



SHAPING THE FUTURE OF AEROSPACE

LOS ANGELES SECTION
JANUARY 2025



Vaughan

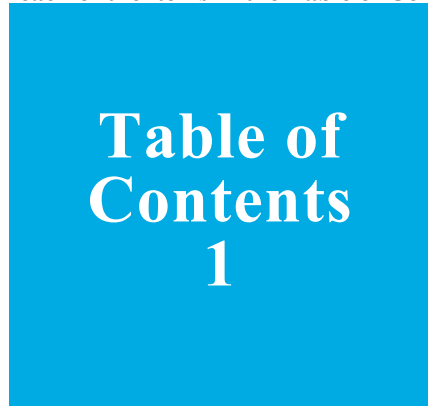
American Institute of Aeronautics and Astronautics
LOS ANGELES SECTION

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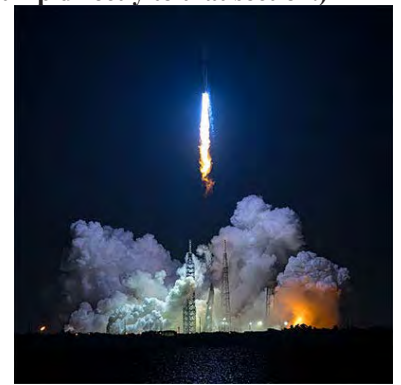


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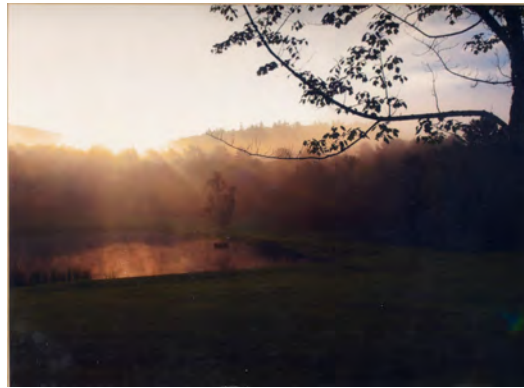
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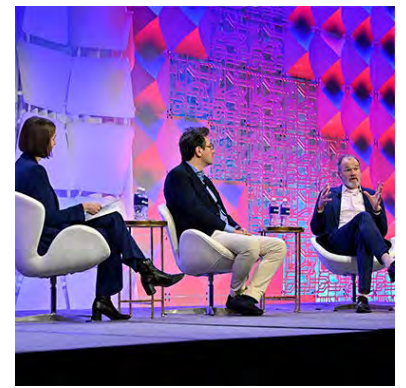
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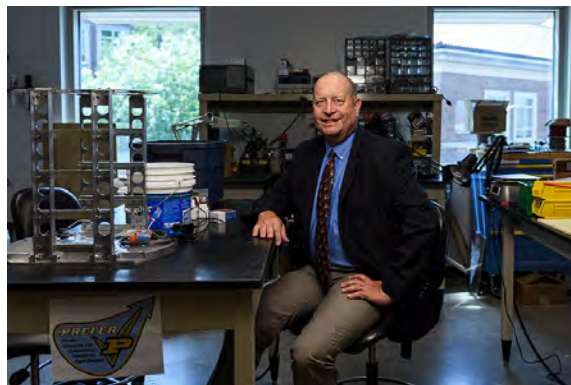
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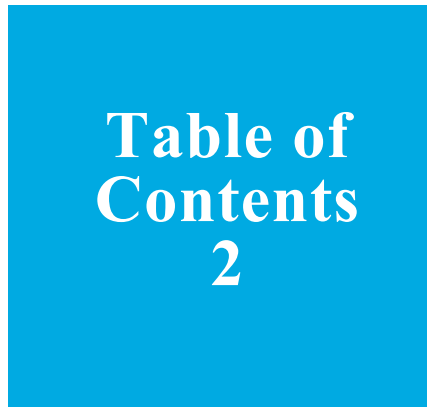
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Upcoming Events / Meetings of AIAA / Los Angeles Section

(<https://www.aiaa-lalv.org/events/2024-events-program>)

Saturday, February 1, 2025, 11 AM PST (GMT -0800) (U.S. and Canada)

RSVP and Information:

(<https://lp.constantcontactpages.com/ev/reg/dfq35wd/lp/8a7c4683-5630-4d30-945c-11d446f7383e>)

Space debris demise in the atmosphere: What are the impacts in the era of mega-constellations?

by

José P. Ferreira

(The speaker will present in person.)



Ph.D. candidate | M.Sc., P.Eng.
NASA FINESST & Fulbright fellow
Department of Astronautical
Engineering
Viterbi School of Engineering
University of Southern California



Physical Location

Lawndale Library (Meeting Room), 14615 Burin Ave, Lawndale, CA 90260

Google Maps: <https://maps.app.goo.gl/e4jDKLVKnLGfRCT46>

(This event is not sponsored by the Lawndale Library)

On-Line attendance

(Please register / RSVP and you will receive the ticket with the Online link. Please check Spam or Junk folder shortly after registration to make sure. If not, please try using an alternative email address to register.)

Tentative Agenda: (All Time PST (GMT -0800, U.S. and Canada))

1030 Check-in, Networking

1100 Welcome and Introduction

1105 Presentation and Q&A

1235 Additional Q&A (if needed) / adjourn.

Disclaimer: The views of the speakers do not represent the views of AIAA or the AIAA Los Angeles Section. AIAA

LA Section: General Contact: contact@aiaa-lalv.org,

Upcoming Events / Meetings of AIAA / Los Angeles Section

(<https://www.aiaa-lalv.org/events/2024-events-program>)

RSVP and Information :

(<https://lp.constantcontactpages.com/ev/reg/vs7d75/lp/3a2bc909-6a97-4dd1-91d8-b986b0365387>)

Saturday, February 8, 2025, 10:30 AM PST (GMT -0800) (U.S. and Canada)

AIAA LA Section Space Sustainability mini-Conference (AIAA LA New Space 2025)

Tentative Agenda:

(All Time PST (US & Canada, GMT -0800))

Presenters

**Kuang-Han Ke, Gran Systems LLC, (Moderator)
"Space Sustainability Solutions"*

**Erik Long, Orbotic Systems,*

"Advancing Small Spacecraft Deorbiting: Drag Modulation and Trajectory Control with the Deorbit Drag Device (D3)"

**Isabelle Mierau, Zero Debris DAO,
"Capacity building for a sustainable space economy"*

(The speakers will present in person or online.)

In-Person in:

*Lomita Library (Don Knabe Meeting Room)
24200 Narbonne Ave, Lomita, CA 90717*

Online:

*(Please register / RSVP and you will receive the ticket with the Online link. Please check Spam or Junk folder shortly after registration to make sure. If not, please try using an alternative email address to register.)
(Meeting link/url in the confirmation email after RSVP or in reminders)*



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AIAA LA Section: General Contact: contact@aiaa-lalv.org, Events/Program events.aiaalalv@gmail.com



American Institute of Aeronautics and Astronautics
Los Angeles Section

Newsletter

Upcoming Events / Meetings of AIAA / Los Angeles Section

(<https://www.aiaa-lalv.org/events/2024-events-program>)

Wednesday, February 12, 11:15 AM - 1 PM PST (GMT -0800) (US and Canada)

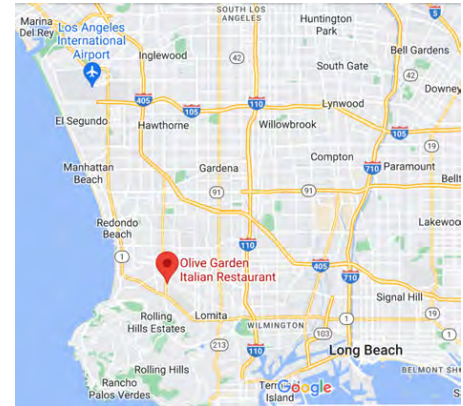
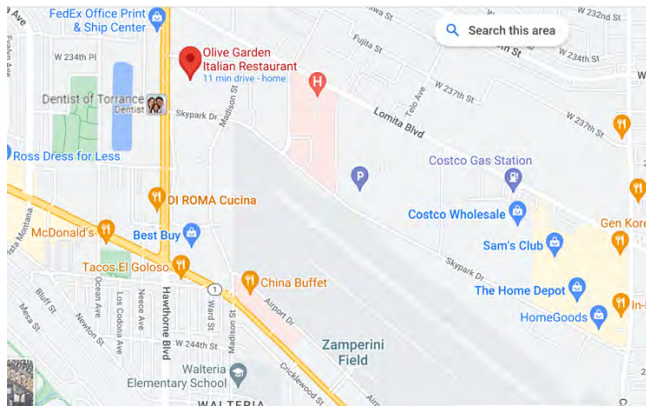
AIAA LA Aero Alumni Meeting

Hybrid in-person luncheon and Zoom on-line meeting

Our monthly Aero Alumni Zoom meeting is at 11 am PST (on-line) / 11:15 am PST (in-person) on February 12 (The 2nd Wednesday of February) It will be a hybrid meeting (both in-person there and on-line) at the Olive Garden in Torrance, 23442 Hawthorne Blvd., Torrance, CA 90505. COVID is again allowing a hybrid meeting. If you can, please join me at the Olive Garden. I'll meet you there. If you can't, you can use the Zoom link below. It will take a few minutes to set up the link. You can chat among yourselves until it's ready.

