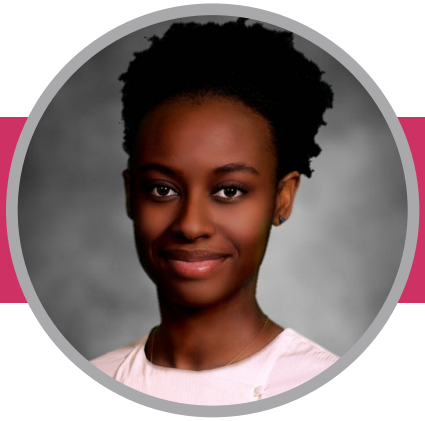
2022

ZONTA INTERNATIONAL

AMELIA EARHART FELLOWS

Expanding opportunities for women in aerospace engineering and space sciences



In an effort to carry out its mission that women have access to all resources and are represented in decision-making positions on an equal basis with men, Zonta International offers the Amelia Earhart Fellowship.

The Amelia Earhart Fellowship was established in 1938 in honor of Amelia Earhart, famed pilot and member of the Zonta Clubs of Boston and New York. The US$10,000 Fellowship is awarded annually to up to 30 women pursuing Ph.D./doctoral degrees in aerospace engineering and space sciences.

Read to learn about Zonta International's 2022 Amelia Earhart Fellows.

2022 Amelia Earhart Fellow

Eleonora Andreis

Citizenship: Italy

Proposed Program: Aerospace engineering at Politecnico di Milano, Italy

Ms. Andreis is a Ph.D. student in aerospace engineering at Politecnico di Milano. Her research focuses on the development of autonomous optical navigation algorithms for interplanetary nanosats missions. The goal is to understand how to enable deep-space limited-budget spacecraft to determine their position autonomously using information embedded in the environment. Her study is framed within the EXTREMA (Engineering Extremely Rare Events in Astrodynamics for Deep-Space Missions in Autonomy) project, awarded an ERC (European Research Council) Consolidator Grant in 2019, which aims to revolutionize the current paradigm of operating deep-space probes.

Ms. Andreis' is motivated by the exponentially increased number of CubeSats, shoe-boxed spacecraft, launched in space, owing to their low cost compared to traditional probes. The CubeSats' impact on the number of interplanetary missions is predicted to be tremendous. At the current pace, piloting CubeSats from the ground with the standard radiometric tracking, which heavily relies on limited resources, will become unsustainable. Self-driving interplanetary CubeSats could represent a solution to this problem. Ms. Andreis is addressing this challenge by developing autonomous optical-based navigation algorithms for deep-space CubeSats, whose accuracy will be also assessed with hardware-in-the-loop simulations in the lab.

Her professional goal is to continue contributing to the scientific research in the autonomous navigation field by enlarging her competencies and applying them to actual flying missions, whether in academia or industry.

Besides her research activity, Ms. Andreis is co-supervising master's students during the development of their final theses and is tutoring undergraduate students. In her free time, she enjoys outdoor activities such as hiking, running and snowboarding. Her favorite activity remains taking a plane whenever she can to visit a new place.

2022 Amelia Earhart Fellow

Vanessa Awate

Citizenship: Senegal and United States

Proposed Program: Aerospace engineering at the University of Illinois at Urbana-Champaign, USA

Ms. Awate is a Ph.D. candidate in aerospace engineering at the University of Illinois at Urbana-Champaign. Her primary focus is the study of rotary wing aerodynamics and, more specifically, the dynamic stall process that occurs as wings or blades move rapidly. This complex dynamic stall phenomenon typically results in a highly unsteady flow field and renders aircrafts uncontrollable. The goal of her research is to understand and to predict the prevalent vortex shedding process to inform future designs and control mechanisms for such flows.

In her research, Ms. Awate combines low-order modeling approaches with advanced non-intrusive flow diagnostic methods in wind tunnel experiments to understand the physical underpinnings behind the dynamic stall phenomenon. She hopes her experiments will contribute to the development of new in-situ flow sensing and control capabilities on helicopters, maneuvering aircrafts and wind turbines.

After completing her doctoral degree, Ms. Awate envisions working for NASA, where she is part of the Pathways program within the flow physics branch. Her long-term goals include starting the first aerospace sciences academy in her home country, Senegal, tackling gender and racial disparities within the STEM faculty body and search committees and teaching at the collegiate level. In her spare time, Ms. Awate enjoys baking, dancing, reading, and creating arts and crafts.

2022 Amelia Earhart Fellow

Madison Borrelli

Citizenship: United States

Proposed Program: Planetary science at Arizona State University, USA

Ms. Borrelli is a Ph.D. student in the School of Earth and Space Exploration at Arizona State University (ASU). She is a planetary scientist primarily studying volcanism on Venus and Mars. Her work currently focuses on Venus' canali, which are long, narrow channels that resemble dry riverbeds. These channels most likely formed from erosion by flowing low-viscosity lava. Ms. Borrelli is testing the hypothesis that carbonatite, a carbon-rich lava that is rare on Earth, is the composition that formed canali. As part of this project, she will also use new stereo-derived topography to compile a more accurate database of Venus' lava channels than currently exists. With the recent selection of two NASA missions and a European Space Agency mission to Venus, this project will prepare her to investigate Venus using a new generation of data.

Ms. Borrelli also studies explosive volcanic eruptions on Mars. She uses analog locations on Earth to learn about comparable locations across the solar system. By altering models of eruptions at Taal Volcano in the Philippines, she can test how eruptions would react under Mars atmospheric and gravity conditions.

