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-applied sciences or aerospace-applied engineering.

Read to learn about Zonta International’s 2019 Amelia Earhart Fellows.
Citizenship: Italy

Proposed Program: Aerospace Engineering at University of Stuttgart

Ms. Baggio will use her fellowship to study droplet wall interactions on textured superhydrophobic surfaces. The most well-known application of this research is the prevention of ice formation on airplane wings during flight. It has been shown that the use of superhydrophobic coatings can reduce ice formation on an airfoil, and that decorating these surfaces with macro-structures (with dimensions of the order of millimeters), can further reduce ice formation.

Ms. Baggio is using 3D direct numerical simulations (DNS) to study different superhydrophobic macro-structures. The goal is to achieve a better understanding of this phenomenon and ultimately provide FS3D with a stable and accurate method to handle arbitrary complex solid boundaries immersed in a multi-phase flow.

In her spare time, Ms. Baggio participates in a swimming club and enjoys reading non-fiction books. She also likes to learn new skills and is currently studying the programming language, Python.
Giulia Becatti

Citizenship: Italy

Proposed Program: Aerospace Engineering, at University of Pisa

Ms. Becatti is studying electric thrusters, which are the primary choice of propulsion systems for the next generation of human and robotic space exploration and Earth observation missions. Her particular focus is cathode physics. The hollow cathode is one of the most critical components of these thrusters, required to provide the electrons to ionize the propellant and sustain the main thruster discharge. Her program aims to characterize the discharge plasma in high-current hollow cathodes using both experimental and computer modeling techniques.

She will spend one year of her Ph.D. program at the NASA Jet Propulsion Laboratory (JPL), where she will not only expand her knowledge of plasma diagnostics, experimental activities and cathode modeling but will also strengthen the relationship between the University of Pisa and JPL, leading to further collaborative projects.

Ms. Becatti has been passionate about playing and watching volleyball for 14 years and is very close to her teammates. She also enjoys traveling and discovering new cultures. She was awarded best poster at the 5th International Conference on Frontiers of Diagnostic Technologies in 2018.
Eva Borakiewicz

Citizenship: Poland and Madagascar

Proposed Program: Mechanical Engineering at ENS Cachan-University of Paris-Saclay

Ms. Borakiewicz is pursuing a Ph.D. CIFRE (Conventions Industrielles de Formation par la Recherche), which supports research based on industrial need, for Airbus in partnership with ONERA University of Paris-Saclay, a French aerospace laboratory. Composite materials are increasingly used in aircraft due to their light weight and strength but the process to validate their resistance to damage is time consuming and expensive especially for large structures.

Ms. Borakiewicz is working to develop a robust and predictive numerical tool to study damage propagation in large composite structures by developing a multi-model adaptive approach. Her work involves using many techniques, including numerical, material modeling and experimental, to study the topic. She especially enjoys the international and culturally diverse aspects of her field of study.

Ms. Borakiewicz is one of the 20 elected representatives of the doctoral students (1,792 students in total in 2018-2019) in the college counsel of the University of Paris-Saclay. In her spare time, she enjoys studying and performing Tahitian dance.
Elodie Bouzekri

**Citizenship:** France

**Proposed Program:** Computer Science-Human Computer Interaction at University Toulouse 3 Paul Sabatier

Ms. Bouzekri describes the main objective of her work as finding a new philosophy to deal with the complexity of the command and control of future civil aircraft. She works on methods and tools for the design and development of critical recommender systems. Critical systems are ones for which the cost of a potential error or failure is much higher than the cost of its development. A recommender system is an information filtering system that deals with the problem of information overload by filtering and prioritizing vital information fragments out of a large amount of dynamically generated information and presenting the results with an interface.

The main case study for her work is an Airbus project called “Cockpit of the Future” to which she has been contributing for the last three years. She studies in detail the allocation of tasks and functions between the pilot and the recommender system to safeguard against problems related to automation. After her Ph.D., she hopes to continue working on the development of usable and safe complex systems involving the human computer interface.

