

Take a Virtual Tour of MAFIOT

November 24, 2021

The <u>Aerospace Virtual Tours</u> allow you to digitally navigate through some of our world-class labs to learn more about the innovative and complex work our experts do every day to advance space capabilities. Be sure to check out what other virtual tours are available on Aerospace.org.

The Mt. Wilson Aerospace Facility for Integrated Optical Tests (MAFIOT) is a flexible testbed system for evaluating techniques and hardware for optical technologies such as long-



range tracking, optical communications, and atmospheric measurements.

The system combines a passive sensor system consisting of cameras in 4 wavelength bands and an active laser ranging or lidar system. The sensors are hosted on a 0.8 m telescope and sited at the historic Mt. Wilson Observatory in the mountains above the Los Angeles Basin.

MAFIOT's goals are twofold – to provide a platform to evaluate individual components of sensor systems, and to develop systems engineering expertise for constructing and operating integrated optical sensor systems.

Explore our **MAFIOT** to learn more.

Aerospace Employees to Honor Veterans, One Wreath at a Time

November 22, 2021

On Dec. 18, more than 250,000 wreaths will be placed at Arlington National Cemetery to honor United States veterans as part of Wreaths Across America (WAA). The Aerospace Military Veterans (AMV) is organizing an effort for Aerospace employees to join by volunteering in Virginia and across the country through the program.

Each year, more than 2,000,000 wreaths are placed at the graves of U.S. veterans in over 2,500 locations across the U.S. and abroad to honor



Wreaths laid out in Arlington National Cemetery.

all veterans and active military members for their service and sacrifice.

AMV is looking for volunteers to help out this year in a variety of ways. Aerospace's George Vogen, Senior Project Engineer in the Space Systems Group, will be leading a truck at Arlington National Cemetery and is looking for volunteers to help him unpack the truck filled with more than 3,000 wreaths. Vogen and his team will be there bright and early to ensure the wreaths are handed out and placed. As a long-time volunteer for Wreaths Across America, Vogen, who is a retired US Air Force veteran, said that year after year the event has left him with lasting memories, "I learn something new every time I'm out there."

Aerospace's Senior Project Engineer Lauren Perry, who started out as a volunteer wreath layer in 2015, now serves as the Key Volunteer Lead for WAA's Arlington Wreath Project at Arlington National Cemetery.



George Vogen and other volunteers unloading a truck at a previous WAA event in Arlington.

"The mission of Wreaths Across America is to 'remember' the fallen, 'honor' those that serve, and 'teach' the next generation the value of freedom," said Perry. "A few years ago at a WAA event, someone recited an anonymous quote 'A person dies twice: once when they take their final breath, and later, the last time their name is spoken.' The mission of Wreaths Across America takes this to heart."

In keeping with this mission, wreath layers are asked to take a moment to read aloud the name of the veteran where they place the wreath. In doing so, volunteers can ensure that the memory of the deceased lives on. "I think it is a really fitting tribute to the veterans and a memory of their sacrifice and an honor to their sacrifice," said Chuck Allen, President of AMV and a retired US Air Force veteran. "After you see all the wreaths out there on the tombstones, it is really worthwhile."

For those interested in volunteering and supporting our veterans and Wreaths Across America, there are many ways to participate.

"From buying or donating wreaths to coming out in person and laying wreaths at a cemetery, there are a lot of ways to be involved," Vogen said. "Everyone is welcome to help out, including friends, family and children, and pay tribute to and honor our nation's veterans."



Truck filled with wreaths waiting to be unloaded in Arlington.

There is a database of other participating locations to sign up and help place wreaths at a veterans' cemetery.

"I think by doing things like Wreaths Across America, sending care packages, also sending postcards, these are things we do that to let the troops know that they matter," Allen said. "What they do matters and their sacrifice matters."

Improving Space Domain Awareness With Prime Focus

November 17, 2021

As more nations and commercial entities have advanced space capabilities, strengthening Space Domain Awareness (SDA) becomes increasingly critical for the nation's space operators to be cognizant of what else is operating in Earth's orbit and beyond.

Integrating and streamlining information across the enterprise is crucial in advancing thateffort. Currently, data does not flow smoothly from photons to decision support tools for the warfighter, delaying real-time decision support.



