AEROGRAM

2025/2026

PURDUE UNIVERSITY SCHOOL OF AERONAUTICS AND ASTRONAUTICS

TINY THRUSTERS, GIANT LEAP

SmallSat propulsion technology proves its potential aboard Blue Origin spaceflight

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TWO PURDUE ENGINEERS JOIN CRADLE OF ASTRONAUTS

Two Purdue University alumni, Adam Fuhrmann and Yuri Kubo, were accepted into NASA's 2025 class of astronaut candidates. Their faces join the other 28 alumni on Purdue's Cradle of Astronauts wall in the Neil Armstrong Hall of Engineering.

Fuhrmann (MS Systems Engineering '22) served as the director of operations for an Air Force flight test unit when he was selected as an astronaut candidate.
Kubo (BSEE '08, MSECE '15) was a senior vice president at Electric Hydrogen when selected. In 2024, Purdue honored Kubo with its 38 by 38 award.

Fuhrmann and Kubo are two of just 10 astronaut candidates chosen from more than 8,000 applicants. They will undergo nearly two years of training before they graduate as flight-eligible astronauts for NASA missions to low earth orbit, the moon and Mars.

University President Mung Chiang lauded their achievement: "Adam and Yuri will carry on the spirit of exploration rooted in the legacy of Purdue-alum NASA astronauts, including Neil Armstrong. Many more small steps and giant leaps to come!"

Adam Fuhrmann

Yuri Kubo

NASA announced its 2025 Astronaut Candidate Class on Sept. 22, 2025. The 10 candidates, pictured here at NASA's Johnson Space Center in Houston, include Purdue Engineering alumni Adam Fuhrmann and Yuri Kubo.

PHOTOS COURTESY OF NASA

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AEROGRAM

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ON THE COVER: Alina Alexeenko, professor of aeronautics and astronautics, led a 12-year project to develop a miniature propulsion system that was tested aboard Blue Origin's New Shepard NS-29 mission in February 2025.

LETTER FROM THE HEAD

Dear alumni, friends, students, staff and faculty,

Each semester in my senior seminar course and during the graduate student welcome meeting at the start of the academic year, I take a moment to remind our students of something essential. When I have the opportunity, I remind our faculty and staff, too. That essential fact is that every individual in our school contributes to the vibrant and intellectually rich community we share.

Aeronautics and Astronautics at Purdue is not an easy program to enter. If you made it here, that means you belong here. If you graduated with a degree from AAE, you deserve every bit of recognition that the Boilermaker reputation carries. We herald that reputation with pride because of our people.

If we are strong, it's because you are strong. If Purdue is respected, it's because you earned that respect yourselves, every day, in the classroom and in your professional life.

That goes for everyone from the students and faculty who study, teach, and learn every day; to the administrative assistants and lab managers who help run our department and manage the tools we use.

Our strong community of support is what allows us to do so much more. That's why we're the No. 3 undergraduate program in the U.S. — now three years running — and have been a top six graduate program for 25 years. We also continue to move into the top 10 worldwide.

All this happens as our program continues to grow in enrollment; we remain the largest aerospace engineering program in the country by degrees granted. We graduated 29 percent more undergraduate students in 2024-25 as the year before, and we keep breaking our enrollment records as well.

Bringing the brightest minds together is how we get that success. We have undergraduates who push the envelope in student organization projects

JOHN UNDERWOOD

that touch rocket propulsion, autonomous aircraft and lunar rovers. We have graduate students who investigate hypersonic flight, find solutions to challenges in astrodynamics and explore new ways to design, analyze and manufacture aerospace structures. Our alumni serve their communities, advance aeronautics, support national security and expand capabilities to place satellites into low earth orbit.

And soon, we will have the first student to accompany her research project into suborbital space.

It is your continued contributions in our field that give us this world-leading program. We wouldn't be this beacon of success in aerospace without you.

Thank you.

Bill

WILLIAM A. CROSSLEY
Uhrig & Vournas Head of Aeronautics and Astronautics

AERONAUTICS AND ASTRONAUTICS BY THE NUMBERS

RANKED **3RD**
BEST UNDERGRADUATE AEROSPACE/ AERONAUTICAL/ ASTRONAUTICAL ENGINEERING
U.S. News and World Report (2025)

RANKED **5TH**
BEST GRADUATE AEROSPACE/ AERONAUTICAL/ ASTRONAUTICAL ENGINEERING
U.S. News and World Report (2025)

THE FACULTY (FALL 2025)

**includes joint appointments*

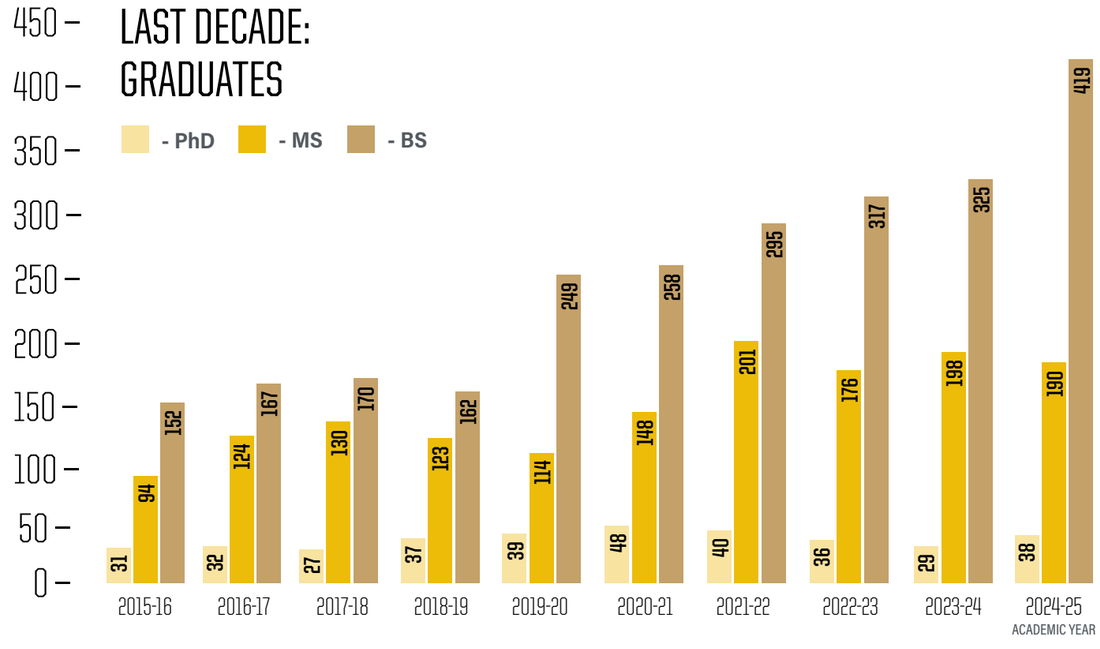
44	27	11	6
TENURED/TENURE-TRACK FACULTY*	FULL PROFESSORS	ASSOCIATE PROFESSORS	ASSISTANT PROFESSORS

5	3	2	5	15
PROFESSORS OF PRACTICE	LECTURERS	RESEARCH FACULTY	VISITING FACULTY	COURTESY FACULTY

THE STUDENTS (2025 FALL ENROLLMENT)

1296 UNDERGRADUATE
19% FEMALE
9% INTERNATIONAL
9% UNDERREPRESENTED MINORITIES

675 GRADUATE (235 PhD)
16% FEMALE
25% INTERNATIONAL
9% UNDERREPRESENTED MINORITIES



STUDENT NEWS

Purdue team soars in GoAero design competition

A student-led club at secured $28,571 in funding from the NASA-sponsored GoAero competition. The three-year challenge pushes teams across industry and academia to build an autonomous Emergency Response Flyer — an easy-to-operate rescue aircraft that can reach remote and dangerous places. After the win, the Vertical Flight Systems Purdue team built a 40% scale prototype of their winning design in Fall 2025, testing its payload and autonomy capabilities at Purdue facilities.

Thiago Guimaraes and Ran Dai, both associate professors in the School of Aeronautics and Astronautics, are faculty advisors for the project.

Valentino Cattaneo, electrical engineering student and president of VFS Purdue, says the funding will carry them through to build the full-scale vehicle. The team expects to participate in the Fly-Off qualifying period from June-December 2026 before advancing to the final fly-off in Feb. 2027, at NASA Ames.

PRESTIGIOUS AERO SCHOLARSHIPS FOR FRANK

AAE student Abby Frank received the Distinguished Scholar Award from The Wings Club Foundation, presented at the organization's annual gala in New York City. She also received the AIAA Daedalus 88 Scholarship — one of AIAA's largest undergraduate scholarships, recognizing project work. Frank was selected for her work as project manager of Purdue Space Program's High Altitude team.

AAE comes out on top in System of Systems Challenge

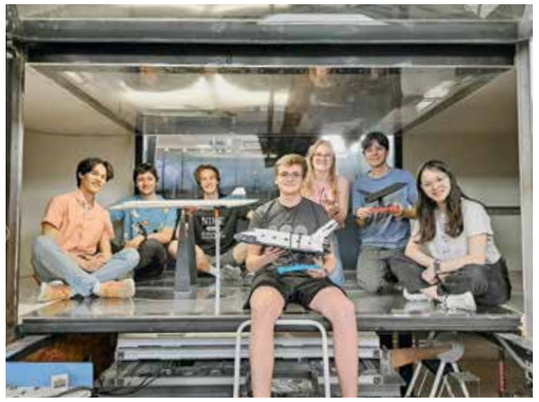
An AAE student team won the Colossus Xploration Grand Challenge — a system-of-systems aerospace design competition focused on wildfire mitigation. Their winning report presents a vision for how aircraft fleets can tackle one of the world's most urgent environmental challenges. The team members are, from left: Ece Inanc, Adler Edsel, Somrick Das Biswas, and Jonah Gerardus (not pictured).

AAE students are regularly receiving Best Paper awards and other major recognitions at academic conferences. Follow us on LinkedIn to keep up with our research successes. bit.ly/AAELinkedin

GRAD STUDENT LIGRESTI STUDYING HYPERGOLICS WITH NASA

Graduate student Joseph Ligresti is one of four from Purdue chosen to conduct world-changing research as part of the NASA Space Technology Graduate Research Opportunities (NSTGRO). Ligresti is studying with Timothee Pourpoint, whose specialty is hypergolic rocket fuels. The research will be conducted at Zucrow Labs, the largest academic propulsion lab in the world.

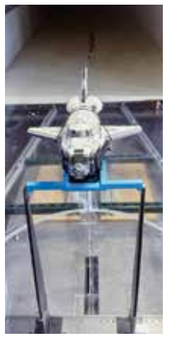
"My research plans to characterize the effects of extended exposure to vacuum and thermal gradient conditions on the reactivity of combustion intermediates for low-temperature storable propellants," Ligresti says. "This work will be applied in the context of long cruise phases for exploration missions to the outer solar system."



LEGOS ARE NEVER A DRAG

As part of the Fluid Mechanics Laboratory course, taught by associate professor Sally Bane, students tested LEGO models of the Concorde and Space Shuttle in the Boeing subsonic wind tunnel. They built the models and then collected data on lift and drag.

The students pictured are: Zachary Detlaff, Aron Dutia, Danielle Evinger, Ian Doering, Grant Embrey, Jacqueline Hee and Parker Givens.



GIANT LEAP, SOFT LANDING

Student team wins $15k milestone award in developing a throttleable liquid rocket engine

Written by the students of Purdue Space Program: Active Controls

Everyone at Purdue knows the legend: if you walk under the Bell Tower, you won't graduate in four years. One day, a team of undergraduates wondered, "What would happen if you could hop over it?"PSP Active Controls is a team of 80 students dedicated to vertical takeoff and vertical landing technology, aiming to build a fully reusable lander vehicle to compete in the Collegiate Propulsive Lander Challenge. We're part of Purdue Space Program, a chapter of Students for the Exploration and Development of Space — and one of the largest student clubs on campus.

In Spring 2025, PSP Active Controls demonstrated throttling capability in our liquid rocket engine and won $15,000 for the competition's throttle milestone.

It was loud, messy, and exhausting. It was also the most rewarding engineering experience any of us has had.

The Lander Challenge pushes students into the frontier of amateur liquid-fueled rocketry, with the final goal to power 160 foot hop, coincidentally the exact height of the Bell Tower. Teams progress through five milestones, from test stand hotfires to a vehicle that can land itself. Competing globally adds pressure. If we want to be the team that performs the hop, we need an engine that throttles reliably.

Enter TADPOLE.

TADPOLE was our first regeneratively cooled bipropellant liquid rocket engine, designed to meet industry-level expectations for reusability. In 2024, we partnered with Elementum 3D to use their proprietary Al6061-RAM2 alloy, previously tested by NASA. Suddenly, professionals were watching to see if undergraduates could deliver on an ambitious technical promise.

For almost a year, we waited for a spot on the 10k Stand at the Maurice J. Zucrow Laboratories. When we finally secured it for a month in April 2025, we arrived the next day ready to fabricate, assemble and test for as many hours as the facility allowed.

