National Aeronautics and Space Administration

AeroSpace FRONTIERS

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Holiday Safety

Happy holidays! As we gather with family and friends to celebrate the season, the CDC recently published recommendations to stay safe. They include:

- Getting vaccinated if you are eligible.
- Wearing a mask indoors.
- Avoiding crowded, poorly ventilated spaces.
- Not attending a gathering if you are sick.
- Getting tested if you have symptoms of COVID–19 or have a close contact with someone who has COVID–19.
- Delaying travel until you are fully vaccinated if possible.

You can find more information at https://www.cdc.gov/coronavirus/2019-ncov/daily-life-coping/holidays/celebrations.html.

Safely enjoy the holidays!

AeroSpace Frontiers
is an official publication of Glenn Research Center, National Aeronautics and Space Administration. It is published the second Friday of each month by the Office of Communications in the interest of the Glenn workforce, retirees, government officials, business leaders, and the general public.

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

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Virtual Wall Pays Tribute to Veterans

Veterans Day is a time for America to recognize those who have served. For one day, we stand united in respect for our veterans.

Originally called Armistice Day, the holiday started as a day to reflect upon the heroism of those who died serving our country. It fell on Nov. 11, which is the anniversary of the signing of the armistice that ended World War I. In 1954, the holiday was changed to "Veterans Day" to account for veterans in all wars.

Although the center has not had a formal observance the past couple of years, Glenn's Veterans Awareness Committee (VAC) wants veterans to know they are appreciated.

"Our veterans have made sacrifices for our country; stood the watch; and have earned every ounce of gratitude that comes their way. We thank them for their service to this great nation," said Samantha Yousef, VAC lead.

For years, Glenn's Veterans Wall in the Employee Center stood as a tribute to employees and family members who selflessly served to defend the freedoms we enjoy today. It also honored those who continue to serve for the good of the nation.

This year, Glenn and the VAC created a video to honor our employees, and family members of employees, who served in the U.S. military. The Glenn Veterans Virtual Wall video will be featured in the new Research Support Building. The video will be regularly updated to include employees and family members.

GRC-2021-C-03540
Rochelle and Sean Gallagher, Army 2000–2004

GRC-2021-C-03506
Darrell Williams, Army 1987–1991; Air Force 1996–2012

Employees are encouraged to submit photos to GRC-ITC@mail.nasa.gov to be included in the video wall. Please send a photo of yourself or loved ones in uniform during time of service, name of the military service member, branch of service, beginning and ending year of service, and affiliation with Glenn. Please indicate in the subject line, "Content for Veterans and Active-Duty Video."

"We as a country stand strong, united, and proud of veterans for their service and sacrifices," said Yousef. "We are grateful to all those associated with the center who have served."

By Doreen B. Zudell

C-2021-C-03467
Sam Casillas, Navy 2006–2013

GRC-2021-C-03470
Cameron Cunningham, Air Force 1993–2015

GRC-2021-C-03477
Dustin Hall, Marine Corps 2002–2011

GRC-2021-C-03488
Traci Patton, Army 1993–2001

GRC-2021-C-03503
Dr. Allen Turner, Coast Guard 1987–2020

Here to Help

The pandemic has brought with it high levels of stress and anxiety for veterans across the country. This, coupled with current events, can cause strong emotions to surface. Please know there is help.

Contact the Veterans Crisis Line at 1–800–273–8255 or Glenn's Employee Assistance Program at 216–433–2989 or susan.k.wilcox@nasa.gov.

These are just a few photos of employees featured in the veterans wall video.

On the Cover:
Flag bearers, left to right: Brian Evans, Jon Drexler, Kristopher Fear, Lee Lam, and Lester Carmean begin Glenn's Memorial Day observance in 2016.

Photo by Rami Daud
GRC-2016-C-03811

GMiS Recognizes Hispanic Leaders and Professionals

Great Minds in STEM (GMiS) honored Center Director Dr. Marla Pérez-Davis and Electrical Engineer Luis R. Pinero, during its virtual 2021 conference last month.

The organization named **Pérez-Davis** Engineer of the Year, as part of its 33rd Annual Class of Hispanic Engineer National Achievement Award Corporation (HENAAC) winners. HENAAC awards recognize the achievements of America's top engineers and scientists from the Hispanic community. She was recognized along with 21 other STEM leaders, innovators, and champions representing the highest levels of academia, government, military, and corporate America.

