

KYLE J. HORN

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EDUCATION

Massachusetts Institute of Technology, Cambridge, MA

Expected Graduation: May 2027

Ph.D. in Aeronautical and Astronautical Engineering

GPA: 5.00/5.00

Concentration: Space Systems Engineering, Human Factors Engineering

S.M. in Aeronautical and Astronautical Engineering

Degree Awarded: Feb 2023

Thesis: Adaptive Oxygen Production of the Mars Oxygen ISRU Experiment

GPA: 5.00/5.00

Arizona State University, Tempe, AZ

Degree: B.S.E. in Mechanical Engineering

Degree Awarded: May 2021

Honors: Summa Cum Laude

GPA: 4.00/4.00

WORK EXPERIENCE

NASA Jet Propulsion Laboratory

Pasadena, California

JPL Visiting Student Researcher

June 2025 – Aug 2024

- Developed novel Venus ISRU aerobot systems model in MATLAB to facilitate design space exploration and trade analysis of feasible aerobot architectures given mission and design parameters, supported by NASA Innovative and Advanced Concepts award
- Conducted 700+ design Monte Carlo simulation to quantifiably explore the system design space and identify pareto-optimal solutions to maximize scientific return on mission for given architectures - delivering on NASA grant requirements
- Presented findings at the 22nd International Planetary Probe Workshop in Stuttgart Germany, winning best student presentation

Blue Origin

Los Angeles, California and Kent, Washington

R&D Test Engineering Graduate Intern

May 2024 – Aug. 2024

- Developed, integrated, and tuned custom controls software for Molten Regolith Electrolysis (MRE) extraction testbeds to support Lunar ISRU technology R&D enabling gas species capture and high-fidelity control
- Managed critical-path testbed hardware design; leveraged Windchill and Creo to rapidly create custom vacuum chamber hardware solution; prevented delay of operations and expanded testbed functionality
- Invented novel pressure relief system to address critical safety risk in test environment; designed, prototyped, and validated solution prior to system integration; produced invention disclosure on design
- Designed fluid flow device for MRE test apparatus; simulated device flow in Ansys Fluent to ensure solution viability before manufacture; prototyped device for integration into testbed; validated and characterized flow parameters and compared to COTS solution; produced invention disclosure on design and expanded data collection capabilities

Systems Engineering Graduate Intern

Jan. 2023 – Apr. 2023

- Increased overall verification completion by 20% for entire 2nd stage of New Glenn launch vehicle, leveraging knowledge of Windchill, PTC Creo, and DOORS Next Generation
- Reduced duplicative requirements by cross-referencing relevant documentation to consolidate requirement and verification scope
- Managed systems interface between BE-3U engines and New Glenn launch vehicle by coordinating relevant stakeholders across all disciplines of second stage and engine subsystems to drive integration efforts

NASA Langley Research Center

Hampton, Virginia

Computational Aerospace Engineering Intern

Sep. 2020 – Dec. 2020

- Developed machine learning methods to aide in material design of carbon fiber-reinforced composites for solar sail spacecraft during restricted lab access from the novel coronavirus pandemic
- Constructed and validated mathematical models and machine learning algorithms for stress relaxation behavior and other time-dependent thermomechanical material properties

Mechanical Engineering Intern

Jan. 2020 – May 2020

- Led research project to assess viability of PEEK thermoplastics for reusable CFRP matrices with accelerated fabrication methods
- Designed and fabricated novel polymer composites for ultra-lightweight deployable space structures
- Developed MATLAB analysis program for material data post-processing that saved five hours of work per tested sample

Ira A. Fulton Schools of Engineering

Tempe, Arizona

Undergraduate Teaching Assistant

Aug. 2020 – Dec. 2020

- Class: Thermodynamics for Mechanical and Aerospace Engineering
- Created discussion videos to review course material for 300+ students, held regular office hours to provide 1 to 1 student support

RESEARCH EXPERIENCE

MIT Human Systems Laboratory

Cambridge, Massachusetts

Doctoral Research Assistant, Massachusetts Institute of Technology

Feb. 2023 – Present

- Developing next-generation In-Situ Resource Utilization (ISRU) technology to enable future Venus aerial robotic missions
- Advancing state-of-the-art for solid oxide electrochemical systems to be used for gas generation and power storage
- Design and execution of laboratory experimentation to demonstrate concept of operations for an extended-life Venus aerobot
- System modeling and multidisciplinary design optimization of Venus ISRU aerobot to maximize scientific return of the mission

Graduate Research Assistant, Massachusetts Institute of Technology

Aug. 2021 – Feb. 2023

- Advanced In-Situ Resource Utilization (ISRU) technology to create oxygen from Martian carbon dioxide
- Mission operations of the Mars Oxygen ISRU Experiment (MOXIE) onboard the Perseverance Rover through experiment design, command uplink, and telemetry/data downlink – coordination with JPL mission control
- Dynamic modeling of physical relationships in MOXIE Pressure Sensor 4 to predict feedback control response
- Validated control response model through both laboratory experimentation of MOXIE system and in-situ experimentation with the MOXIE flight model on Mars