Every campaign starts with baby steps — verify the torch ignites, run a three second "burp" for stable ignition, then a ten second steady state burn and, finally, a full 20-second hotfire to confirm the chamber can survive the throttle duration. Those tests revealed how little margin exists in real engines. Any leak or loose wire can halt progress.

Throttle tests brought forth the engine's true capability. A lander vehicle must go up, hover and come down gently, requiring mastery of the steady state and transient engine behavior. Firing with integrated throttle valves was the heart of the challenge, where we proved engine controllability.

We learned fast. In a one-month campaign, minutes matter. Each subsequent test depends on interpreting sensor data, identifying anomalies and adapting quickly. We learned to trust our instrumentation, trust each other and trust the preparation behind each test.

ALAN CESAR

At left: The PSP Active Controls team conducts hotfires to test TADPOLE at Zucrow Labs.

Our favorite part wasn't just the Mach diamonds, it was the repetition. We tested so frequently that some of us lost interest.

This was intentional. Reusability shouldn't feel cinematic; by the 10th test, it should feel routine. When firing a liquid engine becomes second nature, that's when real progress begins.

Meanwhile, other teams raced toward the same milestone. We secured the final throttle prize by just one day. The results speak for themselves: TADPOLE became Purdue's first throttleable liquid rocket engine and first regeneratively cooled hotfire at the undergraduate level. We accumulated more than 160 seconds of burn time, including multiple continuous 20-second hotfires.

Winning the milestone prize validated our work, but the bigger impact was realizing that undergraduates can achieve complex goals. This campaign unified years of mechanical, electrical, aerospace and computer science work. TADPOLE now guides the design for its successor, super-TADPOLE, with all design, control and cooling strategies informed by real test data.

This effort is possible because of Purdue. Few universities give undergraduates direct access to propulsion facilities like Zucrow Labs or fabrication spaces like the Bechtel Innovation Design Center. Even fewer encourage pushing student teams to the limits. At Purdue, propulsion isn't reserved for graduate school. It's something you can do your freshman year, on a Tuesday afternoon, supported by mentors who treat student hardware professionally.

Liquid propulsion is no longer something students admire online. It is something that we build, test, analyze and iterate on ourselves. As the aerospace industry accelerates, students will increasingly be part of that growth, not spectators of it. So look out. Someday, sooner than people expect, we plan to hop over that Bell Tower.

Andrew Radulovich stands beneath the cryogenic propellant lines to inspect throttle valves after coldflows

Below: Active Controls presents the $15,000 prize awarded by the Lander Challenge in front of Armstrong Hall, celebrates senior class graduation

Grounded in Stardust

Purdue Engineering Fellow shapes missions and mentors future space explorers

Many aeronautical and astronautical engineering (AAE) students dream of taking to the skies and soaring through the stratosphere.

Purdue Engineering Fellow and AAE senior Elizabeth Bradshaw would much rather stay on the ground, with a headset on to communicate with the engineers who are space bound.

"The idea of being in the Mission Control room, working on something that really matters — high stakes but engaging — working with the best people, the best team and helping the mission move forward is something that really speaks to me," Bradshaw says.

A COMMUNITY FOR ROCKETEERS

Bradshaw encountered the Purdue Space Program (PSP) during a college fair after an on-campus tour in spring 2022. She spent almost an hour talking to the president about the wonders of space and the cool factor of working with rockets.

Making friends was a breeze within PSP — all she had to do was share her own love of space and space tech.

"What I love about PSP is everyone's their own flavor of nerd," Bradshaw says. "It's a good community, everyone's passionate about what they do. They're involved because they want to make a difference."

Bradshaw gravitated toward leadership in the student organization, organizing tech company visits to Purdue, including both familiar companies and new ventures.

Her efforts are starting to pay off: Companies have begun reaching out to PSP for recruiting events or speaking engagements before Bradshaw can even reach out to them. The self-sustaining relationship benefits both parties: Companies find future employees and students gain real-world connection and professional project feedback.

Under Bradshaw's leadership, PSP expanded from seven teams to 10 and grew from less than 500 members to nearly 600.

REACHING THE STARS FROM A LAPTOP

At 20 years old, Bradshaw has not only left a mark at Purdue, but among the stars. Literally.

"Between the different constellations of satellites I've worked on at Iridium and at SpaceX, I have code running about 70% of the world's active satellites," Bradshaw says. "It's one of my favorite fun facts."

Bradshaw's internship with Iridium in the summer of 2023 kicked off with a satellite launch where she, just days from officially starting her internship, sat amid an active mission control.

Recognized for achievements that make a positive mark on the university and beyond, Purdue Engineering Fellows receive $25,000 upon graduation from benefactors Robert H. Buckman (BSChE '59) and Joyce A. Mollerup.

To hype up students for the total solar eclipse, Bradshaw traveled around the Midwest to share science experiments and insights from her book, "Your Place in Space: A Career Guide for Girls."

Bradshaw, right, rubbed shoulders with astronaut Drew Feustel (BS'89 solid earth sciences, MS'91 geophysics), center, when she joined Purdue and the Indiana Space Grant Consortium at the Indianapolis Motor Speedway to watch the total solar eclipse in April 2024. Also pictured: EAPS PhD student Stephanie Connell.

It was the perfect opportunity to see what it really took to thrive in a high-stakes space that most would consider behind the curtain.

"I think a lot of people, myself included, find success starting in smaller places," Bradshaw said of Iridium, which has fewer than 1,000 employees. "It's a lot easier to fit in and make a contribution."

The following summer, Bradshaw worked at SpaceX in Hawthorne, California, as a Starshield GNC engineering and operations intern. Her projects included spearheading data analysis from satellite constellations, working with troubleshooting communication between in-flight satellites and ground control and improving satellite software.

The internships balanced out Bradshaw's previous experiences with teaching, communicating and interviewing done for her published book.

While still in high school — and in between astronomy classes — Bradshaw interviewed 18 women in space-related careers. She published what she learned from the interviews in "Your Place in Space: A Career Guide for Girls."

Bradshaw expanded upon the book by holding space-themed events in nearby schools leading up to the total solar eclipse in 2024. She hosted her largest event at Purdue with 40 student volunteers. Bradshaw led Scouting America members through hands-on space and science career-related activities she developed with a team. Puzzles included decoding and encoding images about space communications and making dry ice comets with household ingredients to learn about the solar system.

"The opportunity sounded really interesting to me because I had done outreach before," Bradshaw said. "The eclipse was super cool, people were super excited about astronomy and it was a nice way to sort of segue into other activities."

To make matters better, she was on-site at the Indianapolis Motor Speedway (IMS) in April 2024 where 50,000 people gathered to watch the eclipse as part of an event collaboration with IMS, Purdue University and NASA. As a visiting author and volunteer for the Amelia Earhart Leadership in Space Careers program, Bradshaw signed almost 600 copies of her book.

Connecting young students with fascinating careers in engineering is something Bradshaw plans to continue as she transitions from student to full-time professional after she finishes the master's program. Being selected as an Engineering Fellow was a confidence refresher and sets up an exciting future.

"The Engineering Fellowship is a big, 'I did it!' Bradshaw said. "There are so many times when you're just plugging away at homework and trying to stay on top of the next deadline. But when I received that email, it was reassuring to know that someone saw what I was doing, and it mattered."

SENIORS DEFEND AIRCRAFT DESIGNS IN POSTER SESSION

Poster sessions push future aerospace engineers to master communication as well as construction

Students taking AAE's senior design course now have a milestone celebration near the end of each semester, in the form of a poster session.

All semester, their technical skills are tested as they design and build an aircraft from the wheels up. They sweat the details under the examination of professors, aiming to meet strict performance and payload requirements. After weeks of craftsmanship, their planes endure a flight test — often in biting cold and heavy crosswinds.

Some succeed. Many crash. There are smiles nonetheless.

For Fall 2024 and Spring 2025, faculty members Thiago Guimarães and Leifur Leifsson, along with lab manager Tom Bietsch, piloted a new element to the course: a post-flight poster session. Teams must stand by their aircraft, complete or otherwise, and defend their designs to professors armed with clipboards and rubrics.

That included the kind but firm scrutiny of Bill Crossley, AAE department head, and a brevity challenge from Jamie Canino, associate professor of engineering practice. Canino, whose ready cheer makes him a student favorite, made teams sweat by asking for a one-minute synopsis before grilling them on the details.

Bietsch emphasized why this matters: "When you're working with the Department of Defense and you have $50 billion to build the next fighter jet, you still have to do all these same things," he said. "You still have cost limitations and performance requirements and payload and so on. It's just scaled up."

The challenge has new design requirements as well, requiring landing gear for a ground takeoff instead of hand-launching. Students leaned on Bietsch's expertise throughout the semester, since his office is adjacent to the build lab. "Having Tom right there was incredible," one student said. "Instead of searching online or waiting for an email, we could just walk into his office and get answers."

The poster session brought a buzz to the atrium of Neil Armstrong Hall. Teams shared stories of crashes and triumphs, explaining design decisions to classmates, professors and visitors. Some planes were pristine; others bore scars of hard lessons learned.

But thanks to this new tradition, every team now leaves with something more than an aircraft. They carry the experience of defending their ideas under pressure.

FUELING FUTURE FLIGHT

Juno Propulsion's breakthrough engine could reshape in-space propulsion technology

Members of the Juno Propulsion team: Ari Martinez, Andrew Adams, Alexis Harroun and Cody Niggemyer.

A small Washington-based startup, founded by two Purdue alumni, hopes to be the first organization to ever test a rotating detonation rocket engine (RDRE) in space. The company, Juno Propulsion, won a NASA TechLeap Prize worth up to $500,000 to further develop its engine design, culminating in a NASA-funded flight test in 2026.

"We're going to build the full propulsion system — everything from tankage to fuel delivery, to thruster and controller," says co-founder and CEO Alexis Harroun (MSAAE '19, PhD AAE '23). "Obviously the thruster is the secret sauce, and we're putting in all the experience we got at Zucrow into building this."

Harroun and co-founder Ari Martinez (BSAAE '17, MSAAE '19, PhD AAE '23) both studied under Purdue's propulsion legend Steve Heister, professor emeritus. Harroun was also named to Aviation Week Network's 20 Twenties list in 2019. "I'm thrilled that my students are able to further their doctoral work in this detonative propulsion technology. We do feel that these types of systems will first appear in space propulsion applications," Heister says.

Thanks in part to research and collaborations between NASA and Purdue, practical RDRE applications are closer than ever. Martinez's PhD work at Purdue included designing and testing a liquid-cooled RDRE, with critical components 3D-printed by NASA. "Ari's experience with additive manufacturing has been a really big piece of our product development," Harroun says.

BREAKING BARRIERS

Juno Propulsion's design uses nitrous oxide and ethane as fuel to create a rotating detonation wave. They expect to achieve specific impulses 5% to 10% greater than traditional rocket engines of the same size, according to Harroun. Smaller engines mean space vehicles can have more capacity for payloads and fuel.

If it proves viable, the company's engine may allow companies to wean themselves off toxic hydrazine fuels, are dangerous and costly to handle.

"There are other nontoxic and green solutions on the market, but because they're not using a performance-enhancing tech like ours, they're not going to be able to compete performance-wise," Harroun told Payload. "We're trying to bridge that gap."

Alexis Harroun and Ari Martinez

The current highest-altitude test for an RDRE was achieved by a JAXA sounding rocket on a suborbital trajectory, launched in July 2021. In 2023, NASA's Marshall Space Flight Center conducted a long-duration ground test of a full-scale RDRE. Juno Propulsion would be the first US-based entity to test an RDRE in space and the first ever to fly one on-orbit.

Juno's long-term vision is to build a suite of engines for different use cases, beginning with in-space propulsion systems, and graduating to rocket engines down the line. They expect to have the capacity to produce as many as 10 engines in 2027, and dozens more the year after.

The small team, which has included other Purdue interns and employees, is collaborating with the University of Washington on this project. They also earned funding for rotating detonation engine research through the NSF Small Business Innovation Research and Washington state's JCATI grants program, and have done other product development work with NASA Marshall.

Harroun is thrilled to earn this grant and have the opportunity to send something to space.

"We went to Yellowstone recently with some of our Purdue grad school friends — and when the stars came out at night and we saw satellites orbiting, I was like, 'Oh my god, we're gonna be doing that! That's crazy!'" Harroun says.

ENGINEERING IT FORWARD

Two Caterpillar engineers mentor EPICS teams and guide students toward real-world practice

Above: Jason Huycke, right, has mentored student EPICS teams since 2018.

Jason Huycke (BSAAE '95) didn't think he'd stay at Caterpillar for long. Starting at their Lafayette, Indiana, facility fresh out of college, he thought he'd leave after about a year to find work in aerospace. But Caterpillar offered growth and community, not to mention a place where he could build a career. Over the years, Huycke traveled the world in his role as an engineer with Caterpillar, developing huge generator systems for their Electric Power division.

In 2018, a colleague introduced him to Purdue's Engineering Projects in Community Service (EPICS). EPICS partners with local organizations in need of engineering-based solutions — and challenges teams of undergraduates to design, build and deploy them.

"I didn't know anything about it," Huycke says. "Once I found out what it was, I got really interested and stuck with it."

Within a year, Huycke was volunteering his Friday afternoons, with Caterpillar's support, to advise student teams. The work keeps his engineering awareness sharp and connects him to new generations of engineers — some of whom have since joined Caterpillar.

