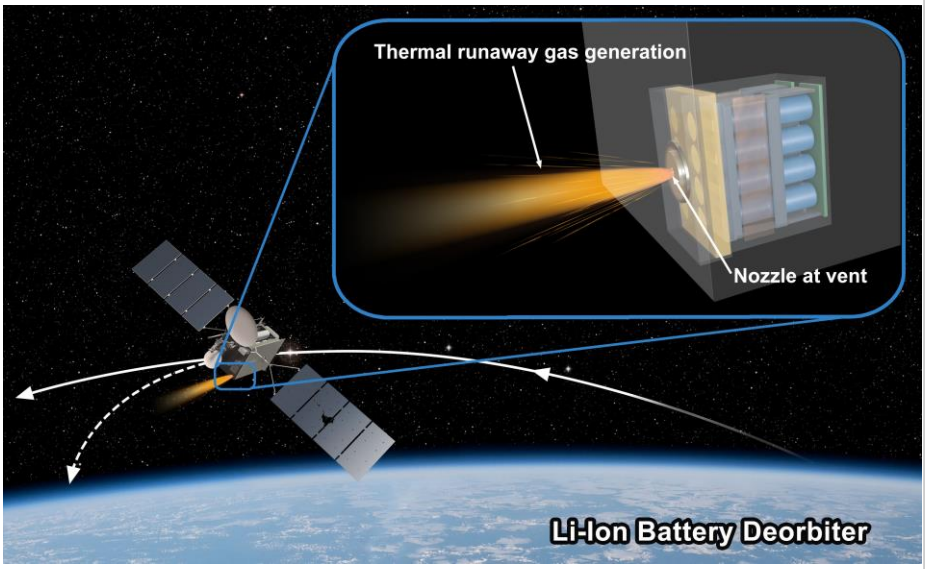
# ORBITER NEWS

News, announcements, and more.

# Novel Satellite Deorbiting Method Can Help Mitigate Space Debris Crisis

August 31, 2021




*The Li-Ion Battery Deorbiter will activate thermal runaway in a controlled manner and utilize the red-hot gasses produced to generate thrust to deorbit.*

The population of satellites in low Earth orbit (LEO) is expected to rapidly rise over the next decade, adding to those already present. Accompanying this increase of satellites is a higher risk of space junk-forming collisions between active satellites, inactive satellites or other space debris. This increased collision risk is a concern previously highlighted by Aerospace's Center for Space Policy and Strategy.

The existing population of human-made objects in LEO has already caused space junk to become self-sustaining due to additional collisions between debris. Even now, most small satellites rely only on atmospheric drag to deorbit—causing these vehicles to remain in orbit well past their useful lifespan and heightening the risk of debris creation through internal explosion or collision.

A team of Aerospace scientists and engineers are developing a novel technology to reduce the amount of debris being left in this critical environment. The solution, known as the Lithium-ion Battery Deorbiter, will utilize the battery already on board the spacecraft to reduce debris by igniting the battery into thermal runaway to generate thrust for deorbit.

*Accompanying this increase of satellites is a higher risk of space junk-forming collisions between active satellites, inactive satellites or other space debris.*

“Everybody knows about lithium-ion batteries and their risk to go into thermal runaway and spewing fire,” said Dr. Joseph Nemanick, a senior research scientist in the Energy Technology Department. “The Lithium-ion Battery Deorbiter is turning that weakness into a strength.”

By activating thermal runaway in a controlled manner, the red-hot gasses produced are channeled through a nozzle to generate thrust to deorbit. This approach is the first zero-added-mass on board spacecraft technology capable of reducing orbital debris and helping to protect low Earth orbit from space junk.

“Most small satellites have no propulsion at all and are stuck in the orbit where they were originally delivered,” said Dr. John DeSain, a senior scientist in the Propulsion Science Department. “Normally atmospheric drag is the only way for the satellite to deorbit, but by using the satellite’s battery as a propulsion unit, the overall lifetime and chance of collision can be decreased.”

The team has already demonstrated proof of concept in the Aerospace Propulsion Research Facility. Scientists demonstrated the activation of space rated battery cells which achieved effective thrust comparable to a commercial solid rocket motor. While this force can be increased further with engineering changes, the projected thrust is sufficient to reduce residual orbit time for a small satellite by 55% in LEO.

Even with these favorable findings, barriers exist from adopting this innovative technology. Perhaps the biggest obstacle is altering people’s outlook on thermal battery runaway.

“Telling people that you can skillfully harness one of the scariest things that can happen in space takes a lot of convincing,” said Nemanick. “However, looking at this event from a purely chemistry perspective, there is significant overlap between battery thermal runaway and a normal solid rocket motor.”

Further testing of this technology is being conducted in the Propulsion Research Facility by members of the Propulsion Department and Propulsion Sciences Department, also including John Schilling, Andrea Hsu, Brian Brady, Andrew Cortopassi, and Dillon Over. Of particular interest is developing different ways of controlling how much thrust can be generated, reliable triggering, and ensuring safe activation. The team is finalizing proposals for funding in order to advance their project further.

