

Samuel W. Albert, PhD

📍 Washington, DC ✉ samuelalbert21@gmail.com ☎ (615) 260-6341 🔒 TS/SCI Clearance

Education

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|------------|---|---|
| PhD | University of Colorado Boulder , Aerospace Engineering Sciences
Advisor: Dr. Hanspeter Schaub, Dr. Robert D. Braun | Boulder, CO
May 2020 – Sept 2023 |
| | <ul style="list-style-type: none"> • Aerocapture, Entry, and Co-Delivery in Uncertain Planetary Atmospheres ↗ • NASA Space Technology Research Fellow • Five first-author papers in peer-reviewed journals • John A. Vise Award ↗ | |
| MS | University of Colorado Boulder , Aerospace Engineering Sciences | Boulder, CO
Aug 2018 – May 2020 |
| | <ul style="list-style-type: none"> • Graduate Certificate in Astrodynamics and Satellite Navigation Systems • Matthew Isakowitz Fellow ↗ | |
| BS | Purdue University , Aeronautical and Astronautical Engineering
Honors College Graduate | West Lafayette, IN
Aug 2014 – May 2018 |
| | <ul style="list-style-type: none"> • Minor: Global Engineering Studies • Exchange semester at Universidad de Carlos III, Madrid, Spain • Stamps Scholar ↗ (full-ride scholarship) | |

Experience

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| Johns Hopkins University Applied Physics Laboratory , Senior Aerospace Engineer
<i>Director's Special Achievement Award, 2025</i> | Laurel, MD
Oct 2023 – present |
| <ul style="list-style-type: none"> • Flight Performance Analyst on NASA Dragonfly Mobility Team – performs Monte Carlo analyses, sensitivity studies, and flight envelope sweeps for rotorcraft on Titan • Applies mission design, orbit estimation, and mission concept development to a variety of national security space missions/projects • Co-PI of 2-year joint IRAD with UMD – leads team in using neural radiance fields to render high-fidelity multi-spectral dynamic spacecraft scenes • Lead author of APL response to NASA Aerocapture Technology Demonstration Mission Request for Information | |
| NASA , Visiting Technologist/Intern (multiple)
Research collaboration with NASA Langley and NASA JPL; Summer 2019 intern at JPL | Remote / Pasadena, CA
2019-2022 (various) |
| <ul style="list-style-type: none"> • Co-developed novel guidance algorithm for drag-modulated aerocapture and implemented in C++ for use in DSEDS aerocapture simulation • Performed flight-mechanics analysis and trajectory design for the Small High Impact Energy Landing Device (SHIELD) concept • Designed aerocapture trajectories for Uranus orbiter "A Team" pre-decadal study | |
| Altius Space Machines , Part-Time Aerospace Engineer | Broomfield, CO
Sept 2018 – Dec 2018 |
| <ul style="list-style-type: none"> • Conducted NASA-funded study on commercialization of low-Earth orbit with partner Nanoracks • Developed tool for rapid optimization of low-thrust trajectory design | |
| Moon Express , Aerospace Engineering Intern | Cape Canaveral, FL
June 2018 – Aug 2018 |
| <ul style="list-style-type: none"> • Designed, simulated, and analyzed trajectories for missions using GMAT, Trick, SPICE, and COSMOS tools • Developed mission and spacecraft command sequences, incorporating designed maneuvers and vehicle constraints | |

- Updated and improved emulated flight software for the MX-1 vehicle

TU Delft Space Institute, Aerospace Engineering Intern

Delft, Netherlands
June 2017 – Aug 2017

- Designed interface between secondary lunar rover and spectropolarimetry instrument for Chandrayaan-2 ISRO mission
- Wrote system & subsystem requirements to constrain design of the instrument during conceptual design phase

Rapid Design of Systems Laboratory, Purdue University, Undergraduate Research Assistant

West Lafayette, IN
Aug 2016 – Dec 2016

- Researched potential application of FPGAs to rapid optimization techniques and created several example projects
- Demonstrated use of MyHDL to convert Python code to HDL in order to integrate FPGA development for the lab

Sandia National Laboratories, Aerospace Engineering Intern

Albuquerque, NM
June 2016 – Aug 2016

- Designed, conducted, and analyzed liquid droplet breakup experiments in the multi-phase shock tube
- Installed and configured geophysics software on Linux virtual machines to enable real-time seismic data analysis
- Assisted in setup and data collection for shock tube experiments