Huycke invited coworker Payal Saraiya to join him as an EPICS advisor in 2023. Together, they now mentor two student teams — Art Smart and Bubble Tube — housed in the Neil Armstrong Hall of Engineering. They guide students on design, execution and stakeholder needs while ensuring each project aligns with real-world engineering practices.

"The process is truly student-run," Huycke says. "We're here to keep them on track and guide them through the engineering process."

> "The process is truly student-run. We're here to keep them on track and guide them through the engineering process."
>
> —**JASON HUYCKE**, EPICS mentor

SMART ART AND BUBBLE TUBES

The Art Smart team is designing an interactive, Indiana-themed art wall for the Art Museum of Greater Lafayette. Children will be able to flip switches to rotate art panels while visible gears add a sense of engineering magic.

"Essentially, they're creating their own Rube Goldberg machine," Saraiya says. "It shows kids that STEM can be creative and fun."

The Bubble Tube team is building a six-foot illuminated column for Grant's House in Lafayette, an organization that supports children and young adults with disabilities. The device helps with relaxation through changing lights and gentle bubbles.

"It's going to be a stimulation tool," Huycke says. "It provides both visual relaxation and engagement for the young adults at Grant's House."

GUIDING THE NEXT GENERATION

While advisors don't build the projects themselves, they frequently discuss more than technical details. Each week, Huycke and Saraiya spend time helping students prepare for life after college — from job fairs to interviews.

"Having someone show you what's ahead eases those fears," Huycke says. "Life after college isn't scary."

Saraiya, who benefited from mentors early in her own career, sees advising as a way to pay it forward. "Mentors are your north stars," she says. "They aren't rowing your boat, but they're guiding your path."

For Huycke, returning to Armstrong Hall feels like coming full circle — from aspiring NASA engineer to a lifelong Lafayette resident, now helping Purdue students chart their own futures.

"I've seen a lot and worked on all kinds of projects," he says. "Being able to translate that into what the students are learning here in EPICS is really rewarding."

ALUMNI SHOWCASE THEIR CAREERS IN SENIOR SEMINAR

The AAE400 Senior Seminar invites Purdue alumni to share their stories and career advice with soon-to-graduate students. This once-a-week course demonstrates the broad range of careers and experiences available to aerospace engineers.

LISA FAHL (BSAAE '05), *vice president of engineering for Boeing in South Carolina*

JASON HUYCKE (BSAAE '95), *configuration engineer at Caterpillar's Electric Power Division*

DARIN DITOMMASO (BSAAE '88, OAE '20), *VP of engineering at GE Aerospace Defense and Systems*

DAVE BEERING (BSEE '85, MSEE '87), *founder and owner of Intelligent Designs*

SATADRU ROY (MSAAE '12, PHD AAE '17), *founder and CEO of Alcifo*

ROB CHAMBERS (BSAAE '92, MSAAE '93, OAE '24), *senior director of space exploration strategy at Lockheed Martin*

TINY TECH, BIG POTENTIAL

Alina Alexeenko, Tony Cofer and Jesus Adrian Meza Galvan with their water-based thruster device.

A new type of miniature propulsion system was tested aboard Blue Origin's New Shepard NS-29 mission in February 2025 — the culmination of a dozen years of development. The lightweight and environmentally friendly thruster, co-developed by Purdue and NASA's Goddard Space Flight Center, could make low-cost miniature satellites more reliable and versatile.

The actual device, called the Film-Evaporated MEMS Tunable Array (FEMTA), is smaller than a penny, needs minimal electrical power and uses only ultra-pure water as a propellant.

More than 100 students, including graduates and undergraduates, have been involved in the project, says Alina Alexeenko, a professor of aeronautics and astronautics. She has led this project with her co-principal investigators, AAE professors Steve Heister (now emeritus) and Steven Collicott.

"We started with a very rough, scrappy prototype, made from a plastic syringe bought in a pharmacy," Alexeenko says. "Then we got funding to build our first MEMS [Micro-Electro-Mechanical System] device, and then tested hundreds of them to get a working integrated micropropulsion system that can turn a CubeSat, and so on from there."

The project was a constant progression, supported by $1.5 million in consecutive grants from NASA and the Air Force. It has resulted in several patents and four doctoral dissertations. Those results, Alexeenko says, are a bargain: "In the space industry, it would take a lot more to get a propulsion technology from TRL 2 [NASA Technology Readiness Level 2] to spaceflight. FEMTA is now on the map of available space-tested smallsat propulsion technologies."

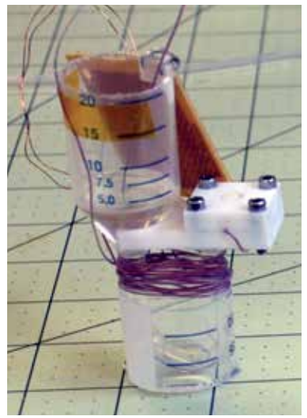
MINIATURE THRUSTERS FOR MINIATURE SATELLITES

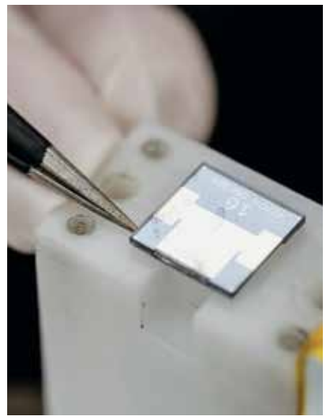
Over the past decade, thousands of small CubeSats have been launched into low earth orbit to perform a variety of tasks — from providing internet service to monitoring soil moisture on Earth. CubeSat sizes range from "one unit" (1U), measuring about 4 inches per side, extending up to 1.5, 2, 3, 6, and even 12U.

Alexeenko says CubeSats make space missions much more cost-effective. "They offer an opportunity for missions such as swarm and constellation flying, that their larger counterparts cannot economically achieve."

But, being so small, there are few practical ways to move them around during flight. That makes CubeSat missions more likely to end early from just being disoriented. To achieve their full potential, CubeSats will require micropropulsion devices to

Small rocket engine tested aboard Blue Origin flight could revolutionize satellite control





The first proof-of-concept MEMS device, built in 2013, used parts of plastic syringes purchased at a farm supply store. After a dozen years and many iterations, the research team would eventually use the high-tech micromanufacturing tools in Purdue labs to make the flight-ready FEMTA thruster.

deliver precise low-thrust "impulse bits" for scientific, commercial and military space applications.

Existing options aren't very practical, says Tony Cofer (BSAAE '09, MSAAE '10, PhD AAE '15), a spacecraft laboratory engineer in AAE. He earned his PhD while working on this challenge and holds two patents related to the FEMTA thruster. "CubeSats currently have very limited propulsion options because those options are so bulky and expensive. A butane gas system can cost around $300,000, and it takes up half of a U [CubeSat Unit]. So, generally, you drop them into orbit and hope for the best. Most of them use reaction wheels and magnet torquers for attitude control, but both can be kind of jittery," Cofer says.

JETS LIKE A PRINTER

Inspired by inkjet printers, which use tiny heaters to propel droplets of ink, Cofer was able to develop a tiny thruster that would shoot out super-purified water to propel a satellite. The thruster opening is only 10 micrometers wide — a critical design feature. At this size, surface tension of the water keeps it from flowing out, even in the vacuum of space.

Activating small heaters at the thruster nozzle creates water vapor and provides a tiny amount of thrust. "It's about as much force as an eyelash falling on your hand," Cofer says. "But these things scale up. They weigh less than a tenth of a gram, and you can put together a bunch of them and get 200 to 300 μN per watt of power."

A small tank of ultra-purified water serves as propellant. Water is much safer to handle than hydrazine, a dangerous rocket propellant that is widely used for maneuvering spacecraft.

And the electricity requirement is very small. In a paper published in 2017, Purdue students demonstrated a thrust-to-power ratio of 230 micronewtons per watt for a specific impulse of 80 seconds. "This is a very low amount of power," Alexeenko says. "One 180-degree rotation can be performed in less than a minute and requires less than a quarter watt, showing that FEMTA is a viable method for attitude control of CubeSats."

The device, Alexeenko says, can also be used to do space science. By providing a source of water under extreme atmospheric conditions, like on the surface of an asteroid, the FEMTA can be used to test hypotheses about the origins of life on Earth.

WITH HELP FROM GODDARD

The original thruster design was developed under a University SmallSat Technology Partnership grant from NASA and a NASA REDDI grant provided the funding for the launch and some development costs.

"The team at Goddard, including Eric Cardiff, Khary Parker, Carl Kotecki and Manuel Balvin, gave us advice and guidance throughout the design process," says Steve Pugia (BSAAE '18, MSAAE '20), a PhD student at Purdue. Pugia worked on the flight-tested iteration and has been doing data analysis since the thruster returned to Earth.

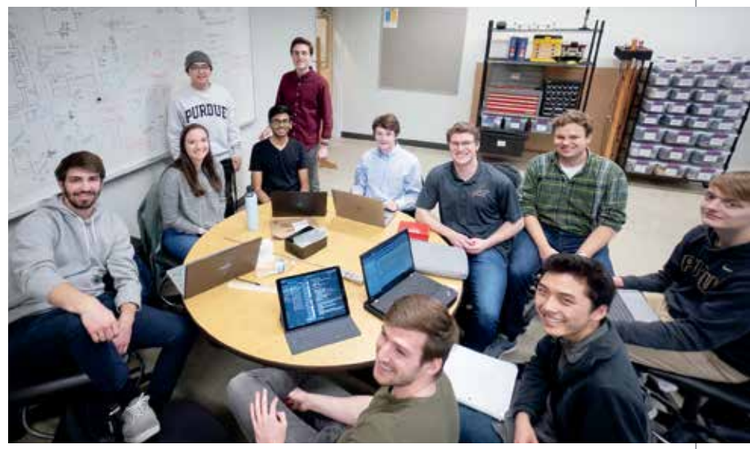
"Goddard had a lot of input in the different generations of the thruster, like with making the smaller capillaries so we didn't need a closing shutter mechanism to prevent background evaporation," he says.

HANDS-ON VIPs

In recent years, the project has been run within a Vertically Integrated Projects course at Purdue. VIP is a cornerstone of the hands-on experience that makes a Purdue education so valuable. Kate Fowee Gasaway (BSAAE '16, MSAAE '18, PhD AAE '22), who co-authored the 2017 research paper on FEMTA, now works with CubeSats at NASA's Goddard Space Flight Center.

PhD student Jesus Adrian Meza Galvan, a teaching assistant for the FEMTA VIP course, chose Purdue precisely for this opportunity. He's also grateful to sometimes talk with Gasaway about the craft of teaching.

"Many schools have strong aerospace programs, but not many offer hands-on opportunities with space-flight projects like Purdue does. I chose Purdue specifically because it has a strong focus on experimentation," he says.



Above: Sessions of Purdue's Vertically Integrated Projects course, like this group from Spring 2020, brought in dozens of student collaborators at a time to bring this concept to flight-readiness.

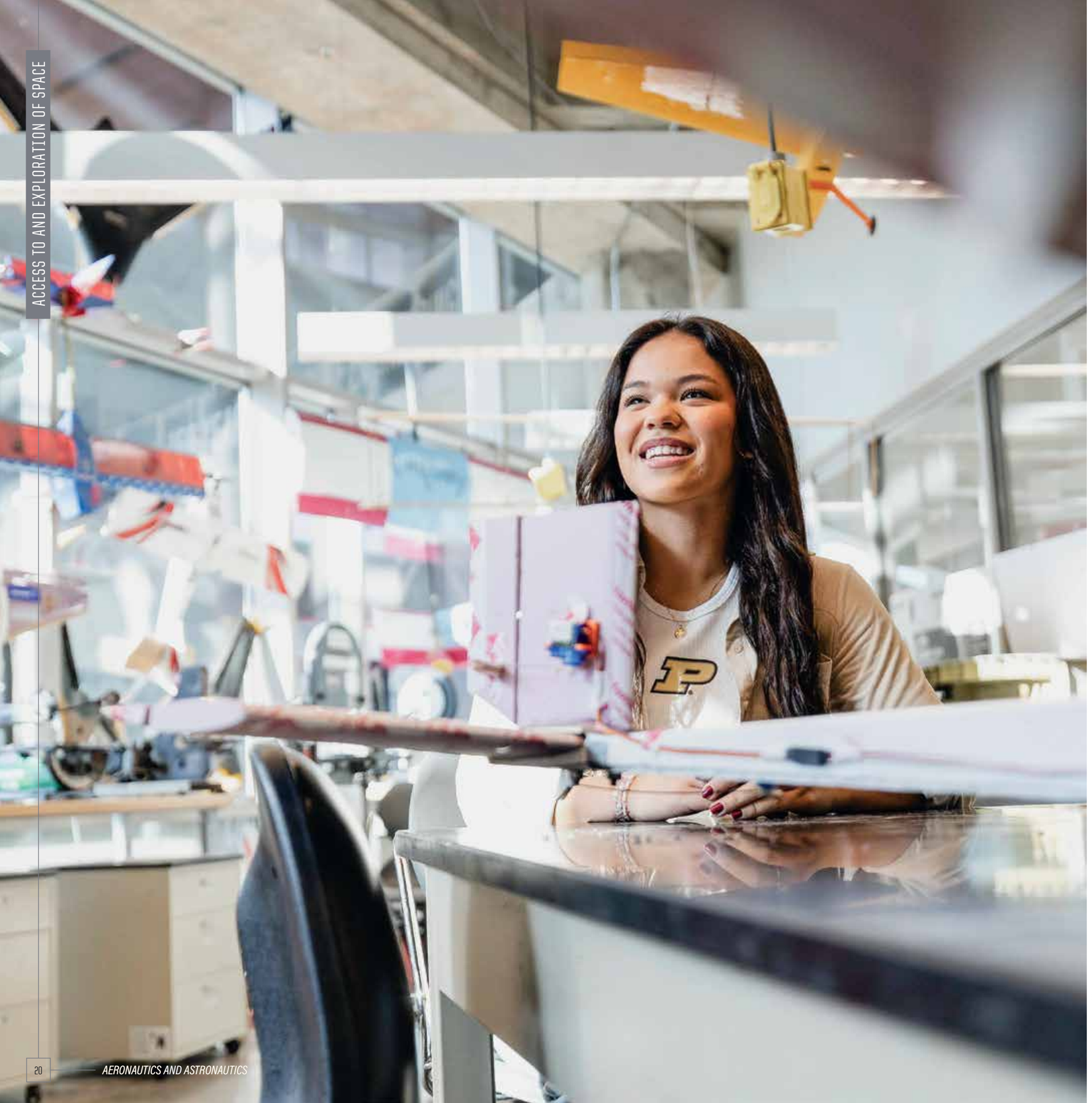
Left: Kate Fowee Gasaway (BSAAE '16, MSAAE '18, PhD AAE '21), who now works in the small satellite program at NASA Goddard, holds an early prototype in 2017.