Ms. Bouzekri is active in outreach, particularly with a program where she interacts with high school girls to inform them about computer science. She teaches human-computer interaction at the university. She has worked as a volunteer in archaeological excavations and in fashion modeling to help an apprentice stylist, and she has been practicing ballet since the age of 6.
Kathrine Bretl

Citizenship: United States

Proposed Program: Aerospace Engineering Sciences at University of Colorado Boulder

Ms. Bretl’s research focuses on preventing deconditioning of astronauts in zero gravity. Lengthy times in space lead to bone and muscle atrophy, cardiovascular deconditioning, impaired vision and many other physiological problems. This deconditioning is a major issue for deep space crewed exploration missions, such as to Mars.

Ms. Bretl’s research involves developing and assessing the efficacy of intermittent artificial gravity (AG) as a countermeasure for spaceflight-induced deconditioning. In particular, she is working to maximize the potential of short-radius centrifugation. The first step is development of a protocol to incrementally adapt subjects to higher speed rotation (30+ RPM). Then, by combining the results of these studies with spaceflight analog studies, future in-transit centrifuge designs can be maximized. She plans to perform these investigations with international partners at the :envihab facility, a medical research facility of the Institute of Aerospace Medicine of the German Aerospace Center (DLR), in Cologne. Once all parameters are chosen and the centrifuge is conceptually designed based on human requirements, her project will conclude with systems engineering and feasibility analyses to evaluate the optimized system.

Ms. Bretl has consistently been involved as a leader in service and mentorship for others. As an undergraduate at MIT, she co-founded the MIT Women in Aerospace Engineering group and was the president of the MIT AIAA Student Chapter. She is active in the Colorado University Boulder Women in Aerospace Engineering group, is on the graduate executive board for the CU Boulder Society of Women Engineers, and is the president of the Colorado University Boulder Aerospace Graduate Student Organization.
Flavia Causa

Citizenship: Italy

Proposed Program: Industrial Engineering at University of Naples Federico II

Ms. Causa will use her fellowship to study autonomous path planning and navigation of multiple cooperative Unmanned Aerial Vehicles (UAVs) in GNSS-challenging environments (Global Navigation Satellite System). Many proposed activities of UAVs require the UAV to pass through areas where the classical GNSS/INS integration does not yield a reliable navigation solution. Her project aims to solve this problem using cooperation between UAVs, one of which is assisting by flying outside the GNSS-challenging area while always being in line of sight with the others.

Her research effort is focused on the issue of routing a multi-UAV swarm in a scenario with heterogeneous GNSS coverage, something that is needed for complex environments. In this framework, each UAV of the swarm can assume the role of assistor and/or assisted based on the mission needs. Navigation and path planning algorithms and techniques demonstrated in simulation are being implemented on board customized UAVs, aiming at building a fully autonomous swarm able to reconfigure itself and perform the tasks required by the mission.

Ms. Causa is interested in video and photo editing and enjoys travel.
Rishita Das

Citizenship: India

Proposed Program: Aerospace Engineering at Texas A&M University

Ms. Das’ Ph.D. research in aerospace engineering at Texas A&M University is focused on the velocity gradient structure and dynamics in turbulent flows. Her studies are on the extreme fluid flow phenomena called intermittency.

She is developing a new approach that combines first-principle physics (local streamline topology) with data-driven analysis to understand how and when these extreme events occur in turbulent flows. This work is directly related to many external aerodynamic flow phenomena and fuel-air mixing efficiency within jet engines. She hopes to develop a comprehensive understanding of the wide-ranging physics underlying fluid dynamics and turbulence by the end of her Ph.D. as well as achieving proficiency in statistical analysis, big-data, machine learning and high-performance computing.

Ms. Das enjoys activities related to drama and music and mentoring students.
Jill Davis

**Citizenship:** United States

**Proposed Program:** Mechanical and Aerospace Engineering at Missouri University of Science and Technology

Ms. Davis is researching the development of novel smallsat navigation techniques to enable formations in deep space and between the earth and the moon. Her studies involve the development of guidance, navigation and control innovations that will enable smallsats to undertake more complex missions and achieve more relevant mission objectives than were previously realizable by this class of spacecraft.