Luis R. Pinero, electrical engineer, Electric Propulsion Systems Branch, received a GMiS Luminary award during the virtual ceremony. This award recognizes professionals in science, technology, engineering, and mathematics who initiate, collaborate, and lead key programs and research within their companies. These individuals have made significant contributions to the Hispanic technical community as leaders and role models.

The theme of this year's conference was "First-Class Diversity, World-Class STEM."

Dr. Pérez-Davis

Pinero

Technology Transfer License Highlight: Startup NASA License

Glenn's Technology Transfer Office (TTO) offers four different ways to license a NASA technology: Commercial, Research, Government Use, and Startup NASA. After TTO and the company have mutually agreed on the appropriate technology, the ideal license type is pursued.

The Startup NASA license is a low-cost license designed for a startup's needs. This license allows companies to invest its resources into product development during the initial, typically capital-intensive, period of incorporating the NASA technology into its product line.

In late 2020, Glenn signed a Startup NASA license with Onedrus for a multi-stage air filtration system. The system was developed at Glenn to ensure air quality in long-duration missions and was specifically designed to operate for long periods of time with little maintenance. The multi-stage filtration system provides a low-maintenance and cost-savings solution to applications like industrial heating, ventilation, and air conditioning (HVAC) systems, commercial aircraft, and more. Onedrus is using this technology to engineer air filtration systems for commercial applications, such as schools and office buildings.

"NASA tech transfer has been very supportive of our strategic goals," said Aaron Wallace, co-founder and CEO. "They continue to be an asset as we develop our technology for commercial use. I would say it has been a very positive experience working with their team."

For more information on NASA Glenn's technologies available for licensing, visit https://technology.grc.nasa.gov.

NASA TECHNOLOGY TRANSFER PROGRAM

NASA Leadership Positions Agency for Future

During a virtual town hall on Sept. 21, NASA Administrator Sen. Bill Nelson announced the agency is creating two new mission directorates that will best position NASA for the next 20 years.

The move separates the agency's Human Exploration and Operations Mission Directorate into the new Exploration Systems Development Mission Directorate (ESDMD) and Space Operations Mission Directorate (SpaceOps).

NASA is making the changes because of increasing space operations in low-Earth orbit and development programs well underway for deep space exploration, including Artemis missions.

Both mission directorates are engineering the future of NASA's Moon to Mars exploration approach from different ends of the spaceflight continuum.

"NASA has long set the vision for space exploration, not only for our nation, but also for the world. This reorganization positions NASA and the United States for success as we venture farther out into the cosmos than ever before, all while supporting the continued commercialization of space and research on the International Space Station," said Nelson. "This also will allow the United States to maintain its leadership in space for decades to come."

Jim Free, who served as Glenn's center director from Jan. 4, 2013, to March 13, 2016, returns to the agency as associate administrator of ESDMD. The new directorate will define and manage systems development for programs critical to Artemis and plan the Moon to Mars exploration approach in an integrated manner.

"I'm excited to be back at NASA. Working hand in hand with our colleagues in Space Operations, we will focus on ensuring the success of Artemis missions in the near term while charting a clearly defined path for human exploration of Mars as our horizon goal," said Free.

Kathy Lueders now serves as associate administrator of the agency's new SpaceOps. This directorate will focus on launch and space operations, including the International Space Station, the commercialization of low-Earth orbit, and eventually, sustaining operations on and around the Moon.

"The space station is the cornerstone of our human spaceflight efforts, and the commercial crew and cargo systems that support the microgravity laboratory are the building blocks to our continued success," said Lueders. "We'll work closely across mission directorates to achieve even greater successes to come, including expanding the low-Earth orbit economy, launching our state-of-the-art science missions, and getting ready for future operations at the Moon and Mars."

Creating two separate mission directorates will ensure these critical areas have focused oversight teams in place to support and execute for mission success. This approach with two areas focused on human spaceflight allows one mission directorate to operate in space while the other builds future space systems, so there is a constant cycle of development and operations to advance NASA's goals in space exploration.

Over the next few months, NASA will implement these new mission directorates while remaining focused on the safety of ongoing operations for commercial crew and upcoming Artemis missions.

There are no changes to NASA center roles and missions as a part of this reorganization.

Free

Lueders

Dust: An Out-of-This World Problem

Dust is a nuisance on Earth. Thankfully, we can simply pull out a vacuum or grab a rag to rid ourselves of the concoction of dust mites, fibers, soil, pollen, and other tiny bits.