Ms. Borrelli completed her undergraduate degree in physics at Wheaton College Massachusetts during which she conducted a space policy internship at the National Academy of Sciences. She hopes to remain involved in the political side of scientific research and to encourage her future mentees to do the same. She has also been involved with student government at ASU. Through her roles in ASU's Graduate and Professional Student Association, she traveled to Washington, D.C., to meet with federal legislators and advocate on behalf of the graduate student community.

In her free time, Ms. Borrelli loves to bake and enjoys crafts such as embroidery and needle felting.

2021 Amelia Earhart Fellow

Jordan Bretzfelder

Citizenship: United States

Proposed Program: Geology/planetary science at the University of California Los Angeles, USA

Ms. Bretzfelder's research focus is on planetary surfaces. Her dissertation work is focused on wind-driven sediment transport and how it shapes the surfaces of different planetary bodies. Recent work used information collected by the Mars Science Laboratory Curiosity rover to study wind-formed features (similar to sand dunes) on the surface of Mars. Sand poses a threat to lander missions, as the rovers can become trapped, possibly ending a mission. Differences between wind-formed features on Earth and Mars mean that there are limited opportunities to test drive capabilities across these uniquely Martian features. The objective of this work was to better understand how differences in the formation and structure of these dune-like features can impact the success of rover traverses across them. This information can inform drive planning for Curiosity as it continues its survey of Gale crater, as well as for the Perseverance rover as it explores Jezero crater.

In addition to the Earth and Mars, wind drives sediment across the surfaces of Titan, Venus, Pluto and even some comets. Ms. Bretzfelder uses a wind tunnel and low-density analog sediment grains to model the behaviors of these grains on different planets, taking into consideration the wide range of surface properties on these bodies, including sediment compositions, varying gravitational acceleration and the diverse atmospheres. She is also studying these questions in the field at Death Valley National Park, a possible analog for the Martian surface.

Along with her Ph.D. work, Ms. Bretzfelder received her private pilot's license in 2021. She engages in outreach events through the University of California Los Angeles to encourage young women to pursue STEM research and uses social media to share her journey through flight school and her Ph.D. so that other young women can see themselves as scientists and aviators.

2022 Amelia Earhart Fellow

Dorota Budzyń

Citizenship: Poland

Proposed Program: Mechanical engineering at the University of Glasgow, Scotland

Ms. Budzyń is a Ph.D. candidate in mechanical engineering at the University of Glasgow. Before starting her Ph.D. program, she worked for the European Space Agency (ESA), where she focused on prototyping Lunar geological tools. While studying Apollo astronauts' feedback regarding the Lunar equipment she got particularly interested in the challenges that were posed by Lunar dust. She decided to continue her research as a Ph.D. project. Her project, funded by the European Space Agency (ESA), focuses on the application of compliant mechanisms in Lunar hardware as an implicit dust protection method.

Ms. Budzyń's primary background is in robotics and mechanical engineering. As a bachelor's and master's student, she worked on a robotic team, Scorpio, which builds Mars rover analogs for international competitions at the University Rover and European Rover Challenges. She also participated in the FREDE project that launched a stratospheric experiment examining the decay of freons in the stratosphere as part of BEXUS program organized by ESA. She took part in ESA's rocket program REXUS, launching the DREAM experiment on board of the suborbital rocket. The aim of DREAM was to examine drilling output distributions in microgravity and vacuum conditions.

In her free time, Ms. Budzyń enjoys baking and taking care of her house plants and herbs. She is also a huge fan of 3D printing and uses her own 3D printer for multiple home projects.

2022 Amelia Earhart Fellow

Anivid Pedrós Faura

Citizenship: Spain

Proposed Program: Aerospace engineering sciences at the University of Colorado Boulder, USA

Ms. Faura is conducting her doctoral research at the University of Colorado Boulder as a member of the Orbital Research Cluster for Celestial Applications (ORCCA) Laboratory. Her research focuses on modeling the behavior of active small bodies (i.e., asteroids, comets) with the goal to build better dynamical environment models to enable safe close-proximity operations.

Close-proximity operations around small bodies can be extremely challenging due to their highly uncertain dynamical environments. Recent missions indicate that surface activity and ejecting particles can exist for both asteroids and comets increasing the uncertainty and risks.

Ms. Faura is currently working on understanding the particle dynamics around small bodies and the mechanisms that result in mass loss. Specifically, she wishes to build robust guidance algorithms and contribute to high-fidelity dynamical models so that active small bodies become reachable targets. As part of her research, she has been working on improving the current state of the art models for cometary drag force and gravity models suitable for irregular bodies.

She will use her Amelia Earhart Fellowship to fund her stay as a visiting researcher at the Japan Aerospace Exploration Agency (JAXA). She will continue her work on improving ejecta motion evolution models using data from the Hayabusa2's kinetic impactor experiment.

Ultimately, Ms. Faura hopes to push the bounds of deep space exploration so that we can better understand solar system formation and where we came from. After graduating, one of her career goals is to become a professor so she can encourage women to pursue careers in STEM fields and help increase the number of role models in the space field. In her free time, she enjoys traveling, skiing and learning new languages.

2022 Amelia Earhart Fellow

Marie Fayolle

Citizenship: France

Proposed Program: Planetary sciences at Delft University of Technology, Netherlands

Ms. Fayolle is doing her Ph.D. in the Astrodynamics and Space Missions section of the Space Engineering department at the Delft University of Technology. Her research focuses on investigating different methodologies and observation strategies to improve our current knowledge of natural satellites' dynamics, looking at the Galilean moons of Jupiter in particular. Determining the moons' trajectories over time (so-called ephemerides) provides valuable insights into planetary systems' dynamical evolution which, for Jupiter's icy moons, directly relates to the question of their habitability.

