National Aeronautics and Space Administration

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A Learning Safety Culture

With the recent release of the Safety Culture Survey results, I would like to celebrate our learning safety culture. Over the first month since the Glenn COVID website was launched, it received over 6,700 visits on topics of return to onsite work expectations, frequently asked questions, mask terminology, and safe at work training. Information shared on the site also includes alerts, COVID information and buttons to report hazards, and ask a team member a question. Visit the site at https://www.grc.nasa.gov/smad/rtow-covid/.

Thank you for your continued interest in learning and working safely!

AeroSpace Frontiers
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Submit short articles and calendar items to the editor at doreen.b.zudell@nasa.gov.

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Solar Power Investigation To Launch on Lunar Lander

GRC–2020–C–01412 Photos by Bridget Caswell

Peshek gathers the solar cells that will be studied on the lunar surface as part of the PILS payload.

On the Cover:

Researcher Tim Peshek brushes an adhesive onto the top of the PILS payload in order to adhere the solar cells to the front surface of the experiment. Research photos were taken in February 2020.

GRC–2020–C–01429
Photo by Bridget Caswell

When Artemis astronauts go back to the Moon, they will need access to electric power to live and work on the surface. Solar power will be one of the options to sustain human life and science for those long-duration missions.

Next summer, a solar power experiment designed by a team of investigators at NASA Glenn will launch to the Moon on Astrobotic's Peregrine lander.

Using state-of-the-art solar cells like the ones on today's orbiting satellites and next-generation space solar cell technologies, PILS (Photovoltaic Investigation on the Lunar Surface) will demonstrate light-to-electricity power conversion devices for future missions. The experiment will also collect data on the electrical charging environment of the lunar surface using a small array of solar cells.

PILS includes multijunction solar cells made from improved gallium arsenide, a highly efficient semiconductor material, and silicon solar cells based on technology used on Earth. The cells will be connected to instrumentation measuring current and voltage outputs for the 8 to 10 days of the experiment.

"We haven't tested solar cells on the Moon since the Apollo era," said Jeremiah McNatt, a principal investigator on the PILS project in the Photovoltaic and Electrochemical Systems Branch. "The technology has changed dramatically, and we want to verify that today's solar cells can provide the level of power needed for future missions."

There are several challenges. Solar cells can suffer damage and degradation by radiation exposure and the highly charged particles present on the Moon. High daytime temperatures can soar to over 260 F, damaging the electronics of solar array systems.

"A sustained presence on the Moon requires a different design that maximizes power while protecting the system," said Tim Peshek, principal investigator. "Figuring out the thermal requirements was one of our biggest challenges."

In an effort to protect the electronics from high temperatures, the team decided to cover everything on the top of the structure, excluding the solar cells, with a film that is reflective of a broad spectrum of light. So, while the solar cells absorb the sun's energy, the heat of the sun will not destroy the operating system. The body of the experiment is also wrapped with multilayer insulation.

The lander is slated to touch down on Lacus Mortis, 45 degrees north of the equator. Because of this latitude the test bed is angled at 45 degrees off the lander, so during lunar noon, it will be pointed directly at the sun.

"Eventually, we think solar power will be best situated on the Moon at the poles where, similar to Earth's poles, the sun doesn't set at certain parts of the year," said McNatt. "The arrays would be rotated to constantly take advantage of the sun's energy."

GRC-2020-C-01406

Student intern Nicole Swatton cleans tools and materials that are being used to start construction of the PILS project's solar cells.

PILS is set to fly on Astrobotic's Peregrine lander carrying NASA payloads to the Moon in 2021. In May 2019, NASA selected Astrobotic and Intuitive Machines as the first commercial companies to fly payloads to the lunar surface as part of the Commercial Lunar Payload Services (CLPS) initiative.

While NASA awarded the companies to fly the agency's science investigations and technology demonstrations to the lunar surface, the agency expects to be one of many customers that will use these commercial landing services. In fact, PILS is one of several additional payloads that customers are sending with 10 NASA payloads, which will be integrated onto Astrobotic's Peregrine lander. It will launch on a United Launch Alliance Vulcan Centaur rocket to the Moon in 2021.

By Nancy Smith Kilkenny

Moving From Awareness to Action

Presentation Supports NASA's New Core Value: Inclusion

On July 23, Administrator Jim Bridenstine announced Inclusion as NASA's new fifth core value. The Administrator said, "NASA is committed to a culture of diversity, inclusion, and equity, where all employees feel welcome, respected, and engaged."