Combustion and Electrochemical Power Systems Laboratory

Tempe, Arizona

Undergraduate Researcher, Arizona State University

Nov. 2018 – Jun. 2021

- Developed a system that aimed to improve the rapid thermal cycling of SOFCs in a metal supported configuration from self-sustaining micro-flame combustion
- Iteratively designed, fabricated, and validated system performance of fuel cell reactor, achieved state-of-the-art efficiency
- Created custom LabVIEW software to run reactor setup and accurately display and record experimental data

PROJECT EXPERIENCE

Qualifying Insulin Delivery Pumps for Human Spaceflight

Cambridge, Massachusetts

Principal Investigator, MIT Media Lab Space Exploration Initiative

Sep. 2023 – Present

- Awarded grant to rigorously test commercial insulin pumps in transient gravitational environments onboard a microgravity flight to serve as an analog for full duration spaceflight mission profiles
- Matured experimental design from concept to flight during 32-week timeline
- Advancing the accessibility of human spaceflight for the Diabetes mellitus (DM) and disabled communities by vetting critical life support technology in analog spaceflight environment to inform future use in human astronaut applications
- Conducted field testing onboard Zero-G parabolic research flight in May 2024, resulting in open access publication and disability outreach events

Satellite Broadband

Cambridge, Massachusetts

Lead Systems Integration Engineer, Massachusetts Institute of Technology

Jan. 2022 – May 2022

- Led technical and programmatic communication between Satellite Hardware Development and Mission Architecture teams
- Ensured mission architecture requirements informed satellite hardware design for power, ADC, communication and computing subsystems, and acted as liaison for team-team and team-instructor communication
- Provided stakeholder recommendations on LEO broadband market competition in relation to the proposed mission

AWARDS & HONORS

MIT School of Engineering MathWorks Fellowship

Sep. 2025 – Present

- Innovative fellowship awarded to students in the MIT School of Engineering who are pioneering solutions to some of today's most urgent challenges—both global and national—and impact the future of engineering and science.

National Science Foundation Graduate Research Fellowship

Sep. 2022 – Aug 2025

- Competitive fellowship awarded by the National Science Foundation to a handful of outstanding graduate students in STEM to ensure the quality, vitality, and diversity of the scientific and engineering workforce of the United States

Arthur Gelb Fellowship

Sep. 2021 – Aug. 2022

- Highly selective fellowship awarded by the Department of Aeronautics and Astronautics at MIT to a single first year graduate student who has demonstrated exceptional strength and determination to succeed by overcoming personal challenges

Future Space Leaders Foundation Fellow

July 2025

- Nationally competitive award intended for U.S. graduate students and young professionals who are pursuing space- and satellite-related careers. Fellows are supported in attending IAC, SGC, and the UN/IAF workshop

Rene H. Miller Prize in Systems Engineering

May 2022

- Awarded by the Massachusetts Institute of Technology Department of Aeronautics and Astronautics for the best graduate thesis in systems engineering

Academic Awards – Arizona State University

- Fulton Undergraduate Research Award: Fall 2019, Fall 2020 | New American University Scholar Award: Fall 2016 – Spring 2021

SKILLS | P - Proficient | I - Intermediate | N - Novice |

Software: MATLAB (P), SolidWorks (P), ANSYS (P), Fluent (P), Creo (P), LabView (P), C (I), Git/HTML (P), STK (I), Python (I)

Equipment: 3+axis CNC Mills (P), Laser CNC (P), 3D Printers (P), PCB Design/Mill/Fab (P), Composites (P), Hydraulic Presses (P)

Lab Instruments: Scanning Electron Microscope (I), Liquid Nitrogen (P), Vacuum Chambers (P), High-Pressure Gas Manifolds (P)

CERTIFICATIONS

EMT, National Registry of Emergency Medical Technicians – Registry No. E3803164, MA Lic. No. E0927047

Jan. 2024

Student Pilot, Federal Aviation Administration – License No. 4850946

Jun. 2023

Rescue Diver, Professional Association of Diving Instructors – Diver No. 23040K2323

Jul. 2024

Certified in Mechanical Design, Dassault Systèmes – Credential ID: C-VDWFNJ39D4

Dec. 2018

SERVICE EXPERIENCE

MIT Emergency Medical Service

Cambridge, Massachusetts

Emergency Medical Technician – Rank: 1st Rider, Provisional Crew Chief

Sept. 2023 - Present

- Volunteering as an NREMT and Massachusetts State Certified EMT-B with MIT EMS, 60+ hrs/month
- Serving on a BLS ambulance providing care to the MIT community, Cambridge, and the greater Boston area
- Leading crew on acute emergency calls, making critical care decisions, and managing scene ops to ensure quality care is provided
- Previously served as an elected officer for MIT EMS