The Aerospace Corporation is leading the way in establishing an operational pipeline for SDA sensors with project Prime Focus – a prototype automated SDA node.

"The current systems rely on human operators, making the pipeline fragile and prone to error," said project lead Matthew Britton, Principal Engineer in Aerospace's Space Science Applications Laboratory. "Prime Focus will yield a sustained, daily operational SDA data flow backed by digital engineering and cloud technologies."

Space control and SDA is a technically challenging problem with many requirements: extensive sensor networks for observational capacity, geometric diversity for solar lighting conditions, broad ground sensor coverage, and response times on a tactical scale.

One foundational issue is how to use multiple heterogeneous sensors to collect data on a list of resident space objects that is growing at an exponential rate. This requires scheduling sensors, communicating observational tasks to them in real time, acquiring these observations autonomously, and reporting the data back to a central data store. Scheduling is a particularly complex problem with many variables, since the sensors, targets, Earth, and sun are all in relative motion. Artificial intelligence and machine learning are promising solution paths that can be leveraged to meet the timescales needed.

"An automated, self-scheduling network of sensors cries out for a solution that can accommodate the dynamic requirements imposed by both weather and tactical imperatives," Britton said.

Prime Focus is an effort to automate the <u>1-m AeroTel telescope</u> located on top of Aerospace's laboratory facility in El Segundo, Calif. AeroTel is well-suited to this project, with a range of existing instrumentation developed specifically for the SDA mission.

To learn more about Prime Focus as well as to see visuals that show how the tracking works, read the full article on **<u>Aerospace.org</u>**.

Aerospace Launches New CSPS Website to Better Help Shape the Future of Space

November 15, 2021

The space enterprise is facing tremendous change, and decisionmakers looking to navigate this deeply complex and rapidly evolving environment require experience and vision. Aerospace's Center for Space Policy and Strategy (CSPS) addresses this growing need for objective, expert analysis, and well-informed insight to help the nation shape the future of space.

In support of that effort, Aerospace has now launched a **<u>new website for CSPS</u>** to offer a dedicated public platform that advances the corporation's thought leadership in space policy research and strategic discussions.

As a collaboration between the Corporate Affairs and Communications division and CSPS, the new website enables visitors to more intuitively access Aerospace's deep library of work across a breadth of space and technology policy topics.

"I really appreciate the work of the communications and development teams that helped put together a much more intuitive look and feel for the CSPS website," said Jamie Morin, Executive Director for CSPS and Vice President in the Defense Systems Group (DSG). "It will make a big difference for our users as they look to find Aerospace insights."

The new website's refreshed interface and streamlined navigation provides an improved user



The new CSPS website enables visitors to more intuitively access Aerospace's deep library of work across a breadth of space and technology policy topics.

experience for the growing audience of CSPS's expert policy papers, Space Policy Show discussions, news commentary in the media and upcoming events.

The structure of the site focuses on specific Research Areas that impact the space enterprise. These areas include National Security; Space Traffic Operations & Debris; National Policies & International Relations; The Business of Space; Science & Technology; Exploration, Society, & the Future; and Climate Change and the Environment.

"In developing and launching the new CSPS website, the cross-function team took the opportunity to implement an adaptable taxonomy structure that helps to better focus on the key themes and interests for the space enterprise," said Karl Jacobs, Associate Director of Digital Media. "It also enhances the user experience in areas such as responsiveness for visitors on mobile devices and accessibility for people with disabilities."

The CSPS website and related content can still be found on Aerospace.org through the existing navigation, and the team is in the process of integrating the new site into the corporate search functionality.

We encourage you to explore the new Center for Space Policy and Strategy website today by visiting <u>https://csps.aerospace.org/</u>



The new website enables users to easily navigate through the Research Areas to explore relevant CSPS policy papers, Aerospace experts, insightful discussions and more to enrich their understanding of space.

Aerospace Patents Revolutionary Lunar Habitat Concept

November 10, 2021

Advancing space exploration capabilities has long been an area of intense interest to human civilization, not only for the potential to improve conditions on Earth but also to better understand the mysteries of the universe. Space habitation and in situ resource utilization will play a critical role in enabling the ability to reach even farther into space.