In-Person in:

***Olive Garden in Torrance, 23442 Hawthorne Blvd., Torrance, CA 90505
 (South of 105/405 Hwy, West of 101 Hwy, North of Pacific Coast Hwy (1))***



Join Zoom Meeting: <https://aiaa.zoom.us/j/84235011411?pwd=8WuNmyxs35Fqf4nrMJHxCaYZN7fuHw.1>

Dial by your location

- +1 669 444 9171 US
- +1 720 707 2699 US (Denver)
- +1 253 205 0468 US
- +1 253 215 8782 US (Tacoma)
- +1 346 248 7799 US (Houston)
- +1 719 359 4580 US
- +1 689 278 1000 US
- +1 301 715 8592 US (Washington DC)
- +1 305 224 1968 US
- +1 309 205 3325 US

Meeting ID: 842 3501 1411, Passcode: 633276

Find your local number: <https://aiaa.zoom.us/u/kbyVIY7XIZ>

One tap mobile

- +16694449171,,84235011411# US
- +17207072699,,84235011411# US (Denver)

- 833 928 4608 US Toll-free
- 833 928 4609 US Toll-free
- 833 928 4610 US Toll-free
- 877 853 5257 US Toll-free
- 888 475 4499 US Toll-free
- 833 548 0276 US Toll-free
- 833 548 0282 US Toll-free

Please contact Mr. Gary Moir (gary.moir@ingenuir.com)



American Institute of Aeronautics and Astronautics
Los Angeles Section

aiaa-lalv.org | aiaa-lasvegas.org
engage.aiaa.org/losangeles-lasvegas

Upcoming Events / Meetings of AIAA / Los Angeles Section

(<https://www.aiaa-lalv.org/events/2024-events-program>)

Friday, February 21, 2025, 10:30 AM PST (GMT -0800) (U.S. and Canada)

AIAA LA Section University Student Branches mini-Conference 2025



Dr. Gary Li (Impulse Space)

Clay Mowry (CEO of AIAA)

Lindsay Mitchell (Liaison of AIAA)

David Moeller Sztajnbok (USC)

Prof. Geoffrey Spedding (USC)

Dr. Nahum Melamed (The Aerospace Corporation)

Mr. Luis Cuevas (Section Chair, AIAA Los Angeles Section)

Mr. Ian Clavio (Education Chair, AIAA Los Angeles Section)

Physical Location

Lawndale Library (Meeting Room), 14615 Burin Ave, Lawndale, CA 90260

Google Maps: <https://maps.app.goo.gl/e4jDKLVKnLGfRCT46>

(This event is not sponsored by the Lawndale Library)

On-Line attendance

(Please register / RSVP and you will receive the ticket with the Online link. Please check Spam or Junk folder shortly after registration to make sure. If not, please try using an alternative email address to register.)

Tentative Agenda: (All Time PST (GMT -0800, U.S. and Canada))

1010 Check-in, Networking

1030 Welcome and Introduction

1035 Presentations and Q&A

1630 Networking / adjourn.

Disclaimer: The views of the external speakers do not represent the views of AIAA or the AIAA Los Angeles Section. AIAA LA Section:

Education Chair: education-chair@aiaa-lalv.org, General Contact: contact@aiaa-lalv.org,

AIAA Statement on Blue Origin New Glenn Test Flight

by AIAA, 2025 January 16 (<https://www.aiaa.org/news/news/2025/01/16/aiaa-statement-on-blue-origin-new-glenn-test-flight>)



New Glenn at liftoff during the NG-1 mission (January 16, 2025). | Credit: Blue Origin

January 16, 2025 – Reston, Va. – The American Institute of Aeronautics and Astronautics (AIAA) issued the following statement from AIAA CEO Clay Mowry:

“Congratulations to the Blue Origin team. Today’s New Glenn test flight from Cape Canaveral Space Force Station marks a pivotal moment in heavy-lift reusable launch vehicle development. The team has made tremendous technical progress reaching orbit on this first attempt. They will learn a lot from today’s test flight and will be able to apply the lessons learned from the engineering data gathered to advance the development of the New Glenn system.

It’s the most exciting time in aerospace in my 30-year career. We’re experiencing a space renaissance with new launch capabilities enabling new exciting missions. New Glenn is unmatched with its heavy-lift volume in its large payload fairing, enabling freedom of design for satellite operators, customers, and government space agencies.

This is an extraordinary moment as we witness the birth of the reusable launch industry, because reusability is the future of launch. As the newest heavy-lift rocket, New Glenn is introducing competition to the launch market, helping accelerate the growing space economy by reducing costs, expanding access to space, and helping return us to the moon and on to Mars. Through such bold steps, we’ll see a future where living and working in space becomes routine.

As a Corporate Member of AIAA, Blue Origin exemplifies the innovation driving our community forward. We commend New Glenn program leaders Jarrett Jones and Mark Featherstone and the countless industry professionals who have designed, built, and tested this new launch system, which brings us closer to a future of sustained human presence beyond Earth. You are shaping the future of aerospace.”

Cover Page Description and Artwork Contributor



COVER- artist's conception; In the future an Orbital Utility Vehicle passes over the rainforests of South America as it maneuvers for a rendezvous. The spacecraft is made of modules and components built on Earth and sent into space for assembly. We might imagine it did not take long for flight crews to nickname the machine a 'Lizzy'...because of its strong resemblance to a lizard and having the same versatile usefulness of the early 20th Century Model 'T' automobile the 'Tin Lizzy'.
 Artwork by **James Vaughan** <https://jamesvaughanphotoillus.com>

A new dawn at the Lowell Observatory

by Dr. David H. Levy, Comet and Asteroid Hunter, Co-Discoverer, Shoemaker-Levy 9 (2025 February article)



Sunrise at our first Adirondack Astronomy Retreat, Summer of 2005. (Dr. David Levy photo)

Last November 16, the Lowell Observatory opened its new Marley Foundation Astronomy Discovery Center. I think this center represents the most significant advance in inspiring young p[people to enjoy astronomy in the last 44 years, since Carl Sagan's Cosmos in 1980. Perched atop Mars Hill at the famous Lowell Observatory, this wonderful building is a dream. If you live in or near any part of Arizona, please plan to take your family to see this. A girl or a boy entering it is treated to a personal tour of the Universe. It begins with our small home planet, the Earth, and then moves outward past Mars, past Jupiter, and onward past the outermost planets. On the roof are telescopes, and an open-air planetarium from which one can see the real sky. Because Pluto was discovered just a few hundred meters away at this observatory, and because Lowell remains a busy center for work on Pluto, this Discovery solar system easily features nine planets.

One of the first things I wanted to see was the solar exhibit that Tim and Carol Hunter provided. It was way up on the building's third floor, and it was stunning. The Sun, which in earlier times was studied only in its own "white light" and in later decades in the 20th century through the light of hydrogen alpha, is now visible by spacecraft in almost too many ways to mention. From big sunspots marching slowly across the surface of the Sun, to coronal streamers and filaments sighted by spacecraft, Tim's exhibit gives us a look at our home star we have never seen before.