Smallsats have recently become of keen interest to many in the spaceflight community; however, the lack of effective on-orbit maneuvering capabilities for these spacecraft has limited their use. Ms. Davis’ research will enable an expanded class of missions and advance state-of-the-art knowledge in the areas of sensors and actuators, including theoretical analysis, algorithm development, and testing of these devices in ways that will provide high-fidelity prototypes that can then be evaluated on-orbit.

Ms. Davis enjoys hiking, black diamond downhill skiing, kayaking, running, mountain climbing and disc golfing. She is an avid reader of science fiction literature.
Ingrid El Helou

Citizenship: Lebanon

Proposed Program: Gas Turbine Aerodynamics at University of Cambridge

Ms. El Helou is pursuing a Ph.D. of the experimental investigation of the large-scale aerodynamics of soot emissions in swirling flows in a gas turbine burner. The dominant combustor technology in jet engines since the 1980s has been the Rich-Quench-Lean (RQL) combustor, introduced to reduce nitrous oxide emissions. Today, the pollutant of concern from aero-engines is soot.

Ms. El Helou's research focuses on optimizing a turbulent swirling flame found in an RQL combustor compatible with aero-engine applications, in an attempt to reduce soot formation. Her work to date shows promise in combating soot emissions in the aviation sector. She is a co-founder of a startup in Lebanon called Benergy that works on collecting coffee waste from local businesses, which is then used to generate logs and pellets for heating.

Her cultural interests include classical music and art, and she is a member of mindfulness and yoga societies. She is fluent in Arabic, English and French, and is also committed to learning new languages.
Ariane Exle

Citizenship: Germany

Proposed Program: Space Robotics at Institute of Space Systems-University of Stuttgart

Ms. Exle’s doctoral studies in aerospace engineering are in the field of space robotics, on the “DESTINY+ Dust Analyzer” (DDA), a scientific instrument for in-situ cosmic dust measurements. It is the main scientific payload of JAXA’s DESTINY+ space probe, set to launch to the asteroid Phaeton in 2022.

In the DDA project, she is responsible for the development of all mechanisms. This comprises the launch lock and release mechanism, the cover mechanism of the dust sensors, and most importantly, the two-axis gimbal that points the instrument towards the observation targets.

Ms. Exle strongly supports young academics. She is engaged as a mentor for first semester students and as an ambassador for female senior high school students.
Emily Jensen

Citizenship: United States

Proposed Program: Electrical and Computer Engineering - Robustness in Cooperative and Distributed Control at University of California, Santa Barbara

Ms. Jensen's Ph.D. research focuses on the design of optimal control policies for distributed systems. Recently, engineering systems are increasingly distributed; they are composed of numerous subsystems each with their own sensors and actuators. In many cases, it is intractable for any single system to communicate with all subsystems.

Distributed control policies must ensure the stability of the entire system despite this lack of information and the restricted, delayed communication between subsystems. Distributed control methods have many applications, especially to safety-critical systems. Her work is particularly focused on the application to groups of small satellites.

Ms. Jensen volunteers at Girl’s Inc. of Santa Barbara where she helps middle school and high school students with math and science homework and other ongoing projects. She is also the current graduate student representative for the Society of Women Engineers at UCSB.
Citizenship: United States

Proposed Program: Aerospace Engineering Sciences at University of Colorado Boulder

Ms. Jenson is pursuing a Ph.D. program focused on analyzing the control of spacecraft about small asteroids. Asteroid missions continue to grow in importance. These missions pose exciting guidance, navigation and control (GN&C) challenges: Spacecraft autonomy is desired due to transmission delays between asteroids and Earth, but autonomy is limited by on-board computational capability.

A specific problem faced by the flight dynamics is to devise control and guidance laws that are robust to the relatively large errors that are introduced by conventional spacecraft thrusters. Ms. Jenson's goal is to develop new methods of robust trajectory optimization for spacecraft in highly uncertain, low gravity environments.

She is passionate about giving young women the encouragement that she was given to pursue science, technology, engineering and math, and has been very active in STEM outreach programs throughout her university studies.
2019 Amelia Earhart Fellow

Jahnavi Kantharaju

Citizenship: India

Proposed Program: Fluid Mechanics at Ecole Polytechnique/ONERA

Ms. Kantharaju's research focuses on noise reduction of airplanes. The manipulation of the downstream evolution of the jets, especially the vortices development found in the combustors and exhausts of aircraft engines, is the key to meeting this challenge. She is firstly studying the organization and production mechanisms of streamwise vortices and secondly characterizing the mixing of the surrounding fluid with the jet.