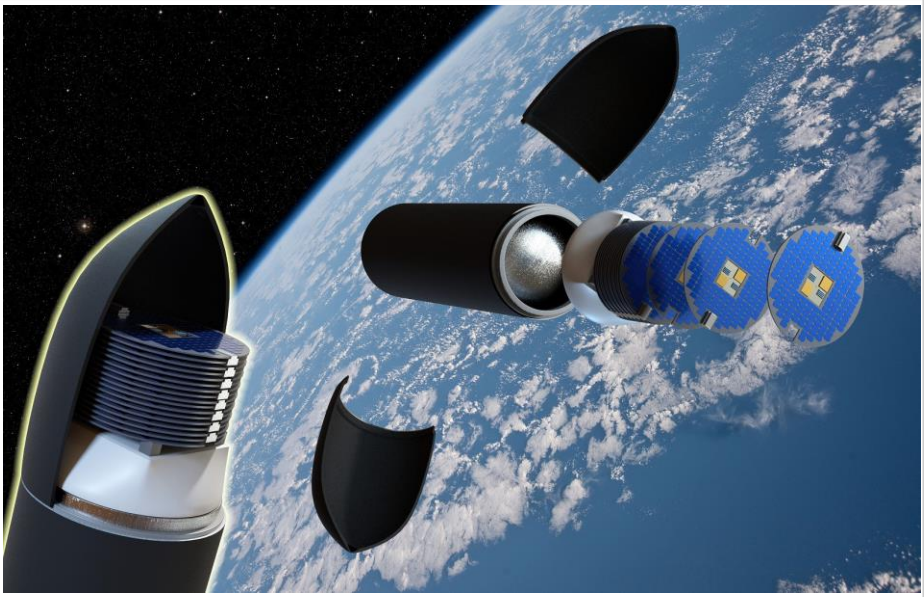
In time, the Lithium-ion Battery Deorbiter could reduce the space junk from satellites without adding additional fuel or weight, proving that sometimes the answer already lies within.

# DiskSat: Aerospace Is Redefining the Future of Small Satellites

August 24, 2021

A defining feature of a standard CubeSat is its containerization—the shape, volume and design—which makes it rideshare-friendly. This quality was historically important since these devices comprised a minor part of the total payload. Containerization ensured that CubeSats could not endanger the launch vehicle or primary payload.

Now, Aerospace engineers and scientists have reevaluated whether the standard CubeSat may be the best shape for a mission.



*DiskSat is a plate-shaped satellite (1 meter in diameter, 2.5 centimeters thick) that could provide the required power and aperture needed for future missions.*

The answer may be in the form of a two-dimensional disk aptly called DiskSat, a NASA Small Spacecraft Technology program-funded concept that may expand the SmallSat mission envelope and enable major scientific discovery at lower cost.

The outside-of-the-box concept for DiskSat originated when Richard Welle, Aerospace Senior Scientist in the Mission Systems Engineering Division and xLab, was part of a study interested in using CubeSats to form a large constellation. The team quickly recognized the mission would need more power and aperture than a CubeSat could provide. Placing the constellation in well-defined orbits would also require dedicated small launch vehicles.

***Read the full article on Aerospace.org.*** *DiskSat was also recently featured in SpaceNews. Read the news article here.*

# AWC's Woman of the Year Awards Highlight Unity and Resilience at Aerospace

August 18, 2021


The Aerospace Corporation honored four employees with Woman of the Year awards this week, recognizing their outstanding professional achievements and contributions to the company.

Hosted by the Aerospace Women's Committee (AWC), the ceremony is one of several Women's Week events taking place throughout the week, including a keynote speech from Dr. Regina Lewis, lightning talks, mentoring events, as well as a fun run and giving campaign.

Tuesday's ceremony featured remarks from Aerospace President and CEO Steve Isakowitz, who congratulated this year's award recipients and spoke of the long role women have played in ensuring the success of the Aerospace mission.

"For more than 40 years, the AWC has been a valuable source of community and fellowship within our company," Isakowitz said. "It plays a crucial role in developing and furthering the professional and personal ambitions of our colleagues. Just as importantly, it's a place to recognize and celebrate the achievements of the talented women who work at Aerospace."

The Woman of the Year award recognizes outstanding job performance; involvement with company activities; community involvement; professional, career and academic achievement; and leadership and mentorship roles.

"The theme chosen for this year's awards is Unity and Resilience, which emphasizes the importance of women supporting women and assisting one another during this period of transition," said Shawné Raiford, AWC national president. "The COVID-19 pandemic has taught us to work together, to support one another and encourage each other to stay on track in the face of adversity."

Here's more about this year's award recipients:

**Lesli Otake** joined Aerospace in 2003 as an intern in the Modeling and Simulation Department. She eventually progressed to a technical lead role as the department's expert for military utility analysis before becoming a lead analyst for DyCAST. She has led high-profile and high-impact studies, and her analyses has helped the government make multi-billion-dollar decisions. Her impact has been recognized by several prestigious awards.

In 2014, Lesli joined MILSATCOM where she participated in various acquisition and planning activities for critical national capabilities.

In 2017, Lesli returned to the Modeling and Simulation Department as its director. She is also an active participant on corporate committees, helping develop well-rounded employees and providing leadership and mentoring curriculum for new managers.

In 2018, The Society of Asian Scientists and Engineers awarded Lesli the Professional Achievement Award, recognizing her as a role model for others in the field.

"It is such an honor to be selected as a 2021 Aerospace Woman of the Year. This is an incredible collection of distinguished, talented and accomplished women, and I feel so privileged to now count myself as one," said Otake in her acceptance speech. "Congratulations to my fellow honorees. You are amazing women and I am proud to share the spotlight with you today."

**Shardai Rhodes** joined Aerospace in July 2009 as a summer intern. Over the last 12 years, she has worked in three different Aerospace Groups: General Services Division, Facilities Division and Special Access Programs Security Division.

Rhodes has been an officer of Aerospace Black Caucus for the past four years, holding various positions such as National Secretary and National Treasurer. She has also been involved in various AWC events.

Rhodes donates to the annual Donate A Life Walk in Fullerton. Following her father's death in September 2011, she began volunteering with the American Cancer Society, and began participating in the Relay for Life in 2014. She also participates in several women's empowerment summits, and networks with organizations such as the Hey Girlfriend Network and Women Empowering Women – Los Angeles.

"I am extremely honored to be one of the 2021 Woman of the Year Recipients," said Rhodes. "I have faced several challenges on my way here, but each one of them has strengthened me to make me the person I am today: a thorough professional who knows exactly what she wants – someone who sets her eyes on a goal and does not lose sight of it until it is achieved."