A new dawn at the Lowell Observatory

I was mentioning all this a recent meeting of the Denver Astronomical Society, One of the DAS members attending it that evening was Brad Schafer, professor emeritus at LSU but who now lives in Tucson. Casually that evening I mentioned that I had been monitoring the Sun since 1963, and he wrote to tell me that if all this is true, then I may have the longest record of solar observations of anybody in the world. More about this in a different article.

As exciting as the s Sun display was, I did want to get another look at my favorite telescope, the 13-inch astrograph telescope that Clyde Tombaugh used to discover Pluto. Where the Discovery Museum showcases the Universe as we see it now, the 13-inch brings us back to an earlier time at Lowell, where Clyde Tombaugh looked out at the solar system, opened his eyes in wonder, and discovered a new world.

It is impossible for me to visit Flagstaff without letting the passions, the emotions of a city of discovery, travel through me. Flagstaff is alive with history, and even its street lights are shaded at night to allow views of the sky. This is the place where V.M. Slipher discovered the red shift that led to Edwin Hubble's revealing the expanding universe. And who knows what youngster with a first look at the Discovery center, might return some day to make a further detection of a cosmic secret whose essence we cannot even imagine?

The ‘Golden Age’ of AI and Autonomy

by AIAA (Anne Wainscott-Sargent, AIAA Communications Team), 13 January 2025

(<https://www.aiaa.org/news/news/2025/01/13/the-golden-age-of-ai-and-autonomy>)

Panel Highlights Critical Role of AI and Autonomy on Earth and in Space

ORLANDO, Fla. – In the future artificial intelligence (AI) and autonomous systems will transform how people and assets are tracked, whether on Earth or in space, noted speakers on an AIAA SciTech Forum plenary on AI and Autonomy last Thursday, 9 January.



Watch Full Session On Demand

Advances in real-time monitoring and connectivity will help first responders act fast, said one panelist, recalling a 2012 Sausalito, California, road fatality caused when a man crashed his car following a heart attack. He was traveling alone at night, with no one aware of his location.

“In a world where we have a fully connected comms system, that plays out very differently,” said Eric Smith, senior principal, Remote Sensing and Data Analytics at Lockheed Martin Space.

Redefining Accident Response

Not only would AI wearable tech proactively monitor the man’s medical condition, it also would alert EMS and even coordinate traffic control systems to ensure the speediest response to his location.

The plenary session highlighted advancements in AI and their applications in simulation, safety, and decision making, as well as how autonomous systems are reshaping the future of space exploration.

“This is a golden age for robotics and autonomy,” noted Marco Pavone, lead autonomous vehicle researcher at Nvidia and an associate professor at Stanford University in the Department of Aeronautics and Astronautics.

His focus is fourfold: 1) develop visual language models for vehicle autonomy architectures, 2) find other ways of architecting autonomous tasks, 3) explore simulation technologies to enable end-to-end simulation of autonomous tasks in a realistic and controllable way, and 4) research AI safety – building safe and trustworthy AI systems, particularly in space systems and self-driving cars.

Pavone also co-founded a new center at Stanford – the Center for AEroSpace Autonomy Research (CAESAR), which was formed to advance the state of the art by infusing autonomous reasoning capabilities in aerospace systems.

Left to right: Julie Shah, MIT; Marco Pavone, Stanford University and NVIDIA; and Steve Walker, Lockheed Martin, participate in the AI and Autonomy panel, Thursday, January 9, at the 2025 AIAA SciTech Forum in Orlando, Florida. AIAA–©

The ‘Golden Age’ of AI and Autonomy

“At the center we are looking at AI techniques for constructions tasks for other space systems and we’re even developing space foundation models that take into account specific inputs and outputs,” he said.

Lockheed Martin is using AI in all four domains of its business – Space, Missiles and Fire Control, Rotary Systems, and Aeronautics. The company envisions AI for autonomy in unstructured environments like the surface of the moon or Mars, with multiagent cooperative autonomy for manufacturing and assembly.

Smart Robots Likely to Precede Humans to Mars

“I foresee the first habitable, critical infrastructure on the surface of Mars being constructed by a team of robots using material and tools and high-level instructions that say, ‘Do the following things’ [in preparation] for humans to arrive,” said Smith.

On the ground, autonomy and AI advances will play an important role in land-use monitoring, to manage and coordinate disaster response and asset tracking, and will work even if objects pass under bridges or under cloud cover. Lockheed Martin Missiles and Fire Control has a department called Advanced Autonomy concerned with autonomous ground vehicles.

Better Fire Prediction and Detection

According to Smith, the group is exploring advanced technologies to help firefighters better predict, detect, and fight wildfires. The technology could predict and locate a fire hours before it even starts from a lightning strike. Using the power of AI, Lockheed’s technology could also analyze fire behavior in near real-time to enable fire growth predictions and to deliver persistent communications across multiagency air and land suppression units, so they might respond quicker to a large complex fire. Unfortunately, the technology is only in test mode; it’s not currently helping fight the fires ravaging southern California, said Smith.

Moderator Julie Shah, Department Head and H.N. Slater Professor in Aeronautics and Astronautics at Massachusetts Institute of Technology (MIT), discussed how much the world has changed in the context of AI over the last two decades.

Continually Evolving AI Systems

“When I did my Ph.D., it was on automated planning and scheduling with no machine learning,” recalled Shah. “When I started my career on faculty, I remember a colleague at NASA told me ... nothing that learns online will ever fly in space. In the blink of an eye, a few years later, all I did in my lab was machine learning.”

Pavone agreed with Shah that future aerospace missions, especially for space exploration, will need AI systems that can continue to evolve and learn after they deploy.

“Adaptation is needed and so that’s something we are working on,” said Pavone, noting that his lab is collaborating with The Aerospace Corporation on AI systems that can serve anomalies – “How do you use those anomalies to train your system on the ground so that you can still do validation and then improve it?”

The ‘Golden Age’ of AI and Autonomy

Following the panel, Pavone emphasized that foundation models, dark language, and vision language models all provide “several opportunities to rethink how we build autonomous systems.”

He pointed to several breakthroughs in simulation technologies, which will make simulation a powerful tool of autonomous systems.

Aerospace: Lessons from Automotive’s AI Experience

Pavone added that while the application domain he focuses on at Nvidia is primarily automotive (self-driving cars), aerospace researchers can learn from the automotive industry.

“The automotive [industry] has been building AI systems for a while now, and they have built quite a bit of competence in terms of which AI system should be fielded and also how to provide that they are safe and reliable. So, both the methodologies and the safety standards that have been developed by the automotive community could be useful for the aerospace community,” he said.

Forum Attendees Weigh In On AI

Following the plenary, Jorge Hernandez, president of Texas-based Bastion Technologies, said, “Just the opportunity to hear how different organizations are working with AI was fantastic. What Stanford, Lockheed, and MIT are doing is exceptional. We’re all interested in seeing how that will impact us in the future...and we’re all interested getting involved.”

His firm focuses on safety and mission assurance and mechanical engineering, said Hernandez. “We get involved on the risk and analysis side, so how AI plays into that will be an important piece of what we do.”

Rudy Al Ahmar, a PhD student who is completing his aerospace engineering studies at Auburn University’s Advanced Propulsion Research Laboratory this semester, agreed with the panelists – there was a lot of skepticism about AI and machine learning five years ago, but those concerns were addressed within a few years. The same thing has happened with generative AI.

“For a lot of scientists and researchers, it’s not a matter of if they’re going to use AI and machine learning, it’s a matter of when and how they’re going to implement it – whether on a large scale or small scale,” he said.

The doctoral candidate said he hopes to research AI and machine learning integration with computational fluid dynamics (CFD) as a university assistant professor.

“It’s computationally demanding to work on these aerospace applications with CFD. AI and machine learning can reduce the computational cost and make things rapid so you can optimize and study things much, much quicker.”

AIAA Announces 2025 International Student Conference Winners

by AIAA, 22 January 2025

(<https://www.aiaa.org/news/news/2025/01/22/aiaa-announces-2025-international-student-conference-winners>)



2025 AIAA International Student Conference Winners. Credit: AIAA-©

January 22, 2025 – Reston, Va. – The American Institute of Aeronautics and Astronautics (AIAA) is pleased to announce the 2025 International Student Conference winners in partnership with the AIAA Foundation. During the 2025 AIAA SciTech Forum, 20 technical paper first-place finalists from all seven 2024 AIAA Regional Student Conferences and the PEGASUS – Europe Conference presented their research papers related to aeronautics and astronautics.