Galvan and Pugia accompanied the device to the Blue Origin launch site in Texas and saw it loaded onto the rocket booster. This flight opportunity will test the device in the rigorous environment of space.

"I was looking for a project that would utilize my skills in microfabrication while also expanding my experience developing space hardware," Galvan says. "FEMTA fit both of those things perfectly and I was lucky enough that Dr. Alexeenko offered me the chance to work on it."

Galvan believes the VIP program is a great opportunity for undergraduate students to get hands-on experience early in their education.

"All together the project has had contributions from more than 100 undergraduates," he says. "We have had students from all disciplines be involved as early as their first semester as freshmen and carry on until their graduation. I think having that level of exposure is very rare."



YASH TRIVEDI

PURDUE 1

Abigail Mizzi to be first Purdue student to conduct research in suborbital space

A Purdue student is going to space.

Not as a tourist, but as a researcher.

On a flight scheduled for 2027, Abigail Mizzi (BSAAE '25) and her faculty advisor, Professor Steven Collicott, will each conduct separate experiments on fluid dynamics in microgravity. They will be part of the world's first all-Boilermaker flight into suborbital space, aboard Virgin Galactic's new Delta-class spacecraft.

Mizzi, a graduate student in the School of Aeronautics and Astronautics, was selected by a Purdue faculty committee to join the historic Purdue 1 mission. The flight will be part of Virgin Galactic's research program, which offers academic institutions direct access to microgravity environments.

"This is a culmination of the skills and knowledge that I learned in the past four years, and now get to apply it in the unique and complex environment of space," Mizzi says.

Her research, as well as Collicott's, will focus on how motion in microgravity affects liquids. Modeling fluid motion has direct applications in spacecraft propulsion systems and fuel management. Their experiments will be conducted during the three to six minutes of weightlessness provided by the suborbital flight.

"This is exactly why I want to go to space," she says. "To gather real data and add to this body of knowledge that researchers, designers and engineers can use on future spacecraft."

Mizzi has also built a leadership profile at Purdue, serving as president of the Society of Women Engineers and received the organization's Outstanding Collegiate Member Award in 2025. She's also an ambassador for AAE, the College of Engineering and the Honors College. She was also awarded a prestigious scholarship from the Wings Club Foundation in 2024.

"She has created positive change on campus," says Karen Marais, an AAE professor who nominated Mizzi for the scholarship. "Her passionate and driven leadership exemplifies the kind of student who gives back to the Purdue community."

The Purdue 1 suborbital space mission aboard a Virgin Galactic spacecraft was announced on Sept. 23, 2025, to a large crowd gathered at the Neil Armstrong Hall of Engineering.

AN ALL-BOILERMAKER FLIGHT

The Purdue 1 mission is a collaboration between Purdue University and Virgin Galactic, with support from NASA's Flight Opportunities program. Collicott will be conducting his own NASA-funded fluid dynamics experiment. The remaining passengers are Purdue alumni Jason Williamson (BSCE '97), senior vice president of the multidisciplinary design firm Dunaway, and two others whose names will be announced later.

Known as the Cradle of Astronauts, Purdue has 30 alumni — 29 from Purdue Engineering — who have already flown in space or been selected as NASA astronaut candidates. Collicott, Mizzi and Williamson will be considered part of the Cradle of Astronauts following their Virgin Galactic flight.

"We anticipate that this mission with Purdue University will be a powerful demonstration of what can be possible when research institutions and educators gain direct access to the microgravity environment," says Mike Moses (BS '89 physics and astronomy, MSAAE '95), president of Virgin Galactic. "By enabling researchers to accompany and interact with their experiments in real time, we are not just advancing science — we are empowering the next generation of innovators and expanding the frontiers of educational opportunity. We expect Purdue 1 to be a milestone for our spaceline and for the broader research and education community, showing how suborbital spaceflight can transform both scientific inquiry and hands-on STEM education."

Designed to seat up to six passengers, Virgin Galactic's next-generation spaceship is customizable and will have one seat removed for this mission to fly the five crew members and allow space for a payload rack to hold the research experiments.

"This flight puts an experienced researcher up there with the experiment," Collicott says. "It's not like I'm sitting with the experiment next to the crew and simply watching it. It'll be a situation where observations and decisions need to be made to maximize the value and amount of data collected in the experiment. I expect to be there and be able to adjust and control the experiment hardware for the duration of the flight."

Virgin Galactic's Delta-class spacecraft is designed for frequent flights, with turnaround times as short as one week. This rapid cadence allows researchers to iterate quickly, potentially accelerating scientific discovery.

"We are challenging the notion that a university is restricted to a geographical location on Earth," says Arvind Raman, dean of the College of Engineering. "A university environment of research, learning and career success can also be continued beyond Earth to space, the next endless frontier."

KELSEY LEEVER

30 YEARS OF MICROGRAVITY RESEARCH

Professor Steven Collicott began his AAE418 course, "Zero Gravity Flight Experiments," 30 years ago with the explicit intent of providing students opportunities few other universities could.

Students from the course have tested spacewalk tools in NASA's and others' neutral buoyancy pools. They've run experiments aboard parabolic flights in Earth's atmosphere while experiencing weightlessness themselves — on the appropriately nicknamed "vomit comet." They've traveled the country to watch their experiments launch on suborbital rockets from private aerospace companies.

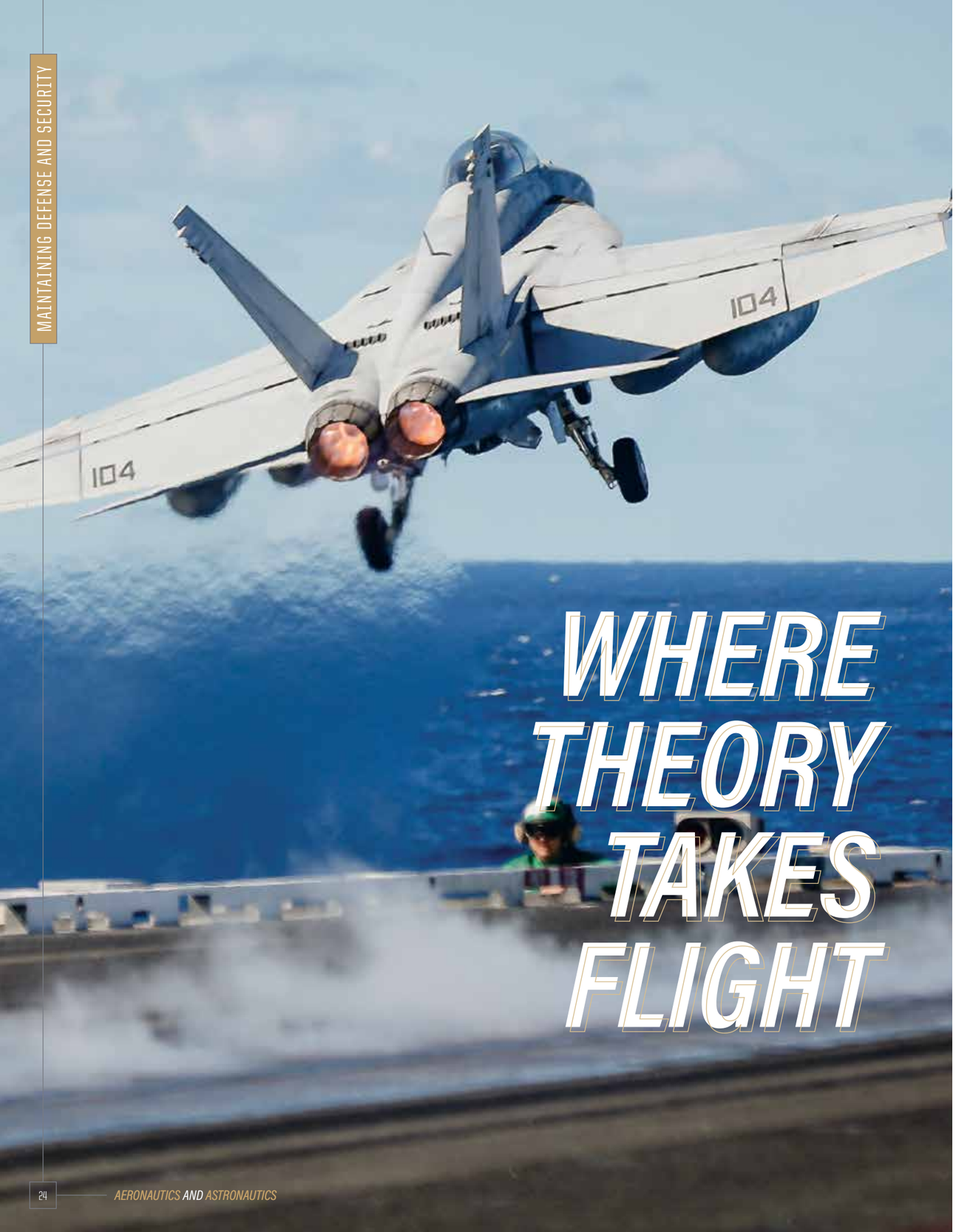
The 2025-26 academic year marks the 30th anniversary of Collicott starting this course, on the insistence of two of his students. More than a thousand students have taken his course since. Many of them have gone on to become major figures in the aerospace industry — including Sirisha Bandla (BSAAE '11), former Virgin Galactic vice president and a Purdue astronaut.

AAE students Abigail Mizzi, left, and Thendral Kamal, right, both received the Outstanding Collegiate Member Award from the Society of Women Engineers in 2025. Jamie Krakover (BSAAE '04), center left, a senior manager at Boeing, received SWE's Ignite Award for her contributions as a mentor. Tamaira Ross (BSAAE '96, MSAAE '98), center right, advanced technology director at Boeing, received the Beacon Award for technical leadership.

Mizzi's warm personality and talent as a public speaker has earned her multiple opportunities to speak at Purdue events. She has emceed AAE's Outstanding Aerospace Engineer awards dinner, and, as seen above, given a speech during the College of Engineering's Distinguished Engineering Alumni Awards reception.

HELP SEND ABBY TO SPACE

Abby's flight on Purdue 1 will be entirely donor-funded. You can help send her to space and support research at Purdue.



WHERE THEORY TAKES FLIGHT

University's partnership with the U.S. Naval Test Pilot School blends classroom learning with cockpit application

BRUCE ALSTROM

Bruce Alstrom has always been drawn to the space where theory meets practice. As an assistant professor of engineering practice, he thrives on showing students how aerodynamic principles work not just on paper, but in the real world.

That's what made him a natural fit for a new partnership between Purdue and the U.S. Naval Test Pilot School. The program allows military pilots and civilian engineers to earn a Purdue master's degree while completing the rigorous 11-month test pilot curriculum at Naval Air Station Patuxent River in Maryland.

Alstrom's role is central: he teaches the aerodynamics course custom-designed for the program. While rooted in the fundamentals of aerodynamics, the class is built with the military's unique needs in mind. "The Navy wanted more applied, real-world examples," Alstrom said. "The assignments need to reflect the challenges they'll actually face."

While the course itself is delivered fully online, collaboration with the test pilot school is anything but distant. Teams from Purdue, including Alstrom, visit Pax River twice a year to meet with Navy leadership and ensure the program continues to align with the school's evolving needs. "It's a true partnership," Alstrom said. "We're always working together to make sure what we teach directly supports what they do in the air every day."

