge  
 2022 AIAA SciTech Forum and Exposition, San Diego, CA, Jan 2022

*Public Speaking*

**Commencement Speaker**

May 2019

Watson School of Engineering

*Binghamton, NY*

**SheLAEDs Conference Speaker**

May 2019

Singapore Women Leaders in Aerospace Conference

*Singapore (Virtual)*

**Breaking Barriers Through Sustainability in Tech**

Oct 2018

Society of Asian Scientists and Engineers

*Binghamton, NY*

**Mitigating the Effects of High-Intensity Storms**

Jul 2018

Brooke Owens Fellowship

*Washington, DC*

**Sustainability in Space Exploration**

Nov 2017

Naval Academy Science and Engineering Conference

*Annapolis, MD*

**PUBLICATIONS**

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(In Preparation) Preliminary Analysis Tool for Asteroid Tour Mission Design

**C.J. Long**, D. Lujan, A. Pedros-Faura, J.W. McMahan

(In Preparation) BYORP and Tidal Parameter Uncertainty of 1996 FG3

**C.J. Long**, D. Lujan, A. Pedros-Faura, J.W. McMahan

## CONFERENCE WORK

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### *Conference Papers*

Preliminary Mission Design Tool for Asteroid Tours

**C.J. Long**, D. Lujan, A. Pedros-Faura, J.W. McMahon

*2022 AAS/AIAA Astrodynamics Specialist Conference*, Charlotte, NC, Aug 2022

Rapid Filtering Method for Asteroid Exploration Candidate Searches

**C.J. Long**, A. Pedros-Faura, J.W. McMahon

*33th International Symposium on Space Technology and Science*, Oita, Japan, Feb 2022

### *Conference Presentations*

(In Preparation) Tool to Constrain Tidal Effect of Binary Asteroids Using Thermal Modeling and BYORP Simulation

**C.J. Long** and J.W. McMahon

*55th Annual Division for Planetary Sciences Joint Meeting with Europlanet Science Congress*, San Antonio, TX, Oct 2023

Method to Investigate Tidal Effect on Binary Asteroid System Orbit

**C.J. Long**, K. Sorli, J.W. McMahon

*Asteroids Comets Meteors Conference*, Flagstaff, AZ, Jun 2023

Changes to the Long-Term Dynamical Evolution of Didymos After the DART Impact

J.W. McMahon, R. Cueva, **C.J. Long**

*54th Lunar and Planetary Science Conference*, The Woodlands, TX, Mar 2023

## HONORS AND AWARDS

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<b>Timothy Grice Memorial Scholarship</b>	Sep 2021 – May 2022
<b>Aerospace Departmental Award</b>	Sep 2019 – May 2020
<b>Mechanical Department Service Award</b>	May 2019
<b>Tau Beta Pi</b>	2018
<b>Pi Tau Sigma</b>	2018
<b>Brooke Owens Fellow</b>	2018
<b>New York State Space Grant</b>	Sep 2018 – May 2019