**Via Van Liew** joined Aerospace in 2017 and quickly progressed up the ranks from diversity and inclusion manager to principal director of diversity, equity and inclusion (DEI). She has been instrumental in the launch of critical initiatives like the Aerospace Committee for Equality (ACE),focused on 34 key actions to address our most pressing DEI priorities; the Aerospace Re-entry Program, which supports reintegrating women back into the workforce; and our Diversity Scorecard that measures DEI progress and accomplishments.

Van Liew also led impactful campaigns to expand and implement DEI while supporting a culture of trust, inclusion and belonging. These included introducing the Diversity Referral Program, redesigning the Aerospace Tech Fellow program and creating a Women Senior Leadership Network.

As part of her role overseeing DEI for Aerospace, Van Liew co-chairs the Executive Diversity Council (EDC) and ACE, as well as represents DEI on the Aerospace Diversity Action Committee (ADAC).

Van Liew's contributions go beyond her role in DEI as she has been actively involved in the Los Angeles County Department of Public Social Services' Annual Adopt-A-Family Program since 2015. She also contributes her time to many charitable organizations such as The National Lawyers Guild Foundation, Leukemia Society, Los Angeles Mission, Make A Wish, Special Olympics, Watts Project, Saint Jude and Breast Cancer Awareness. Van Liew clearly exemplifies her commitment to the community as well as her role at Aerospace.

"Being selected to receive the Woman of the Year award is a moment I am proud to share. My accomplishments are a small preview of the commitment I will continue to make throughout my career at Aerospace, and I am excited for what the future will bring," said Van Liew. "Congratulations to the other outstanding women who are being acknowledged as well; I am humbled to be recognized alongside you."

**Catherine Venturini** began her career in the Remote Sensing Department of Aerospace's Physical Sciences Laboratory. In 2007, Venturini moved to Developmental Planning and Projects in DSG, where she directed mission concept development studies and technical efforts for 11 years. During this time, she built successful collaborations working CubeSat activities across DoD, intel and civil agencies.

Venturini served as the lead for several CubeSat missions, heading an experiment that led to the creation of a first-of-its-kind device for dispensing 28 atmospheric probes to measure the Earth's thermosphere, one of which was named the "Venturini" probe, in honor of her leadership.

In 2013, Venturini was a recipient of the Team of the Year Award for "Key Aerospace Contributions to PicoSats." Last year, Catherine received the Aerospace Innovation Award, which is presented "to the AC-10 team, for development of operational tactics, techniques and procedures for future space missions using CubeSats."

"It is an honor to be recognized by the Aerospace Women's Committee. I could not have accomplished all of the achievements and projects without the amazing mentors, teachers, managers and colleagues I have had throughout my life, and especially during my time at Aerospace," said Venturini. "I appreciate their time, wisdom and support, and I hope to pass along what I have learned to future generations."

# Why Digital Engineering Is Essential to the Future of Space

August 17, 2021

The modern space enterprise is transforming at an unprecedented rate. The next era of innovation and outpacing the threat will require space systems and operators to work faster, smarter and more connected than ever before. To meet that challenge, a massive paradigm shift toward digital engineering principles and technologies is already underway.

Aerospace is advancing the concepts, capabilities, and strategies that leverage an integrated digital approach to revolutionize how the hardest problems across the space enterprise, and other complex enterprises, can be solved. Adopting a digital-first approach enables for more opportunities to integrateacross the enterprise and fosters better multi-domain collaboration,scalable agile architecture and informed acquisition planning.


The foundation of digital engineering is built upon the use of authoritative data, model-based approaches, and integrated analytical tools to create fully connected digital ecosystems, enabling for full domain awareness, repeatable model-driven processes, dynamic simulation environments, and real-time testing and implementation.

“At its most fundamental, digital engineering is the application of modern technologies and processes at an enterprise scale to perform, connect and integrate traditional engineering functions in new ways,” said Todd Nygren, Senior Vice President for Aerospace’s Engineering and Technology Group. “It represents a transformation of how Aerospace does business that spans everything from systems acquisitions to mission assurance to enterprise integration.”

In an integrated digital ecosystem, validated data across various disciplines is stored in repositories and used as a central reference, enabling digital simulations that evolve and follow hardware and software systems throughout the lifecycle to replace traditional static models and more efficiently discover and resolve emerging concerns, threats, and risks. This digital ecosystem eliminates legacy information silos and enables better strategic integration across the enterprise at scale, modernizing traditional engineering functions that improve efficiency and speed and enhance capabilities.

“Digital engineering is simply a modern approach to execute all of our engineering processes and analyses that we do within Aerospace in support of our customers,” says Dean Bucher, Principal Director of Digital Engineering Integration at Aerospace. “It’s taking everything we do and transforming every aspect of our jobs so that it is all based on underlying repositories of data and models that is authoritative, validated, used and reused, and updated in seamless ways. Anything we produce out of any kind of engineering analysis will go straight back into the repositories of data and analyses to be made available for people to use and reuse for their own purposes and engineering functions.”

Organizations across the space enterprise, and other civil and commercial enterprises, recognize digital engineering as the future of technology development, systems acquisition, and operations. In the United States Space Force (USSF) Vision for a Digital Service digital engineering is one of four key focus areas necessary to realize the Digital Space Force Vision, enabling “all personnel to act as ‘intrapreneurs,’ embracing digital technology, driving innovation, and pushing boundaries in how processes and operations are executed throughout the organization.”