Beyond Earth's atmosphere, dust is insidious. On the Moon, it is made of crushed rock and is damaging to everything from lunar landers to spacesuits and human lungs if inhaled. As NASA readies to return to the Moon with Artemis, a team at NASA Glenn is working to mitigate dust's dangers.

Houston, We Need a Vacuum

Dust mitigation has been an issue for NASA since Apollo. When astronauts were entering and exiting the lunar module, dust got everywhere—it clogged mechanisms, interfered with instruments, caused radiators to overheat and even tore up their spacesuits.

"We learned from Apollo that lunar dust can be less than 20 microns (about 0.00078 inches) in size," said Sharon Miller, Environmental Effects and Coatings Branch. "The dust is very fine, abrasive, and sharp, like tiny pieces of glass, making it more of a dangerous threat than just a simple nuisance."

Fifty years later, the challenges of dust are greater for long-term exploration and sustainability on the Moon, as well as future human exploration of Mars.

Shaving Off the Rough Edges

On Earth, dirt and dust is smoothed out by erosion. Like water running over pebbles or a constant breeze blowing over a field, the particles' rough surfaces are eroded away, making them roundish and relatively easy to deal with.

"There is no erosion on the Moon," said Dr. Erica Montbach, Space Technology Project Office. "That's one of the things that surprised me. When I first started, I thought, 'What's the big deal, we deal with dust on Earth a lot.' It's different because there is no erosion, so those individual particles end up being very sharp and angular. It is very damaging in ways that we don't see on Earth."

Unlike on Earth, Moon dust is not packed down. Any activity on the surface can kick up bucketsfull of the stuff. Also, whether it is from the equator or highlands or the dark side, Moon dust may look and behave differently. For example, the sun-facing side is constantly exposed to solar radiation. Because of that, dust on the day side has a positive electrical charge. This solar charging means it clings to everything—like static here on Earth.

Solutions to the Lunar Dust Challenge?

For NASA to conduct extended human and robotic exploration on the Moon or Mars, the agency needs a better understanding of how to mitigate the omnipresent, complex problem of dust.

In 2019, NASA's Space Technology Mission Directorate established the Lunar Surface Innovation Initiative (LSII) to coordinate cross-agency teams and spur the creation of novel technologies needed for lunar surface exploration. Dust mitigation is one of the key capability areas LSII addresses, which is looking at active and passive mitigation technologies for different exploration systems, like rovers, power systems, spacesuits, and other surface hardware exposed to dust.

As with most NASA initiatives, the agency will not go it alone. NASA is looking for partners in industry, academia, and other organizations to help identify ways to deal with Moon dust.

"We are certainly looking to collaborate with others outside of NASA," said Montbach. "We feel there is going to be an opening up of commercial space in the future, and we want to work with the best minds."

The dust mitigation technology that is currently being developed will be tested on the lunar surface starting in 2023. Once it has been evaluated and the best solutions identified, NASA could use this technology on Artemis missions, and future missions to Mars.

"Studying the Moon, and eventually Mars," said Miller, "will give us more information about our own planet and the solar system's formation. When we understand our own planet better, we'll have better ideas about how to protect it for the future."

By Mike Gianonne

Workforce Gathers Virtually to Focus on Safety, Health Awareness

Glenn's annual Safety and Health Awareness event on Sept. 21 provided a relevant message for the workforce: "Be Safe Where You Are."

That theme was embraced by NASA astronaut Dr. Stanley Love and NASA's Director of Health and Medical Systems Dr. Jade Spurgeon. The pair headlined the virtual event. Glenn Deputy Director Susan Motil introduced Love, while Steven Herron, Safety and Health Division chief, introduced Spurgeon.

Love discussed mental health and some of the stressors brought on by the COVID–19 pandemic that are affecting society, including feelings of confinement and isolation. He drew parallels to some pandemic stressors being carried over into the workplace where there can be a large workload and a high cost of failure. To improve one's mental health, Love emphasized the importance of a work-life balance, while also drawing on his experiences as an astronaut. Love and his fellow astronauts learned how to work together as a team and lean on one another during stressful situations.

"It's all about teamwork, and it's not just empty words," Love said. "I've seen it in action, and it's really true."