In the spirit of this new NASA value of Inclusion, the Office of Diversity and Equal Opportunity (ODEO) and Office of the Chief Human Capital Officer (OCHCO) hosted a UStream event, Aug. 12. They invited employees across the agency to hear author and professor Ibram X. Kendi's presentation on Cultivating an Antiracist Workplace.

Dr. Kendi is the director of Boston University's Center for Antiracist Research, which fosters racial research, research-based policy innovation, data-driven educational and advocacy campaigns, and narrative-change initiatives. He is a columnist at The Atlantic, a correspondent with CBS News, and author of five books centering on racism.

Moderators Janet Sellers, ODEO director of Diversity and Data/Analytics, and Brady Pyle, OCHCO chief, led a question and answer session with Kendi. This included questions submitted from employees across the agency.

Kendi talked about his journey through racism, enlightenment, and action. He defined racism and being racist as a state of denial for actions or beliefs based on cultural biases, miseducation, and inequal policies. Antiracism, on the other hand, is actively working to educate ourselves and our communities to become more aware and inclusive, and to help reform unjust/inequal policies.

He stressed the importance of acknowledging our racism, bigotry, and prejudice instead of denying it. "It was important for me to come to grips with my racism," he said, "then consciously work to be antiracist."

He talked about his umbrella philosophy where racism ideas are taught to be facts. "If you're born in the U.S., racist ideas are rained on our heads about every racial group," he said.

These microaggressions—everyday indignities and insults that members of marginalized groups endure in their routine interactions with people—culminate into racial harassment. This can cause feelings of anxiousness, shame, and anger.

The hope in his message: "Children are not born racist. Parents, caregivers, and teachers…can teach them [children] to be antiracist," Kendi said. He recommended exposing young people to literature that features multiculturalism and modeling antiracism through our actions.

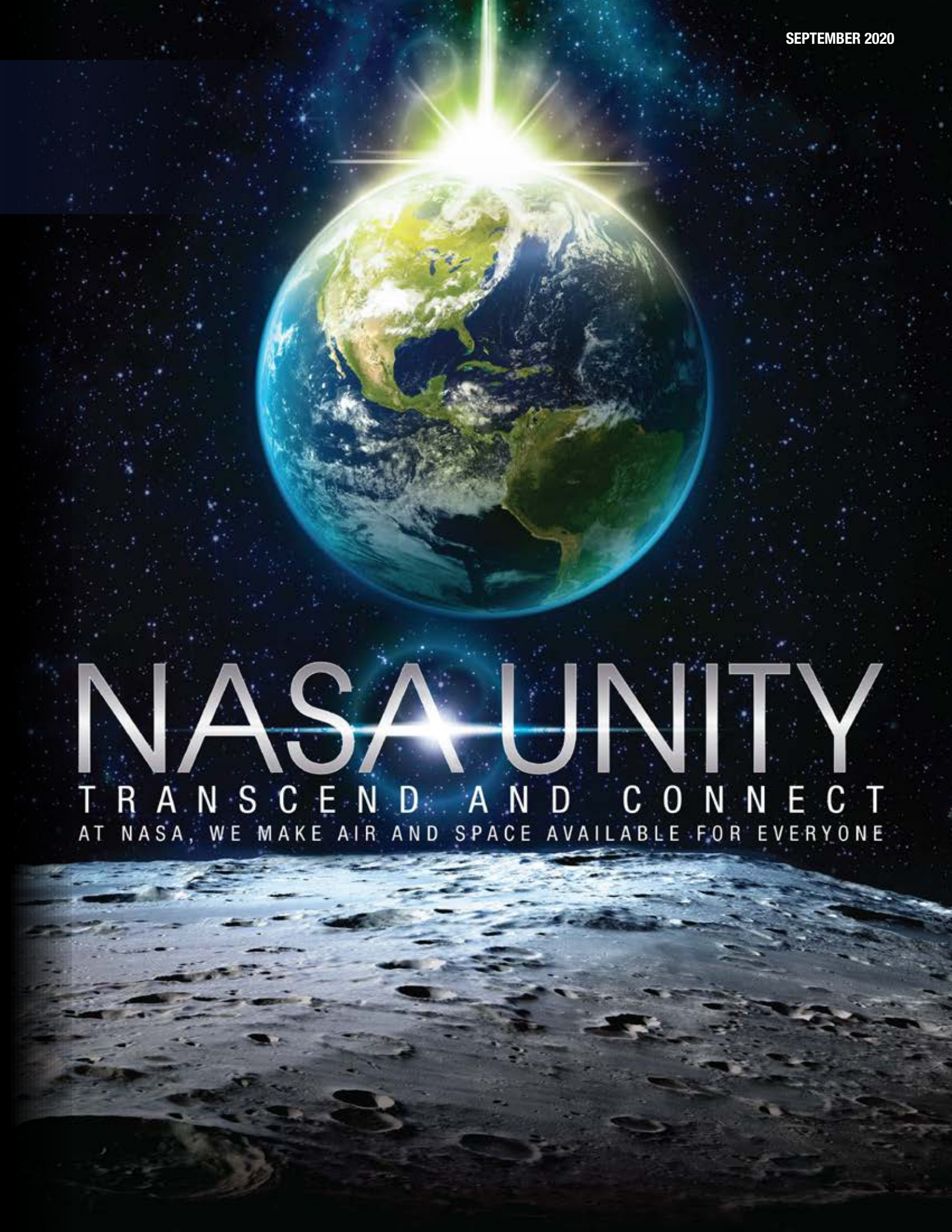
Moderators affirmed the value of continuing honest conversations about racism and reviewing racial hiring and retention data.