Alstrom's own background prepared him perfectly for the role. He is an experienced flight sciences engineer who earned a PhD in experimental active flow control from Clarkson University. Prior to Purdue, Alstrom was a research engineer at Georgia Tech with a focus on experimental aerodynamics, flight mechanics and human factors. "I've been fortunate to bridge that gap between theoretical work and hands-on experimentation," he said. "That experience translates directly into what these students need — helping them see how the math applies when they're in the cockpit." His mix of scholarly expertise and applied problem-solving made him a natural choice when Purdue created a faculty line specifically to support the Navy partnership.

Behind the scenes, the partnership itself represents a milestone for Purdue. John Fassnacht, principal managing director for online in the College of Engineering and the Purdue Polytechnic Institute, helped shepherd the agreement from idea to reality.

"The Navy had a real challenge," Fassnacht said. "Its test pilot school isn't an accredited university, so graduates couldn't earn a degree directly from the program. Previously, students would earn an MS after attending test pilot school, but that meant doing the 11-month program first, then going back for possibly two or more years of school. They wanted a way to make it concurrent."

In 2023, Navy leadership visited West Lafayette to explore a possible partnership. Over the next year, Purdue worked with six different university departments and the Navy to craft a flexible solution. Students could earn credit for parts of the test pilot school curriculum, take online Purdue courses tailored to their needs concurrent with the test pilot curriculum, and complete foundational online courses in math and mechanics through Purdue Online before arriving in Maryland.

The result was a one-of-a-kind master's degree from the Purdue School of Engineering Technology with a major in developmental testing and innovation. Additional pathways into the online MS programs in aeronautics and astronautics or interdisciplinary engineering are available for students who wanted deeper specialization. "We were willing to step back from our traditional structures and ask, *How do we make this work?*" Fassnacht said. "That flexibility is what made Purdue the right fit."

For Alstrom, teaching in the program is both a professional challenge and a point of pride. The students bring years of flight experience, engineering knowledge and military discipline into the classroom. "These are highly motivated professionals," he said. "They know what's at stake in the work they do, and they're eager to connect theory with practice. That makes teaching them incredibly rewarding."

The impact reaches beyond the Navy. International partners — including test pilot schools from the UK and France as well as pilots from allied nations — participate each year, strengthening Purdue's role on the global stage. Roughly 70 to 72 students move through the program annually, building a network of advanced training that stretches across borders.

Alstrom's faculty line was created specifically to support the program, underscoring its importance to Purdue's future. "This is the most unique program I've ever worked on," Fassnacht said. "It brings together custom course design, cross-department collaboration and a true partnership with the Navy. It's unlike anything else we've done."

For Alstrom, the appeal is simple: helping pilots and engineers bridge the gap between theory and application, between classroom and cockpit. "At the end of the day," he said, "it's about giving them tools they can use immediately. When I see a student connect the dots between an aerodynamic principle and the aircraft they're testing — it doesn't get much better than that."

REBECCA ROBIÑOS

PURDUE AND ROLLS-ROYCE SAFEGUARD OUR FUTURE

Leaders in academia and industry are advancing aerospace research together

Who knows how to stay one step ahead?

From state-of-the-art facilities in West Lafayette, Purdue and Rolls-Royce are leading the world in what's next for aerospace research.

"Purdue is a world-class research institution and a top university in the U.S. for engineering aeronautics and astronautics," says Warren White, head of assembly and testing at Rolls-Royce. "Our partnership is strengthened by an aligned interest in transformative technologies in civil and defense aerospace."

For over 70 years, this partnership has safeguarded national security and provided innovative solutions. Today, it continues to lead progress in critical fields, including advanced manufacturing, compressor and turbine technologies, and hybrid-electric and hypersonic propulsion.

While technological capabilities have advanced significantly since Purdue first used Rolls-Royce engines for a post-World War II project, one thing has remained constant: the Purdue and Rolls-Royce partnership has remained at the forefront of futuristic feats.

The two organizations are pioneering the next iterations of U.S. military aircraft. In 2003, Purdue was designated as the first Rolls-Royce University Technology Center (UTC) partner in the U.S.

"Giant leaps in aerospace happen here," White says. "We are proud to be working with Purdue to advance these efforts."

Those giant leaps include forging a more sustainable future in aviation by employing hybrid-electrical technology instead of relying on fossil fuels; overcoming challenging operating environments with improved high-altitude testing; and helping aircraft reach high speeds with hypersonic systems.

> I chose Purdue because our chemical propulsion and combustion research is unmatched."
>
> —**TRISTAN SHAHIN**, AAE PhD student

LEFT: KELSEY LEFEVER. RIGHT: REBECCA ROBIÑOS

WHERE COLLABORATION TAKES PLACE

Boilermakers don't have to travel anywhere to find extraordinary opportunities — because of Purdue's status as a UTC, students have access to top-tier facilities, a network of notable leaders plus work-study, co-op and intern positions.

"I chose Purdue because our chemical propulsion and combustion research is unmatched," says Tristan Shahin, an AAE PhD student. "Students are given ownership over the design, fabrication and operation of experiments that utilize pressures, temperatures and flowrates. Our work has direct relevance to government and industry partners."

"The competition for engineering resources has never been fiercer," White says. "Our relationship with Purdue has been instrumental in developing a strong pipeline of talent. Today more than 700 Rolls-Royce engineers have a degree from Purdue."

In 2022, Purdue and Rolls-Royce signed the largest industry-academia deal in the university's history: a 10-year, $75 million strategic alliance. Since then, major investments have benefited Purdue's Zucrow Laboratories — the largest academic propulsion laboratory in the world — as well as the Hypersonics and Applied Research Facility (HARF), home to the only Mach 8 quiet wind tunnel in the world and the hypersonic pulse (HYPULSE) reflected shock/expansion tunnel.

"I work right alongside other Boilermakers," says Tonya Munevar, a testing outsource manager at Rolls-Royce who earned a master's degree in technology and research from Purdue in 2011. "A personal highlight for me is supporting the students as they transition from theoretical thinking to industry practice while helping them understand and adapt to the new expectations."

WHEN SECURITY MATTERS MOST

Ever-evolving capabilities place even more pressure on not only being prepared for today but being able to anticipate the challenges of tomorrow. Global rivals' attempts at ensuring dominance have led the U.S. Department of Defense (DOD) to seek new opportunities with academia and industry partners.

Research between Purdue and Rolls-Royce aligns with critical technology areas designated by the DOD, including the implementation of innovative and cost-effective hypersonic systems. Advancements in the field of high-speed flight will further bolster the nation's air, land and sea operational forces.

Students and researchers regularly test components for Rolls-Royce that end up in industry-changing aircraft, like the V-22 Osprey that combines the vertical performance of a helicopter with the speed of a top aircraft. Teams in West Lafayette work on Rolls-Royce engine lines fit for tiltrotor, rotorcraft and energy applications.

WHY WE PERSIST

Every year, new projects in West Lafayette propel the world forward. The Discovery Park District at Purdue is a launch pad for businesses, from Fortune 100 companies to early-stage startups. Rolls-Royce has involved those on campus, in the West Lafayette community and across the state of Indiana to strengthen a global network.

"Working with partners like Rolls-Royce highlights Purdue's involvement in shaping the future of aerospace propulsion," Shahin says. "It's easy to see the broader impact of our work when we're turning wrenches on hardware that actively flies in aircraft."

New AI Platform Allows Users to Design and Analyze Composite Materials, Structures

AnalySwift collaborates with Purdue to develop CompositesAI for its software products

A new artificial intelligence platform has been launched to help users more quickly develop composite materials and structures without requiring in-depth technical jargon or knowledge.

AnalySwift LLC, a composite simulation software provider, has partnered with Purdue University researchers to create CompositesAI. CEO Allan Wood says it helps users more quickly create and analyze composite products designed with other AnalySwift software solutions.

Designers and engineers can use the free platform at CompositesAI.com.

INITIAL FOCUS: AIR MOBILITY INDUSTRY

Wood says AnalySwift offers software for the burgeoning air mobility industry to design composite rotor blades and propellers, components common to these vehicles. As air mobility companies mature, they encounter difficulty in modeling complex multimaterial, multilayer rotor blades.

"They need blades with very specific shapes and performance characteristics such as inertial, elastic and strength properties," he says. "While air mobility engineers may have strong knowledge of composite materials and structures, blades often require specialized experience, which meant outsourcing this key component or hiring blade engineers. CompositesAI, paired with AnalySwift's blade modeling software, VABS, helps overcome this challenge."

As an example, an engineer could describe a helicopter or air mobility blade in natural language through the platform.

"CompositesAI translates that language into the specialized input files needed to design the blade with VABS," Wood says. "This helps engineers more quickly develop products without requiring detailed technical knowledge related to using AnalySwift's tools — VABS and SwiftComp."

DEVELOPING COMPOSITESAI

AnalySwift partnered with Wenbin Yu on the CompositesAI project. Yu is the Milton Clauser Professor of Aeronautics and Astronautics and AnalySwift's chief technology officer.

Professor Wenbin Yu is the author of "Multiscale Structural Mechanics: Top-Down Modeling of Composite Structures Using Mechanics of Structure Genome."

The book, published in January 2026, delivers a unified approach to composite modeling based on the mechanics of structure genome, offering multiscale constitutive modeling for general anisotropic and heterogeneous materials and structures with the simplicity of classical engineering models.

"AI is rapidly transforming many aspects of our life and will play a major role in advancing composites' design and manufacturing," he says. "We are working to stay on the leading edge of these developments by launching CompositesAI, aimed at consolidating and delivering composites expert knowledge using AI."

The CompositesAI project focused on four objectives:

1. Train CompositesAI to be an AI-powered tech support system for AnalySwift products.
2. Develop a feedback mechanism so users can provide questions and answers to further improve the performance of CompositesAI.
3. Develop an AI-human interactive platform so AnalySwift engineers can collaborate with CompositesAI to answer customers and automatically collect answers to further improve CompositesAI.
4. Develop application programming interfaces so input files can be easily generated and companion software can be invoked for AnalySwift products.

Yu says CompositesAI is initially focused on rotor blades for air mobility, helicopters, unmanned aerial vehicles, drones and wind turbines, but its uses will expand.

"It will soon be able to handle other composite structures such as plates, shells, panels and other 3D structures utilized by engineers in designing the next generation of aerospace, defense, energy, medical and sporting goods applications," Yu says. "Once fully developed, CompositesAI will be capable of handling all aspects of composites with the precision of validated engineering software and authority of world-leading experts."

AnalySwift has partnered with Indiana-based Applied Research Institute, an economic development organization whose innovation voucher program provided matching funding to further the objectives of the partnership with Purdue.

AnalySwift licenses some of its innovations through the Purdue Innovates Office of Technology Commercialization.

WILL CABRAL

Wenbin Yu, the Milton Clauser Professor of Aeronautics and Astronautics, is chief technology officer at AnalySwift, LLC. He has received many recognitions for his academic work, including:

- ASC Award in Composites, ASC, 2025
- Distinguished Senior Fulbright Scholar, 2025
- Dedicated Service Award, 2025, ASME

ROBOTS NEED EYES LIKE OURS

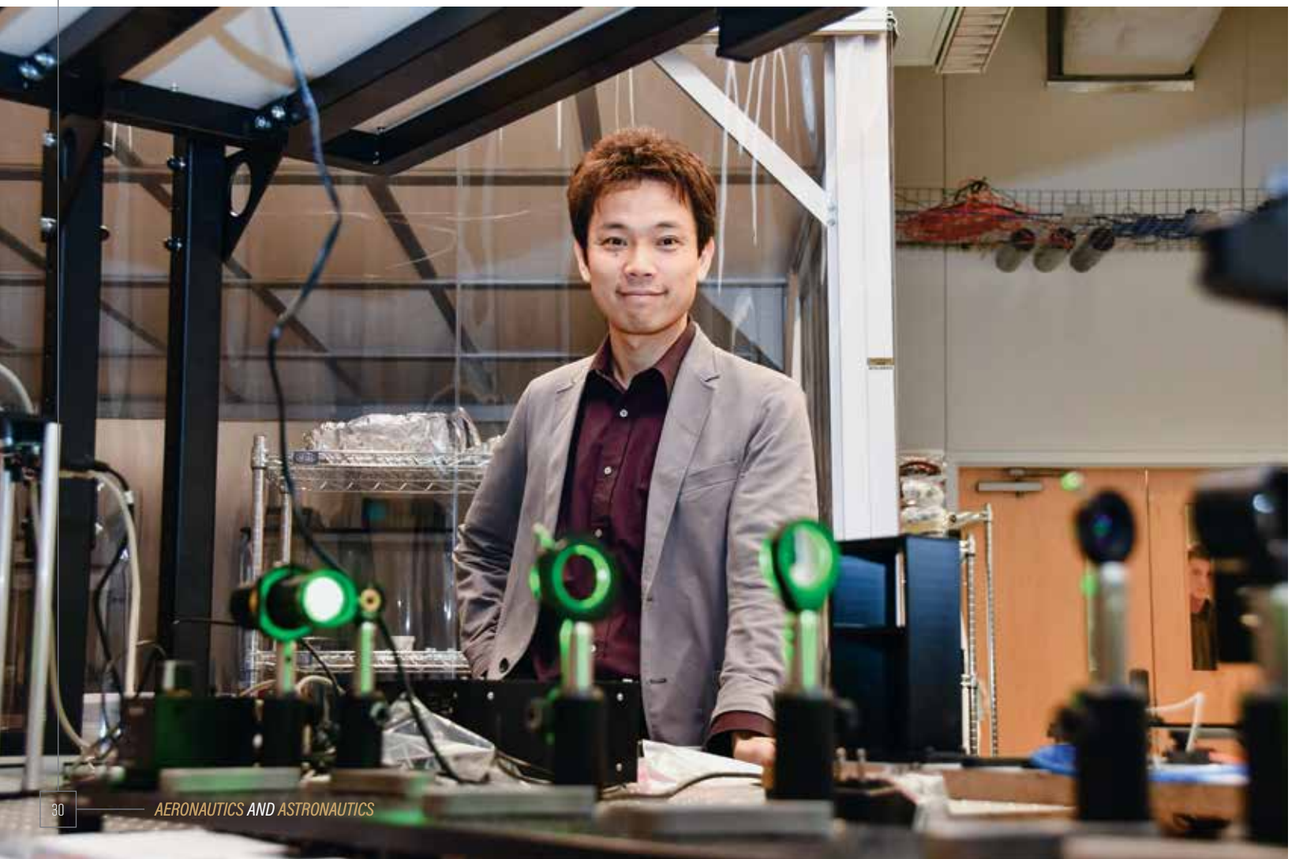
Associate professor Takashi Tanaka is developing event-based perception systems that reduce data load and allow near-instant decision-making in autonomous platforms

When a self-piloted vehicle is making decisions, any delays in the process could make the difference between life and death. The biggest delay in that decision-making is often in the camera hardware says Takashi Tanaka, AAE associate professor.