Ms. Kantharaju is contributing to different student committees. Her hobbies include badminton, trekking and reading.
Carolin Kissner

Citizenship: Germany

Proposed Program: Aerospace Engineering at Technische Universität Berlin

Ms. Kissner is working on the reduction of the fan noise of airplane engines because with modern engines, achieving ambitious future noise reduction goals partly depends on the reduction of fan noise. Her chosen method combines a stochastic approach for synthesizing turbulence and a computational aeroacoustics code for the generation and propagation of sound. She systematically expands the method and applies it to realistic fan configurations.

Ms. Kissner loves running. She practices power yoga and salsa dancing. Classical music has always been a part of her life and she has a passion for foreign languages.
Katherine Kokmanian

Citizenship: Canada

Proposed Program: Mechanical and Aerospace Engineering at Princeton University

Ms. Kokmanian focuses on developing miniature sensors which can capture the detailed behavior of supersonic flows—flows that travel faster than sound.

She is motivated by the renewed interest in deep space missions and the advancement of high computing technology. By designing and manufacturing nano-scale sensors which can be placed in supersonic test facilities, she can extract accurate turbulence statistics to predict drag on fast-moving objects. Her research will not only provide an accurate database regarding supersonic boundary layers; it will also improve the understanding of compressible flows.

Ms. Kokmanian is volunteering in several student committees. She speaks four languages and has started to learn another one.
Sireetorn Kuharat

**Citizenship:** Thailand

**Proposed Program:** Aerospace Engineering at University of Salford

Motivated by the sun being the most prominent energy source in our galactic system, Ms. Kuharat is performing a theoretical and experimental investigation of the benefits of using metallic nano-particles in spacecraft solar energy systems. She is studying annular and 3D geometric models for nanofluid solar direct absorber collectors and investigating manufacturing fluid dynamics of solar collector coatings. She plans to conduct carefully designed experiments for validation.

Ms. Kuharat is interested in photography and enjoys running.
Komal Kumari

**Citizenship:** India

**Proposed Program:** Aerospace Engineering at Texas A&M University

Fundamental understanding of turbulence is critically important in aerospace engineering. Numerical simulation is much more cost effective than experiments. Therefore, the development, analysis and implementation of a novel Computational Fluid Dynamics capability that will effectively leverage the largest computational resources is the focus of Ms. Kumari’s dissertation. Her research will help to improve the turbulence models used for industrial scale simulations and to facilitate design of more efficient airplanes, rockets and jet engines.

Ms. Kumari likes different sports and games.
Virginia Notaro

Citizenship: Italy

Proposed Program: Mechanical and Aerospace Engineering at Sapienza University of Rome

Ms. Notaro’s research focuses on spacecraft Doppler tracking. Doppler tracking of deep space probes is commonly used for spacecraft navigation and for radio science experiments aimed at determining the gravity field and rotational state of planets and satellites.

Ms. Notaro is working on the Juno gravity science experiment on the Jupiter orbiter. Juno has already answered fundamental questions about the interior structure of Jupiter and will continue observing the planet until July 2021.

She enjoys practicing sports and open-air activities, especially running, swimming and road biking.
Sarah O’Meara

Citizenship: United States

Proposed Program: Mechanical and Aerospace Engineering at University of California, Davis

Ms. O’Meara’s Ph.D. research combines her interest in human performance with her educational background in engineering. She has a fascination with extreme environments, where humans are not physiologically adapted to survive, and her research area focuses on human-robotics integration (HRI) and in particular, control interface design. It is an interdisciplinary research area requiring knowledge in physiology, robotics, controls and human performance and as such, her work involves both the Centre for Human/Robotics/Vehicle integration and performance and the Robotics, Autonomous systems and Controls Laboratories, as well as collaboration with NASA Johnson Space Centre Robotics division.

The objective of her Ph.D. research is to investigate the use of electromyography (EMG) to control an assistive robotic arm and her experiments will focus on the appropriate level of autonomy and how to best integrate a human and a robot.