“Congratulations to these exceptional students – our future leaders in aerospace. These bright minds are today’s up-and-coming innovators. Their fresh perspectives and critical thinking are working to solve current technical challenges. They will help shape the aerospace landscape for decades to come,” said Laura McGill, chair, AIAA Foundation. “The AIAA Foundation takes great pride in nurturing their development through initiatives like the International Student Conference.”

This event is invitation-only, contained within the annual AIAA SciTech Forum, where first-place winners from each of the previous year’s AIAA Regional Student Conferences present their winning papers. They are judged by a panel of AIAA professional members in the undergraduate, master’s, and team categories. AIAA Foundation awards a \$1,000 cash prize to each category’s first-place winner. All participants’ papers are published as part of the AIAA SciTech Forum proceedings and become part of the enduring aerospace industry technical archive found in AIAA’s [Aerospace Research Central \(ARC\)](#).

AIAA Announces 2025 International Student Conference Winners



2025 AIAA International Student Conference participants. Credit: AIAA—©

2025 International Student Conference Winners

Undergraduate Category:

1st Place: “Experimental Investigation of the Impact of Propeller Configuration, Motor Noise, and Sound Reflection on Sound Pressure Level” by Olivia Hilburn, United States Air Force Academy

Master’s Category

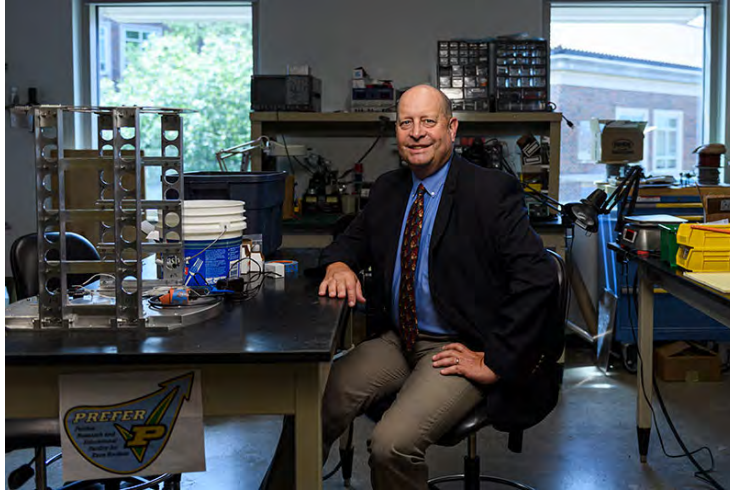
1st Place: “Performance Characteristics of a Low-Cost Self-Contained Pressure Data Acquisition System” by Nathan Eller, California State Polytechnic State University, San Luis Obispo

Team Category

1st Place: “Lessons Learned from the Launch of a Student-Built LOX/Jet-A Sounding Rocket” by Callum MacDonald, Rithvik Nagarajan, Ethan Heyns, Braden Anderson, Michael Krause, Varun Natarajan, Anthony Otlowski, and Tristan Terry, Georgia Institute of Technology

Reaching space to become a reality for Purdue aerospace engineer

by Purdue University, December 16, 2021 (<https://www.purdue.edu/newsroom/archive/releases/2021/Q4/reaching-space-to-become-a-reality-for-purdue-aerospace-engineer.html>)



Steven Collicott, an aerospace engineer in the School of Aeronautics and Astronautics, was selected by NASA for a suborbital flight to conduct a research experiment aboard a Virgin Galactic aircraft. (Purdue University photo/Rebecca McElhoe)

Professor Collicott will join his experiment on Virgin Galactic suborbital flight

WEST LAFAYETTE, Ind. — Purdue University's Steven Collicott was 8 years old when he saw Neil Armstrong step onto the moon and dreamed of reaching the stars. Now, both he and his research are going to make a giant leap into space aboard a Virgin Galactic craft.

Collicott, a professor of aerospace engineering in the School of Aeronautics and Astronautics, was selected Wednesday to receive an award by NASA's Flight Opportunities program giving him the chance to fly into suborbital space and back on a Virgin Galactic craft while conducting a zero-gravity experiment.

Collicott was the only applicant in this round of selections to receive the chance to take a suborbital flight sponsored by NASA. His research was selected as part of a competitive nationwide process.

The selection will make Collicott the first Purdue faculty member to take a trip to space.

"The sudden news that I now get to fly into suborbital space to work in an amazing new zero-gravity laboratory aboard Virgin Galactic is a thrill beyond words," he said. "That I'll be one of the first researchers to fly with their own experiments is an exciting notion that I never bothered to consider before."

Collicott already is known for his high-flying experiment endeavors, having taught a zero-gravity flight experiment course for many years. As part of the course, Collicott and some of his students experience weightlessness while conducting experiments aboard a parabolic aircraft flight, dubbed the "Vomit Comet."

Those flights reach an altitude only in the range of 30,000 feet, significantly less than suborbital rocket altitudes that begin as high as 50 miles.

Reaching space to become a reality for Purdue aerospace engineer

Known as the Cradle of Astronauts, Purdue has 27 alumni who have flown in space or have been selected for space flight. liquid that wets a solid surface less than perfectly moves in an awkward stick-slip process across that solid surface in weightlessness.

The final decision for Collicott's inclusion in the Cradle follows guidelines developed over three years ago when commercial space activities increased. William Crossley, the J. William Uhrig and Anastasia Vournas Head of Aeronautics and Astronautics, will apply those guidelines after Collicott's flight. Inclusion is possible for alumni, faculty, staff and students who work in space.

Collicott, who recently returned from a zero-gravity aircraft flight, plans to start building the experiment soon.

For the flight, Collicott will conduct an experiment that explores a difficult-to-model phenomenon in how a liquid that wets a solid surface less than perfectly moves in an awkward stick-slip process across that solid surface in weightlessness.

The phenomenon can be found with green rocket propellants and water in life-support systems. In spaceflight, this stick-slip spreading process is important even in meters-long fuel tanks.

The experiment serves to help engineers exploit numerous liquid-solid combinations, such as new green propellants, in future spacecraft. The experiment also will highlight possible ways to automate such measurements in the future, and this automation enables cheaper launches of automated follow-up experiments.

Green propellants are new variations of rocket fuels being researched as non-toxic replacements for long-used traditional fuels, which are dangerously toxic and very difficult to handle.

In recent years, Collicott has flown seven automated experiments on five Blue Origin missions and an automated experiment on a UP Aerospace launch with a second scheduled to happen in 2022. He also has flown automated experiments on numerous Exos Aerospace test flights.

The selection makes Collicott the latest person with Purdue connections to set their sights on suborbital flight. Two School of Aeronautics and Astronautics alumna – Sirisha Bandla and Audrey Powers – flew suborbital this year with fellow graduate Beth Moses, who became the first female commercial astronaut on Virgin Galactic's flight test in February 2019.

Powers flew in October via Blue Origin as the company's vice president of mission and flight operations. Moses and Bandla, Virgin Galactic's vice president of government affairs and research operations, flew in July.

AIAA LA Outreach in AIAA Sci-Tech 2025 Town Hall and READ Meeting (2025 January 5) *(Photos Only)* (<https://www.aiaa-lalv.org/blogs/2025-blogs/2025-january/2025-january-5>)



(Left) People enjoyed this fun Town Hall Meeting. (Right) The panelists/speakers included President Dr. Hastings (speaking, middle).



(Left) The new CEO of AIAA, Mr. Clay Mowry, presented the status of AIAA and the priorities, with (Right) attendees listening.



(Left) Attendees interacted with the panelists/speakers. (Right) Ms. Jane Hansen (in black) and Ms. Merrie Scott (in light brown.)

AIAA LA Outreach in AIAA Sci-Tech 2025 Town Hall and READ Meeting (2025 January 5) *(Photos Only)*



(Left) The agenda/topics in the Town Hall Meeting led by CEO Mr. Clay Mowry. (Right) The READ Gathering after the Town Hall Meeting.



