The Conduit

NEWS FROM THE COLLEGE OF ENGINEERING AND SCIENCE

FALL 2025

Inside this Issue

FLORIDA TECH

FLORIDA'S **STEM** UNIVERSITY

Message From Interim Dean Phil Bernhard

Welcome to the fall 2025 issue of *The Conduit: News from the College of Engineering and Science* at Florida Tech!

The 2024–2025 academic year ended on a very positive note, with a successful faculty hiring season. This fall, we welcomed 11 new full-time faculty to the College of Engineering and Science (COES). Their specialties span a broad range of areas, including orbital dynamics, complex composites, deep-ocean microbes, gastrointestinal pathogen response, biomolecule production and processing, microelectronics, software security, bio-inspired soft robotics and climate change impacts on glacerized catchments.

This summer also marked the departure of former Dean John Harris, who accepted a position as provost at Missouri University of Science and Technology. Those of us who knew Dr. Harris will remember him as an inspiring and insightful dean, who had a big impact on the college and university. While we miss him greatly, we recognize that his new position is a wonderful opportunity, so we wish him well.

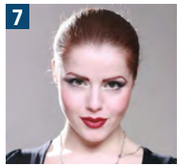
Over the next year, we will conduct a national search for a new dean with the assistance of Parker Executive Search. In the meantime, I am serving as interim dean, Jessica Smeltz is serving in my place as interim associate dean of academics, and Vipuil Kishore is serving in her place as interim department head of chemistry and chemical engineering.

Also, Ratan Jha, who has been serving as department head of aerospace, physics and space sciences for the past two years, has decided to return to teaching and research. Don Platt is serving as interim department head during the search for Dr. Jha's replacement.

Lastly, we celebrated a strong number of COES graduates this past academic year, with just under 1,000 students completing degrees across a range of majors. We wish these graduates well as they continue on to the next chapter of their lives!

Respectfully,
Phil Bernhard, Ph.D.
Interim Dean, College of Engineering and Science

Panthers on the Rise



1 CHAD FIFER '92

Chad Fifer became president and CEO of the Aquarium of Niagara in June 2024. Fifer, who earned his degree in marine biology from Florida Tech, had his first professional experience through a federal work-study placement at the Brevard Zoo.

He has held leadership roles at respected institutions across the country, including the Nashville Zoo, Cleveland Metroparks Zoo, Zoo Knoxville, Ripley's Aquarium of the Smokies and the Dayton Society of Natural History.

2 JOHNNY M. MOORE '02 PH.D.

Johnny M. Moore has been named the 13th president of Rust College, Mississippi's oldest historically Black college. Selected from nearly 200 candidates in a national search, Moore brings more than 30 years of leadership experience in higher education to the role, most recently serving as chancellor of Arkansas State University — Newport (ASUN).

Moore earned his Ph.D. in STEM education with a specialization in mathematics education at Florida Tech, and his previous leadership roles include president and CEO of Pierpont Community and Technical College, president and CEO of Philander Smith University, executive vice president of student affairs at Tyler Junior College and vice president of student affairs at Indian River State College.

3 EDDIE MYERS '06

Eddie Myers has been named chief growth officer at Critical Frequency Design, a leader in next-generation aerospace and defense photonics technologies.

In this newly created executive role, Myers will shape the company's enterprise growth strategy, leading business development, government relations and marketing efforts to expand its presence across the defense, aerospace and intelligence sectors.

4 LAURA SEWARD FORCZYK '06

Laura Seward Forczyk is the founder of Astralytical, a space consulting firm she launched in 2016 to help make the space industry more accessible to everyone.

Her clients include startups, nonprofits, government agencies and major companies, such as Blue Origin. Her work includes space policy analysis, NASA mission reviews, market research, product development and strategic planning for companies looking to advance into the space sector.

5 KASSANDRA CRIMI '08

Kassandra Crimi has been promoted to morning meteorologist at WFTV Channel 9 in Orlando, a station she has long considered home. Crimi previously served as WFTV's weekend meteorologist and brings years of broadcast experience to her new role.

Her connection to WFTV began during her student years, when she interned at the station in 2008.

A Minnesota native, Crimi grew up with a passion for science and math. She began her studies at Florida Tech to study astronomy and astrophysics, but after experiencing Florida's intense 2004 hurricane season, she shifted her focus and earned a bachelor's degree in meteorology.

6 TIZIANO BERNARD '15, '16 M.S., '18 PH.D.

Tiziano Bernard, a Trieste, Italy, native and the first graduate of Florida Tech's flight test engineering master's degree program, has been named the best certified flight instructor (CFI) in the nation by the Aircraft Owners and Pilots Association (AOPA).

While Bernard was working at Gulfstream Aerospace, the ownership of nearby Savannah Aviation enlisted his help. That was in 2022, and since then, he has graduated 25 students and has become an FAA Gold Seal Certified Flight Instructor and Cirrus instructor.

7 MARTINA DIMOSKA '21

Martina Dimoska is the first Macedonian and female Balkan analog astronaut, leading high-fidelity missions—some supported by NASA, the European Space Agency (ESA) and the Canadian Space Agency (CSA). Most recently, she served as commander of the M08 SELENE mission at Lunares.

Dimoska's research centers on in-situ resource utilization (ISRU) and material engineering, and she holds a suborbital spaceflight certification. She also serves as a senior ambassador for the National Aerospace Training and Research (NASTAR) Center, advocating for innovative, inclusive pathways into the space industry.