Spurgeon reflected on how the COVID–19 pandemic has affected her personally, and how everyone is experiencing a collective trauma caused by the pandemic. She emphasized the importance of fostering a culture of support, kindness, and understanding both inside and out of the workplace. Spurgeon also encouraged the workforce to focus on their health and take leave to help them recharge.

"Support goes beyond a single inquiry and is more a pattern of checking in and paying attention to your coworkers," said Spurgeon.

In addition to the speakers, vendors provided virtual presentations and answered questions on a range of topics. Some of these included the NASA Safety Reporting System, personal protective equipment, ergonomics, employee assistance program, fitness center, and safety culture.

Mishap Investigation Board members Scott Howe, Kurt Blankenship, Tom Ratvasky, and James Smith presented a mishap case study on Armstrong Flight Research Center's DC–8 aircraft. The aircraft incurred foreign object damage to its engines at an airport in 2019. Panel members discussed lessons learned and answered questions throughout the presentation.

Dr. Love

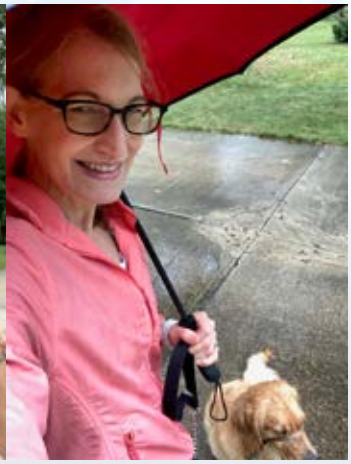
Dr. Spurgeon

The event concluded with a virtual health walk. Employees walked for 30 minutes and recorded their participation through the SMAD's Safety and Health Awareness Event (SHAE) website through Friday, Sept. 24.

Visit the SHAE website to view the speakers' presentations and health walk video, https://www.grc.nasa.gov/smad/shae-2021/.

By Adam Schabel

GRC-2021-CN-00062



GRC-2021-CN-00063

Charles Hoff, NASA Safety Center, left, and Joyce Dever, Materials and Structures Division, participated in the virtual health walk.

STEM Event Inspires Young Students

Glenn's Office of STEM Engagement hosted the virtual event "Exploring Flight With Airplane Adventures" for kindergarten through fourth-grade (K–4) students on Sept. 18. The event engaged students in the excitement of NASA's aeronautics research and advancements. Students and their family members participated in a virtual tour of the Flight Research Building, designed and built their own paper gliders, and engaged in conversations with David Friedlander, Inlets and Nozzles Branch. The goal of the event was to inspire K–4 students to want to learn more about NASA's missions and STEM.

GRC-2021-C-03088 Photo by Bridget Caswell

Students work on a project with Greg Marsh (Paragon), Office of STEM Engagement.

NEWS AND EVENTS

Event Illuminates American Latino Museum

NASA held the "Hispanic Heritage: 'El Ayer y El Mañana'" event on Oct. 7 to highlight the pioneering spirit of Latinos past, present, and future. Dr. Ellen R. Stofan, undersecretary for Science and Research at the Smithsonian Institution, discussed the creation of the new National Museum of the American Latino. Center Director Dr. Marla Pérez-Davis, NASA Administrator Sen. Bill Nelson, astronauts Dr. Frank Rubio and Joseph Acabá, and many other voices across NASA provided comments. NASA's Hispanic Outreach and Leadership Alliance; employee resource groups at several NASA centers, including Glenn; and the Equal Opportunity and Diversity Management Division, hosted the event.

Imaging Technology Center Members Earn Agency Honors

Three Alcyon Technical Services employees in Glenn's Imaging Technology Center received honors from the NASA Expert Imaging Group Awards.

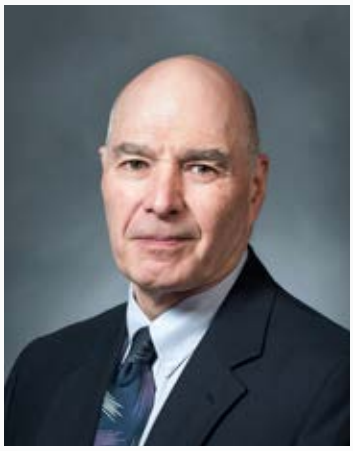
Glenn photographers **Bridget Caswell** and **Marvin Smith** were recognized as part of NASA's third annual "Photographer of the Year" awards for photos taken in 2020. Caswell's photo earned second-place in the "Portrait/People" category, while Smith's photo landed third-place honors in the "Documentation/Places" category.