(Left) Ms. Jane Hansen, Director of READ, led/moderated this READ Meeting. (Right) Attendees included Prof. Jeff Marchetta (middle).



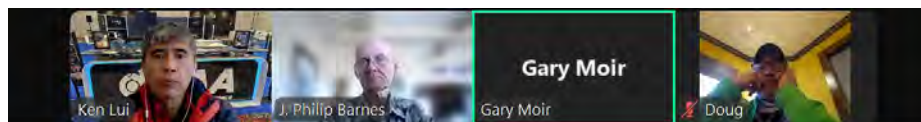
Interesting enthusiastic conversations during this READ Meeting.

(January 15) AIAA LA Aero Alumni (Retirees from aerospace) Meeting

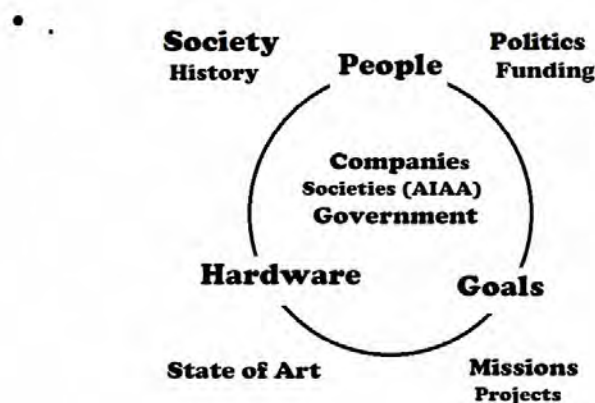
(Screenshots) (Contact: gary.moir@ingenuir.com) (<https://www.aiaa-lalv.org/blogs/2025-blogs/2025-january/2025-january-15>)



Attendees greeted "New Year" to each other. The discussions included a dry-run presentation by Mr. Gary Moir for an amateur rocket club in a few days.



Our Engineering Universe



The presentation was centered around people, inspired by the book written by Mr. Mike Ciminera (AIAA book).

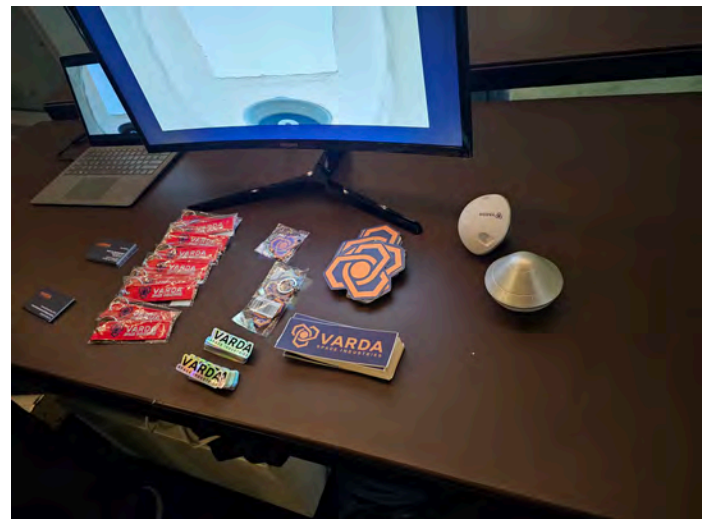
AIAA LA Outreach in AIAA Sci-Tech 2025 Varda Space Industries Happy Hour (2025 January 6) (Photos Only) (<https://www.aiaa-lalv.org/blogs/2025-blogs/2025-january/2025-january-6>)



(Left) The flyer of this Happy Hour. Varda is located right in the heart of the South Bay area. (Right) People gradually arrived.



Visitors enjoyed chatting with fellow attendees at Varda's Happy Hour area, and the beer!



(Left) Varda's banner, showing very interesting messages for what they do. (Right) Fun giveaways and the computer demo (hypersonic reentry).

AIAA LA Outreach in AIAA Sci-Tech 2025 Section Officers Social Meeting (2025 January 7) (Photos Only) (<https://www.aiaa-lalv.org/blogs/2025-blogs/2025-january/2025-january-7>)



(Left) Mr. Clay Mowry (in brown suit and standing) the new AIAA CEO, greeted the attending section officers. (President Dr. Hastings (sitting, lower right)). Ms. Lindsay Mitchell (standing, upper right). (Right) Mr. Clay Mowry shared his views and chatted with attendees.



Section officers/volunteers gathered to meet with the new AIAA CEO and meet with others from other AIAA sections.



(Left) Clay (left) continued to share his views, with Ms. Lindsay Mitchell (right). (Right) Networking in the Conference area.

AIAA Los Angeles Section Outreach to CAMS Career Day 2025 (January 24)

(Photos Only) (<https://www.aiaa-lalv.org/blogs/2025-blogs/2025-january/2025-january-24>)



(Left) It was a beautiful day with many future rising stars (and potential members) after New Year! (Right) Morning introduction.

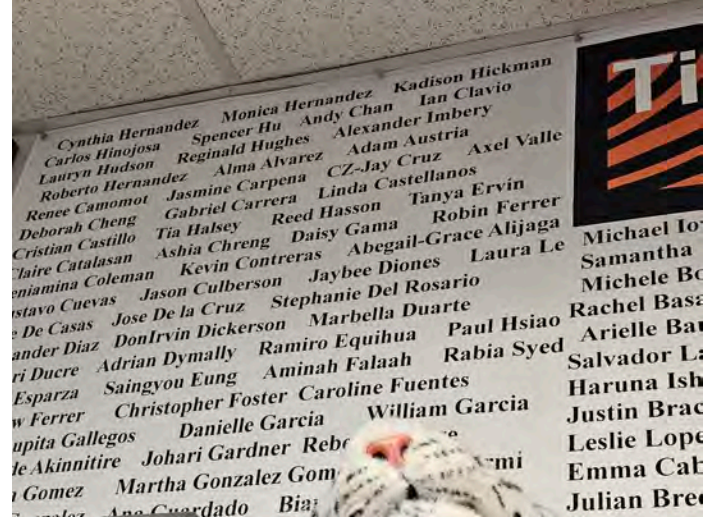


(Left) Ian was in the morning introduction meeting, and (Right) the speakers met the volunteer students.



(Left) Students in the 1st session listened to Ian's talk. (Right) The classroom displayed some of students' projects.

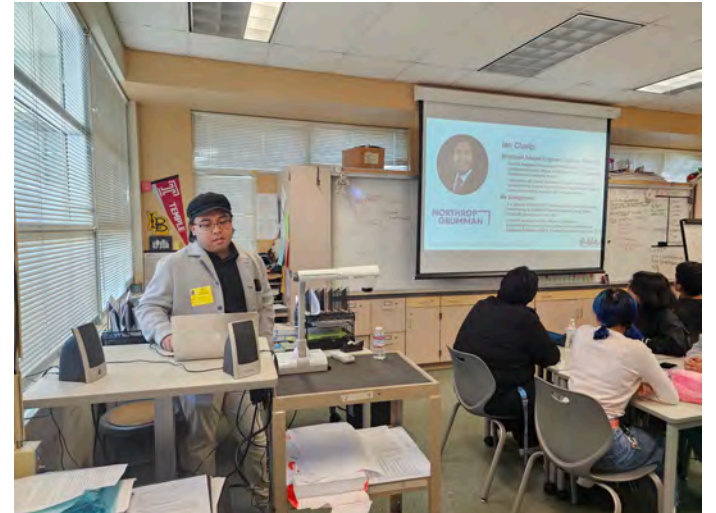
AIAA Los Angeles Section Outreach to CAMS Career Day 2025 (January 24)



(Left) Ian shared / gave advices in careers etc. (Right) Ian's name was still on the wall. (He led CAMS Robotics to World Championship).



(Left) Mrs. Nancy Brown (sitting, right), and (Right) Mr. Joe Carpenter (standing, right).



(Left) Mrs. Nancy Brown (AIAA Educator Member) praised Ian and talked about and AIAA Membership. (Right) Ian Started the 2nd session.

AIAA Los Angeles Section Outreach to CAMS Career Day 2025 (January 24)



Students listened carefully to Ian's sharing, transitioning from the 2nd session (left) to the 3rd session of students (right).