Honors and Awards

APL Director's Special Achievement Award	2025
IPPW Best Student Presentation Award	2022
John A. Vise Award	2022
NASA Space Technology Research Fellow	2019
Matthew Isakowitz Fellow	2018
Space & Satellites Professionals International Scholarship	2018
Warren G. Koerner Scholar	2016
Warren G. Koerner Scholar	2015
Stamps Scholar	2014

Journal Articles

Dimensionality Reduction for Onboard Modeling of Uncertain Atmospheres Samuel W. Albert, Alireza Doostan, Hanspeter Schaub 10.2514/1.A35839 🔗 (AIAA Journal of Spacecraft and Rockets)	2025
Energy Reference Guidance for Drag-Modulated Aerocapture Samuel W. Albert, Ethan Burnett, Hanspeter Schaub, P. Daniel Burkhart, Alex Austin 10.1016/j.asr.2023.09.034 🔗 (Advances in Space Research)	2023
Co-Delivery of a Martian Probe Network Samuel W. Albert, Hanspeter Schaub 10.2514/1.A35560 🔗 (AIAA Journal of Spacecraft and Rockets)	2023
Relative Motion in the Velocity Frame for Atmospheric Entry Trajectories Samuel W. Albert, Hanspeter Schaub 10.2514/1.A35753 🔗 (AIAA Journal of Spacecraft and Rockets)	2023
Flight Mechanics Feasibility Assessment for Co-Delivery of Direct-Entry Probe and Aerocapture Orbiter	2022

Samuel W. Albert, Hanspeter Schaub, Robert D. Braun
[10.2514/1.A34953](#) (AIAA Journal of Spacecraft and Rockets)

Conference Papers

Onboard Density Modeling for Planetary Entry via Karhunen-Loève Expansion

March 2023

Samuel W. Albert, Alireza Doostan, Hanspeter Schaub

[10.1109/AERO55745.2023.10115794](#) (IEEE Aerospace Conference, Big Sky, MT)

Relative Motion on Highly-Eccentric Atmospheric Entry Trajectories

January 2023

Samuel W. Albert, Hanspeter Schaub

[hanspeterschaub.info/Papers/Albert2023.pdf](#) (AAS/AIAA Space Flight Mechanics Meeting, Austin, TX)

Maneuver Design and Flight Control for a Martian Probe Network

August 2022

Samuel W. Albert, Hanspeter Schaub

[hanspeterschaub.info/Papers/Albert2022b.pdf](#) (AAS/AIAA Astrodynamics Specialist Conference, Charlotte, NC)

A New Guidance Technique for Discrete-Event Drag Modulation for Aerocapture Missions

February 2022

Ethan R. Burnett, Samuel W. Albert, Hanspeter Schaub

[10.1007/978-3-031-51928-4_50](#) (AAS Guidance, Navigation, and Control Conference, Breckenridge, CO)

Co-Delivery of Multiple Small Probes to the Martian Surface

January 2022

Samuel W. Albert, Hanspeter Schaub

[10.2514/6.2022-1653](#) (AIAA SciTech, San Diego, CA)

Linear Covariance Analysis of Entry and Aerocapture Trajectories in an Uncertain Atmosphere

January 2022

Jack Ridderhof, Samuel W. Albert, Panagiotis Tsiotras, Hanspeter Schaub

[10.2514/6.2022-1216](#) (AIAA SciTech, San Diego, CA)

Finite-Dimensional Density Representation for Aerocapture Uncertainty Quantification

January 2021

Samuel W. Albert, Alireza Doostan, Hanspeter Schaub

[10.2514/6.2021-0932](#) (AIAA SciTech, Nashville, TN)

AeroDrop: Prospects and Challenges for Co-Delivery of Probe and Orbiter via Aerocapture

August 2020

Samuel W. Albert, Robert D. Braun, Hanspeter Schaub

[hanspeterschaub.info/Papers/Albert2020.pdf](#) (AAS/AIAA Astrodynamics Specialist Conference, Lake Tahoe, CA)

Comparative Study of Lift- and Drag-Modulation Control Strategies for Aerocapture

February 2020

Casey R. Heidrich, Evan Roelke, Samuel W. Albert, Robert D. Braun

AAS Guidance, Navigation, and Control Conference, Breckenridge, CO

Conceptual Development of AeroDrop: Aerocapture and Direct Entry for Two Spacecraft on a Common Approach Trajectory