Ms. Fayolle's Ph.D. takes place in the context of the preparation for the upcoming JUICE and Europa Clipper missions, which will study three of Jupiter's Galilean satellites in the 2030s (Europa, Ganymede and Callisto). She analyzes different ways to combine spacecraft tracking data acquired during planetary missions with Earth-based observations collected over several decades. The project also implies investigating possibilities for new observations and how they would contribute to an improved solution for natural satellites' dynamics. The outcomes of Ms. Fayolle's Ph.D. project will help formulate clear recommendations regarding future observations of the Galilean moons and adequate data processing strategies to achieve more accurate ephemerides.

Besides research, Ms. Fayolle always had a very strong interest in education, which was realized in different ways over the years—from teaching math and physics to high school students, to helping unaccompanied minors through their studies and professional insertion. She now continues along this path through her educational tasks at the university. At home, she likes to play music and read philosophy, as well as trying to learn electronics by working on some small robotics projects.

2022 Amelia Earhart Fellow

Abigail Flom

Citizenship: United States

Proposed Program: Earth and planetary sciences at the University of Hawai'i at Mānoa, USA

Ms. Flom has been a sci-fi fan since she was a kid and realized that she wanted to be a scientist while taking advanced science classes and participating in her school's astronomy club and rocket team. She pursued her undergraduate degree in planetary science at the Florida Institute of Technology, where she began working on research in her first semester. While there, she explored modeling Jupiter's atmosphere, classifying asteroids and designing Martian regolith simulants. This led her to do a summer internship at the Lunar and Planetary Institute, studying hydration in lunar regolith using Moon Mineralogy Mapper data, which prompted her to continue studying lunar hydration in her Ph.D.

Now, Ms. Flom is a graduate student beginning the final year of her Ph.D. program and has funding from NASA FINESST to do her thesis research. Her research includes using telescopic observations during the special observing conditions of partial eclipse to study lunar hydration, measuring the spectra of Apollo soil samples in the near infrared to describe their photometric properties and making measurements in the visible to near infrared of the newly opened Apollo core samples through the ANGSA project. In the future, she's really interested in supporting remote sensing, robotic, and human exploration of the moon and beyond.

2021 Amelia Earhart Fellow

Mariachiara Gallia

Citizenship: Italy

Proposed Program: Aerospace engineering at Politecnico di Milano, Italy

Ms. Gallia is a Ph.D. student in aerospace engineering at the Politecnico di Milano. The main goal of her research is to develop a numerical tool that is capable in assisting in the design and optimization of electro-thermal ice protection system (ETIPS) for fixed and rotary wing aircraft. Ice accretion presents a serious hazard for flight safety; even light icing could cause large performance reduction and stability problems. Modern aircraft are equipped with ice protection systems to avoid or delay ice formations. The main issue is the large energy consumption of ETIPS. A reliable numerical tool is therefore necessary to increase IPS efficiency and reduce design cost.

Ms. Gallia is also working on the uncertainty quantification for in-flight icing. Her goal is to combine the physical model and the uncertainty quantification to develop a robust optimization procedure to be included in the design process of ETIPS. She is working as part of the European Union project ICE GENESIS to develop the next generation of 3D simulation tools for icing.

2022 Amelia Earhart Fellow

Maaninee Gupta

Citizenship: India

Proposed Program: Aeronautics and astronautics at Purdue University, USA

A member of the Multi-Body Dynamics Research Group at Purdue University, Ms. Gupta's Ph.D. research focuses on the field of orbital mechanics.

Within this domain, Ms. Gupta's research involves spacecraft trajectory design, modeling the true complexities of a space-based dynamical environment. A key aspect of simulating this complex motion is the inclusion of secondary gravitational forces that directly influence spacecraft dynamics, resulting in an inherently challenging nonlinear dynamical system. Upcoming missions that will operate in the vicinity of the moon, such as the NASA's Lunar Gateway, will benefit from such comprehensive analyses that account for the intricacies associated with accurately modeling spacecraft motion.

While the process is theoretically and computationally grueling, this higher-fidelity gravitational analysis results in unique orbits that are remarkably useful for missions to and near the moon. Although numerous orbits are available at our disposal in cislunar space, resonant orbits possess significant advantages that can aid long-term mission success. Spacecraft in such orbits remain in resonance with the lunar orbit and, thus, provide naturally recurring access between the Earth and the moon. Additionally, resonant orbits exhibit natural stability, which can minimize the long-term spacecraft operational costs. Accordingly, Ms. Gupta's research seeks to investigate the availability of Earth-moon resonant orbits and their applicability to current mission demands.

With the expertise gained in her doctoral research program, she hopes to contribute toward spacecraft trajectory design in support of humanity's return to the moon. Besides research, she enjoys doing crosswords, playing tennis and watching Formula One.

2022 Amelia Earhart Fellow

Maren Hülsmann

Citizenship: Germany

Proposed Program: Aerospace engineering at the Universität der Bundeswehr München, Germany

Ms. Hülsmann is pursuing a Ph.D. in aerospace engineering at the Universität der Bundeswehr München. She is researching the application of artificial intelligence (AI) techniques onboard of space systems. With mega-constellations in sight, the near-Earth orbit will get crowded, leading to rising numbers of collisions but also large amounts of orbit and telemetry data to be monitored. Evidently. there is the need for spacecraft that detect and react autonomously to hazardous events such as faults and collisions in orbit.