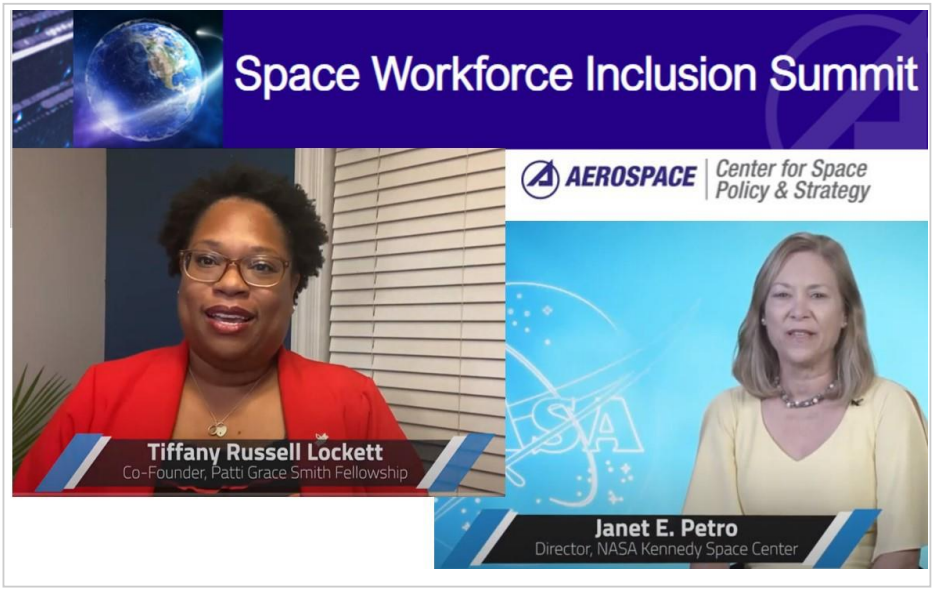
As an example, engineers operating in a digitally integrated environment will construct “digital twins”, which are digital replicas of an actual space asset that can then be used to test, analyze and even implement updates and upgrades before having to touch the hardware. Drawing from authoritative sources of data, engineers can better assess different scenarios and potential outcomes through simulations that more closely represent real-world environments. Those digital models would then be reused and updated as a point of departure going forward, saving time and streamlining future processes for design, upgrades and improvements.

“The promise of digital engineering is really to streamline acquisition and address the growing complexity of the space enterprise,” Bucher said. “We will soon be working off a set of digital models and data with a more seamless connection between the government and industry partners that are developing complex systems and their associated digital twins.”

*Read the full article on Aerospace.org.*

# CSPS Hosts DEI Conversations on Future Space Workforce

August 12, 2021




Aerospace's Center for Space Policy and Strategy (CSPS) recently hosted the inaugural **Space Workforce Inclusion Summit**. This two-hour virtual event brought together graduate and undergraduate students from across the country to have open conversations on how to build diversity, equity, and inclusion (DEI) in the future space workforce. The 40 participants were from technical and non-technical degree programs – from space law to aeronautics. Though the Summit hosted students from a wide variety of backgrounds and institutions, they all had one thing in common: interest in a space career and a passion for better inclusion within it.

Underpinned by two keynotes speakers, the focus of the Summit were five break-out sessions that gave students the opportunity to discuss inclusion through different lenses. The break-out categories were Space Force culture, K-12 education, university relations, STEM and non-STEM collaboration, and media representation. Discussions centered on the importance of DEI for that subject, challenges and barriers that contribute to lack of inclusion, and next steps that can be taken by space enterprise decision makers.

To kick off the summit, Dr. Janet Petro, newly named Director of NASA's Kennedy Space Center, offered inspiring words about her own space journey after graduating. She also discussed what NASA is doing to promote better DEI in its workforce. She asked attendees to ask themselves what success looks like and to be specific about the actions needed to get there. Watch her full remarks here.

The second keynote speaker, Tiffany Russell Lockett, is co-founder of the Patti Grace Smith Fellowship. She concluded the event with her experiences as a black woman in the space sector and encouraged attendees to "be brilliant" in work ethic and compassion for others. She challenged them to strive to make a difference no matter how big or small. The full video is available here.

The Summit captured an abundance of considerations and valuable insights from students. Major takeaways ranged from the importance of outreach and recruiting to workplace culture and accessibility, neurodiversity and more.

Ultimately, attendees wanted to communicate the importance of the school-to-space pipeline and the flaws that exist within it. Many students expressed that this pipeline is what shapes the space workforce, and that space leaders must invest more energy in making this system more diverse, equitable and inclusive. A full write-up of key findings will be provided to key decision makers across the Aerospace customer base. The Space Workforce Inclusion Summit gave aspiring space workers the opportunity to shape their own future and contribute to the overall success of the U.S. space workforce.

*Written by Sophia Jones, Technical Intern for Aerospace's Center for Space Policy and Strategy (CSPS)*

# Q&A with Aerospace Employee Selected for NASA Human Research Program

August 10, 2021


Aerospace is involved in numerous aspects of humanity's hopes for intergalactic travel but for one employee that mission is now personal. NASA's Human Research Program recently selected Ashley Kowalski, Project Leader in the Global Partnerships department at Aerospace, for a spaceflight simulation study in Moscow, Russia. Kowalski looks to join an international crew of six people who will live together in isolation for eight months while NASA researchers study crew interactions, health, and physiology experiences including various aspects of social isolation and confinement.

The simulation is part of the program known as the Scientific International Research In a Unique terrestrial Station (SIRIUS) program and takes place in a ground-based analog facility called Nazemnyy Eksperimental'nyy Kompleks, or NEK, within the Institute of Biomedical Problems of the Russian Academy of Sciences in Moscow.

The latest mission, known as SIRIUS-21, will include nearly 70 separate studies that will help researchers study the effects of isolation and confinement on human psychology, physiology, and team dynamics to help prepare humans for Artemis exploration missions to the Moon, trips to the planned lunar Gateway, and long-duration missions to Mars.

Kowalski and three other U.S. crew members will report for training in Russia in late August. Two of them will be selected for the planned isolation mission from November 2021 to July 2022.

We caught up with Kowalski to ask her about her hopes for the program.