January 2020

Samuel W. Albert, Robert D. Braun

[10.2514/6.2020-1737](#) (AIAA SciTech, Orlando, FL)

Aerodynamic Breakup and Secondary Drop Formation for a Liquid Metal Column in a Shock-Induced Cross-Flow

January 2017

Yi Chen, Edward P. DeMauro, ustin L. Wagner, Marco Arienti, Daniel R. Guildenbecher, Paul Farias, Thomas W. Grasser, Patrick Sanderson, Samuel W. Albert, Aaron Turpin, William Sealy, Remington S. Ketchum

[10.2514/6.2017-1892](#) (AIAA Aerospace Sciences, Grapevine, TX)

Measurements of the Initial Transient of a Dense Particle Curtain Following Shock Wave Impingement

January 2017

Edward P. DeMauro, Justin L. Wagner, Lawrence J. DeChant, Steven J. Beresh, Paul Farias, Aaron Turpin, William Sealy, Samuel W. Albert, Patrick Sanderson
[10.2514/6.2017-1466](#) (AIAA Aerospace Sciences, Grapevine, TX)

Other Papers/Presentations

Relative Motion About Aerocapture and Entry Trajectories

August 2023

Samuel W. Albert, Hanspeter Schaub

International Planetary Probe Workshop, Marseille, France. Oral Presentation

(Best Student Presentation Award) Entry Flight Mechanics Analysis for SHIELD: Small High Impact Energy Landing Device

August 2022

Samuel W. Albert, Hanspeter Schaub

hanspeterschaub.info/Papers/IPPW22_AlbertSchaub.pdf (International Planetary Probe Workshop, Silicon Valley, CA. Oral Presentation.)

Aerocapture Simulation in Basilisk, an Open-Source Astrodynamics Framework

August 2022

Mikaela Felix, Samuel W. Albert, Hanspeter Schaub

hanspeterschaub.info/Papers/IPPW22_MikaelaFelix.pdf (International Planetary Probe Workshop, Silicon Valley, CA. Poster Presentation.)

Efficient Delivery of a Network of Small Probes to the Martian Surface

March 2022

Samuel W. Albert, Hanspeter Schaub

hanspeterschaub.info/Papers/AlbertSchaub_poster_2022.pdf (Low-Cost Science Mission Concepts for Mars Exploration workshop, Pasadena, CA. Poster Presentation.)

Revolutionizing Access to the Mars Surface

March 2022

Christopher J. Culbert, Bethany L. Ehlmann, Abigail A. Fraeman, Samuel W. Albert, Don Banfield, Jonathan Bapst, Dave Bearden, Kevin Bonnet, Joel Burdick, Wendy Calvin, Barbara Cohen, Tim Crain, Charles Edwards, Giusy Falcone, Elizabeth Frank, Andrew Horchler, Mark Johnson, Brett Kennedy, Laura Kerber, Rob Manning, David Masten, Larry Matthies, Michelle Munk, David Murrow, Paul Niles, Mark Panning, Zachary Putnam, Eva Scheller, Rachel Sheppard, Nathan Stein, Skylar Wei, Ryan Woolley, Paul Wooster

[10.7907/d1sm-mj77](#) (Final Workshop Report for the W.M. Keck Institute for Space Studies)

Designing Probe and Orbiter for a Single Entry Trajectory

September 2021

Samuel W. Albert, Hanspeter Schaub

[10.7907/d1sm-mj77](#) (AIAA Rocky Mountain Annual Technical Symposium, Boulder, CO. Oral Presentation.)

Co-Delivery of Probe and Orbiter via Aerocapture for Interplanetary Missions

July 2021

Samuel W. Albert, Robert D. Braun, Hanspeter Schaub

hanspeterschaub.info/Papers/Albert2021c.pdf (International Planetary Probe Workshop, Virtual. Oral Presentation.)

One Approach Trajectory, Multiple Vehicles

March 2021

Samuel W. Albert, Robert D. Braun, Hanspeter Schaub

hanspeterschaub.info/Papers/Albert2021c.pdf (Revolutionizing Access to the Martian Surface Workshop, W. M. Keck Institute for Space Studies. Poster Presentation.)

Enabling and Enhancing Science Exploration Across the Solar System: Aerocapture Technology for SmallSat to Flagship Missions

March 2021

Alex Austin et al.