"Pain is usually essential to healing," Kendi said. "We cannot heal America without surgically removing inequality and injustice."

Following professor Kendi's remarks, a center leaders roundtable provided opportunities to share some of their efforts for instilling the new Inclusion value.

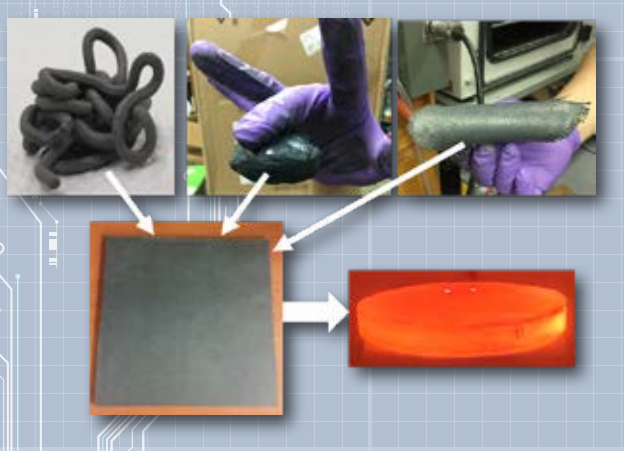
Glenn Deputy Director Susan Motil talked about a time when she had to put biases aside to ask assistance from another co-worker, and how it ended up being a positive decision. She shared how Glenn supervisors are conducting dialogue sessions with staff that encourage honesty and respect. She pointed to the value of Center Director Dr. Marla Pérez-Davis' weekly virtual townhall meetings, which place emphasis on each employee's health and well-being. Motil also touted the importance of the special emphasis advisory groups that bring awareness about different cultures.

By Doreen B. Zudell


NASA UNITY
TRANSCEND AND CONNECT
AT NASA, WE MAKE AIR AND SPACE AVAILABLE FOR EVERYONE

Trending With Tech Transfer

SiC Matrix Enhances Aerospace/Military Projects



GRC–2020–CN–00061

Goodman Technologies is able to seamlessly join parts and make them into large, monolithic ceramic nanocomposites.

Glenn's Technology Transfer Office has signed a 1-year government-use license with Goodman Technologies LLC, a small business based in Albuquerque, New Mexico. Goodman Technologies has demonstrated an ability to create silicon-carbide (SiC)-based nanopastes, which are 3D printable and moldable, via their proprietary process. The company secured a license for Glenn's cutting-edge SiC Fiber-Reinforced SiC Ceramic Matrix to create continuous fiber ceramic nanocomposites to meet a variety of defense and space applications. They include thermal protection systems for space and hypersonic applications.

Goodman Technologies is developing these materials via several NASA and Department of Defense-funded SBIR and STTR projects. For more information on NASA Glenn's technologies available for licensing, visit https://technology.grc.nasa.gov.