However, even today, human settlement of the Moon and Mars presents numerous practical and logistical challenges. In addition to the rigors of space travel, human settlers will face hostile environments characterized by extreme temperatures and low gravity. While the Earth's magnetosphere and atmosphere afford protection from solar and cosmic particle radiation as well as meteoroids, no such protection exists on the Moon or Mars, making specialized protective habitats a necessity for human colonists.

The Aerospace Corporation was recently granted a p<u>atent</u> for its *Regishell* Lunar Habitat concept for lightweight, inflatable lunar human habitat structures (airforms) that could be transported in compact, deflated form to the Moon and inflated using any volatile gas that could be generated on-site, such as oxygen. Once inflated, the *Regishell* could be rigidized with an Earth or lunar-made alkali binder mixed with local regolith, a soil covering comprised of dust and broken rocks that blankets solid rock surfaces, and the mixture could be sprayed on or injected into the inflated structure. The Aerospace Physical Sciences Laboratories (PSL) have conducted experiments to find an appropriate binder material for which even small concentrations could lead to hardening in vacuum and lunar daylight surface temperatures.

"If we're really going to establish a base camp on the Moon or Mars, we need to anticipate how base camps will grow and turn into a kind of ecosystem," said Alli Taylor, Senior Project Leader of the Human Exploration and Space Flight Division. "There's going to be a lot of construction," Taylor said. "It's an area we thought would be good to build Aerospace's experience and skillset in. The *Regishell* concept is just the beginning of the process of establishing methods and materials to make this happen."



The Regishell method can be used to create multilayer structures that also serve as water reservoirs for human inhabitants, as well as magnetic tarmacs to keep hazardous, ionized moon dust away from human habitats.

Living Off the Land

The immense amount of energy required to leave Earth's gravitational field places a premium on rocket payload systems, making the transportation of building materials to the Moon or Mars impractical. For years, researchers have explored the idea of enlisting on-site resources to the cause of space exploration. While the Moon and Mars contain a variety of volatiles and minerals of interest to science, a resource they both possess in abundance is regolith.

"We recognize the big challenge of transporting mass to the moon. Bringing the materials needed to build homes analogous to the beautiful ones we have here on Earth is simply not possible," said Dr. Lael Woods, Systems Director of Aerospace's iLab. "Reducing payload mass and using local resources were key objectives when we held our Moonfield Summit brainstorming session to develop novel concepts related to lunar exploration."

The *Regishell* habitat concept boasts a number of advantages, including a smaller payload volume to deliver to the Moon compared to other habitat concepts, and lower cost of materials for the same or better radiation protection. In addition, habitats created using the *Regishell* method can be multilayer structures that can also serve as reservoirs for water to sustain the human inhabitants within.

This water reservoir concept played an essential role in the simulation phase of research conducted by PSL to determine the extent to which *Regishell* could shield inhabitants from the ever-present threat of radiation.



Shelter in Space

"We looked at what would happen in the event of a solar flare. These events produce huge amounts of radiation, which is very problematic for astronauts," said Dr. Henry Helvajian, Senior Scientist at the Surface Science and Engineering Department (PSL). "We looked at what would happen during a 14-day stay on the Moon, using a standard 70 kg water-phantom as stand-in for an actual astronaut. We looked to see if a *Regishell* structure would protect an astronaut from radiation, and from our calculations it appears that it does."

The patented *Regishell* methodology may ultimately be a pathway for more efficient and less costly space exploration. Members of the team are now exploring techniques for breaking down lunar soil into individual components on the Moon. In addition, the team is now investigating ways to mitigate the problematic characteristics of lunar dust.

"Dust on the moon is ionized and takes the form of shards. This presents problems for human health," Taylor said. "Since it's also magnetic, we're exploring the possibility of creating a tarmac out of modified *Regishell* that attracts this dust and keeps it out of human habitats."

While there are numerous technical and logistical hurdles to overcome before lunar and Martian colonies become a reality, new approaches to materials development and the use of on-site resources are critical to making exploration viable.

"The next step is to transition this concept to our colleagues outside of Aerospace," Woods said. "Ultimately, we aim to continue to use our Ventures investments to prove concepts like this, that facilitate the far-reaching objectives of our customers."

This article has been published on Aerospace.org.



Space Leaders Discuss Accelerating Government and Commercial Collaboration

November 09, 2021

The space domain is changing faster than ever, and the boundaries that once separated national security, civil and commercial space are blurring at an increasing pace. As a result, new opportunities are emerging to partner to outpace threats, address shared challenges and unlock a new era of human achievement in space.