Ms. O’Meara is developing an outreach program that attracted a Shooting Star STEM award. She is also a keen diver and participates in high performance athletic events.
Paula do Vale Pereira

Citizenship: Brazil

Proposed Program: Aerospace and Astronautics at Massachusetts Institute of Technology (MIT)

In her Ph.D. program, Ms. Pereira is working to develop new capabilities for space-based optical imaging systems. Her Ph.D. thesis focuses on the thermomechanical design, testing and prototyping of two exploratory payloads: DeMi (Deformable Mirror Demonstration Mission) and Prometheus (nuclear-Powered RObotic MEchanism Technology for Hot-water Exploration of Under-ice Space).

Through the DeMi mission, Ms. Pereira is contributing to the identification of Earth-like exoplanets on the habitable zone around other stars. In her studies, she is investigating innovative materials such as shape memory alloys to enable actuation of deployables on-orbit. Importantly, this actuation does not depend on motors and is able to be actuated thousands of times, as many space actuators are single use for deployments. She is also helping to look at new optical technologies that would allow multiple access communications with lasers using devices such as liquid lenses.

Ms. Pereira is involved in the MIT Graduate Women in Aerospace Engineering. Since September 2017, she has served as the outreach and mentor director. Her goal is to inspire more girls to get involved in science, technology, engineering and math through events, demonstrations and classes for children and teenagers.
Hannah Rana

Citizenship: United Kingdom

Proposed Program: Aerospace Engineering at University of Oxford

Ms. Rana’s Ph.D. research program is on spacecraft cryogenics. Given that spacecraft instruments (such as detectors, sensors and imagers) all operate at challenging cryogenic temperatures, this field enhances the possibilities for sophisticated scientific exploration and Earth observation missions.

The aim of her thesis is to study how the performance and longevity of cryocoolers can be improved. Her investigations will focus on a Stirling Pulse Tube Cryocooler (SPTC) variant, with a coaxial flow design. It will involve mathematically modeling the configuration, followed by design, development and testing of a prototype. The ultimate aim is to develop a novel cryocooler design encompassing more efficient and long-lasting cryogenic technology for future spacecraft instrumentation.

Ms. Rana is also president of the University of Oxford Space and Astronomy Society and is a member of Global Shaper, World Economic Forum, working with a team of social entrepreneurs on projects promoting women in science, technology, engineering and math, reducing homelessness in Oxford and establishing microfinance in rural communities.
Shikha Redhal

Citizenship: India

Proposed Program: Aerospace Engineering at University of Maryland, College Park

The aim of Ms. Redhal's research is to study the fundamental nature of Rotating Detonation Engines (RDE). Detonation-based engines are being considered as replacements to traditional constant-pressure heat engines as they are more efficient. A Rotating Detonation Engine is one of the novel engine concepts, gaining much interest from the aero propulsion industry, including the rocket and airbreathing propulsion community.

Ms. Redhal has developed a detonation tunnel to conduct experiments, and she is testing various injectors and different propellant combinations (including hydrogen, ethylene, methane with oxygen). Her test bed enables her to study the complex flowfield and 3D wave structure inside the injector, and preliminary results indicate that detonation waves could be sustained momentarily. The outcome of her thesis will help design sub-components such as fuel injection and mixing systems, predict practical performance measures of RDEs and eventually lead to the development of practical RDEs.

Ms. Redhal has taught and educated underprivileged students in India and coordinated and led a team to organize a blood donation camp in India.
Marine Ruffenach

Citizenship: France

Proposed Program: Space Physics and Instrumentation at University of Toulouse-ISAE-SUPAERO

The aim of Ms. Ruffenach’s Ph.D. thesis is to develop miniaturized radiation monitors that can fly on Cubesats. There is currently no lightweight space-borne radiation detector and her master’s degree experience in analyzing radiation monitor data using Monte-Carlo simulations has positioned her well for this work. She has so far developed a radiation monitor to detect protons 1 – 10MeV – this is because satellites spend time in radiation belts and can suffer damage due to these protons. The population of these protons is not well known and probably underestimated by current radiation models. Her design has a good signal to noise ratio, and it will be tested on an AIRBUS-DS satellite.