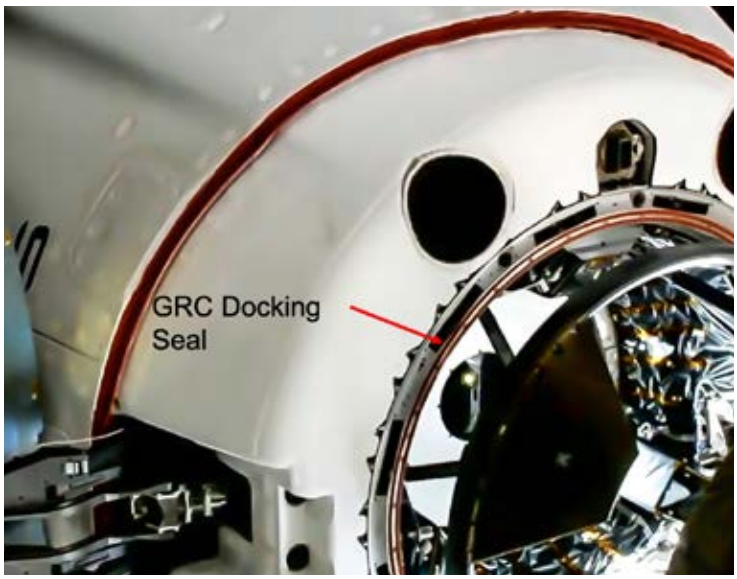
SpaceX Crew Dragon: Sealed With Care

When the SpaceX Crew Dragon docked with the International Space Station during the Demo-2 mission, one thing may have gone unnoticed—a narrow rubber seal that plays a critical role in safely connecting Crew Dragon with the space station.

NASA Glenn led efforts to develop the new, robust seal for the NASA Docking System, which is used by the Commercial Crew Program (CCP) and other current and future spacecraft. For the last 15 years, NASA Glenn worked with many outstanding partners, including NASA Johnson, to conceive the seal design and evaluate materials and performance in every possible condition experienced during flight.

"These seals prevent breathable air from escaping through the connection between the visiting spacecraft and the station," explained Pat Dunlap, Mechanisms and Tribology Branch. "This connection is a heavily loaded somewhat dynamic structural interface and the seals must perform flawlessly during docking approach and while docked to the International Space Station."

To learn more about the challenges this team overcame to design the perfect seals, visit https://go.nasa.gov/2PoYvel.



GRC–2020–CN–00062 Photo by SpaceX

Seals developed by NASA Glenn and its many partners for the NASA Docking System can be seen during the SpaceX Crew Dragon's approach to the space station on May 31.

NASAIRS Flying Club Dedicated to Making Aviation Accessible

In 1965, a group of aviation enthusiasts from NASA Glenn's Lewis Field and Plum Brook Station formed the nonprofit NASAIRS Flying Club. The goal of the club was to promote economic general aviation and aviation safety for its members.

Fifty-five years later the club has endured, maintaining its philosophy of respectful and responsible aviation.

"There are many people who want to fly, but think it's cost-prohibitive," said NASAIRS member Jared Berg, Thermal Systems and Transport Process Branch. "A flying club is an economical alternative to owning a plane, with more peace of mind than renting."

Berg, who also serves as maintenance officer, explains that NASAIRS membership provides more than a convenient way of flying. Members share ownership in the Cessna 172 airplane. They learn about the mechanics of the plane and become actively involved in decisions regarding maintenance and membership approval. Club members fuel, wash, and wax the plane and participate in owner-performed maintenance like oil changes.

Along with active involvement in aircraft maintenance, NASAIRS stresses learning and developing as an aviator. The club does not admit student pilots without a Private Pilot License, but it does have multiple members that are Certified Flight Instructors and actively encourages advanced flight training in the aircraft. The club is governed cooperatively with elected officers, and decisions are made by members voting at club meetings.

NASAIRS member since 1986, Steve Schneider, Chemical and Thermal Propulsion Systems Branch, said at one time the club owned two airplanes, a Cessna 172 and a Cessna 182. The planes were tied down along a grass strip at Cleveland Hopkins.

"Club membership was at its peak in the late 1970s, with both male and female members," said Schneider. "Around the late 1990s, many of the club's members retired from NASA and left the club. Membership was opened to the general community, and the club downsized to one airplane, which is now based at Medina Municipal Airport."