***How did you get involved with NASA's Human Research Program?***

I have always had a desire to be more involved with human spaceflight, so I was specifically seeking out opportunities outside of my daily work at The Aerospace Corporation that could give me the chance to be an active participant in furthering research in that field, and perhaps place me one step closer to my goal of becoming an astronaut.

Participating in an astronaut analog study is one way of doing my part to help further the future of human spaceflight so that we can successfully return humans to theMoon for long-duration lunar exploration missions and eventually to Mars.

I already knew of several other astronaut analog studies in existence – for instance, NASA HERA, NASA NEEMO, HI-SEAS, Mars Desert Research Station – but when I saw the SIRIUS mission, I knew that it had my name written all over it! Why you might ask? Well, for SIRIUS 21, the ground-based analog facility, the Nazemnyy Eksperimental'nyy Kompleks (Наземный Экспериментальный Комплекс), or NEK, is located in Moscow, Russia. I had previously spent time living abroad in various countries, and specifically had alreadyspent a year living and working in Russia due to my interest in the global space industry and U.S.-Russian space relations. In order to gain a better understanding during my time there, I studied Russian. This happened to prepare me for one of the requirements for SIRIUS 21 which was to pass various Russian language tests, in addition to other academic, physical, and psychological requirements.

Additionally, because of my experiences in Russia, I was knowledgeable about NEK. NEK is quite a historic facility as the Russians have a long history of conducting research on behavioral health in support of crewed space flights and how to maintain human performance in unique/extreme conditions. Probably the most famous study performed at that facility that people might be familiar with is the Mars 500 study. All of that paired with my love of human exploration and my desire to be a part of NASA's path to return humans to the Moon for long-duration missions made this feel like the opportunity was meant for me and it just solidified my decision to apply for a position with NASA's Human Research Program.

***This study will involve spending eight months in isolation with five other crew members. What are you personally hoping to get out of the experience?***

I'm hoping to learn and grow both personally and professionally while carrying out all the SIRIUS experiments to the best of my abilities. I feel like this program really brings together a lot of my passions – intercultural relations and international cooperation, Russian space program developments, USA-Russia relations, space exploration, and human spaceflight to name a few.

Additionally, I'm the type of person who really likes to do things that challenge me and push me to the limit to see how much I can endure and to see what I am truly capable of mentally, emotionally, psychologically, and physically. And, of course, I have applied to and plan on continuing to apply for NASA's Astronaut Program, so this will be a great test for me to see if I am capable of handling the rigors of that career path.

***How do you plan to handle being shut in? Do you have any hobbies to help pass the time?***

I love learning languages, so I'm hoping to really improve my Russian while I'm in the habitat. I'll have direct access to native Russianlanguage speakers during the training portion prior to ingress as well as within the habitat, and I plan on bringing some of my Russian language books with me, so this will be a great opportunity for me to really focus on my Russian language skills!

Also, I'm really hoping to journal and video/photo-document my time in the habitat as much as I can, so I can share details about this experience once it's complete. I love talking about and sharing STEM topics on social media, so my hope is that I can share this unique experience with the publicas much as possible to help continue to garner interest in space, STEM, and human spaceflight. Additionally, I've been toying around with the idea of writing a book for a while, so maybe during the limited free time we have, I will have the chance to sit down and start putting thoughts down on paper officially!

Unfortunately, a lot of my other hobbies are not easily transferrable into a habitat environment. For instance, those that know me are aware that I actively participate in musical theater and dance, I perform on stage regularly, and play musical instruments, so maybe I'll have to see if my crew mates want to join me in some in some artistic/performance endeavors while in the habitat. Perhaps a SIRIUS 21 mini-musical? 😊

***Do you think your experience at Aerospace will be useful as a crewmember for the study? If so, how?***

Yes, one hundred percent! All of the technical knowledge I've gained while at Aerospace the past seven years will be beneficial to me, but specifically, my current position with the Global Partnerships Department involves daily interactions with international partners.

In my role in Global Partnerships, I've not only refined my diplomacy skills in my interactions with international partners as we represent the USSF interests, but I've also learned how to foster successful relationships and work on collaborative projects with people and organizations of varying cultural backgrounds. This will be extremely useful for me while in the habitat as only two of the six total crew members will be from the U.S.

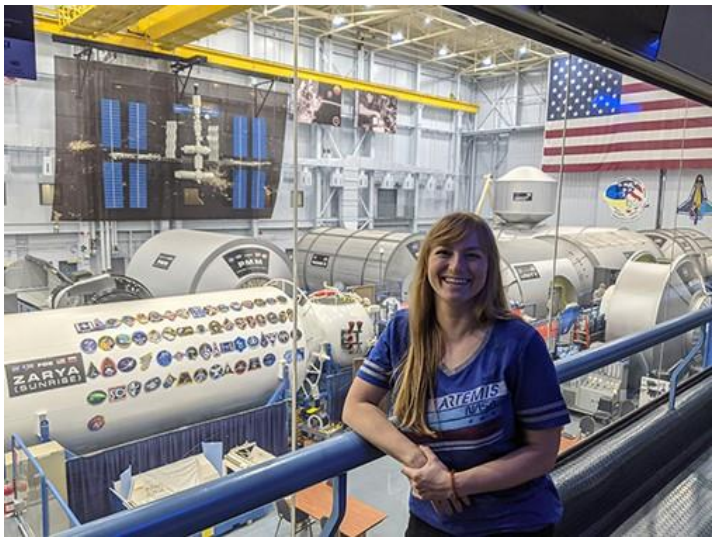
***You speak Russian and German and are fluent in Polish. Where did you develop your language skills?***

I honestly just love learning languages! I grew up in a bilingual household. My parents are both originally from Poland, so I was fortunate to spend a lot of time in Poland throughout my life and had many opportunities to communicate with family members who were native Poles. I was also recently able to practice my Polish skills in a professional setting at Aerospace as we engaged in dialogue and established partnerships with Poland.