Video Production Specialist **Bill Fletcher** received the 2021 Ray Banks Award for passion, creativity, and endless energy in support of NASA imagery. Banks was a well-known and beloved member of the NASA Digital Television Working Group and NASA TV community. Fletcher was nominated by colleague Quentin Schwinn, and customer Ron Sicker, ISS and Human Health Office.

The awards were given during a virtual agency livestream event in September.

GRC-2020-C-02493 Photo by Bridget Caswell

Todd Reynolds, spacecraft technician with ASRC Federal, pauses for a portrait while working on Orion's electrical systems at NASA's Neil A. Armstrong Test Facility.



Fletcher

GRC-2020-C-01391 Photo by Marvin Smith

The Orion spacecraft for the Artemis I Mission, consisting of the crew module and European-built service module, sits in the Thermal Vacuum Chamber within the Space Environments Complex at Armstrong Test Facility.

Rodriguez Recognized as Influential Latino in Cleveland

Abigail Rodriguez, Center Operations Directorate, was selected as one of the "100+ Latinos Cleveland Must Know!" by AmMore Consulting and the Hispanic Star. The list highlights Latino professionals who lead and contribute to the economic and cultural development of the Cleveland area. AmMore is a Cleveland-based company committed to creating more diverse, inclusive, and equitable workplaces. To view the list, visit https://www.ammore.us/100.

Rodriguez

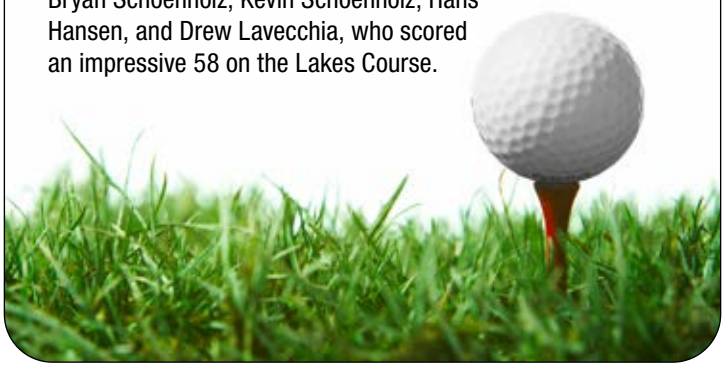
Shop Now for NASA-Themed Holiday Gifts

Looking for holiday gifts? Look no further than the online Glenn Exchange Store, a one-stop shop where you can find NASA apparel and accessories. From sweatshirts to drinkware, the Exchange Store is a great place to find that NASA-themed item. The store is open 24/7 to employees and the general public.

Visit the Exchange Store at www.NASAShop.com.

Colleagues Connect at GRC Golf Outing

Two hundred thirty five golfers endured a little morning rain but had a great time reconnecting with friends and colleagues at the 11th Annual GRC Golf Outing at Mallard Creek Golf Club on Aug. 13. Four-person scramble participants ended the day with barbecued chicken and ribs along with a cornhole competition. Congratulations to this year's winning teams: Team 3—Jim Blake, Richard Manco, Mitch Ahaus, and Charlie Towne, who shot 65 on the Woods Course; and Team 22A—Bryan Schoenholz, Kevin Schoenholz, Hans Hansen, and Drew Lavecchia, who scored an impressive 58 on the Lakes Course.



Promotions

Dr. Timothy Peshek has been selected chief, Photovoltaics and Electrochemical Systems Branch, Power Division for the Research and Technology Directorate. Peshek has 20 years of experience as a photovoltaics expert.

Michael J. Zernic has been selected chief, Management Integration Division for the Facilities, Test and Manufacturing Directorate. He has been serving as acting chief of the office on detail since February 2021. Prior to his detail, Zernic served as chief of the Program/Project Integration Office in the Space Flight Systems Directorate.

Dr. Peshek

Zernic

Retirements

Louis R. Galmarini Jr., Operational Safety Branch, Safety and Health Division, Safety and Mission Assurance Directorate, retired Sept. 30, 2021, with 34 years of NASA service.

David J. Hoffman, Power Architecture and Analysis Branch, Power Division, Research and Engineering Directorate, retired Oct. 30, 2021, with 38 years of NASA service.

Jill D. Noble, Information and Applications Office, Office of Chief Information Officer, retired Sept. 30, 2021, with 32 years of NASA service.