GRC–2020–CN–00057 Photo by Brett Hewitt

NASAIRS member Jared Berg during a recent flight over Lynchburg, Virginia.

Congratulations to NASAIRS Flying Club and its members throughout the past 55 years for making aviation accessible, exciting, and safe! For more information about the club, visit https://www1.grc.nasa.gov/nasairs/.

By Doreen B. Zudell

GRC-1979-C-05021 Photo by Donald Huebler

This 1979 photo shows NASAIRS members with the club plane at Cleveland Hopkins International Airport.

NASA Honors Pilots on National Aviation Day

On National Aviation Day, Aug. 19, NASA recognized the importance of pilots everywhere and highlighted pilots throughout the agency. Private and professional pilots from Glenn are among those featured on #https://twitter.com/i/events/1296237327560380416.

GRC–2020–CN–00058

Glenn's Jared Berg.

Female Pilots Inspire Confidence in Aviation Careers

GRC–0000–CN–00059 Photo by Susan Johnson

Johnson's FAA-certified experimental Pietenpol was a family project constructed when she was a teenager and inspired her to become a pilot and aeronautical engineer.

Johnson

Glenn's Revolutionary Vertical Lift Technology Project Manager Susan Johnson participated in the virtual panel "Powerful Female Pilots," July 22, during the Experimental Aviation Association's (EAA's) Spirit of Aviation Week 2020. Johnson and astronaut Anne McClain joined pilots from the U.S. Air Force and United Airlines. They talked about their first solo flights, career paths, STEM opportunities, personal experiences, and mentoring. The panel was one of the many virtual presentations scheduled to excite the public about aeronautics as part of this year's modified activities for the annual EAA AirVenture convention and fly-in. The panel session is posted on YouTube at Power Female Pilots, EAA Spirit of Aviation Week.

NEWS AND EVENTS

NASA Shows Generosity During Food Drive

NASA employees throughout the agency donated a total of 277,696 pounds of food—exceeding its goal of 150,000 pounds—during the 2020 Feds Feed Families Food Drive. Hunger organizations in Ohio received 12,266 pounds of recorded donations from NASA, which includes donations from Lewis Field and Plum Brook Station employees.

The Feds Feed Families Food Drive is a voluntary federal-wide and nationwide effort for NASA civil servants and contractors to collect and donate food for those in need. The 2020 Campaign at NASA focused on summer giving from July 1 through 31. It also encouraged federal employees to donate year-round.

NASA conducted this year's campaign virtually in communities where social distancing was in place. It included a greater emphasis on online donations.

Kudos to Feds Feed Families Food Drive coordinators, Anne Storer (Lewis Field) and Geneva Biglin (Plum Brook Station). Thank you to everyone who donated to the Feds Feed Families Food Drive!

GRC–2020–CN–00056 Photo by Will Cummings

Will Cummings stands in the Security Gate building lobby at Plum Brook with a portion of the 247.5 pounds of food later donated to the Victory Kitchen food bank in Sandusky.

Students Explore Glenn Facilities and STEM Careers

GRC–2020–C–02125 Photo by Jef Janis

Smith was the featured speaker and tour guide for the Space Environments Complex.

NASA Glenn held its first-ever virtual 2020 Girls in STEM Event on July 17. The event provided nearly 90 students the opportunity to explore Glenn's facilities and learn from NASA employees about pursuing careers in the fields of STEM.

Organized by Office of STEM Engagement (OSTEM) Activity Manager Gerald Voltz and moderated by Dr. Lisa Bell, OSTEM/Partnership Training and Education Centres (PTEC) senior project coordinator, the event kicked off with a welcome from Center Operations Director Robyn Gordon and opening remarks from Center Director Dr. Marla Pérez-Davis. Featured speaker, Nicole Smith, chief of the Exploration Systems Office, gave a presentation on how she came to work at NASA and her experience with Orion testing at Plum Brook Station. Smith led participants on a virtual tour through the Space Environments Complex and held a brief question and answer session before students participated in a hands-on activity, titled Spacecraft Safety.

Students were challenged to design and build a spacecraft model to transport two astronauts through space. They used materials from their homes to construct their models, with a few using Lego figurines as their astronauts, then conducted drop tests to see how well their models protected the astronauts inside.