In a recent virtual panel produced in partnership with TechCrunch, a



leading media organization focused on the startup community, Aerospace President and CEO Steve Isakowitz engaged on the topic of leveraging commercial capabilities at the national level to support enterprise mission success. Watch the **full conversation here**.

Other space leaders on the discussion included Gen. David D. "DT" Thompson, Vice Chief of Space Operations, United States Space Force; Alexander MacDonald, Chief Economist at NASA; and Mandy Vaughn, Founder and CEO GXO, Inc., which helps commercial space ventures quickly navigate the startup environment.

"I would argue at no time in our history have we seen so much change across all sectors as we're seeing now," Isakowitz said of the space enterprise.

He pointed to the emerging capabilities of adversaries that pose a threat to national security, critical issues like space traffic management and cislunar leadership impacting civil space, the influx of investment capital fueling the growth of commercial space, and new innovations and technologies accelerating the pace of change.

Making the most of this evolving landscape relies on the nation's space programs being able to acquire transformative space capabilities and technologies at the speed of mission need.

"What we have to do is understand some of those areas where we've trusted ourselves and only ourselves for decades," Gen. Thompson said. "We really do have to break the mold, think differently and understand and recognize we can incorporate more commercial services." The panelists discussed demands for mission success intersecting with new capabilities being put forward by commercial companies, as well current capability gaps and opportunities for new space companies to partner and do business with government space programs.

"If the government working with industry can develop standards and interfaces [for architecture], I do think it allows for more opportunities to onramp new technologies and players... It makes for a more resilient and much more affordable architecture," Isakowitz said.

The panel is a lead-up to TechCrunch's upcoming TC Sessions: Space 2021 in December, to which Aerospace is a sponsor. For more information, visit <u>https://techcrunch.com/events/tc-sessions-space-2021/</u>

November 2021 Obituaries

November 01, 2021

Sincere sympathy is extended to the families of:

- James E. Anderson, member of technical staff, hired June 5, 1961, retired Aug. 1, 1986, died Aug. 31, 2021
- Kenneth Benner, member of technical staff, hired May 9, 2016, died Sept. 18, 2021

- Ronald Cook, member of administrative staff, hired June 2, 1961, retired Jan. 1, 1995, died Sept. 27, 2021
- Richard Davila, office of technical support, hired March 6, 1967, retired Sept. 1, 2010, died Sept. 26, 2021
- John Ericson, member of technical staff, hired July 27, 1964, retired July 1, 1994, died June 22, 2021
- Allen Gross, member of technical staff, hired Sept. 7, 1965, retired Jan. 1, 2003, died Sept. 9, 2021
- **Thomas Hartwick,** member of technical staff, hired March 27, 1961, retired March 1, 1995, died Sept. 2, 2021
- **Robert Kang,** member of technical staff, hired Aug. 3, 1981, retired Nov. 1, 1993, died Sept. 30, 2021
- Phyllis Leonard, office of technical support, hired Feb. 3, 1964, retired June 1, 2001, died Sept. 8, 2021
- **Debra Levy,** member of administrative staff, hired Jan. 24, 1966, retired Nov. 1, 2005, died Sept. 20, 2021
- David Matson Jr., member of technical staff, hired April 2, 1962, retired Aug. 1, 1988, Oct. 7, 2021
- Milton Norsworthy, member of technical staff, hired Feb. 18, 1964, retired Oct. 1, 1996, died Aug. 12, 2021
- **Donald Preihs,** member of administrative staff, hired Oct. 3, 1960, retired Dec. 1, 1990, died Sept. 25, 2021
- Walter Pyper, member of technical staff, hired June 15, 1985, retired Sept. 1, 1995, died Sept. 14, 2021
- **Patricia Richardt**, office of technical support, hired Oct. 2, 1989, retired Jan. 1, 2000, died Sept. 14, 2021
- Dianne Sakguchi, member of technical staff, hired July 24, 1972, retired Nov. 1, 2012, died Oct. 22, 2021
- H Joyce Schieler, member of administrative staff, hired Sept. 5, 1960, retired May 1, 1992, died Aug.
 22, 2021
- Leroy Shigg, office of technical support, hired March 27, 1978, retired April 1, 2010, died Aug. 19, 2021

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