One of her research use cases is the fault management system as it is a critical part for each spacecraft. Here, AI-based concepts are developed that predict and detect faults onboard before they occur. Another use case is the development of decision-making concepts within the research group on autonomous collision avoidance for multi-spacecraft systems. She received the Zonta Club of Munich I's Amelia Earhart Club Prize for her doctoral research in 2021.

Before starting her Ph.D., Ms. Hülsmann graduated with a master's in applied mathematics from the University of Bremen. She received the faculty award in 2017, as well as the ZARM Promotional Award in 2018 for her master thesis on the optimization of atmospheric re-entry supervised by DLR institute of space systems.

During her studies, she worked as a tutor at the DLR_School_Lab Bremen and participated in the ninth cycle of the REXUS/BEXUS program by the German Aerospace Center (DLR), the Swedish National Space Agency and the European Space Agency. Before joining Bundeswehr University, she worked as a flight dynamics engineer at the German Space Operations Center.

Outside of her studies, Ms. Hülsmann is an active member of the Space Generation Advisory Council (SGAC), where she served in several roles over the past years. Since beginning of 2022, she has represented the SGAC as a national point of contact for Germany.

2022 Amelia Earhart Fellow

Jeimmy Nataly Buitrago Leiva

Citizenship: Colombia

Proposed Program: Aerospace science and technology at the Universitat Politècnica de Catalunya, Barcelona Tech, Spain

Ms. Leiva is doing her Ph.D. on the value chain for the extension of the useful life of satellites through efficient, profitable and sustainable processes. Her doctoral study will include research on an ecological manufacturing chain, sustainable development processes, and a proposal for removal and entry to Earth of satellites at the end of their useful life.

Ms. Leiva was a graduate of the Conservatory of Music Department at the National University of Colombia playing the viola. She also loves sports and participated in national competitions in the following disciplines: tennis (bronze medalist, 2018); fencing (2014); weapons: foil and sword.

2022 Amelia Earhart Fellow

Yana Lishkova

Citizenship: Bulgaria

Proposed Program: Control engineering at the University of Oxford, United Kingdom

Ms. Lishkova is pursuing her Ph.D. research at the University of Oxford and focuses on developing methods for simulation, optimization and control of multirate systems, which exhibit dynamics on different time scales. These methods allow for high-fidelity simulation and control of multirate systems while enabling substantial reductions in the required computational cost. This makes the methods highly advantageous for the safety-critical application and/or implementation on systems with limited computational capacity in aerospace systems.

Ms. Lishkova's work attempts to tackle these challenges for the problems of flexible satellite control and space debris de-orbit. With this work, she aspires to create a well-rounded approach applicable not only in the aerospace field but in other areas of science and engineering as well. She would like to dedicate her career to the topic of optimal spacecraft control and help enable sustainable life both on Earth and beyond.

Previously, Ms. Lishkova completed a bachelor's and master's in aerospace engineering and instrumentation and control at the University of Cambridge and a Diploma of Higher Education in software engineering and electronics from the University of Edinburgh. Parallel to her Ph.D. studies, she works as a junior dean at St. Hugh's College and represents the engineering graduate student body at departmental and divisional meetings. She also acts as vice president of AerOx, a society dedicated to inspiring students to pursue a career in the aerospace field. In her spare time, she is learning to pilot unpowered aircraft and enjoys teaching and event management.

2022 Amelia Earhart Fellow

Sara Miller

Citizenship: United States

Proposed Program: Planetary Science at Cornell University, USA

Ms. Miller uses numerical modeling to shed light on the fluid dynamics that take place in the ice-covered ocean at Jupiter's moon, Europa. Her doctoral research in the Planetary Habitability and Technology Laboratory at Cornell University seeks to advance the state of global ocean circulation modeling at Europa by resolving the turbulent transfer of heat, salt and momentum across the ice-ocean boundary layer and into the deep ocean. While no direct measurements of Europa's ocean are presently available, she hopes to use modeling as a window into the ocean world's potential for habitability.

Ms. Miller graduated from the Georgia Institute of Technology with bachelor's and master's degrees in aerospace engineering. Her master's research, in the High-Power Electric Propulsion Laboratory, involved a combination of experimental and theoretical electric propulsion performance studies. In addition to academic and research activities, she gained hands-on experience via internships at several NASA locations including the Glenn Research Center, Marshall Space Flight Center and Johnson Space Center.

Beyond research activities, Ms. Miller enjoys running and sharing her passion for space exploration with the public. She balances her time in front of a computer with marathon training and assistant coaching the local youth track and field team. As a member of NASA's Speaker's Bureau, she has given aerospace-themed presentations and demonstrations to audiences that span preschool to retirement communities. Through outreach and mentorship, she hopes to inspire future generations of scientists and engineers.

2022 Amelia Earhart Fellow

Adriana Mitchell

Citizenship: United States and Brazil

Proposed Program: Aerospace engineering at Massachusetts Institute of Technology, USA

Ms. Mitchell's Ph.D. research at the Massachusetts Institute of Technology (MIT) combines her optical and aerospace backgrounds by focusing on visual navigation for autonomous planetary landings under variable illumination conditions. Current algorithms used for visual navigation have difficulty recognizing landmarks when illumination of the landing site during a planetary landing differs from orbital imagery taken for navigation. Nighttime landings, for example, will differ significantly from daylight images, affecting spacecraft landing safety. Landing accuracy will be critical to the success of manned missions to Mars or other planetary bodies that require pre-positioning of vital life-sustaining supplies for following astronauts.