As for German, Germany is known for engineering, and at the time that I was starting my engineering career as a freshman at The George Washington University, I had already thoughtthat maybe I would like to do an internship abroad sometime in the future, so I figured I'd give German a try in order to be more competitive for international internship applications!

Turns out that paid off because I did end up doing an undergraduate summer internship at the Technische Universität Berlin, as well as a separate year-long Department of State sponsored fellowship program, the Congress Bundestag Youth Exchange for Young Professionals program, in Hamburg after graduate school. Russian was the language I decided to pursue a little later in life. I became interested in U.S.-Russian space relations, and I had found out about a fellowship program in Russia, the Alfa Fellowship Program, which would allow me to spend a year living and working within my field in Moscow.

So, to give myself a competitive edge for that fellowship, I decided to start taking Russian language classes. Actually, Aerospace's tuition reimbursement program helped me do that! It all paid off in the end because I was indeed accepted to the Alfa Fellowship Program! Now, I am able to apply my experiences from that program during the SIRIUS 21 mission.




***How have your family and friends reacted to your participation in the study, knowing you'll be isolatedfor eight months?***

At this point, I do not think any of my life or career choices are shocking to my family or friends! Ha ha. Honestly, everyone – my family, my friends, my Aerospace colleagues — have been extremely supportive and excited for me because they know that this could potentially help bring me one step closer to fulfilling the ultimate dream of mine of becoming an astronaut. You never know what the future holds! Even if that dream never comes to fruition, I know I'll look back and think "Wow, I really did that!" and I'll be satisfied knowing that I had a hand in helping NASA with their goals of studying how human psychology, physiology,and team dynamics change while exposing individuals to long-term confinement, sensory deprivation, andlimited communication.

***The goal of this study is to prepare humans for inter-galactic travel. Would you be interested in traveling to Mars if you knew you could not return to Earth?***

That's the million-dollar question right there! That is very difficult to answer and I'm hoping that the SIRIUS astronaut analog study will provide me with experiences that will help me form a more definitive answer to that question. With that said, I think that decision would depend a lot on where I am in life at the time, what my priorities are, and what's more important to me. Earth is a beautiful blue gem with beautiful people on it, so I will say that it would be very hard to separate from all of that permanently, but it's definitely not out of the question for me!

# Zero Robotics Competition Highlights Aerospace Summer of STEM Programs

August 09, 2021


Aerospace recently sponsored the Zero Robotics coding competition, an event in which middle school students applied their knowledge of computer programming and robotics to compete with other teams virtually in a final code-off competition.

The middle school students competed in two conferences: Mercury and Apollo. The top winner for the Apollo conference was Project KoreX and the top winner of the Mercury conference was Irongate Command Center Teams, while the Most Improved award went to the Weingart East LA YMCA – Resurrection School Learning Pod team.


*Team KoreX, one of two Zero Robotics coding competition top winning teams*

Led by the Massachusetts Institute of Technology in partnership with Aerospace, the event was the culmination of a three-week program designed to teach middle school students the basics of coding and space engineering. In preparation for the event, the students leveraged their understanding of math and physics to brainstorm strategies and create program codes they tested in simulated scenarios.

“In the modern space age, we’re learning to do more and more with robotics,” said Steve Isakowitz, Aerospace President and CEO. “Success in this area requires innovative thinking, creative problem solving and teamwork. We’re in one of the most exciting times ever in space and there’s no telling what we can accomplish in the years ahead.”

*Zero Robotics coding competition (Mercury conference) winners Irongate Command Center*

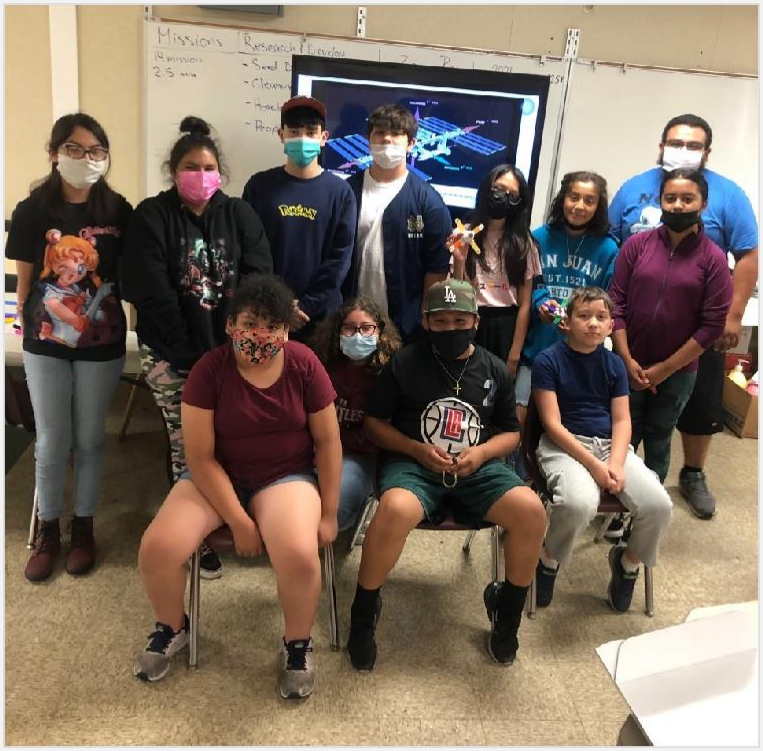
The Aerospace Federal Credit Union awarded $350 to each of the three winning teams. In addition to financial support, Aerospace provided 28 interns to mentor the students, who were drawn from various organizations across the country, such as the YMCA, Boys and Girls Club, scouting organizations, as well as other science clubs. Prior to the competition, the Zero Robotics program hosted a virtual Career Day event, featuring speakers from Aerospace, MIT, NASA, Cal State Northridge, and the U.S. Space Force.