Future work will involve collaboration with the Institute of Applied Physics in Prague to study the ability of a pixelated detector to measure protons and electrons with a light and low power detector. These types of detectors have flown on spacecraft, but they simply measure radiation dose. The aim of Ms. Ruffenach’s research is for such a detector to perform high resolution spectrometry to discriminate different types of particles on a Cubesat. She hopes to continue research on modeling detectors and studying the radiative environment of Earth and other planets.

Ms. Ruffenach enjoys playing the guitar and hiking and is also an active member of the Paul Sabatier University astronomy club.
The main goal of Ms. Sargeant’s Ph.D. research is to develop a technique to produce water from lunar rocks and soil for use on a future joint European Space Agency and Russian Space Agency mission to the Moon. The mission will include the ProSPA instrument, which is a miniature science laboratory being built at the Open University.

Ms. Sargeant’s role is to identify a water extraction technique that can be performed on ProSPA and determine the optimal operational procedures. Her research begins with an extensive review of lunar extraction techniques, followed by the selection of a technique that could be potentially performed using the ProSPA instrument. She has performed a first order theoretical study to determine the feasibility of the technique and she has identified areas of improvement. Her work will involve development of a model and experimentation to optimize the procedure before testing on lunar meteorites and finally lunar soil from the Apollo collection. The results of this thesis will lead to the selection of optimum landing sites for large scale water production plants to support crewed missions to the lunar surface.

Ms. Sargeant is an active member of a science, technology, engineering and math outreach scheme to inspire underprivileged students in London. She is also a passionate ultimate Frisbee player and has had the opportunity to play all over the world.
2019 Amelia Earhart Fellow

Karin Schlottke

Citizenship: Germany

Proposed Program: Aerospace Engineering at University of Stuttgart

Ms. Schlottke's Ph.D. research will use the Direct Numerical Simulation approach to simulate a single grid cell in a combustion process. Combustion processes play an important role in many engineering fields and there is an ongoing challenge to optimize fuel evaporation and combustion processes in a sustainable manner.

Experimental investigations are often difficult and expensive, and numerical simulation programs are often used; however, simulating the whole physical domain in great detail is computationally expensive. Simplified models are therefore used but as spatial resolution improves, these models reach their limits and require improvement.

Ms. Schlottke will use the University of Stuttgart’s in-house code, FS3D, to study individual droplets at different boundary conditions. Her investigations will include temperatures of both the droplet and the surrounding gas, fuel vapor mass fraction in the vicinity of the droplet and droplet velocity. She will also investigate non-spherical droplets, including oscillation effects and look at the influence of neighboring droplets. Her work will develop a new evaporation model, extend it to the gas phase, and then couple it with the evaporation model.

Ms. Schlottke’s professional goal is to become an astronaut and she has already applied to be the first female astronaut in Germany. She also enjoys playing the violin as well as skiing, snowboarding, hiking and mountaineering.
Aarohi Shah

Citizenship: India

Proposed Program: Aerospace at Georgia Institute of Technology

Ms. Shah's Ph.D. research program is focused on structural health monitoring in helicopters. Her research involves the development of a high-fidelity damage model which is computationally efficient, facilitating real-time feedback to alleviate applied aerodynamic loads.

To achieve her goal, she is developing a physics-based multi-scale approach (GMsFEM), wherein she will use the micro-scale information to perform analysis at a macro-scale. Once a robust damage model is developed, her research will gear towards coupling the model with machine learning. Implementation of this model will increase vehicle safety, extend the operational life of components and immensely reduce the required maintenance, thus, leading to significant cost savings. This model can be implemented so that the pilot can control a helicopter without worrying about the structural effects of flying conditions and maneuvers on critical components.