Ms. Mitchell is developing a "smart" solution to the visual navigation problem with NASA Jet Propulsion Laboratory by using machine learning to perform visual navigation across different image types, including visual images, thermal images and RADAR images of potential future planetary lander candidates, like Mars, Titan and even Venus, where only RADAR can penetrate the thick atmosphere to image the surface. Her results will help give future missions access to new locations currently unreachable by current visual navigation techniques as well as helping to continue to improve landing accuracy on Mars and the Moon.

Most recently, Ms. Mitchell spent six months researching at Politecnico di Milano in Milan, Italy where she worked on the European Space Agency (ESA) asteroid characterization CubeSat M-ARGO. Prior to that, she worked at the Japan Aerospace Exploration Agency (JAXA) in Sagamihara, Japan, on their asteroid sample-return mission, Hayabusa2. Ms. Mitchell received her master's in aerospace engineering in 2021 at MIT and her bachelor's in optical sciences and engineering from the University of Arizona in 2019. Ms. Mitchell enjoys karaoke and fashion history and is an avid traveler. She anticipates participating in international and eventually interstellar collaborations throughout her career.

2022 Amelia Earhart Fellow

Maya Nasr

Citizenship: Lebanon

Proposed Program: Aerospace engineering at Massachusetts Institute of Technology, USA

Ms. Nasr is a Ph.D. candidate in the aerospace engineering department at the Massachusetts Institute of Technology (MIT), working with Professor Jeffrey Hoffman on the Mars Oxygen ISRU Experiment (MOXIE) for NASA Jet Propulsion Lab's Mars 2020 Perseverance rover. A native of Lebanon, she received her acceptance to MIT at the age of 16 and finished her bachelor's and master's degrees in aerospace engineering from MIT in 2018 and 2021 respectively. She previously worked on several projects including NASA's Cassini mission activity on Titan, the OneWeb satellites network, the MIT KitCube Satellite, Zero Robotics ISS programming competition and the AquaMAV at Imperial College London.

Ms. Nasr is passionate about increasing global representation and access in the space sector and bringing awareness to nationality-based discrimination in career opportunities for foreign nationals. She is a TEDx talk-featured speaker about this topic and is currently the co-founder of the HUMANS—Humanity United with MIT Art and Nanotechnology in Space—project that creates a symbolic avenue for space access worldwide, and is intended to be launched to the International Space Station (ISS) in partnership with the MIT Space Exploration Initiative (SEI).

As part of the Space Generation Advisory Council (SGAC) Space Law & Policy Project Group, she is currently the policy lead for the SGAC Taskforce on U.S. Space Policy. Additionally, she is the lead of the Space Resources and Space Ethics & Human Rights subgroups with the goal of peaceful and equitable use of outer space.

Her primary research interests are space systems engineering and international space law, policy and ethics. Outside of MIT, she loves traveling around the world, painting, and writing Arabic poetry.

2022 Amelia Earhart Fellow

Benita Nortmann

Citizenship: Germany and Switzerland

Proposed Program: Control theory/aeronautical engineering at Imperial College London, United Kingdom

Ms. Nortmann's Ph.D. project at Imperial College London addresses the challenge of limited information in control design. From modern airliners to satellite constellations, aerospace systems are complex, interconnected and difficult to model. While classical control theory provides powerful tools to design controllers ensuring safe and reliable operation, many such tools require accurate model knowledge.

Ms. Nortmann uses measured data to account for unknown or imperfect information. Her work has extended a low-complexity learning framework to linear time-varying systems—a class of systems particularly relevant in the aerospace industry. Time-variation is inherent in many aerospace systems, from changes in aerodynamic coefficients to orbital variations. Currently, she is exploring the extension of the data-driven framework to overcome limited information regarding the system model and performance criteria in the context of dynamic game theory, which provides tools to model interactions in interconnected engineering systems. Her research also focuses on practical applications of her results. Her professional goal is to contribute to a safer and greener future of aviation by conducting research on control design and automation.

Ms. Nortmann is active in teaching and outreach activities. She is a graduate teaching assistant and co-supervises master's students. Throughout her undergraduate degree, she worked with school students as a STEM ambassador and continued the engagement into her Ph.D. by lecturing at a summer school.

Outside her Ph.D. studies, Ms. Nortmann is the treasurer of the Imperial College karate society. In addition to practicing the martial art, she enjoys hiking, climbing and learning Italian.

2022 Amelia Earhart Fellow

Funmilola Oluwafemi

Citizenship: Nigeria

Proposed Program: Space biochemistry at Federal University Oye Ekiti, Nigeria

Ms. Oluwafemi currently works with the Space-Agency of Nigeria–National Space Research and Development Agency (NASRDA) in the Space Life-Sciences Division. She is enrolled for her Ph.D. studies at Federal University Oye Ekiti, with her research focus on space biochemistry through the study of the effect of simulated-microgravity via Clinostat on plant crops to activate their biochemical innate-reaction-mechanisms. The hypothesis is that these crops will produce better yields, improved nutritional qualities and improved abilities to withstand environmental stresses than their counterpart terrestrial crops as microgravity bio-fortifies. It is hoped that space explorers in the distant future will have improved crop breeds from this research that may adapt/survive well in the harsh environment of space

Ms. Oluwafemi won Round4 Climate, Food and Farming Global-Alliance on Agricultural Greenhouse-Gases Development Scholarships (CLIFF-GRADS) program on food-security and was a mentor in the New York Academy of Sciences' 1000Girls, 1000Futures program to engage young women interested in STEM and advance their pursuit of STEM careers through mentoring and skills development. She mentors teenagers—especially girls—on how to be empowered for self-reliance and how to cope during challenge periods.