Mission: AstroAccess

Cambridge, Massachusetts

Director of Flight Operations & AstroAccess Ambassador

Nov. 2023 - Present

- Managing a 501(c)(3) nonprofit organization's research activities for current and future microgravity flights, resulting in peer-reviewed publications, a chapter in the AIAA Space Architecture decadal survey, and multiple conference presentations
- Selected to fly 37 parabolas with the MIT Space Exploration Initiative 2024 parabolic research flight as a Mission: AstroAccess Ambassador to test insulin pump technology in microgravity to increase spaceflight accessibility, resulting in an open access publication to the Journal of Wilderness & Environmental Medicine, DOI: 10.1177/10806032241304439
- Invited to multiple individual and panel interviews for a variety of organizations – including the Cambridge Science Consortium, Boston Museum of Science, and the MIT Media Lab – to raise awareness for accessibility in the future of human spaceflight

Space Generation Advisory Council

Sydney, Australia

Space Generation Congress Delegate

Sept. 2025 – Oct 2025

- Selected through the Future Space Leaders Foundation to serve as a delegate during the 2025 Space Generation Congress
- Delivered brief to UN Office of Outer Space Affairs on the topic of satellite connectivity in rural communities and the actionable steps to address UN sustainable development goals, specifically targeting SDG #3 (good health and well-being) and SDG #4 (quality education) by outlining a path towards tuberculosis treatment and community support for healthcare professionals
- Interfaced with industry and government leaders in space policy, opening conversations about disability equitable access for space

ACADEMIC PUBLICATIONS & PRESENTATIONS

- **Horn, K.**, Cutts, J., Elangovan, S., Hecht, M., Hoffman, J., Izraelvitz, J., Krishnamoorthy, S. (2026, Mar). Science Benefits for Long-Lived Aerial Robotic Platforms Enabled by ISRU [Oral Presentation]. 57th Lunar and Planetary Society Conference. The Woodlands, TX.
- **Horn, K.**, Cutts, J., Elangovan, S., Hecht, M., Hoffman, J., Izraelvitz, J., Krishnamoorthy, S. (2025, Nov). Advancements in ISRU-Enabled Venus Aerobots for Long Duration Missions [Oral Presentation]. 23rd Meeting of the VEXAG. Niagara Falls, NY.
- **K. J. Horn** (2025, Oct). Planetary Atmospheric Exploration: Ballooning on Other Worlds [PowerPoint]. 16.00 Introduction to Aerospace Design, Department of Aeronautics and Astronautics, Massachusetts Institute of Technology.
- **Horn, K.**, Cutts, J., Hecht, M., Hoffman, J., Izraelvitz, J., Krishnamoorthy, S. (2025, Oct). Venus Aerial Platforms: Long-Lived Balloons with ISRU for Buoyant Gas Replacement [Oral Presentation]. 76th International Astronautical Congress. Sydney, Australia.
- **Horn, K.**, Cutts, J., Hecht, M., Hoffman, J., Izraelvitz, J., Krishnamoorthy, S. (2025, Jun). Exploring Venus with Electrolysis: Atmospheric ISRU for Long Duration Aerial Missions [Oral Presentation]. 22nd Interplanetary Probe Workshop. Stuttgart, Germany.
- Cutts, J., Hecht, M., **Horn, K.**, Izraelvitz, J., Krishnamoorthy, S. (2024, Nov). Long-Lived Venus Balloon Technology Implemented with Buoyant Gas Replacement [Poster Presentation]. 22nd Meeting of the VEXAG. Louisville, Kentucky.
- **Horn, K.**, Hoffman, J. (2024, Nov). Insulin Delivery Pumps for Human Spaceflight: steps towards an accessible space future. *Journal of Wilderness & Environmental Medicine*. DOI: 10.1177/10806032241304439
- **Horn, K.** (2023, Feb). Adaptive Oxygen Production of the Mars Oxygen ISRU Experiment (MOXIE) through Feedback Control of Pressure Sensor 4. *Massachusetts Institute of Technology DSpace@MIT*. URI: <https://hdl.handle.net/1721.1/150106>.
- Hoffman, J., Hecht, M., ..., **Horn, K.** (2022, Aug). Mars Oxygen ISRU Experiment (MOXIE) – Preparing for Human Mars Exploration. *Science Advances*. DOI: 10.1126/sciadv.abp8636
- **Horn, K.** (2020, Dec). Machine Learning Methods for Thermomechanical Property Determination of Viscoelastic Polymer Composites [Oral Presentation], NASA LaRC Fall 2020 Symposium. Hampton, Virginia.
- **Horn, K.** (2020, Nov). Metal-Supported Solid Oxide Fuel Cells for Rapid Thermal Cycling II [Poster Presentation], FURI Fall 2020 Symposium. Tempe, AZ.
- **Horn, K.** (2020, May). Low Creep / Low Relaxation Thermoplastic Polymer Composites for Deployable Structures [Oral Presentation], NASA LaRC Spring 2020 Symposium. Hampton, Virginia.
- **Horn, K.** (2019, Nov). Metal-Supported Solid Oxide Fuel Cells for Rapid Thermal Cycling [Poster Presentation], FURI Fall 2019 Symposium. Tempe, AZ.