(Left) answered questions face-to-face with students in the 3rd session. (Right) Lunch Meeting: speakers and industrial participants.



Lunch Meeting of the speakers / industrial participants. (Left) President of CAMS. (Right) Mrs. Linda Ramos led the discussions.

AIAA LA Aerospace News Digests *(by Dr. Ken Lui, AIAA Los Angeles Section)*



(1/25) Aerial firefighting companies' new challenge: Keeping up with demand



(1/25) Space-sector IPOs set to take off as industry braces for a busy 2025



(1/24) How to see 6 planets align in a rare night-sky parade in January and February



(1/23) 'Nerve-racking': Inside The Aerial Battle To Tame Los Angeles Fires



(1/23) Clear evidence of liquid water, not just frozen ice, discovered on Mars



(1/22) Finland signs on to Artemis Accords



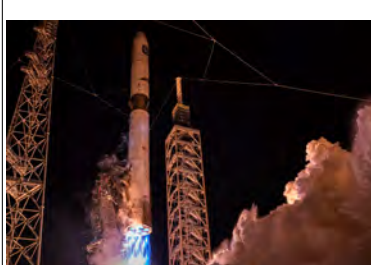
(1/22) Fighting fires with AI, drones and sensors. How high tech could help battle future blazes



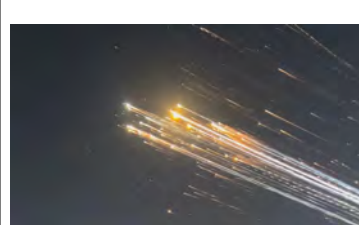
(1/21) Los Angeles-based private airline Aero launches Park City flights in time for Sundance



(1/20) Rocket Lab Lands Pair of Contracts



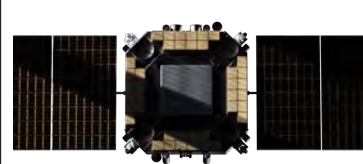
(1/18) FAA requires mishap investigation for failed New Glenn landing



(1/17) Regulators are investigating reports of property damage from SpaceX Starship's explosion



(1/16) Aerial firefighting CEO says he loses sleep over people flying their drones near his planes



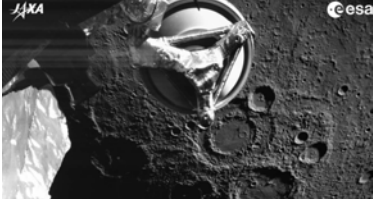
(1/15) Bigger, higher, cheaper: Space startup looks beyond LEO: The Pentagon's former space policy chief joins LA-based K2 Space.



(1/15) Firefly Aerospace's Blue Ghost Mission 1 Successfully Launches and Begins 45-Day Transit to the Moon



(1/14) Los Angeles fires leave NASA's Deep Space Network mission control empty for 1st time in 60 years



(1/10) Spacecraft makes final flyby of smallest planet in solar system



(1/9) China's Hypersonic Weapons Just Got Deadlier



(1/5) UFO-like electric flying vehicle which gives passengers 360 degree views could be the next Uber



(1/3) NASA sees strong support for strategy to maintain continuous human presence in LEO



(1/1) A Chinese spacecraft burned up over Los Angeles. Earthquake sensors mapped its path through the atmosphere.

The Commercial Space Economy: Innovation, Workforce, and the Future of Space

by John Wensveen, Ph.D., International Space University President | TEDx Speaker | Best-Selling Author | Aspiring Astronaut

(<https://www.linkedin.com/pulse/commercial-space-economy-innovation-workforce-future-wensveen-ph-d--o7vje/>) (2025 January 15)



The space industry is undergoing a profound transformation. What was once the exclusive domain of government agencies has become a thriving commercial ecosystem, with private companies, entrepreneurs, and global stakeholders driving innovation at an unprecedented pace. The commercial space economy is projected to exceed \$1 trillion by 2030, fueled by advancements in satellite technology, reusable launch vehicles, space tourism, and in-orbit manufacturing. Yet, amidst this rapid growth, one truth is clear: the success of this industry hinges not only on cutting-edge technology but also on a skilled and adaptable workforce.

From Public Sector to Private Sector Leadership

Space exploration and technology development began as a public sector endeavor. Government agencies like NASA, the European Space Agency (ESA), and Roscosmos spearheaded the early milestones of space exploration, from the Apollo Moon landings to the development of satellites and interplanetary probes. These missions laid the foundation for the modern space economy by developing key technologies, infrastructure, and a skilled workforce.

Today, the private sector is taking the lead, building on the legacy of public investment. Companies like SpaceX, Blue Origin, and Rocket Lab are advancing launch capabilities with reusable rockets, drastically reducing costs and democratizing access to space. The public sector continues to play a critical role, providing funding, regulatory frameworks, and partnerships that enable private innovation to flourish. For example, NASA's Commercial Crew and Cargo Program has spurred the development of private spacecraft, while ESA and other agencies collaborate with startups and established companies to advance Earth observation, satellite communications, and deep-space exploration.

This synergy between the public and private sectors is a driving force behind the rapid expansion of the commercial space economy, creating opportunities for innovation, investment, and global collaboration.

The Commercial Space Economy: Innovation, Workforce, and the Future of Space

by John Wensveen, Ph.D., International Space University President | TEDx Speaker | Best-Selling Author | Aspiring Astronaut

Innovation and Technology Development in the Commercial Space Economy

Innovation lies at the heart of the commercial space economy. Companies like SpaceX, Blue Origin, and Rocket Lab have redefined launch economics with reusable rockets, slashing costs and opening the door to a broader range of missions. Satellite mega-constellations, such as Starlink and Project Kuiper, are bridging the digital divide, bringing connectivity to remote and underserved regions. Meanwhile, advances in artificial intelligence (AI) and robotics are enabling autonomous satellite operations, in-orbit servicing, and lunar exploration.

The potential of in-space manufacturing is another game-changer. Research on the International Space Station (ISS) has demonstrated that microgravity can produce superior materials and pharmaceuticals, paving the way for commercial factories in orbit. These innovations are not only expanding the boundaries of space exploration but are also creating new markets and opportunities on Earth.

The Crucial Role of the Workforce

While technology propels the industry forward, the human element remains indispensable. The current workforce is tasked with managing complex systems, designing innovative solutions, and ensuring mission success. However, as the industry evolves, so too must its workforce.

Key Workforce Challenges

- **New Skill Demands:** The integration of AI, machine learning, and autonomous systems requires expertise in data science, software engineering, and robotics.
- **Upskilling and Reskilling:** Legacy aerospace workers need training in emerging technologies and methodologies to stay relevant.
- **Diversity and Inclusion:** Expanding the talent pool to include underrepresented groups is essential for fostering innovation and addressing global challenges.
- **Global Collaboration:** The space economy is inherently international, requiring cross-cultural competence and collaboration skills.

Preparing for the Future Workforce

To ensure the commercial space economy's sustainability, we must invest in the next generation of space professionals. Educational institutions, governments, and industry leaders all have roles to play in developing a pipeline of skilled talent.

1. Building New Skills

- **STEM Education:** Encouraging students to pursue science, technology, engineering, and mathematics is foundational.
- **Interdisciplinary Learning:** Space careers now demand knowledge that spans engineering, business, law, and policy.
- **Digital Proficiency:** Skills in programming, AI, and data analytics are increasingly critical.

The Commercial Space Economy: Innovation, Workforce, and the Future of Space

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2. Upskilling and Reskilling the Current Workforce

- **Workforce Development Programs:** Tailored training initiatives can help professionals transition into roles requiring new technical proficiencies.
- **Executive Space Courses:** Programs like those at the International Space University (ISU) are equipping leaders with the strategic insights needed for the space industry.
- **Online Learning Platforms:** Flexible, remote learning options allow workers to gain skills without interrupting their careers.

3. Diversity and Inclusion Initiatives

- **Scholarships and Outreach:** Programs targeting underrepresented groups can broaden participation in the space industry.
- **Mentorship Opportunities:** Connecting young talent with experienced professionals fosters growth and innovation.

4. Partnerships for Workforce Development

Collaboration between academia, industry, and government is vital. Organizations like NASA, ESA, and private companies such as SpaceX and Boeing must work alongside universities and training centers to shape the future workforce.