2022 Amelia Earhart Fellow

Katherine Opacich

Citizenship: United States

Proposed Program: Aerospace engineering at the University of Dayton, USA

Ms. Opacich is a doctoral student in aerospace engineering at the University of Dayton in Dayton, Ohio. Her research focuses on plasma-assisted combustion through the application of nanosecond pulsed high-frequency discharges. The development of reliable, energy efficient and environmentally responsible combustion systems is a challenge that exists in air-breathing propulsion, internal combustion engines and stationary power generation. Working to meet these operational needs with lean burning and reduced residence times has created environments that push the limit of traditional combustion techniques. Nanosecond discharges is a technology that has shown success in igniting these conditions. Ms. Opacich's research is in collaboration with the Air Force Research Laboratory (AFRL) and looks to further explore the benefits and limitations of nanosecond discharge ignition.

Ms. Opacich is a National Science Foundation Graduate Research Fellow, an American Institute of Aeronautics and Astronautics (AIAA) student member and a teaching assistant. In her free time, she volunteers at outreach programs aimed at introducing and inspiring K-12 students to pursue careers in STEM.

2022 Amelia Earhart Fellow

Eleni Ravanis

Citizenship: United Kingdom and Greece

Proposed Program: Planetary science at the University of Hawai'i at Mānoa, USA

Ms. Ravanis is a Ph.D. candidate and graduate research assistant at the University of Hawai'i at Mānoa, a student collaborator for the Mastcam-Z instrument onboard the Perseverance rover and member of the Mars 2020 science team. In her research, she explores the processes and potential sources of explosive volcanism in the Nili Fossae region of Mars, using a combination of numerical modeling, remote sensing analysis and comparison with Earth analogs. Her work aims to provide a more detailed insight into the volcanic history of the Nili Fossae region and potential sources for volcanism in Jezero Crater, home of the Perseverance rover, and the surrounding area. This will help provide valuable context for the Mars 2020 mission and for future returned samples from this region.

Before moving to Hawaii, Ms. Ravanis worked for the European Space Agency for two years on the Mars Express mission at the European Space and Astronomy Centre in Spain.

Ms. Ravanis is passionate about working for an equitable and inclusive space future. She is co-lead of the Space Generation Advisory Council (SGAC) Ethics and Human Rights working group, and a co-creator of The Space Ethics Library. She has been a member of the Austrian Space Forum (OeWF) Flight Planning Team since 2019 and is a writer for the Geobites website.

2022 Amelia Earhart Fellow

Archana Tikayat Ray

Citizenship: India

Proposed Program: Aerospace engineering at Georgia Institute of Technology, USA

Ms. Ray is pursuing her Ph.D. in aerospace engineering at Georgia Institute of Technology. Her research focuses on the development and implementation of natural language processing (NLP) tools and techniques to enable/support the automated translation of natural language aerospace requirements into machine-readable requirements. Specifically, Ms. Ray works on the development of language models (LM) with aerospace-specific domain knowledge to improve their performance and generalizability on aerospace text and requirements. Using LMs capable of identifying named entities, classifying aerospace requirements, etc., will promote better communication between stakeholders due to common and consistent use of language. In addition, it will improve the accuracy and understandability of requirements.

Besides her research activities, Ms. Ray mentors undergraduate students as a part of the Mentor Jackets program at Georgia Tech. She is also involved with Women in Engineering (WIE) and visits public schools in and around Atlanta to interact with female students and to motivate them to take up STEM careers in the future. She enjoys hiking, reading, painting and exploring different cuisines.

2022 Amelia Earhart Fellow

Malina Reitemeyer

Citizenship: Germany

Proposed Program: Electric ion space propulsion systems and thrusters at Justus-Liebig-Universität Giessen (Giessen University), Germany

Ms. Reitemeyer's area of interest lies in neutralizers for electric propulsion systems. Electric propulsion is an emerging and highly efficient space propulsion technology, which allows low-cost mission operation. In addition, efficient satellite constellations can be realized with this propulsion technology. Neutralizers are an essential piece of research studies because aerosol particles dispersed by nebulization, combustion or powder dispersion are usually electrostatically charged. Normally, a high level of electrical charge is undesirable because it increases the particle loss to the walls of transport and sampling systems, or it can affect filter-efficiency measurements. For an efficient electron generation, highly functional materials are needed. Ms. Reitemeyer's research focuses on a novel, promising material called electride for application in neutralizer devices. Electride promises lower operating temperatures and compatibility with new propellants. This would lead to a higher efficiency and an increased lifetime of the whole satellite.

Currently, Ms. Reitemeyer is aiming for a Ph.D. degree as member of the ion thruster group at Giessen University. Before, she studied physics with a focus on space physics in her master studies. During her bachelor's degree studies, she spent one semester abroad in Paris and enjoys French language and cuisine. Ms. Reitemeyer leads a group of student volunteers, who offer free private lessons to pupils who cannot afford paid tutoring.