To understand the world around it, the human eye and brain process the world continuously but identifying changes over time. That's part of what makes humans incredibly adept at making split-second decisions, with a reaction time around 200 milliseconds. We're not processing every single thing in our field of view all the time — we're mostly noticing what's new in any given moment, Tanaka says.

Cameras, however, view the world as a series of complete pictures. A traditional camera might capture a frame every 30 milliseconds, but autonomous vehicles have compounding steps between image capture and action.

They need to transfer the frames to memory, identify objects in each frame, process and analyze each object in context with adjacent frames, and identify any relevant changes before it can come to a decision. There's simply a lot of data throughput and processing power required. Robotic reaction time slows further when those images are transmitted wirelessly to an off-device computer.



> Feedback is a type of magic that can turn a crude mechanism into a very fine-tuned system."
>
> —**TAKASHI TANAKA**, associate professor

That's why Tanaka is pursuing control system designs that are inspired by living creatures. His work in neumorphic perception is exploring the use of "event cameras," a technology that takes a more human approach to vision. Instead of capturing complete, consecutive frames of image data, an event camera detects changes frame to frame — making it capable of giving instant-reaction information, while also reducing the data transfer and processing challenges of traditional cameras.

Event cameras operate at a frequency around 30,000 frames per second — many orders of magnitude faster than a traditional camera. This is possible because, "it is sensitive only to the moving portion of any pixel," Tanaka says. "It gives an X and Y position, a polarity, and a time value of moving objects. For collision avoidance, fast processing and feedback control are critical. We are designing control systems for things like collision avoidance based on these unique vision systems."

TANAKA'S PATH FROM SPACE HARDWARE TO AUTONOMY RESEARCH

As an undergraduate student at the University of Tokyo, Tanaka was involved in building the first successful CubeSat: The XI-IV, which launched in 2003 and remains in stable orbit 820 km above Earth. His soldering and other hands-on work were carried to space on three different CubeSats that are still operational today.

But he didn't fall in love with autonomy and control until he was in the U.S., doing control theory research while pursuing an advanced degree at University of Illinois. Today, he studies the ways machines can take a sensor input and use it to adjust its behavior.

Many machines operate exactly the same way, continuously, over and over — like a robot in an assembly line, making the same weld or attaching the same component to a thousand cars a day. But when a machine continuously monitors its sensors to tweak how it's performing that task, that's called a feedback loop. It's similar to how a human might see a pothole and adjust their car's position in a lane or hear a siren and look for an ambulance to determine if they need to pull over.

"Feedback is a type of magic that can turn a crude mechanism into a very fine-tuned system," Tanaka says.

Throughout his research, from his post-doctoral work at MIT and KTH Royal Institute of Technology to his time as an assistant professor at UT Austin, he delved into the man-made science of control systems. He continues to use humans and other living creatures as inspiration for how to break new ground in machine behavior.

SEED FLIGHT

PhD student sends Pakistan's first space payload to ISS

Through an international collaboration, Mahhad Nayyer, an AAE PhD student, helped lead a mission to send culturally significant crop seeds from 11 nations to the International Space Station (ISS). That payload included seeds from Nayyer's home country, Pakistan — a historic first.

The initiative brought together researchers and space leaders from around the world to explore how native crops respond to microgravity. Nayyer, a 2024 Karman Pioneer, spearheaded Pakistan's contribution.

"This is quite literally a dream come true," Nayyer said. "It's not just about sending seeds to space — it's about planting the idea that space exploration should be inclusive, culturally grounded and accessible to all."

The seeds — including Egyptian cotton, Armenian pomegranate, Nigerian egusi melon, and Pakistani wheat — represent more than agricultural staples. They are symbols of national identity and resilience. The mission aims to study how these crops behave in space, generating insights into seed germination, structural changes and adaptive traits under microgravity. These findings could inform future efforts to develop cultivars suited for space farming and extreme Earth environments.

At Purdue, Nayyer is collaborating with graduate research assistant Muhammad Haroon (MS '25 botany) in the Department of Botany and Plant Pathology to analyze physiological changes in the wheat seeds, including water transport and gas exchange mechanisms. The research builds on Purdue's legacy of leadership in space exploration and agricultural innovation.

The mission also carries a powerful educational message. Nayyer engaged schools, universities and science outreach programs across Pakistan to connect students with the experiment and inspire future space scientists. "We want young people to see space not just as rockets and astronauts, but as something rooted in their stories, their crops and their ideas," he said.

The payloads were selected through a competitive process within the Karman Project's global network, which spans over 70 countries. Jaguar Space, a bioastronautics company founded by Karman Fellow Luis Zea, is providing technical expertise and mission integration.

"This mission reflects the action-oriented spirit of our Fellowship," said Hannah Ashford, managing director of The Karman Project. "It empowers our community to lead impactful projects across borders and build a more inclusive space future."

Mahhad Nayyer, right, with Jaguar Space founder Luis Zea, holds seed samples that launched to the ISS with NASA's SpaceX Crew-11 in July 2025.

The seeds launched to the ISS with NASA's SpaceX Crew-11 on July 31, 2025, and returned to Earth in August.

INTERNATIONAL HONORS

Mahhad Nayyer was recognized as one of five Young Space Leaders for 2025 by the International Astronautical Federation (IAF), during a ceremony in Sydney, Australia. This award celebrates individuals who contribute to astronautics and global space sustainability.

"This represents one of the highest honors a young space professional can receive," Nayyer said. "To be recognized among only five global awardees and as one of just two engineers is an immense source of pride for me, and a moment of deep gratitude toward my current and past alma maters who have shaped my journey."

Nayyer's research focuses on Space Situational Awareness and Space Traffic Management, developing analytical frameworks to assess orbital capacity and inform technical, legal, and policy decisions for sustainable space operations.

Nayyer envisions a future where space activities are inclusive, equitable and sustainable. As a PhD student at Purdue, he continues to refine his research in astrodynamics and orbital design, aiming to shape global frameworks for space traffic coordination.

SEEING IS BELIEVING

Student-built transparent rocket engines provide insight into fuel cavitation, propellant mixing and combustion

In a propulsion course in spring 2025, Purdue AAE undergraduate students got to do more than "just" fire their own rocket engines.

They got to see right through them.

Professor Tim Pourpoint believed that designing, building and testing a hypergolic rocket engine in just one semester wasn't challenging enough. He pushed his students to use optically clear components as much as possible — for an unprecedented view at the processes happening inside.

"The idea was to have an optically clear engine, allowing us to see visible light through every part," Pourpoint explains. "That includes tanks, feed lines, cavitating venturis, valves, injectors, manifolds, injector orifices, the combustion chamber and the nozzle."With support from the School of Aeronautics and Astronautics, NASA and materials supplier Formlabs, two student teams each designed rocket engines, developed computer models of component in those engines and submitted four scientific abstracts to a major aerospace conference from their findings.

This kind of hands-on experience is a key part of the education at Purdue's Maurice J. Zucrow Laboratories, the largest academic propulsion lab in the world.

A CLEAR VIEW OF COMBUSTION

Researchers at Zucrow regularly use clear components on a small scale, like clear windows on the side of a combustion chamber or other important components. This is not something undergraduate students typically have access to.

Pourpoint told his class to try optically clear materials as the default, resorting to stainless steel and other traditional components only if absolutely necessary. Students immediately jumped to additive manufacturing for many components, finding a corporate partner to supply a special high-quality resin.

"Very quickly the students went to 'Can we 3D-print those components out of clear plastic?' We partnered with Formlabs on the resin and used equipment available here on campus to print them and iterate many versions essentially at zero cost. The students printed the cavitating venturis, their orifices and they learned how to process and machine the materials we used."

This isn't just for show. Students also built computer models of their systems and then compared their predictions with what they actually saw during test firing. The transparency provided a real-time view of processes like fuel cavitation and how propellants mix and burn. Watching fluids flow and ignite firsthand gives them a concrete understanding of concepts often only covered in textbooks.

REAL-WORLD PROPELLANTS AND LEARNING FROM EXPERIENCE

The course received outside support from both NASA's Marshall Space Flight Center and Goddard Space Flight Center, which recognized the value of students learning about optically clear combustion chambers. External funding and subject matter expertise, plus support from the School of Aeronautics and Astronautics, allowed two student teams to compete in building their transparent rocket engines.

The engines used hypergolic propellants, which ignite instantly upon contact — a crucial feature for quick maneuvers in space. Instead of the more common but highly toxic hypergolic propellants, the class used 90% hydrogen peroxide and a low-toxicity fuel with triglyme and sodium borohydride.

> I want these students to go to their next job interview and say, 'This is how I designed it, this is how it works and this is why.' And I guarantee you they can."
>
> —**TIM POURPOINT**, Professor of AAE

An unexpected but valuable lesson came when an optically clear injector revealed a nitrogen bubble entering the oxidizer manifold, flowing down the injector and leading to combustion instability in the combustion chamber. This observation, only possible with the transparent design, turned a problem into a powerful learning moment. "It's something you don't want to see happen, but it ended up being an extremely useful thing for the students to see what it does to the combustion event," Pourpoint points out.

Even failures offered insights. When the sapphire combustion chamber cracked during a test fire, one student was elated: "The cracks are exactly where we predicted they would be!"Pourpoint added, "That was really neat; we took a risk, we wanted to see if the model was correct — and the model was correct." This hands-on validation of their models, even under stress, is a core part of the course's teaching.

BUILDING SKILLS FOR THE FUTURE

The skills that students gain are directly applicable to research and industry. While these 3D-printed parts won't fly on any real system, "the point is to understand how things work fundamentally and iterate on designs very quickly because we can see it, see through it," Pourpoint explains. This practical experience has already caught industry attention, with one professional asking for video of the student-designed optically-clear coaxial swirl injector to show their own engineers.

This blend of theory, rapid prototyping and real-world testing, all in one semester, helps explain why Purdue continues to produce highly capable aerospace engineers. It's about getting hands-on, learning from every result and truly seeing how complex systems operate.

Pourpoint's main goal is simple: "I want these students to go to their next job interview and say, 'This is how I designed it, this is how it works and this is why.' And I guarantee you they can."

SCALING STEM DISCOVERY

NSF-funded project blends virtual and hands-on labs to improve student learning

Funding from the National Science Foundation is helping Purdue Engineering researchers to improve educational outcomes for large laboratory courses.

The $743,728 award from NSF's Division of Undergraduate Education is supporting a three-year project to improve STEM education, called Scalable Inquiry-Based STEM Instruction: A Blended Virtual-Physical Lab Concept for Large Lab Courses. It aims to address long-standing challenges in delivering self-guided, inquiry-based learning experiences in large lab settings. The project, which runs until August 2028, will be implemented in large fluid mechanics lab courses at Purdue's West Lafayette and Indianapolis campuses, reaching more than 1,500 students annually.

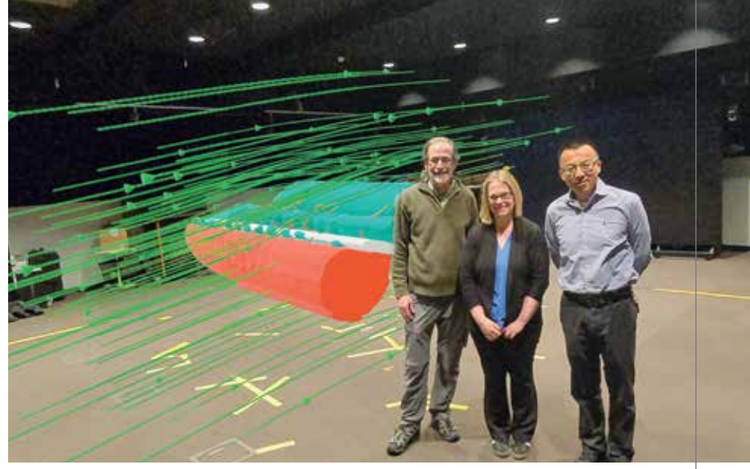
The project's principal investigator Sally Bane, is an associate professor of aeronautics and astronautics and director of the school's laboratory and hands-on education. She is collaborating with co-investigators Sean Brophy, associate professor of engineering education, and Jun Chen, professor of mechanical engineering.