The Importance of the 3I's: International, Intercultural, Interdisciplinary

At the International Space University (ISU), we champion the 3I's approach to education: International, Intercultural, and Interdisciplinary. These principles are essential for preparing a workforce capable of thriving in the global space economy.

- **International:** Space is a global endeavor, and collaboration across borders is critical for innovation and success.
- **Intercultural:** Understanding and appreciating cultural diversity enhances teamwork and fosters mutual respect in multinational projects.
- **Interdisciplinary:** Combining expertise from engineering, business, policy, and beyond ensures comprehensive solutions to complex challenges.

By embedding these principles into education and workforce development, ISU prepares space professionals who can navigate the complexities of a dynamic and interconnected industry.

Call to Action

As the President of the International Space University, I call on all stakeholders in the space ecosystem to prioritize workforce development. By investing in education, upskilling, and diversity, we can ensure the commercial space economy's long-term success. Let us build a future where innovation thrives, and opportunities abound for all.

NASA Day of Remembrance

by NASA (2025 January 25) (<https://www.nasa.gov/dor/>)



Each January, NASA pauses to honor members of the NASA family who lost their lives while furthering the cause of exploration and discovery, including the crews of Apollo 1 and space shuttles Challenger and Columbia. In 2025, the Day of Remembrance will be observed on Jan. 23.

NASA Day of Remembrance

NASA Remembers Fallen Heroes

NASA remembers the crews of Apollo 1 and space shuttles Challenger and Columbia during the agency's Day of Remembrance on Jan. 23, 2025.

Watch on YouTube



<https://www.youtube.com/watch?v=6pHKGo9bUZw>



Kennedy Space Center workers and guests placed flowers at the Space Mirror Memorial at the Kennedy Space Center Visitor Complex in Florida during NASA's Day of Remembrance on Jan. 26, 2023. The event honored the crews of Apollo 1 and space shuttles Challenger and Columbia, as well as other astronauts who lost their lives in the pursuit of spaceflight.

Photo Credit: NASA/Kim Shiflett

NASA Day of Remembrance

Remembering Apollo 1

On Jan. 27, 1967, veteran astronaut Gus Grissom, first American spacewalker Ed White, and rookie Roger Chaffee were sitting atop the launch pad for a prelaunch test when a fire broke out in their Apollo capsule.

The investigation into the fatal accident led to major design and engineering changes, making the Apollo spacecraft safer for the coming journeys to the Moon.

More on Apollo 1



Apollo 1 Crew (l-r): Virgil I. Grissom, Edward H. White, Roger B. Chaffee Image Credit: NASA



NASA Administrator Bill Nelson and NASA Deputy Administrator Pam Melroy place flowers at the grave markers of Virgil "Gus" Grissom and Roger Chaffee from Apollo 1, during a ceremony that was part of NASA's Day of Remembrance, Thursday, Jan. 25, 2024, at Arlington National Cemetery in Arlington, Va.

NASA/Keegan Barber

NASA Day of Remembrance

Remembering Challenger

Just 73 seconds after launch on the morning of Jan. 28, 1986, a booster engine failed and caused the shuttle Challenger to break apart, taking the lives of all seven crewmembers.

President Ronald Reagan eulogized the crew, quoting from John Gillespie Magee's poem "High Flight": "We will never forget them, nor the last time we saw them, this morning, as they prepared for the journey and waved goodbye and 'slipped the surly bonds of earth' to 'touch the face of God.'"

More on Challenger



STS-51L Crew (l-r): Mission Specialist Ellison S. Onizuka, Pilot Michael J. Smith, Payload Specialist Christa McAuliffe, Commander Francis R. "Dick" Scobee, Payload Specialist Gregory B. Jarvis, Mission Specialist Judith A. Resnik, Mission Specialist Ronald E. McNair Image Credit: NASA



The Space Shuttle Challenger Memorial is seen after a wreath laying ceremony that was part of NASA's Day of Remembrance, Thursday, Jan. 25, 2024, at Arlington National Cemetery in Arlington, Va. The event, traditionally held every year on the fourth Thursday of January, remembers the crews of Apollo 1 and the space shuttles Challenger and Columbia.
NASA/Keegan Barber

NASA Day of Remembrance

Remembering Columbia

The seven-member crew of the STS-107 mission was just 16 minutes from landing on the morning of Feb. 1, 2003, when Mission Control lost contact with the shuttle Columbia. A piece of foam, falling from the external tank during launch, had opened a hole in one of the shuttle's wings, leading to the breakup of the orbiter upon re-entry.

Addressing the nation, President Bush said, "Mankind is led into the darkness beyond our world by the inspiration of discovery and the longing to understand. Our journey into space will go on."

Learn More



STS-107 Crew Seated in front, from left, are: Astronauts Rick D. Husband, mission commander; Kalpana Chawla, mission specialist; and William C. McCool, pilot. Standing, from left, are: David M. Brown, Laurel B. Clark, and Michael P. Anderson, all mission specialists; and Ilan Ramon, payload specialist.



The Space Shuttle Columbia Memorial is seen after a wreath laying ceremony that was part of NASA's Day of Remembrance, Thursday, Jan. 25, 2024, at Arlington National Cemetery in Arlington, Va. The event, traditionally held every year on the fourth Thursday of January, remembers the crews of Apollo 1 and the space shuttles Challenger and Columbia.
NASA/Keegan Barber

NASA Day of Remembrance

NASA Memorials and Burials at Arlington National Cemetery

[Learn More](#)



*The Apollo 1 monument at Arlington National Cemetery is seen following its dedication, Thursday, June 2, 2022, in Arlington, Virginia. The monument honors and memorializes the Apollo 1 crew of Virgil I. "Gus" Grissom, Edward H. White II, and Roger B. Chaffee.
Photo Credit: NASA/Bill Ingalls*

The US Will Build an Iron Dome Air Defense System

New Types of Threats Means the End of the MAD Doctrine

by Dr. Stephen Bryen, ormer Deputy Under Secretary of Defense and is a leading expert in security strategy and technology
(2025 January 27) (<https://weapons.substack.com/p/the-us-will-build-an-iron-dome-air>)

Note: The US does not have a fully integrated air defense system for the continental United States. And it does not yet have a system that can intercept the emerging threat of hypersonic ballistic missiles and delivery systems including hypersonic glide vehicles. The current hodge-podge of US ballistic missile defenses is, therefore, not necessarily a good model to meet President Trump's goal of an Iron Dome for America.

The US has almost no full time air defense on the East Coast, nothing in the center of the United States, and nothing along the Caribbean Sea.

Newly approved Secretary of Defense Pete Hegseth has announced that President Trump will issue a number of Executive Orders for US Defense, including the creation of an Iron Dome system "like the one used by Israel to deflect incoming missiles." With hypersonic threats starting to multiply, the old mutually assured destruction (MAD) doctrine will no longer work to prevent a first strike, and the US could be subjected to devastating and fatal nuclear ballistic missile attack.

It is important to distinguish between what Israel calls Iron Dome and what President Trump has in mind.

In Israel Iron Dome (Kippat Barzel) refers to the air defense system that was developed initially to deal with short range missiles fired into Israeli territory from Gaza.

In President Trump's usage, Iron Dome refers to an integrated air defense system that can protect the United States from missile attack.



The Israel Missile Defense Organization conducts an air drill with the cooperation of the IDF, US forces and CENTCOM (Israel MOD)

The US Will Build an Iron Dome Air Defense System

Today Israel has an integrated air defense system that includes Iron Dome, Iron Beam, David's Sling, Arrow 2 and Arrow 3 plus long range radars. Israel's system includes a capability to intercept ballistic missiles in the exoatmosphere and, possibly, beyond. Israel is also working on a new version of the Arrow system in partnership with the US, called Arrow 4. (Israel air defenses have also been integrated with US radars.)

The Israeli air defense shield was partly US funded and major US defense companies, Raytheon (now RTX Corporation), Boeing and Lockheed participate in Israel's air defense programs. RTX also markets SkyHunter, a variant of the Tamir interceptor used in Iron Dome. RTX is building a new facility in Camden, Arkansas to produce SkyHunter for the US Marines. "The Marine Corps' FY-25 budget request includes \$111 million for the program to support the purchase of 12 launchers and 242 missiles as it transitions from rapid prototyping to rapid fielding." The new facility is partly owned by Rafael Advanced Defense Systems, the Israeli company that manufactures Iron Dome.