“STEM competency impacts each person’s ability to contribute to the economic success of both the national and global economy,” said Dr. David Miller, Aerospace’s Chief Technology Officer. “Technology has become integral to daily life in the 21st century, making the mastery of STEM knowledge and skills critical to every individual’s employability and career success.”

Students, teachers and schools that have completed this year’s Zero Robotics virtual program will be guaranteed a spot in the 2022 competition, to be scheduled as a live event on the International Space Station (ISS). For the 2022 competition, ISS astronauts will referee the competition in real time, running student-developed code on ISS Astrobee robots, NASA’s new free-flying space mission assistants.

The 2021 Zero Robotics virtual program is not the only program designed to promote and cultivate interest in STEM disciplines via online lessons and activities. This summer, Aerospace also offered a four-week program of Professional Learning Sessions for educators, designed to instruct teachers about the variety of ways they can promote STEM disciplines to their students.

In addition, Aerospace’s ACE K-12 STEM Outreach group offered rising high school students the opportunity to attend Aerospace Academy, a free summer academic experience which ran for two weeks in July.




*Zero Robotics coding competition (Most Improved award) winners Weingart East LA YMCA – Resurrection School Learning Pod team.*

Academy participants were assigned activities and completed problem-solving exercises based on real-world technical problems, with AeroScholars leading the student teams and technical managers volunteering their time and services. Participants were provided with a mentor, as well as opportunities to meet with STEM professionals to observe their efforts to achieve mission success.

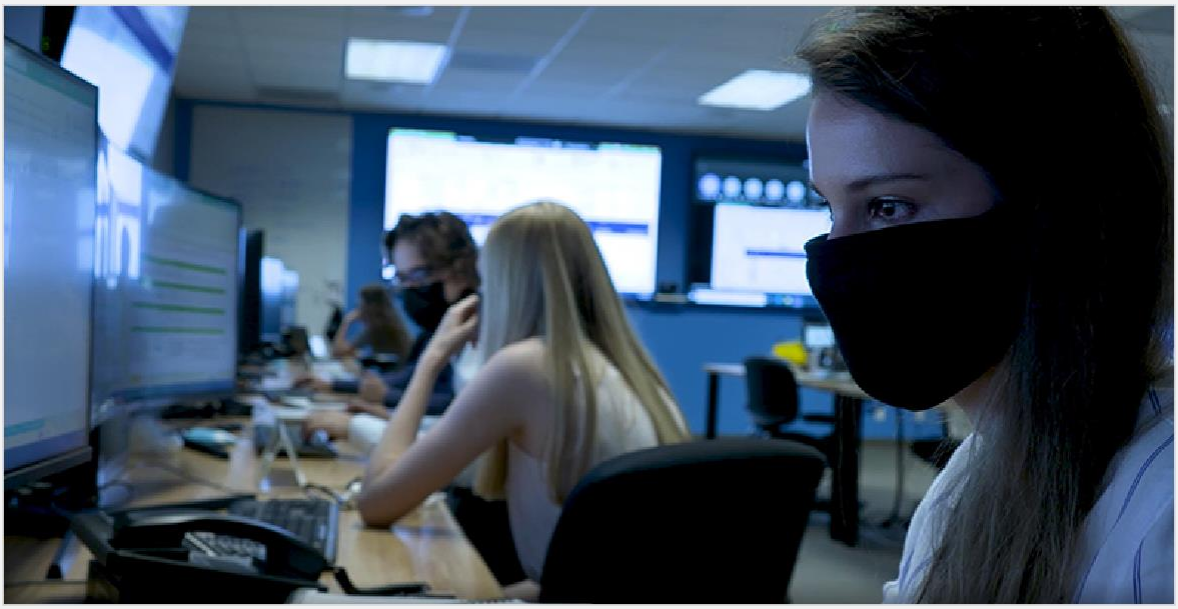
Last but not least, 93 high school students attended Aerospace's Virtual High School STEM Institute at the end of July. The free, week-long program offered students interested in STEM disciplines the opportunity to learn about careers in aerospace, and to collaborate with experts to apply problem-solving skills.

# Aerospace Interns Develop Conceptual Designs for Three Customer-Funded Projects

August 03, 2021

After over one year of an almost fully-remote work posture, a group of bright engineers at The Aerospace Corporation got together in person at the Aerospace Concept Design Center (CDC) to develop rapid space system conceptual designs for three customer-funded projects.

In past years, the Intern CDC program has conducted architecture and vehicle concept designs led by a group of summer interns with support from Aerospace Subject Matter Experts (SME). Last year, during COVID conditions, the program successfully performed two all-virtual design studies. This summer, the program was larger than ever; a multidisciplinary group of 42 interns from across the company formed three teams to support three different projects, all funded by customers: 1) Cislunar Ventures, funded by the iLab Ventures, 2) Protected Tactical SATCOM (PTS), funded by an SSG customer, and 3) beyond GEO (XGEO) GPS, partially funded by a USSF customer. The scope and size of this year's program demonstrated a new CDC capability by simultaneously conducting in-person CDC studies at two different Aerospace campuses for the first time.



*This summer's Intern CDC program was larger than ever, with a multidisciplinary group of 42 interns from across Aerospace forming three teams to support three different customer-funded projects.*

The Cislunar Ventures Team, co-led by interns Kevin Tong and Lee Organski, designed CubeSats to perform refueling and rendezvous, proximity operations, docking and undocking (RPODU) in cislunar space. The team studied the concept feasibility and evaluated various potential lunar orbits to propose a solution that would demonstrate key enabling technologies for future satellite servicing and logistics. iLab PIs for project included Hannah Weiher, Dr. Blake Rogers, and Dr. Jonathan Aziz.

