# **Eric Shear** - Curriculum Vitae

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Contact:

Gainesville, FL, USA
(415) 910-5981 (text)
(253) 444-9627 (video relay)
eric.m.shear@gmail.com
https://www.linkedin.com/in/eric-shear/
https://www.ericshear.space


## Education

2023-present — **Ph.D (Chemical Engineering)** — *Gainesville, FL, USA*
*University of Florida, Herbert Wertheim School of Engineering*

Supervisor: Ranga Narayanan

2019-2022 — **M.Eng (Chemical Engineering)** — *Gainesville, FL, USA*
*University of Florida, Herbert Wertheim School of Engineering*

GPA: 3.56

2016-2017 — **M.Sc (Earth and Space Science)** — *Toronto, Canada*
*York University, Lassonde School of Engineering*

Thesis: Small Spacecraft for Planetary Exploration
Supervisor: John Moores

2011-2015 — **B.Sc, Honours (Physics and Astronomy)** — *Toronto, Canada*
*York University*

## Work experience

2023-present — **Graduate Research Assistant** — *Gainesville, FL, USA*
*Bifurcation and Nonlinear Instabilities Laboratory, University of Florida*

2022-2023 — **Engineering Research Assistant** — *Jacksonville, FL, USA*
*Clean and Renewable Energy Lab, University of North Florida*
Developed an one-dimensional simulation of a methane pyrolysis reactor in MATLAB and designed a reactor to produce hydrogen gas using lithium hydride and water, both using principles of thermodynamics and fluid mechanics and heat transfer. Developed a test plan for the lithium hydride-steam reactor while prioritizing safety.

2021-2022 — **Patent Research Intern** — *Gainesville, FL, USA*
*UFInnovate Tech Licensing, University of Florida*
Produced more than 60 prior-art searches and non-confidential summaries on technologies invented at University of Florida, to determine patentability and commercialization potential of such.

2016-2017 **NSERC Technologies for Exo-Planetary Science (TEPS) Fellow** *Toronto, Canada*
*Planetary Volatiles Laboratory, York University*
Independently created code in MATLAB to carry out numerical simulations of time- and position-dependent solar flux intensity at Mars and orbital rendezvous at Saturn. Created a control system with programmable LCDs to alter radiometric measurements in a CCD sky imager and curve-fitted the data.

2010 **Engineering Intern** *Bothell, WA, USA*
*Tethers Unlimited*
Developed detailed CAD models of existing hardware and conceptual designs, investigated H2/O2 combustion dynamics in a small thruster, identified necessary components for test setups, and performed tests with bench-top laboratory equipment. This work resulted in $750,000 in SBIR Phase II funding from NASA for the HYDROS CubeSat thruster.

## Analog astronaut experience

2023 **CAPCOM, Inclusion-1 and 2** *Oracle, AZ*
*Space Analog for Moon and Mars, Biosphere II*
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2018 **Crew Astronomer, Crew 193** *Hanksville, UT*
*Mars Desert Research Station*
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## Parabolic flight experience

2022 **Deaf Ambassador, Flight 2** *Houston, TX*
*Mission AstroAccess*
Investigated how freefall affects the legibility of sign language in various orientations.

2021 **Deaf Ambassador, Flight 1** *Long Beach, CA*
*Mission AstroAccess*
Investigated the feasibility of using sign language in freefall and various methods to signal the return of gravity, using LEDs and haptic feedback.

2011 **Student Researcher/Team Lead** *Houston, TX*
*NASA Microgravity Education Flight Program*
Investigated the behavior of water droplets on a NAFION membrane (characterized as contact angle) in freefall, in an effort to reduce the need for high pressure to operate electrolyzers in microgravity.

## Self-started projects

2015-2016 **Cryogenic CO2 Scrubber** *NASA Ames Research Center, CA, USA*

Used cryogenic compatibility guidelines, CAD, and fluid mechanics and heat transfer principles to design a cryogenic CO2 scrubber prototype with a 3D-printed ice/air separation stage. Established relationships with vendors to manufacture and coat the prototype within 2 months. Devised and conducted 3 experiments to qualify the prototype's behavior with liquid nitrogen and carbon dioxide with mentorship from NASA Ames, and compiled the results in a final report.

## Publications & presentations

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| 2018 | **Shear, E.** and Moores, J.E. (2018) Saturn Ice Ring Exploration Network (SIREN) Mission Platform. Int. J. Space. Sci. Eng. 5 (1) pp 16-42 |
| 2016 | **Shear, E.** and Moores, J.E. (2016) Hydrolyzed Polar Terrain Ice Aerobot (HYPATIA) Mission Platform. International Journal of Space Science and Engineering. 3 (4) pp 342-359 |
| 2018 | **Shear, E.**, Saturn Ice Ring Exploration Network, presented at the International Space Development Conference, Los Angeles, CA |
| 2017 | **Shear, E.**, Adaptive Whole-Sky Imager for Planetary Rovers, poster presented at the 48th Lunar and Planetary Science Conference, Houston, TX |
| 2016 | **Shear, E.**, Hydrolyzed Polar Terrain Ice Aerobot Mission Platform, presented at the CASI ASTRO Conference, Ottawa, ON |
| 2014 | **Shear, E.**, Solar Water Vapor Balloons for Martian Polar Expeditions, presented at the 17th Mars Society Convention, Houston, TX |

## Skills

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| **Technical** | Fluid transfer<br>Heat transfer<br>Chemical kinetics<br>CAD/CAE<br>Separation operations<br>Thermodynamics<br>Astrodynamics<br>Data analysis and reduction |
| **Professional** | Scientific problem solving<br>Scientific/technical writing<br>Public speaking<br>Technology commercialization |
| **Software** | Microsoft Office: Advanced<br>SolidWorks: Advanced<br>NX: Advanced<br>UniSim: Intermediate<br>MATLAB/Simulink: Advanced<br>System ToolKit: Intermediate |
| **Programming** | Julia: Beginner<br>Python: Intermediate<br>MATLAB: Advanced<br>LaTeX: Advanced |
| **Languages** | English: native<br>American Sign Language: native<br>Spanish: intermediate |

## Honors & awards

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| 2020 | Christopher M. Squitieri Graduate Scholarship |
| 2017 | NASA iTech Semi-Finalist |
| 2016 | NASA iTech Semi-Finalist |
| 2014 | Inspiration Mars Student Design Competition, Semi-Finalist |
| 2012 | Mars Society University Rover Challenge, First Place |

## Volunteer experience

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| 2019-2021 | Deaf Mentor, Florida School for the Deaf and Blind |
| 2018-2019 | Astronomy Support, Mars Desert Research Station |
| 2017 | Mentor, NASA Space App Challenge, Toronto |

## Qualifications

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| 2015 | Advanced Ham Radio |
| 2013 | Open Water Scuba Diver |