

KYLE J. HORN

kylejhorn.com | (530) 798-0750 | kjhorn@mit.edu

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA Expected Graduation: May 2026
GPA: 5.00/5.00
Degree: Ph.D. in Aeronautical and Astronautical Engineering
Concentration: Space Systems Engineering, Human Factors Engineering

Degree: S.M. in Aeronautical and Astronautical Engineering Degree Awarded: Jan 2023
GPA: 5.00/5.00
Thesis: Adaptive Oxygen Production of the Mars Oxygen ISRU Experiment

Arizona State University, Tempe, AZ Degree Awarded: May 2021
GPA: 4.00/4.00
Degree: B.S.E. in Mechanical Engineering
Honors: Summa Cum Laude

WORK EXPERIENCE

Blue Origin Kent, Washington
Systems Engineering Graduate Intern Jan. 2023 – Apr. 2023

- Increased overall verification completion by more than 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 / 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

Human Systems Laboratory Cambridge, Massachusetts
Graduate Research Assistant, Massachusetts Institute of Technology Aug. 2021 – Present

- Developing next-generation 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
- Validating control response model through both laboratory experimentation of MOXIE engineering model and physical experimentation of MOXIE flight model
- Autonomous control development for optimized and continuous oxygen production to enable future human exploration of Mars using next-generation MOXIE technology

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 COTS insulin pumps in transient gravitational environments onboard a microgravity flight to serve as an analog for full duration spaceflight mission profiles
- Advancing the accessibility of human spaceflight for the type 1 diabetic and disabled communities by vetting critical life support technology in analog spaceflight environment to inform future use in human astronaut applications
- Field testing on Zero-G parabolic research flight to be conducted in May 2024, subsequent disability outreach events to follow

BeaverNet Satellite Broadband

Lead Systems Integration Engineer, Massachusetts Institute of Technology

Cambridge, Massachusetts

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

Negative/Positive Airway Pressure (NPAP) Face Mask

Team Leader, Arizona State University

Tempe, Arizona

Aug. 2020 – May. 2021

- Led senior mechanical design capstone team to address a critical societal need from the novel coronavirus pandemic
- Led development, fabrication, and validation of a powered filtration mask to create an effortless breathing environment, aimed to provide a PPE solution for disabled individuals who have impaired breathing capabilities
- Managed task distribution for subteams, set project schedule and budget, followed up with team members to track progress towards critical items and deadlines, created solid model, design drawing package, validation simulations, and team presentations

AWARDS & HONORS

National Science Foundation Graduate Research Fellowship

Sep. 2022 – Present

- Competitive fellowship awarded by the National Science Foundation to a handful of outstanding graduate students in STEM

Arthur Gelb Fellowship

Sep. 2021 – Aug. 2022

- Highly selective fellowship provided 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

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), ANSYS Fluent (P), PTC Creo (P), STK (I), Python (I), LabView (I), C (N)

Equipment: 3D Printers (P), CNC Mills (I), Laser Cutting (P), Shop tools (P), Hydraulic Presses (P), Soldering (I), Circuit Boards (I)

Lab Instruments: Scanning Electron Microscope (I), Liquid Nitrogen (P), Vernier Calipers (P), Dynamic Mechanical Analyzer (P)

CERTIFICATIONS

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

Jan. 2024

Student Pilot, Federal Aviation Administration – License No. 4850946

Jun. 2023

SCUBA Advanced Open Water, Professional Association of Diving Instructors – Diver No. 23040K2323

Apr. 2023

Certified in Mechanical Design, Dassault Systèmes – Credential ID: C-VDWFN39D4

Dec. 2018

Eagle Scout, Bronze Palm – Troop 466 BSA, Senior Patrol Leader & OAHS

Jun. 2015

SERVICE EXPERIENCE

MIT Emergency Medical Service

Cambridge, Massachusetts

Volunteer Emergency Medical Technician

Sept. 2023 - Present

- Volunteering as a NREMT and Massachusetts State Certified EMT-B with MIT EMS
- Serving on a BLS ambulance, 20 hrs/mo providing care to the MIT community, Cambridge, and the greater Boston area

EXTRACURRICULAR ACTIVITIES

Disabled @ MIT

Aug. 2023 – Present

- Serving as Covid Safe Campus Ambassador to distribute NIOSH N95 respirator masks to the MIT community and bring attention to the ongoing presence and impact of COVID-19 at the Institute
- Serving on officer board to organize accessible events for the MIT community and coordinate diabetes mutual aid efforts

Tau Beta Pi Engineering Honors Society

Sep. 2020 – May 2021

- Participated in community service events that benefitted the Ira A. Fulton Engineering community

Sun Devil Marching Band

Aug. 2016 – May 2021

Tenor Saxophone Section Leader

Aug. 2019 – May 2021

- Led sectional rehearsals for low reed woodwind instruments, taught new members how to march and play
- Served the ASU community through Kappa Kappa Psi National Honorary Band Service Fraternity, approx. 100 hrs / semester

ACADEMIC PUBLICATIONS & PRESENTATIONS

- **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. *Journal of Science Advances*. DOI: 10.1126/sciadv.abp8636
- **Horn, K.** (2020, Dec). Machine Learning Methods for Thermomechanical Property Determination of Viscoelastic Polymer Composites, NASA LaRC Fall 2020 Symposium. Hampton, Virginia.
- **Horn, K.** (2020, Nov). Metal-Supported Solid Oxide Fuel Cells for Rapid Thermal Cycling, FURI Fall Symposium. Tempe, AZ.
- **Horn, K.** (2020, May). Low Creep / Low Relaxation Thermoplastic Polymer Composites for Deployable Structures, NASA LaRC Spring 2020 Symposium. Hampton, Virginia.