Ms. Shah is president of the Atlanta chapter of the Vertical Flight Society, secretary of the American Society of Engineering Education and is involved in the Society of Women Engineers and science, technology, engineering and math outreach.
2019 Amelia Earhart Fellow

Blaga Todorova

Citizenship: Bulgaria

Proposed Program: Aerospace Engineering at University of Glasgow

Ms. Todorova is conducting her Ph.D. research into the flow fields around hypersonic aircraft to support the development of an air-breathing hypersonic vehicle for both military and civil purposes. Modeling the flow field around the hypersonic aircraft accurately and efficiently is crucial to the aerodynamic design of the vehicle. The formulation of numerical methods governing the flow at a kinetic level with a computational efficiency suitable for demanding aerospace applications still represents a significant difficulty.

The main goal of her research is to establish a numerically efficient scheme, while at the same time maintaining the ability to model the flow on the more detailed kinetic level. This is a key step in finding the best aerodynamic shape for a hypersonic vehicle. Her current research is focused on extending the kinetic model to diatomic gas mixtures with the objective to accurately model the constituents of air.

Ms. Todorova plays competitive volleyball at the University of Glasgow. She enjoys traveling and is learning Mandarin and Spanish. She previously studied German and is fluent in English and Bulgarian.
Dea Wangsawijaya

Citizenship: Indonesia

Proposed Program: Mechanical Engineering at The University of Melbourne

Ms. Wangsawijaya is conducting her Ph.D. research in fluid mechanics, studying turbulent flows. Typically, the surface of an aircraft has some degree of roughness, and when this element exceeds a permissible size, skin friction drag increases. Rivet rows and panel joints on an aircraft fuselage, for example, can be considered as roughness elements and thus become additional sources of drag.

Currently, tools that are available for engineers to analyze the turbulent flows over rough surfaces are based on the assumption that the roughness element is homogeneously distributed; however, the majority of engineering applications involve surfaces with spatially varying roughness. In her research she is focused on a specific case where the surface roughness varies in the lateral direction. Her research may lead to potential applications in flow control research and aircraft drag reduction.

Ms Wangsawijaya does volunteer crocheting for the Baby Bundles program at the Royal Women’s Hospital, Melbourne. The bundles contain baby clothing, toys and blankets for newborn babies and are distributed to new mothers who experience less fortunate circumstances. She enjoys cycling and literature.
Natalie Wolfenbarger

Citizenship: United States

Proposed Program: Geophysics-Planetary Science at The University of Texas at Austin

Ms. Wolfenbarger's research in her Ph.D. program uses geophysical data acquired by aircraft to inform interpretation of future data acquired by spacecraft through the study of terrestrial analog environments, all to better understand processes that are occurring at Jupiter's moon, Europa.

Europa is considered one of the primary candidates for life beyond Earth. Europa is thought to harbor a global subsurface ocean underneath an ice shell. Europa will be explored by NASA's Europa Clipper spacecraft and European Space Agency's Jupiter Icy Moons Explorer (JUICE) within the next decade. Both spacecraft include radar sounding instruments that can penetrate through the ice shell and detect signatures of processes occurring within.

Ms. Wolfenbarger's research focuses on ocean-driven exchange processes, specifically upwelling of buoyant ice that delivers both heat and material from the ice-ocean interface to the ice shell surface. Her project work strives to examine the feasibility and expected radar signatures of marine ice upwelling in Europa's ice shell through modeling informed by existing terrestrial ice core and radar data.

Ms. Wolfenbarger volunteers as a mentor to secondary students and encourages girls to enter science, technology, engineering and math programs. While in the Arctic she judged a science fair in the Inuit community in Resolute, a community on Cornwallis Island in Nunavut, Canada.
Ms. Zhao's research is focused on high-speed jet noise reduction. The novelty in her approach is to use instability inherent in a jet with swirl to mitigate jet noise. With her research team, she has identified a powerful, yet practical, means of controlling aircraft engine noise through shear layer swirl and centrifugal instability both in the inner and the outer shear layers.

The twin engines in the advanced fighter aircraft, F/A-18 and EA-18G, are closely coupled in the aft portion of the fuselage. Since the co- and counter-swirls that are induced in twin engine (shear layers) can either point in the downward (gravity) or upward directions in the center plane between the two engines, the coupled behavior—up or down—is expected to affect the near-field noise levels and directivity patterns. A reduction in the noise level in the near field is important to the community as well as the personnel who work in the proximity of these advanced fighter jets.

Ms. Zhao volunteers in her community to assist young children and the elderly.