The virtual event concluded with closing remarks from Christopher Hartenstine, an OSTEM/PTEC educational specialist, who shared several educational resources on Glenn's site for students to review. He encouraged participants to continue working on their models at home and to share pictures of their creations online using the hashtag #NASAGlennSTEM.

By Cynthia Zhang, NASA Intern

Event Connects Stakeholders to NASA Technology

The University of Toledo (UT) in conjunction with NASA Glenn and the agency's Space Technology Mission Directorate (STMD) hosted a virtual event, "Connecting to NASA Technology Through NASA Glenn," Aug. 13. The event drew over 300 participants who learned about ongoing NASA programs and identified collaboration and partnership opportunities for government, industry, and academic stakeholders in northwest Ohio.

GRC–2020–C–01933 Photo by Marvin Smith

Gynelle Steele, NASA's SBIR/STTR deputy program executive, presents as a panelist.

Administrator Jim Bridenstine provided the keynote address followed by remarks from Congresswoman Marcy Kaptur, Center Director Dr. Marla Pérez-Davis, and STMD Associate Administrator Jim Reuter. Panel topics and breakout sessions included an STMD overview and details on NASA's Prizes and Challenges, Space Technology Research Grants, Glenn Internships, Technology Transfer and Partnerships, and the SBIR/STTR programs. Breakout sessions focused on specific opportunities at NASA Glenn.

NASA Glenn
HErOes of the Week

Green

Dr. Lewandowski

Russell

Drexler

Four Glenn employees have been recognized by the Human Exploration and Operations Mission Directorate as NASA HErOes for the Week. This honor celebrates an individual each day of the week working to help the agency achieve one step closer to reaching the goal of sending the first woman and next man to the Moon.

The first three Glenn employees received recognition the week of June 15, and more recently, Drexler received his the week of Aug. 10

Carrie Green, Flight System Assurance Office, for safety and technical leadership as the Safety and Mission Assurance lead on European Service Module (ESM) Propulsion Subsystem Project (PSS) at Glenn collaborating with an international team of propulsion engineers to ensure the safety and reliability of the project.

Dr. Edward Lewandowski, Power Architecture and Analysis Branch, who serves as the Orion Flight Power Systems Development and Integration lead, for being instrumental in coordinating the team developing the Multi-Purpose Crew Vehicle Orion's electrical power system.

James "Jimi" Russell, Office of Communications, for successfully coordinating a public-media event for the arrival of the Orion spacecraft on the Super Guppy to Mansfield-Lahm Airport, and, subsequently, keeping them informed throughout the Orion Artemis I testing at Plum Brook Station.

Jonathan Drexler, Cost & Economic Analysis Office, for developing the programmatic products for the Power and Propulsion Element required to support the upcoming KDP-0 review of the Lunar Gateway Program.

PROMOTIONS

Fedor

Gregory Fedor has been selected the Chief Safety and Mission Assurance Officer (CSO) for the Solar Electric Propulsion Project in the Flight System Assurance Office. Fedor previously served a 4-month detail as the acting CSO.

Timothy Gaydos has been selected chief of the Quality Engineering and Assurance Branch in the Program and Project Assurance Division, Safety and Mission Assurance (SMA) Directorate. Gaydos previously served as SMA's chief officer and lead for the Solar Electric Propulsion project.

Carl Sandifer II has been selected deputy chief of the Space Science Project Office, Space Flight Systems Directorate. Sandifer most recently served as Mission Integration manager with previous leadership experience in various aspects of NASA's Radioisotope Power Systems Program.

Sandifer

MORE THAN A MEMORY

Phillips

Alan H. Phillips, 60, a 2019 retiree with 30 years of NASA service, died Aug. 3. Phillips was the founding director of the NASA Safety Center, located at NASA Glenn, where he served until retirement. He began his NASA career in 1989 in Langley's Office of Safety and Mission Assurance (SMA). By 2002, Phillips was appointed to the rank of Senior Executive Service and director of Langley's SMA program, prior to reassignment (2006) to the Safety Center. In 2016, Phillips received the prestigious Presidential Rank Award.

Dr. Scaglione

Dr. Lois J. Scaglione, 69, a 2009 retiree with 25 years of NASA service, died July 28. Scaglione retired as a product assurance manager. She played a critical role in ensuring the flightworthiness of complex electronic parts for several NASA programs, including the International Space Station, at NASA's Glenn and Goddard centers. She received NASA's Exceptional Achievement medal for contributions to the Process Based Mission Assurance Knowledge Management System, and a Space Flight Awareness Honoree Award for contributions to the Columbia Accident Investigation.