2022 Amelia Earhart Fellow

Lidia Carós Roca

Citizenship: Spain

Proposed Program: Aeronautics at Imperial College London, United Kingdom

Ms. Roca is pursuing a Ph.D. at Imperial College London in optimization of airfoils for Martian rotorcraft. The Martian atmosphere presents various challenges when designing rotorcraft. First, the atmosphere of Mars is very thin compared to Earth's, with a low surface density reducing rotor efficiency. Additionally, the speed of sound on Mars is lower than on Earth, limiting rotor speeds to avoid high Mach numbers at the blade tip. These conditions require Martian rotor blades to operate in a low-Reynolds-number compressible regime, for which conventional airfoils are not designed. Insect-inspired non-conventional airfoils have been proven to achieve better performance than conventional airfoils in these conditions, but optimal airfoil shapes have yet to be developed.

Ms. Roca is using evolutionary algorithms to explore non-conventional airfoils under Martian flow conditions with high-fidelity computational fluid dynamics (CFD) simulations. The flow over these airfoils involves complex unsteady flow behavior, which needs to be accurately resolved. The novelty of Ms. Roca's project is the use of high-order-accurate direct numerical simulations (DNS) for airfoil optimization. This is made possible thanks to the capabilities of the CFD framework, PyFR. Apart from optimizing airfoils, Ms. Rosa's work involves analyzing the flow physics around optimized airfoils with PyFR, as well as testing different optimization techniques to reduce the overall optimization cost.

Prior to her Ph.D., Ms. Roca pursued a master's degree in advanced computational methods for aeronautics at Imperial College London, and a bachelor's degree in aerospace vehicle engineering at the Polytechnic University of Catalonia.

Ms. Roca has participated in several volunteering activities and has taken part in organizations that promote science for young people, especially encouraging women to pursue engineering careers. She also enjoys scuba diving, photography and hiking.

2022 Amelia Earhart Fellow

Madeleine Schroeder

Citizenship: United States

Proposed Program: Aeronautical and astronautical engineering at Massachusetts Institute of Technology, USA

Ms. Schroeder is a doctoral student in the Space Propulsion Lab at the Massachusetts Institute of Technology (MIT). Her research focuses on characterizing the physics of ionic liquid electrospray propulsion systems. Electrospray is an emerging technology for small satellites that facilitates precise attitude and altitude control for Earth imaging and deep space exploration in addition to deorbiting capabilities to minimize space junk.

In her doctoral research, Ms. Schroeder will develop and experimentally validate a comprehensive molecular model of the evaporation and fragmentation of ionic liquids to determine why ion clusters of different sizes are emitted and how these clusters fragment under different conditions. She will design new experimental methods to characterize the effects of cluster emission and fragmentation on propulsive efficiency in addition to other factors that affect system performance. This information will be used to design electrospray hardware and operating conditions that improve propulsive performance and system lifetime.

Ms. Schroeder received her bachelor's degree in engineering from MIT in 2020 and master's degree in aeronautics and astronautics from MIT in 2021, completing a thesis focused on simulating ionic liquid cluster fragmentation and its effects on electrospray propulsion efficiency. Upon completion of her doctoral program, she plans to lead a research group focused on engineering novel electric propulsion systems for use in commercial and academic space programs to make electric propulsion systems accessible for budget-limited small satellite projects. She hopes to share her passion for space and engineering with students and support the next generation of engineers in developing the next generation of space technology.

Outside of research, Ms. Schroeder enjoys the outdoors while running, hiking, biking and riding horses.

2022 Amelia Earhart Fellow

Emileigh Shoemaker

Citizenship: United States

Proposed Program: Planetary sciences at the University of Arizona, USA

Ms. Shoemaker's research focuses on investigating the subsurface of volcanic environments on Mars and Earth using orbital and ground penetrating radar (GPR) systems. Eruptive products like lava flows from effusive volcanic activity or ash and pumice from explosive activity provide a glimpse into the evolution of the interior of a planet.

On Mars, volcanic activity is primarily effusive—resulting in shield-like volcanic edifices and extensive lava flows similar to those seen in Hawaii. Explosive activity is less common; however, there is evidence on the surface that these types of eruptions have taken place in the past. Ms. Shoemaker uses the Shallow Radar (SHARAD) instrument currently orbiting Mars to investigate the subsurface and the stratigraphy of the largest volcanic province on the planet known as Tharsis. This region has been volcanically active for most of Mars' history which makes it an excellent site to study the evolution of the planet over time. SHARAD has assisted Ms. Shoemaker in making measurements of the thickness of lava flows and ash deposits there.

Ms. Shoemaker has represented the University of Arizona as a participant of several NASA field expeditions to the Icelandic Highlands, where she mapped ice buried by ash and pumice from two eruptions of the Askja Volcano using GPR. This area was used to test operational methods to map subsurface ice using these handheld radar systems for future astronauts who will need to access this precious resource during missions on other terrestrial bodies like Mars and the Moon. During these expeditions, Ms. Shoemaker can speak to the general public and hopes these interactions will encourage other students to participate in planetary field geology and geophysics in the future.

2022 Amelia Earhart Fellow

Caroline Hamilton Smith

Citizenship: Australia

Proposed Program: Unsteady subsonic/transonic aerodynamics/aeronautics at The University of Sydney, Australia

Ms. Hamilton Smith is passionate about aeronautics, more specifically aerodynamics and acoustics, applying out-of-the-box problem solving while continuing to learn. She is currently an aerodynamics Ph.D. candidate at the University of Sydney, working with experimental and computational cavity flow and energy harvesting, in support of a sustainable future in aviation.