"Traditional labs give students valuable hands-on practice, while virtual labs allow for flexibility and scale," Bane says. "This project combines the best of both worlds, giving students opportunities to experiment, design and problem-solve in ways that would be difficult to achieve with only one format."

REBECCA ROBIÑOS

Left: Sally Bane, associate professor of AAE, is the principal investigator for a three-year project to improve STEM education, funded by the National Science Foundation.

Right: Bane, center, with co-collaborators Sean Brophy, associate professor of engineering education, and Jun Chen, professor of mechanical engineering



The project introduces a new instructional framework called Scalable Inquiry-Based Lab Experiences (SIBLE). This model blends physical and virtual experiments with AI-driven feedback tools, enabling students to engage in authentic, inquiry-based lab work at scale.

Brophy's research within the School of Engineering Education focuses on developing adaptive expertise through simulations, analogical reasoning and model-based learning. His work examines how students comprehend, analyze, troubleshoot and design complex systems — and how these proficiencies can be cultivated via thoughtfully designed learning environments.

"Integrating AI-driven feedback into this model allows students to learn more independently while still receiving meaningful guidance," Brophy says. "This project aims to not only improve student outcomes but also make lab instruction more adaptable across different disciplines."

The research team will explore three central questions:

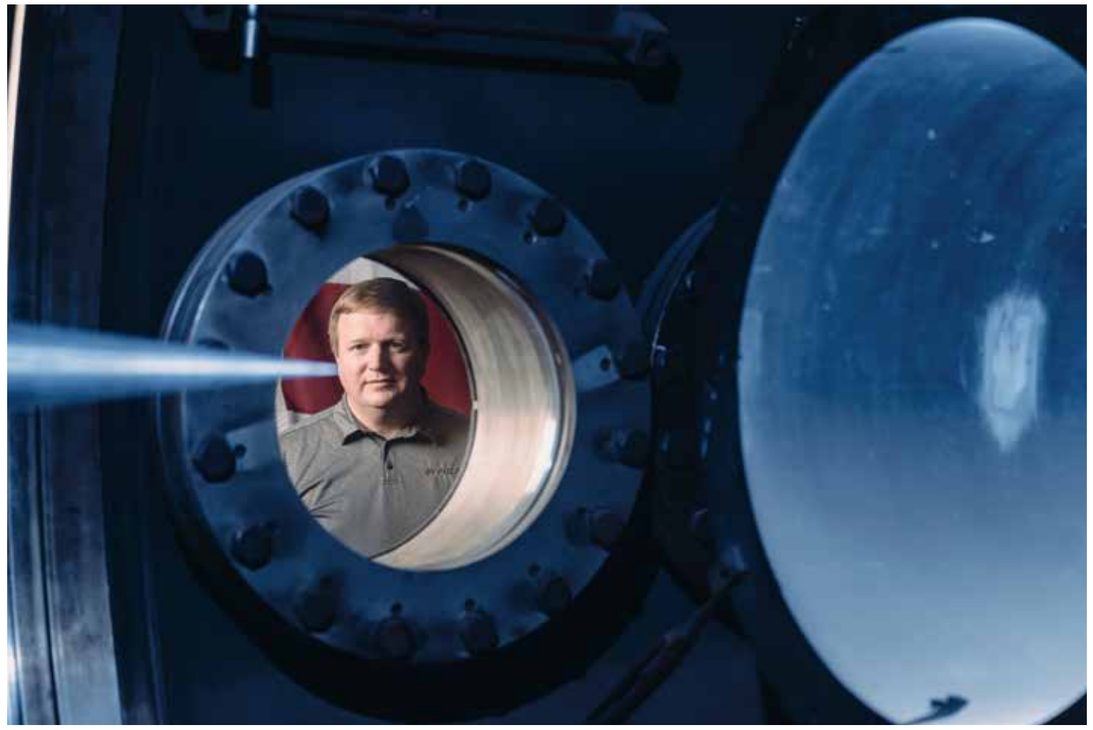
How does SIBLE enhance students' critical thinking, problem-solving and career readiness compared to traditional methods?

How can effective, meaningful feedback mechanisms be integrated into the framework?

What challenges arise when adapting SIBLE to other STEM courses and institutions?

The ability to successfully scale up instruction allows more students to learn within the same physical lab space — without compromising the quality of their educational experience. "Scaling up inquiry-based learning has always been a challenge in large STEM labs because of limitations in equipment, space and staff," says Chen, who also serves as the School of Mechanical Engineering's associate head for facilities and operations. "By combining physical experiments with virtual simulations, we're creating a more accessible, flexible, and effective learning environment."

FACULTY NEWS



JEWELL NOMINATED FOR ASSISTANT DEFENSE SECRETARY

Associate Professor Joseph Jewell has been nominated by President Donald Trump to be the next assistant secretary of defense for science and technology, the White House announced in April 2025.

Keeping its technological edge is critically important for the United States, Jewell says.

"We know our adversaries are working very hard to take away the advantage we have historically had in science and technology," he says. "I've been pleased to contribute to that for the past 20 years as a researcher in hypersonics and, if confirmed, will be excited to contribute in this new role as well."

At Purdue, Jewell holds the title of John Bogdanoff Associate Professor of Aeronautics and Astronautics. He advises graduate students as director of the Boeing/Air Force Office of Scientific Research Mach 6 Quiet Tunnel research group, and of the HYPULSE research group. A highly regarded hypersonic and aerospace research expert, Jewell focuses his research on boundary layer instability, transition and turbulence and nonintrusive aerothermodynamic diagnostic methods.

NEW FACULTY

AAE has hired new faculty members to keep up with the program's tremendous growth. Here are the new faces who joined us this academic year.

DANIEL DUMBACHER
Professor of Engineering Practice

JAMES GOPPERT
Research Assistant Professor

KYLE HANQUIST
Assistant Professor

DeLAURENTIS SELECTED AS PURDUE EXECUTIVE VP FOR RESEARCH

At the conclusion of a national search, Dan DeLaurentis was named Purdue's executive vice president for research in May 2025. A longtime Purdue administrator, award-winning scholar and educator, DeLaurentis now leads research across all of Purdue, totaling more than $600 million in awards from federal and industry sources.

"Dan DeLaurentis has been an outstanding leader, including over two decades of success at Purdue," Purdue President Mung Chiang said at the time of the announcement. "Dan will work with the entire campus to lead Purdue research at a time of national transformation."

DeLaurentis, the Bruce Reese Professor of Aeronautics and Astronautic, has been vice president for Institutes and Centers at Discovery Park District at Purdue since 2023. Under his leadership, the 15 Discovery Park District centers and institutes were involved in more than $205 million — a record 32% of Purdue's total funded research in 2024.

YU SELECTED AS FULBRIGHT SCHOLAR FOR MODELING METAMATERIALS

Wenbin Yu, the Milton Clauser Professor of Aeronautics and Astronautics, has been selected as a Fulbright U.S. Distinguished Senior Scholar. His research, "Multiscale Constitutive Modeling of Bio-inspired Metamaterials," will be conducted at Tel Aviv University in Israel from December 2025 through April 2026.

Yu also received the ASC Award in Composites from the American Society of Composites.

FACULTY NEWS

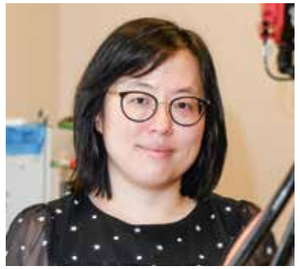
RECOGNITION IN THEIR FIELDS

Professor Steven Collicott
Microgravity and Space Processes Award, AIAA; Fellow, American Society for Gravitational and Space Research

Associate Professor Carolin Frueh
Fellow, American Astronautical Society

Professor Kathleen Howell
Aerospace Guidance, Navigation and Control Award, AIAA

Professor Vikas Tomar
Lifetime Fellow, International Association of Advanced Materials



Associate Professor Dianyun Zhang
Associate Fellow, AIAA

Professor Nicole Key
Ground Testing Award, AIAA

Professor Jay Gore
Potter Gold Medal, American Society of Mechanical Engineers

DEPARTMENT NEWS

Space systems degrees program meets the challenge of modern engineering

Purdue University is standing at the forefront of expanding space exploration and a future economy with the creation of the first-ever Comprehensive Space Engineering Degrees Program in the country.

The program combines both a new online master's degree in space systems engineering and a new space engineering undergraduate certificate to the established array of cutting-edge programs in the College of Engineering.

"More than ever, the School of Aeronautics and Astronautics is producing students with a firm grounding in how to engineer space systems," says Bill Crossley, the Uhrig and Vournas Head of Aeronautics and Astronautics. "This comprehensive program is tailored to the demands of engineering modern space systems, ensuring our graduates are equipped to tackle the more complex challenges of tomorrow."

The degree offers new opportunities in engineering education that both students and industry see as important moving forward. The degree provides deeper immersion and proficiency in modern multifaceted engineering space systems, with returning graduates who are already active industry professions expected to make up many of the students.

Further bolstering the aerospace program is a new space engineering undergraduate certificate. Professor Steven Collicott says the certificate is considered a supplemental program for undergraduates at the West Lafayette campus that demonstrates a student's interest in space engineering while pursuing another major.

The interdisciplinary aspect of the undergraduate certificate will help answer the unrealized and ever-expanding needs of space flight beyond propulsion. Challenges continue to exist in areas ranging from biology and agronomy to biomedical engineering, psychology and more.

"The Comprehensive Space Engineering Degrees Program is unique in showing the strength of aerospace education at Purdue," Collicott says. "The space engineering certificate and online master's degree are integral parts of that program."

APOLLO 11 POSTDOCS

The Apollo 11 Postdoctoral Fellowship, launched in 2024, supports forward-looking research in aerospace engineering. Beom Park (MSAAE '21, PhD AAE '25), one of the first recipients of this fellowship, is working to shine a light on the chaotic trajectories in cislunar space. He is collaborating with renowned astrodynamicist Kathleen Howell, the Hsu Lo Distinguished Professor of Aeronautics and Astronautics.

Beyond geosynchronous orbit, spacecraft are simultaneously affected by Earth's and the moon's gravity. That varying pull, plus effects from the sun, makes long-term orbit predictions extremely difficult. Park's research is expecting to bridge gaps in existing prediction models to improve future mission design and real-time operations.

"Right now, we don't have a full understanding of how chaotic these regions are," Park explains. "We want to know where it's safe to fly and what strategies we can use when we have to operate in more chaotic zones."

Park's research is a continuation of his doctoral work under Howell. The Apollo 11 Fellowship has given Park the freedom to pursue this ambitious research without the constraints typical of industry-funded projects.

"External sponsors are often focused on specific missions," he says. "But this kind of foundational research is too broad to fit into a single mission plan. The fellowship lets me focus on the bigger picture."

The program is accepting applications through February 6, 2026. Visit bit.ly/apollo11postdocs.

ALUMNI NEWS

OUTSTANDING AEROSPACE ENGINEER AWARDS

The designation of Outstanding Aerospace Engineer recognizes the professional contributions of graduates from the School of Aeronautics and Astronautics and thanks them for the recognition their success brings to Purdue and the School.

The school is pleased to honor five AAE graduates with the Outstanding Aerospace Engineer award on April 3, 2025.

Recipients have demonstrated excellence in industry, academia, governmental service or other endeavors that reflect the value of an aerospace engineering degree. The 230 Outstanding Aerospace Engineers represent just over 2% of the school's alumni.

The Class of 2024 honorees are:

- **Shannon FitzPatrick** (BSAAE '01, MSAAE '03)
  Associate Director of Flight Programs, Planetary Science, NASA
- **John Gedmark** (BSAAE '05)
  Co-founder and CEO, Astranis
- **Albert Shih** (PhD AAE '91)
  Professor of Mechanical Engineering, University of Michigan
- **Paul "Rusty" Thomas** (BSAAE '91)
  Chief Technology Officer, Sierra Space Corporation
- **Adam Trebs** (MSAAE '08, PhD AAE '12)
  Lead Technologist, Hypersonic Airbreathing Propulsion,Raytheon

SHANNON FITZPATRICK
(BSAAE '01, MSAAE '03)

Fitzpatrick serves as associate director of Flight Programs for NASA's Planetary Science Division, leading efforts to develop and execute deep-space missions that push the boundaries of human knowledge and exploration.

A champion of planetary science and mission execution, Fitzpatrick continues to shape NASA's strategy for future space exploration. Her leadership and technical expertise drive innovation and discovery in planetary missions.