Upcoming Center Events

Save the Date!

Virtual Safety and Health Awareness Event

Tuesday, Sept. 22

Listen to exciting speakers, visit virtual vendors and participate in the Virtual Health Walk.

You won't want to miss it!

POC: Steve Herron, 216–433–2917 or steven.l.herron@nasa.gov

Insider Threat Awareness Month

September is National Insider Threat Awareness Month with the focus of "Resilience" as the theme this year. An insider threat is a person who has, or once had, authorized access to information, facilities, networks, people, or resources and who wittingly, or unwittingly, commits an act in contravention of law or policy. To learn more, visit the NASA Insider Threat Program website: https://www.hq.nasa.gov/office/ops/nasaonly/internal/ITP/. Personnel may register for Inside Threat Awareness training in SATERN (SATERN ID: ITS-NITTF-INSIDER-THREAT).

POC: Craig Mehl, 3–5716

VIRTUAL COFFEE AND CONVERSATION

The Glenn Science and Engineering Library will host a virtual Coffee and Conversation with Glenn's Records Manager and History Officer Anne Mills. Join them in Microsoft Teams on Wednesday, Sept. 16, from 11 a.m. to 12 p.m., to hear about Mills' career path and her guidance on all things records and history!

See Today@Glenn under Upcoming Events for the link.

POC: Robin Pertz, 3–5776

OUTDOOR SIREN TESTING

The Emergency Management Office staff will conduct an audible siren test on the "severe thunderstorm" tone on Saturday, Oct. 3, at Lewis Field. They will conduct a mass notification voice test at bldg. 39 on Wednesday, Oct. 7.

POC: Allen Turner, 3–6826

AEROSPACE TOASTMASTERS MEET

Improve communications and leadership skills through Aerospace Toastmasters. The group meets on Microsoft Teams on Thursdays from 12:05 p.m. to 12:50 p.m. Contact john.wang-1@nasa.gov, extension 3–3613, for more information. https://aerospace.toastmastersclubs.org/

TELEMEDICINE CONSULT SERVICES

Glenn's Medical Services Clinic staff is available to provide telephonic medical consultations for all Glenn employees during the current center telework stage. Contact their staff for a consult today by sending an email to grc-medicalservices@mail.nasa.org.

VIRTUAL FITNESS FUN

Join Glenn's Fitness Center staff and your co-workers for daily workouts via Microsoft Teams or exercise on your own with specially designed workouts. For information, visit https://www.grc.nasa.gov/smad/fitness/.

POC: Bob Laws, 3–6313

Stay tuned to Today@Glenn for updates on all these activities

Deadline for next calendar section is **Sept. 16, noon**. News and feature stories require additional time.

National Aeronautics and Space Administration

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Read AeroSpace Frontiers online at https://www.nasa.gov/glenn/aerospacefrontiers.

Glenn Software Receives Runner-Up for NASA's Software of the Year Award

NASA Glenn's Open Multidisciplinary Design Analysis and Optimization (OpenMDAO) Framework was selected as a runner-up for NASA's Software of the Year (SOY) Award on June 18.

OpenMDAO was developed to solve large-scale design optimizations for the study of unconventional aerospace concepts. It allows users to solve the most complex multidisciplinary analysis design optimization problems on an unprecedented scale.

The OpenMDAO team includes: Justin Gray, Stephen Ryan, Bret Naylor, Kenneth Moore, Robert Falck, Eric Hendricks, and Daniel Kilkenny, Research and Engineering Directorate; Herb Schilling, Thaddeus Kollar, Drayton Munster, and Calvin Robinson, Office of the Chief Information Officer; and former NASA contractor, John Hwang.

From 2016 to the present, OpenMDAO has been used by NASA's Flight Demonstration Concepts to build a mission planning tool that is essential for the X–57 Maxwell X-plane subproject. It also has been instrumental in the design of pioneering new aircraft, wind turbines, wind-farm layouts, power plants, and small satellites known as CubeSats.

The SOY Award competition allows for NASA to recognize and appreciate the team members that set high standards for software that is innovative, developed efficiently, meets the mission and infrastructure requirements, and possesses inherent quality.

By Lauren Simmers

openMDAO