Cavity free-stream bow interaction has an extensive past, evolving with the progression of aerodynamics. While cavity bow is significant in many aircraft applications, landing gear and bomb bays are the focus. Research has analytically, computationally and experimentally attempted to understand, predict and solve the bow complexities over a range of speeds and geometries. Regardless, the unsteady and complex nature remains misunderstood, and no distinct conclusions or solutions exist. Ms. Hamilton Smith's plan is to build two aligned cavity models for installation to a wind and acoustics tunnel and run a wind tunnel program to observe a vast array of tests to attain as much data as required, analyze the data and determine the relationship between pressures, acoustics and vibrations and how they are altered by geometry, speed up-stream and boundary layer structure. She will then develop a collective and distinctive library/database of understanding behind how the free-stream reacts to the cavity and design a wind tunnel campaign to run experiments on the suppression and energy extraction techniques.

Ms. Hamilton Smith is dedicated to working in the aviation/space industry—particularly research, design, flight test, manufacturing and in-service repairs and maintenance. In her free time, she enjoys hiking, running, swimming and practicing yoga.

2022 Amelia Earhart Fellow

Emma Stevenson

Citizenship: United Kingdom

Proposed Program: Aerospace engineering at the Universidad Politécnica de Madrid, Spain

Ms. Stevenson is a third-year aerospace engineering Ph.D. student and Marie Skłodowska-Curie Early Stage Researcher at the Universidad Politécnica de Madrid. Sitting at the exciting intersection of two fields, her research focuses on the application of recent advancements in artificial intelligence to the growing problem of space debris and space traffic management. To this end, she is developing novel techniques to aid in automating operational processes for avoiding catastrophic collisions between space objects, a topic of paramount importance for protecting current day space assets and the future usability of the space environment. Her research project is supported by Stardust-R: the Horizon 2020 Space Debris and Asteroid research network and, as a part of her Ph.D., she has carried out two secondments at the French Space Agency and the University of Strathclyde to help bridge the gap between research and operations.

Ms. Stevenson has been involved in a variety of outreach activities to raise awareness of the issues surrounding space debris and the need for sustainability in space, as well as promoting space science topics, and women in space and scientific career paths. Outside of research, she enjoys traveling, learning languages, food and hiking.

2022 Amelia Earhart Fellow

Leanne Su

Citizenship: United States

Proposed Program: Aerospace engineering at the University of Michigan, USA

Ms. Su is a Ph.D. candidate at the University of Michigan studying aerospace engineering. As a member of the Plasmadynamics and Electric Propulsion Laboratory, her research focuses on characterizing and improving krypton performance on high-power magnetically shielded Hall thrusters. Her work includes setting up, operating and analyzing data from Hall thruster test campaigns. She utilizes multiple diagnostics, including far-field probes and laser-induced fluorescence, to obtain the data necessary to further the physical understanding of these devices.

Ms. Su graduated from the University of Washington in 2018 with a bachelor's degree in aeronautical and astronautical engineering. Outside of the lab, she enjoys swimming, embroidery and taking pictures of her cat, Pudge.

2022 Amelia Earhart Fellow

Pa Chia Thao

Citizenship: United States

Proposed Program: Astronomy and physics at the University of North Carolina at Chapel Hill, USA

Ms. Thao is pursuing a Ph.D. in astronomy and physics at the University of North Carolina at Chapel Hill.

Her work focuses on understanding how planetary atmospheres change with time by probing the atmosphere of young (less than 1/5th the age of the Earth) exoplanets through their transit depths as a function of wavelength (transmission spectroscopy). To achieve this, she uses a mix of ground-based telescopes (Southern Astrophysical Research Telescope in Chile and Keck in Hawaii) and space-based telescopes (Spitzer, Hubble and the James Webb Space Telescope). Her aim is to compare the properties of young planets to their older counterparts and analogies in the solar system.

In her free time, Ms. Thao enjoys playing with and going on hikes with her two dogs. She is also passionate about outreach and supporting the representation of women and underrepresented minorities in the scientific field.

2022 Amelia Earhart Fellow

Mahsa Taheran Vernoosfaderani

Citizenship: Iran

Proposed Program: Space systems at the University of Stuttgart, Germany

Ms. Vernoosfaderani's Ph.D. is part of a collective European effort to shift the landscape of astronomical balloons by developing extensible, reusable and adaptive platforms that can fly regularly to operate different instruments and even different telescopes, with a relatively short time in between flights. Balloon-based telescopes are a cheaper alternative to space telescopes, particularly when it comes to infrared (IR) observation. A shorter time to fly would mean newer technologies would be flying, and refilling cryogenics for IR astronomy is possible. This expands astrophysicists' access to the spectrum and improves the existing constraints on observation time access on the existing space and aerial platforms.

To create these efficient platforms of science, one not only depends on advances in technologies such as safe landing, modular electronics and structure, but also a robust and reusable software onboard and on ground. Ms. Vernoosfaderani's research focuses on exploring the operational aspects of such flexible stratospheric platforms, including onboard autonomy, observation scheduling and execution, and adaptive downlink implementation. By studying how different instruments and mission goals can change the system requirements and major software-defined elements, she looks at the possible solutions to cope with these changes in the software in a cost-effective manner. The resulting reusable building blocks and extensible components, onboard and on ground, offer an easier integration process for new instruments.

Ms. Vernoosfaderani plans to continue her career in space operations and work on similar questions, including extendibility, autonomy and mission planning in large-scale complex space systems. She is active in outreach, participating in programs such as Skype a Scientist, and has several years of experience with Space Generation Advisory Council as Regional Coordinator for Middle East. Besides her professional life, she enjoys crafts, in particular woodworking, has been a badminton player and marathon runner, and is passionate about dancing.