Galmarini Jr.

Hoffman

Noble

Join us for

Glenn's Virtual Holiday Gathering

Dec. 13, 12–2 p.m.

During the Town Hall

Travel Through Time With Glenn's History

Travel through time and view a photographic history of the first 80 years of NASA's Glenn Research Center.

Visit https://www.nasa.gov/glenn-research-center/photo-history.

Attention Employees and Retirees

Do You Know This Person?

Glenn's Logistics and Technical Information Division needs your help identifying people, places, and research from archived images. If you recognize a photo placed here, email GRC-ITC@mail.nasa.gov.

To ensure your email reaches the right individuals, please enter "DYKTP" into the subject line. Although we cannot respond to individual emails, please know your participation is appreciated!

GRC-1988-C-00901

INFORMATION CAFÉ

On Wednesday, Nov. 17, from 11–11:45 a.m., the Glenn Library will showcase the O'Reilly digital learning platform and its interactive sandboxes and scenarios tool.

POC: robin.n.pertz@nasa.gov

OUTDOOR SIREN TESTING

Emergency Management Office staff will conduct a mass notification voice test at buildings 100 and 302 on Wednesday, Dec. 1, at Lewis Field. An audible siren test will be conducted on the "emergency condition" tone on Saturday, Dec. 4.

POC: allen.r.turner@nasa.gov

SPACE SERENITY AL-ANON

Space Serenity Al-Anon group meets the second Tuesday of each month. The next meeting is Dec. 14, from 1–2 p.m. They are a fellowship that offers a program of support and recovery for the families and friends of alcoholics, whether or not the alcoholic recognizes the existence of a drinking problem or seeks help. Please contact Glenn's partner at NASA Johnson to join this meeting in Teams (jsc-employeeassistanceprogram@mail.nasa.gov) or call 281–483–6130.

POC: angela.d.windau@nasa.gov

Deadline for the next calendar section is **Wednesday, Nov. 17, noon**. News and feature stories require additional time.

NASA Glenn Employees: For more calendar information, visit **https://wing.grc.nasa.gov/event-calendar/**.

National Aeronautics and Space Administration

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www.nasa.gov

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

2021 Combined Federal Campaign

You Can Be the Face of Change

As the world recovers from the challenges of the past year and meets the challenges of 2021 and beyond, Combined Federal Campaign (CFC) pledges are making a meaningful difference in the lives of those in need. Last year, the Ohio CFC collectively pledged more than $1.7 million and 2,360 volunteer hours. Thousands of charities and countless beneficiaries are depending on our continued generous support.

NASA Glenn's Chairperson Tonya Mitchell kicked off the center's 2021 CFC drive, Oct. 7, with the theme: "You Can Be the Face of Change." The virtual event highlighted the generosity of federal employees over the past 60 years and the importance of continuing the legacy of giving in support of the CFC today. Glenn's 2021 CFC monetary goal is $275,000.

Center Director Dr. Marla Pérez-Davis shared welcoming remarks, stressing her support for the campaign. She stated with pride that employees have made NASA Glenn a leader in charitable giving over the years. "Because of you, the world is becoming a better place every day," she said.

The program introduced representatives from local federal agencies and highlighted several charities in need. Special guest Vice President Kamala Harris thanked federal employees for "carrying on the proud tradition of generations of federal workers who have stepped up for our communities, our country, and our world."

Some people might say it takes an extraordinary person to care enough to give, but it is easier than you might think. Anyone can become a changemaker through the CFC.

Here's How It Works

Choose your cause. Whether you care about finding cures for diseases, supporting military families, or promoting equality for all, the CFC has vetted charities for any cause you want to support. You can even give to multiple charities with one pledge.

Make your pledge. The online pledge portal allows you to easily renew your pledge each year and offers the full range of pledge options: payroll deduction, credit/debit card, e-check/bank transfer, and volunteer hours (federal employees only). Other options include the CFC Giving Mobile App and paper pledge forms.

Change the world. Thanks to your generosity, CFC charities will make a difference in local communities, across the nation, and around the world.

Visit Glenn's CFC homepage at https://www.grc.nasa.gov/cfc/ to learn more and contact committee members and keyworkers who can help.

Emergency and Inclement Weather Lines

Lewis Field: 216–433–9328 (WEAT)
Neil A. Armstrong Test Facility: 419–621–3333

Connect With Glenn