The PTS Team, co-led by interns Will Parker and Dipal Shah, designed a constellation of satellites to provide resilient and robust communication services to tactical warfighters. The team explored several orbit and payload disaggregation options to evaluate different architecture and space system concepts, providing key take-aways and cost-effective options for project PIs Bomey Yang and Steve Breese in support of their SSG customers.

Finally, the XGEO GPS Team, co-led by interns Jishnu Medisetti and Cameron Johnstone, addressed the currently limited Position, Navigation, and Timing (PNT) capability beyond GEO. The team explored ways to fill the gap should high-fidelity PNT service not be offered in time to respond to increasing interest in cislunar missions today. To meet those needs of commercial and government customers, the team evaluated different low-cost architectures to propose a minimum viable product (MVP) baseline cislunar PNT architecture for the USSF's consideration in a broader architecture study. Project PIs include Dr. Tom Heinsheimer, Andre Doumitt and Dr. Todd Sheerin.

After several weeks of all-virtual preparation, starting from trade space analysis to tool development, the teams conducted in-person CDC studies lasting three days. In those studies, the interns used concurrent engineering to work together simultaneously to rapidly develop and evaluate space system concept designs.

During the week of July 19, two of the teams performed CDC studies simultaneously: the PTS Team used the newly renovated CDC lab located in A4 of the El Segundo campus, while the XGEO GPS Team employed a new CDC facility at the Aerospace Chantilly campus with the support of Allan Cohen and Barik Monasterio-Smith. This is the first time in-person CDC studies were simultaneously conducted at two different physical locations. The following week, the Cislunar Ventures Team performed their CDC study inEl Segundo.

*Concept Design Center (CDC) Study led by a team of Aerospace interns in the newly renovated lab at the El Segundo campus for the Cislunar Ventures project during the week of July 26, 2021. (Photo: Dr. Rob Stevens)*

Cameron Johnstone, co-lead for the XGEO GPS Team and an aerospace engineering graduate student at Georgia Tech said, "An invaluable take-away [from the CDC experience] is how valuable it is to have intelligent people around you to solve problems. It rapidly increases the quality of your work".

While the teams were on site, they had an opportunity to meet with their stakeholders and present their progress. "Customer interaction is something that interns typically don't get. And that is invaluable," said Will Parker, who is studying aerospace engineering at MIT, and who is a co-lead on the PTS team.

After the CDC studies, each of the teams will deliver their results through a study report and two outbriefs: there will be a four-hour in-depth presentation of their work, followed by a shorter presentation to brief key results and lessons learned to their stakeholders.

A majority of the interns are close to the end of their internship. Parker mentioned Aerospace internships offer interns many learning opportunities. In his words, “[Space] is an industry that really grows, and you need to stay up-to-date. There are a lot of changes that happen in real time – it’s exciting time to be at Aerospace because there are a lot of opportunities to learn about what is going on, and because people here are working on the cutting-edge and driving the future.”

This year marks the sixth year of the summer intern CDC study coordinated by the Architecture and Design Subdivision in ETG. Dr. Rob Stevens, Dr. Todd Sheerin and Rina Onishi led in coordinating this year’s CDC program, along with the support of many others across the Corporation.

*Written by Rina Onishi, Vehicle Design and Innovation Department, The Aerospace Corporation.*

# August 2021 Obituaries

August 01, 2021

*Sincere sympathy is extended to the families of:*

- **Thomas Caracash,** member of administrative staff, hired March 30, 1998, retired March 1, 2019, died June 17, 2021
- **Dante Aqui,** member of administrative staff, hired Feb. 4, 1980, retired August 1, 2006, died April 13, 2021
- **Robert Barczewski,** member of technical staff, hired June 13, 1966, retired April 1, 2007, died July 1, 2021
- **Robert Butland,** member of administrative staff, hired August 18, 1980, retired Oct. 1, 1993, died May 15, 2021
- **Vincent Canales,** member of technical staff, hired Nov. 26, 1984, retired June 1, 2016, died June 23, 2021
- **Richard Chambers,** member of technical staff, hired May 6, 1963, retired Oct. 1, 1996, died June 28, 2021
- **Cecil Crews,** member of technical staff, hired April 12, 1966, retired Oct. 1, 1996, died June 27, 2021
- **Leroy Dixon,** member of technical staff, hired July 18, 1966, retired Nov. 1, 1991, died July 1, 2021
- **Noble Dowling,** member of technical staff, hired Oct. 31, 1977, retired Jan. 1, 2001, died Feb. 4, 2021
- **Thomas Farabee,** member of technical staff, hired March 31, 1965, retired April 1, 1989, died July 12, 2021
- **Donald Fresh,** member of technical staff, hired Nov. 11, 1972, retired Nov. 1, 1991, died June 26, 2021
- **Harrison Killian,** member of technical staff, hired Feb. 13, 1961, retired Dec. 1, 1997, died July 20, 2021
- **Gloria Melson,** office of technical support, hired April 3, 1961, retired June 1, 1989, died July 9, 2021
- **Walter Melton,** member of technical staff, hired Sept. 15, 1975, retired Jan. 1, 1995, died June 23, 2021
- **Paul Nordin,** member of technical staff, hired June 24, 1963, retired March 1, 2014, died July 5, 2021
- **Delores Rickerd,** office of technical support, hired Sept. 29, 1980, retired Oct. 1, 1989, died July 24, 2021
- **John Rosenberger,** office of technical support, hired Nov. 19, 1973, retired March 1, 2003, died June 27, 2021
- **Kenneth Russell,** member of technical staff, hired May 15, 1989, retired June 1, 2001, died March 26, 2021
- **Jennie Yeh,** member of technical staff, hired Nov. 2, 1981, retired Feb. 1, 2002, died June 18, 2021

*To notify Aerospace of a death and have it included in the Orbiter, please contact People Operations at (310) 336-5107.*