<https://doi.org/10.3847/25c2cfef.4b23741d> (White Paper for the Planetary Science Decadal Survey, 2023-2032)

Aerocapture as an Enhancing Option for Ice Giants Missions

July 2020

Soumyo Dutta et al.

ntrs.nasa.gov/citations/20205002647 (White Paper for the Planetary Science Decadal Survey, 2023-2032)

AeroDrop: Dual Aerocapture-Entry Architecture for Multiple Spacecraft Missions

July 2019

Samuel W. Albert, Robert D. Braun

International Planetary Probe Workshop, Oxford, UK. Poster Presentation

Survey of Microbial Environment for Crew Health at the Mars Desert Research Station

April 2018

Samuel W. Albert, D. Marshall Porterfield

aiaa.org/awards/regional-student-paper-conferences (AIAA Region III Student Conference, West Lafayette, IN)

Professional Service and Involvement

International Planetary Probe Workshop (IPPW)

2023 – present

- 2026: Chair, Local Organizing Committee
- 2024: Chair, Technical Committee, Ice Giants & Gas Giants session
- 2023: Co-Chair, Technical Committee, Innovative Concepts for Exploration session
- 2023: Student Organizing Committee

Cislunar Security Conference

2024 – present

- 2025: Technical Committee
- 2024: Chair, Technical Committee, Oversight & Norms session

Undergraduate Research Program (x2)

Aug 2021 – May 2022

Research Supervisor

- Developed and supervised research by two undergraduates in the Autonomous Vehicle Systems Laboratory
- Tutored students in spacecraft dynamics, spacecraft guidance, programming, and software development practices
- Students were selected for IPPW 2022 and National Conference on Undergraduate Research

Graduate School Peer Mentor (x6)

Aug 2019 – May 2022

Mentored six first-year graduate students

Patti Grace Smith Fellowship Program (x3)

Aug 2020 – Dec 2022

Reviewed applications, interviewed semifinalists, and mentored two recipients

Purdue Honors College

Aug 2018 – May 2020

Peer mentor

Students for the Exploration and Development of Space (SEDS)

Aug 2014 – May 2018

- 2017: Chair, Council of Chapters, SEDS USA
- 2016: SpaceVision 2016 organizing committee
- 2015: Purdue SEDS National Representative

Sigma Gamma Tau, Purdue Chapter

Jan 2016 – May 2018

Inducted Member

Purdue Global Engineering Program

Jan 2015 – May 2018

Program Ambassador

Purdue Student Publishing Foundation

Jan 2016 – May 2018

Vice-Chair

Study Abroad and Additional Experience

NASA Micro-g NExT Competition

Aug 2017 – Aug 2018

- Proposed, designed, and fabricated air leak repair device
- Planned and directed testing in the Neutral Buoyancy Laboratory at NASA Johnson Space Center

Mars Desert Research Station Crew 186

Apr 2017 – May 2018

- Health & Safety Officer at analog Mars base in Hanksville, UT, for two weeks
- Collaborated with NASA JSC to study microbiome in habitat using PCR and MinION DNA sequencer

Study Abroad at Universidad de Carlos III, Madrid, Spain

Jan 2017 – June 2017

Exchange semester with full aerospace engineering coursework and Spanish language immersion

Study Abroad: US/European Perspective of Space Exploration

May 2016

Study abroad Maymester including ESA HQ, ESA ESTEC, Airbus Space & Defence, and TU Delft

Engineering Projects in Community Service

Jan 2015 – Apr 2016

Project Manager, team of 17 students, worked with local university & community in Lumbisi, Ecuador, to design and build covered outdoor seating

Study Abroad at Universidad de Cartagena, Colombia

June 2015 – July 2015

Summer term including Spanish language intensive, Latin American history & culture, and internship with physics department

References

Ben Schmachtenberger: Section Supervisor, Space Algorithms and Technologies, Johns Hopkins University Applied Physics Lab, benjamin.schmachtenberger@jhupl.edu

Dr. Hanspeter Schaub: Distinguished Professor, Aerospace Engineering Sciences, University of Colorado Boulder, hanspeter.schaub@colorado.edu

Dr. Dan Burkhart: Senior Staff Engineer, Entry Descent and Landing GN&C Group, NASA Jet Propulsion Laboratory, paul.d.burkhart@jpl.nasa.gov

Dr. Bobby Braun: Sector Head, Space Exploration Sector, Johns Hopkins University Applied Physics Lab, bobby.braun@jhupl.edu

Dan Dumbacher: Chief Innovation and Strategy Officer, Special Aerospace Services, dan-dumbacher@purdue.edu