Tamir/SkyHunter Interceptor

At the top level of US-Israel air defense cooperation is the partnership between the US Missile Defense Agency (MDA) and Israel Missile Defense Organization (IMDO). The IMDO is part of the Israeli Directorate of Defense Research and Development (DDR&D), at Israel's Ministry of Defense. The MDA is a research, development, and acquisition agency that works on ballistic missile defense systems for the United States and its allies.



Missile Defense Agency HQ

The US Will Build an Iron Dome Air Defense System

Among allied countries, the US is among the least prepared to counteract enemy ballistic missiles and other threats including drones. The lack of protection was intentional as the opponents of missile defenses, including those opposing President Ronald Reagan's Strategic Defense Initiative (SDI) argued that achieving a missile shield was neither technically feasible nor strategically acceptable.

The technical arguments in the mid to late 1980's centered on the challenge of putting interceptor systems in space (one of the Reagan proposals was called Brilliant Pebbles, an idea pioneered by Lowell Wood and Edward Teller at the Lawrence Livermore National Laboratory).



A pebble emerges from its "life jacket" just prior to launch

The policy argument claimed that SDI would undermine the MAD doctrine. MAD stands for Mutually Assured Destruction and it is based on the notion that neither the US or its adversaries would use nuclear weapons since the outcome of their use would be the assured destruction of the contending party. Arms control agreements were tailored around the idea of blocking any breakthrough that would give either the US or the USSR (and its successor, Russia) a way to achieve a credible first strike capability (meaning that the nuclear assets of the other side would be obliterated before they could be used for retaliation).

While some claimed that MAD was an acceptable approach to safeguard against the use of nuclear weapons, others, including President Reagan, saw MAD as a mutual suicide pact. A key problem was that one country, China, did not participate in arms control agreements and continued to grow its nuclear strike capabilities. Another was the rise of additional nuclear actors, notably North Korea and others seeking to join them such as Iran.

The US Will Build an Iron Dome Air Defense System



A Ground Based Interceptor (GBI) is transported to its silo during a recent emplacement on the Missile Defense Complex (MDC) at Fort Greely, Alaska. (Photo by SGT Jack Carlson III)

The US put in place an air defense system based in Greely Alaska and Vandenberg Space Force base in California called the Ground Based Interceptor (GBI) which is part of the US Ground Based Midcourse Defense System. That multibillion dollar system has been plagued by numerous problems and a renewed effort is now underway to upgrade the interceptor kill vehicles and field a \$17 billion Next Generation Interceptor for GBI. An Interim Solution of 20 interceptors is planned for 2026.

It is claimed, without any real proof other than the limited number of interceptors, 44, associated with GBI, that GBI was mostly focused on a rogue state threat (that is North Korea) and not China.

GBI uses a hit to kill intercept system, meaning that an incoming ballistic missile warhead is destroyed by the kinetic force of a non-explosive kill vehicle that is part of the interceptor. Called an EKV for Exoatmospheric Kill Vehicle, it has been a source of problems and is limited in dealing with maneuvering nuclear warheads. A plan to redesign the kill vehicle, called RKV, was dropped after the plan was judged unworkable. Beyond the kill vehicle, a huge issue, radars associated with GBI also have had problems, particularly a radar known as Sea Based X Band. X Band radars operate in the 8 to 12 GHz microwave band.

The US Will Build an Iron Dome Air Defense System



Sea Based X Band Radar

The Defense Department apparently has plans to put an evolved GBI system on the East Coast. At least four locations are under consideration, but the most likely is Fort Drum in New York near Lake Ontario. Congress has mandated an East Coast system to be in place by 2030, although without a workable system and funding, the 2030 date is optimistic.

The US also has forward deployed THAAD (Terminal High Altitude Air Defense) systems; in Korea, UAE, Israel, Romania and Guam. THAAD is mainly an area defense system, and it has been used once, successfully, intercepting a Houthi-launched ballistic missile. That THAAD unit was operating from Israel. THAAD has a range of 150 to 200 kilometers (93 to 124 miles).



THAAD arrives in Israel

The US Will Build an Iron Dome Air Defense System

In addition, the US has AEGIS air defense systems on board US Arleigh Burke class destroyers (DDG-51) and Ticonderoga cruisers (CG-47). AEGIS is regarded as effective against ballistic missiles. There are around 56 AEGIS-equipped ships, although the US Navy is retiring some Ticonderoga-class cruisers.

The US also has three AEGIS-Ashore (land based) systems, one in Guam, another in Poland and in Romania. AEGIS-Ashore was also planned for Japan, but the Japanese government cancelled the program, allegedly because of local opposition to interceptor sites near them. Japanese Kongō class ships do have the AEGIS system, but there are only four ships. Two new Kongo-class ships are planned over the next few years. In addition, Japan and the US are working on an interceptor optimized to intercept hypersonic threats.



Kongō class of guided-missile destroyer

AEGIS has been used in the Red Sea to counter Houthi missiles. A key problem has been intercepting Houthi-fired anti-ship ballistic missiles. Software in the AEGIS system was hurriedly upgraded to account for the anti-ship missile threat, and AEGIS has played a role in helping track threats and destroying Houthi missiles. As of January, US ships have fired 120 SM-2 missiles, 80 SM-6 missiles, 160 rounds from destroyers and cruisers' five-inch main guns, as well as a combined 20 Evolved Sea Sparrow Missiles (ESSM) and SM-3 missiles. SM-2, SM-3 and SM-6 are AEGIS missiles. In one case the USS Gravely had to rely on its Phalanx CIWS rapid fire short range gun to knock out a Houthi missile that was tracked by the AEGIS system's radar.

AEGIS is important for US missile defense in the Pacific and Atlantic and now in the Red Sea and Persian Gulf.

New Types of Threats

The US does not have a fully integrated air defense system for the continental United States. And it does not yet have a system that can intercept the emerging threat of hypersonic ballistic missiles and delivery systems including hypersonic glide vehicles. The current hodge-podge of US ballistic missile defenses is, therefore, not necessarily a good model to meet President Trump's goal of an Iron Dome for America.

The US Will Build an Iron Dome Air Defense System

The US has almost no full time air defense on the East Coast, nothing in the center of the United States, and nothing along the Caribbean Sea.

The US does have some important components for a US Iron Dome. Among these components are highly advanced radars, hit to kill technology, sophisticated secure communications, space based sensors, and experience it can draw on from its deployments in the Middle East and Israeli know-how and experience dealing with enemy swarm tactics.

One can expect that the Russians and Chinese will continue to pursue hypersonic platforms including Russian systems such as Avangard and Chinese hypersonic threats. China already has "the world's leading hypersonic arsenal" according to the US Defense Intelligence Agency. The use by Russia in Ukraine of the Oreshnik intermediate range ballistic missile featuring a Avangard-like hypersonic glide vehicle with multiple kinetic warheads demonstrates that missile defenses will be challenged not only by nuclear, but by conventionally armed missiles too.

An Iron Dome for the United States, therefore, needs to account for both conventional and nuclear threats, for hypersonic weapons, and for serious problems of detecting and destroying the threats efficiently and effectively.

For long range ballistic missile threats this means the US should look again at Brilliant Pebbles and other space-based intercept capabilities. A space based approach is a more certain way of knocking out hypersonic glide vehicles before they are launched by ballistic missiles.

For intermediate and short range threats the US needs to improve its ability to destroy incoming threats at the theater level, whether on land or sea. It may be possible to build on AEGIS and other systems for this purpose, linking land based radars to improved space-based sensors and developing hypersonic interceptors.

The US also needs to step up work on air defense integration and the use of artificial intelligence to deal with increasingly sophisticated tactics including different types of decoys and maneuvering warheads. AI if properly developed may also be able to distinguish between a conventional and nuclear threat.

A US Iron Dome is a huge challenge but it is needed and indispensable before one of our adversaries concludes destroying the US can easily be accomplished. That's the risk of sticking with MAD, and it is the reason that both Secretary Hegseth and President Trump are moving quickly to build a US Iron Dome.