JOHN GEDMARK
(BSAAE '05)

Gedmark co-founded Astranis in 2015, building the company from the ground up to develop a new generation of small geostationary satellites. Under his leadership, Astranis launched its first satellite, Arcturus, in 2023, revolutionizing the industry with cost-effective GEO satellites.

With over $750 million in funding and a team of 300 engineers, he continues to drive innovation in satellite technology, inspiring the pursuit of bold ideas in aerospace.

ALBERT SHIH
(PHD AAE '91)

Globally recognized as a leading authority in manufacturing technology, Shih's work has led to innovative machining processes, cutting tool advancements and biomedical device development, significantly improving manufacturing efficiency and precision, for aerospace components.

Beyond research, Shih is a dedicated educator and mentor, shaping future engineers as a professor of mechanical engineering at the University of Michigan

PAUL "RUSTY" THOMAS
(BSAAE '91)

As chief technology officer at Sierra Space Corporation, Thomas' leadership has secured key partnerships with NASA, the Department of Defense, and commercial space companies.

Previously, he founded Kuiper Government Solutions at Amazon, scaled Dragon spacecraft production at SpaceX and led DARPA's Blackjack satellite program. With over 130 launched spacecraft, his expertise continues to shape the future of commercial and government spaceflight.

ADAM TREBS
(MSAAE '08, PHD AAE '12)

As a lead technologist at Raytheon, Trebs drives the development of next-generation hypersonic systems. His expertise spans propulsion performance, system integration and hypersonic flight testing, shaping Raytheon's leadership in airbreathing hypersonic propulsion.

He is committed to advancing aerospace engineering, collaborating across the defense industry and mentoring the next generation of propulsion engineers.

DISTINGUISHED ENGINEERING ALUMNAE AWARD

The Distinguished Engineering Alumni/Alumnae Award is presented by the College of Engineering to men and women who have distinguished themselves in any field in ways that reflect favorably on Purdue University, the engineering profession or society in general.

These alumni are engaged in engineering work and their record of accomplishments is indicated by their growth into positions of increasing responsibility.

Two alumnae of the School of Aeronautics and Astronautics were recognized among the 12 DEA Award recipients in 2025.

ANNA-MARIA RIVAS McGOWAN
(BSAAE '92)

After earning her PhD from the University of Michigan, Rivas McGowan was selected to become NASA's 1st agency-level senior engineer for complex systems design — a prestigious senior technical (ST) executive position she has held since 2015.

Her career has advanced innovation and demonstrated new capabilities for commercial and military systems through integrating groundbreaking technologies and methodologies with cross-domain and collaborative approaches.

BETH MOSES
(MSAAE '92, MSAAE '94)

Moses made history in 2019 when she flew to space in Virgin Galactic's VSS Unity, becoming the first woman commercial astronaut and securing her spot as the 25th member of Purdue's Cradle of Astronauts.

In conducting research on how future fliers would experience free-floating in the cabin, she became the first human ever to unbuckle and float around during a suborbital space flight.

Since joining Virgin Galactic in 2013, she has completed six of the company's nine space flights while also pioneering its astronaut training program.

Thomas Horan (BSAAE '08), a Purdue Engineering 38 by 38 Award honoree, gives feedback during a presentation by the GoAero Purdue team.

38 BY 38 AWARDS

Eight AAE alumni were selected for Purdue Engineering's annual 38 by 38 Awards, a recognition of high achievement by 38 young alumni. The award was inspired by the legacy of alumnus Neil Armstrong, who was 38 years old when he set foot on the moon.

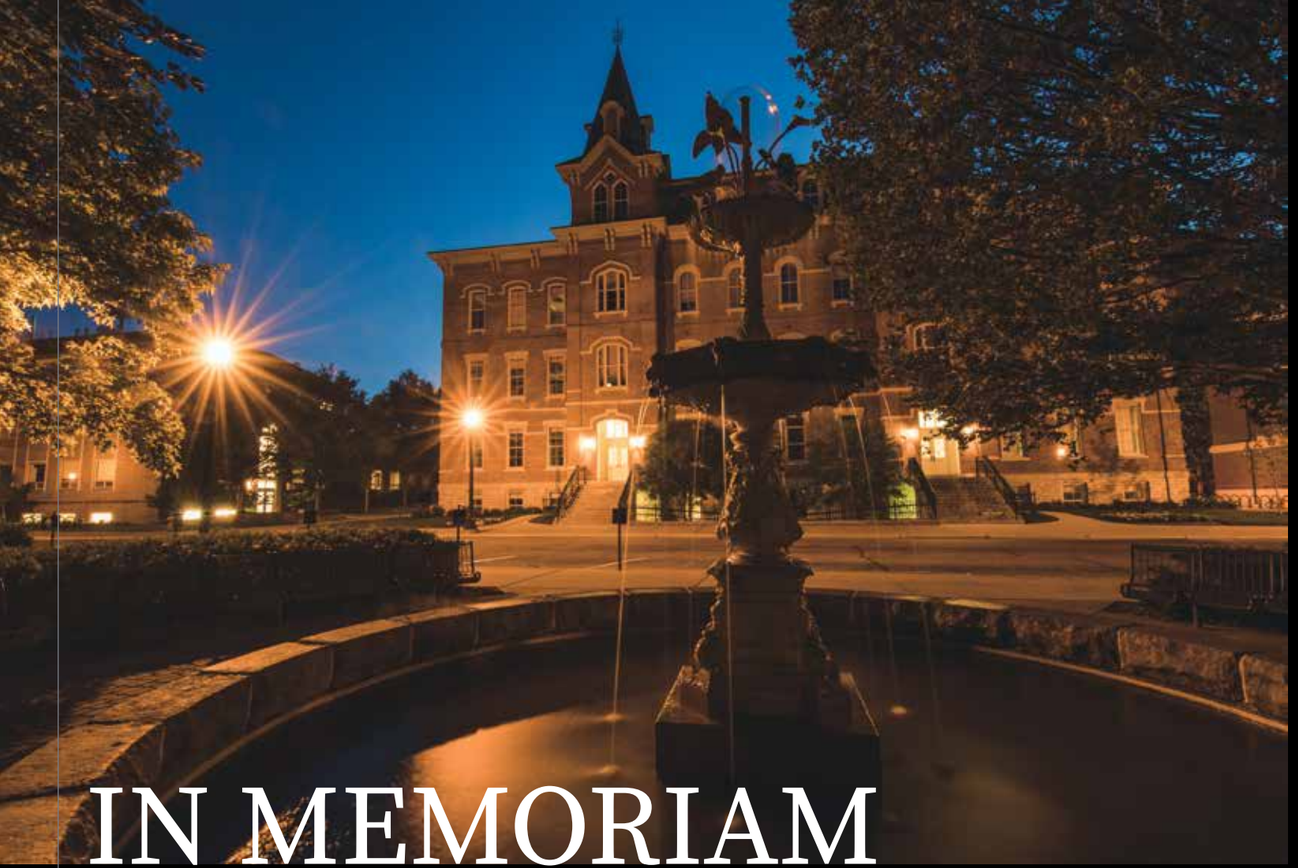
Award recipients who returned to campus were able to meet with students and provide insight on their early career experiences. Student clubs preparing for competition were able to present their work to these alumni and receive meaningful feedback on their designs.

The 2025 AAE honorees are:

- **Catherine Berdanier** (MSAAE '13, PhD AAE '16), Associate Professor of Mechanical Engineering, Pennsylvania State University
- **David Cronin** (BSAAE '10), Vice President, Commercial Aviation Operations, Intelsat
- **Tom Feldman** (BSAAE '11, MSAAE '13), Co-Founder and CTO, Stoke Space Technologies
- **Thomas Horan** (BSAAE '08), AI/ML Portfolio Director, Department of Defense
- **Alex Jordan** (BSAAE '12), Associate Technical Fellow, The Boeing Company
- **Marat Kulakhmetov** (MSAAE '11, PhD AAE '16), Head of Analysis and Hypersonics, Varda Space Industries
- **Austin Link** (MSAAE '14), Co-Founder, Starfish Space
- **Oscar Ojeda** (MSAAE '21), CEO, Cydonia Foundation and Advisor of the Aerospace line, Ministry of Science, Technology and Innovation of Colombia

Nominate a young alum for the 38 by 38 Awards by January 31, 2026.

Send your news and updates to aae@purdue.edu or tag @PurdueAeroAstro on LinkedIn, Instagram, X or Threads.



IN MEMORIAM

1940s

Raymond M. Goodman (BSAE ’45)
Jack Hudson Fredericks (BSAE ’49)
Lynn Ray Ikerd (BSAE ’49)
Sherrill R. McDonald (BSAE ’49)
Howard Carroll Rodean (MSAE ’49)

1950s

George Theodore Shapen (BSAE ’50)
William C. Berghorn (BSAE ’51)
Peter W. Schaper (BSAE ’51, MSAE ’53)
Ralph Samuel Miller (BSAE ’52)
Robert Dee Sherrill (BSAE ’52, MSAE 56)
George Edward Thompson (BSAE ’54)
Willy August Christian Wolter (BSAE ’56)
Robert James Jezik (BSAE ’57, MSAE ’58, PhD AE ’64)
Roger Jacob Jurgovan (BSAE ’57, MS Industrial Administration ’59)
Edward H. Loeffler (BSAE ’57)
Richard Charles Offhaus Jr. (BSAE ’57, MSAE Science ’59)
William Frank Swoger (BSAE ’57)
Anton Dwight Abbott (BSAE ’58, MS Industrial Administration ’65)
Wendell Smith Norman (MSAE ’58, PhD AE ’61)
Richard Darrold Carlson (BSAE ’59)
Julius Frederick Ickler (MSAE ’59)
William Frank Lewis (BSAE ’59)
Charles David Musgrave (BSAE ’59)
Dennis Allen Plunkett (BSAE ’59)

1960s

John Peter Gleiter (BSAE ’60)
Alan Wayne Severance (BSAE ’60)
Thomas Dennis Murtaugh (BSAE ’61)
Noel Edward Ashbaugh (BSAE ’62, MSAE ’63)
Burnette John Carlson (BSAE ’62)
Donald R. Chamberlain (BSAE ’62)
Brent Eugene Coy (BSAE ’63, MSAE ’65, PhD AE ’69)
Douglas Glen Kinney (BSAE ’64)
William Hugh Frey (BSAE ’65)
Jon Allen Whitworth (BSAE ’65)
Kenneth Wayne Jonaitis (BSAE ’66, MSAE ’68)
Robert Wiliam Reid Jr. (BSAE ’66, MSAE ’67, PhD AE ’70)
Richard L. Thacker (BSAE ’68)
Peter Henry DeLaFosse (BSAE ’69)
Stephen Charles Hostetler (BSAE ’69)
Vernon Naoki Owara (BSAE ’69)

1970s

Edward Anthony Owczarek (BSAE ’70)
Thomas N. Prymak (BSAE ’70)
Douglas Lyle Bowers (BSAE ’72)
Richard Michael Witt (MSAE ’72)
Jeffrey Earl Fugate (BSAAE ’76)

1980s

Larry Roger Fisher (BSAAE ’88)

1990s

Thomas Samuel Barnes (BSAAE ’90)
Gregory John Grindey (MSAAE ’92)
Andrew John Shurtleff (BSAAE ’99)

2000s

Anh-Thu T. Nguyen (BS Science ’02, MSAAE ’04)
Brian Dwight Chernish (BSAAE ’05)

2010s

Geoffrey M. Andrews (MSAAE ’17, PhD AAE ’22)

In Memoriam listings are based on those reported to us. Did we miss someone? Please let us know. Email Ashley Thompson: althompson@purdueforlife.org

Geoffrey Andrews (MSAAE ’17, PhD AAE ’22), known for his love of aircraft and flying, his vast suite of hobbies and of his ever-present bow ties, died in a plane crash in June 2025. “He began flying before he could drive a car,” said Gentry Andrews, his widow. “He just loved flying machines and thought they were incredibly cool. They defy gravity, and they connect people all over the world.”

In 2024, Anh-Thu Nguyen (BS Math ’13, MSAAE ’15) became the 10th woman to fly solo around the world. She died in a plane crash in July 2025, on another attempt to accomplish the same feat in her Lancair IV-P, “Amelia.” Nguyen was also a devoted mentor, founding the nonprofit Asian Women in Aerospace and Aviation to provide guidance and funding to Asian women entering the industry.

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School of Aeronautics and Astronautics

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Drum Corps Champ

Senior Trevor Stoyer can now call himself a world champion. In summer 2025, he played mellophone and marched with the Boston Crusaders Drum and Bugle Corps. The organization captured its first Drum Corps International World Championship title in August.

The DCI World Championships are held over three days at Lucas Oil Stadium in front of more than 20,000 spectators. Around 40 corps compete in the preliminary competitions. The top 25 World Class corps advance to semifinals and the top 12 move on to finals.

"I have marched at a few corps," Stoyer says. "I started at the Spartans, which was an Open Class corps at the time. I did one summer at the Madison Scouts. I set my sights on the Boston Crusaders because I loved their recent show designs."

At Purdue, Stoyer plays mellophone and French horn for the "All-American" Marching Band, Boiler Brass, the men's basketball pep band and other indoor ensembles. He's also a member of the Purdue Aerial Robotics Team.