8 ANUAR AKCHURIN '22

Anuar Akchurin is set to compete on the world stage after placing third at the USA Canoe Sprint Team Trials.

His performance earned him a spot on Team USA for the 2025 ICF Canoe Sprint World Championships in August in Milan. There, he competed in the C-2 (canoe double) 500-meter event, which is part of the program for the 2028 Summer Olympics in Los Angeles, making this appearance a key step on the road to the Olympics.

Originally from Kazakhstan, Akchurin competed independently in sprint canoeing while earning his mechanical engineering degree at Florida Tech, where he also assisted the American Society of Civil Engineers student chapter, teaching students proper paddling techniques and team-building exercises to improve overall communication.

9 WHITNEY ELLIS '23

Whitney Ellis is bringing beloved theme park attractions into the future as a project engineer at Universal Studios, where she interned in 2022 as an electrical engineering student at Florida Tech. Her role focuses on upgrading ride control systems to meet current industry standards, ensuring long-term safety and reliability for some of the most iconic rides in the park.

Currently, Ellis leads a multimillion-dollar renovation project at Universal Studios Japan, working closely with a team based in Osaka, where she frequently travels to monitor progress and coordinate on-site activities.

10 KIRA (ELECTRA) SCARPIGNATO '24

Kira (Electra) Scarpignato participated in a prestigious 12-week research fellowship at Sandia National Laboratories in Albuquerque, New Mexico, as part of the 2025 Universities Research Association (URA) Sandia Graduate Summer Fellowship this summer. During the program, Scarpignato contributed to research focused on the rapid testing of biological therapeutics.

Scarpignato, who earned her bachelor's degree in biomedical engineering at Florida Tech, conducts her research in a systems immunology lab, where she uses computational tools to identify disease trends and make predictions from high-dimensional immunology data.

ALUMNI SPOTLIGHT

HOW SUSIE ALLEN-SIERPINSKI BECAME A NASA ENGINEER

Since age 4, Susie Allen-Sierpinski '05, '07 MSA, has dreamed of being an astronaut.

Now, as a Gateway Deep Space Logistics (DSL) DSL-1 Mission integration engineer with NASA, Allen-Sierpinski is that much closer to reaching the stars.

> "I did not think working on space toilets was going to be in my repertoire when I left Florida Tech, but here we are!"

Born and raised in Nottingham, England, Allen-Sierpinski's passion for space was first sparked by a trip to NASA's Kennedy Space Center on a family vacation to Florida.

She quickly became a self-proclaimed "space nerd," and her parents encouraged her interest, sending her back to Kennedy Space Center for Space Camp Florida.

As the years went by, Allen-Sierpinski's passion for space grew. So, when her family decided to move to the United States, it only made sense to relocate to the Space Coast.

That's when she found Florida Tech.

"I was 16 when I enrolled at the university," Allen-Sierpinski says. "Moving to a new country and being younger than most of my peers was challenging, but Florida Tech made the experience perfect with its small campus and class sizes."

While a student, Allen-Sierpinski dove into the college experience and joined the women's rowing team, which she helped clinch the Sunshine State Conference Championship in 2001.

"The small community I gained from the women's rowing team helped me learn that everyone has something to bring to the table as a group," Allen-Sierpinski says. "That lesson has carried on with me throughout my career."

After graduation, Allen-Sierpinski was ready to take off.

Throughout her illustrious career, she has held positions in the private industry with Boeing's C-17 Propulsion Systems Division and United Space Alliance's space shuttle program, and she worked on the Orion spacecraft before joining the government as part of the Federal Aviation Administration's Commercial Space Transportation Office and on to the Naval Air Systems Command before landing at NASA.

In her current role as part of NASA's Gateway Deep Space Logistics Project office, Allen-Sierpinski gives mission updates to the team working on the DSL-1 Mission as part of the agency's broader Artemis campaign.

"As an integration engineer, I get to touch a lot of different systems and work with a diverse group of engineers, contractors, business folks and lawyers," Allen-Sierpinski says. "All the little things that we do contribute to the larger goal of having a space station around the moon."

In 2012, Allen-Sierpinski won the Space Coast Distinguished New Woman Engineer Award, and she was inducted as an American institute of Aeronautics Associate Fellow in January.

In the words of acting NASA administrator Janet Petro, Allen-Sierpinski's message to fellow space nerds is to always "Embrace the challenge."

FLORIDA TECH CONNECTION: '05 B.S. aerospace engineering, '07 MSA applied aviation safety

LAST BOOK YOU READ: *Through the Glass Ceiling to the Stars: The Story of the First American Woman to Command a Space Mission*, by retired U.S. Air Force Col. Eileen M. Collins and Jonathan H. Ward.

FAVORITE HOBBY: Taekwondo

WHAT'S ON YOUR BUCKET LIST: Spaceflight and visit Australia

IF YOU COULD BE A PLANET, WHICH PLANET WOULD YOU BE: Earth

WHAT ARE THE THREE MOST-USED APPS ON YOUR PHONE: Camera, Instagram and Kindle

CLUB SPOTLIGHT

WOMEN IN AEROSPACE ENGINEERING

Ava Nieburg is an aerospace engineering and mathematical sciences senior who serves as president of Florida Tech's Women in Aerospace Engineering (WAE) chapter, an organization she helped start at the university in April 2024. In just over a year, the club has grown to 100 members and counting. We spoke with Nieburg about all things WAE and the impact it has had on her college experience and others'.

WHAT IS WAE ALL ABOUT? WHAT DOES BEING A MEMBER ENTAIL?

WAE is a student organization that supports and promotes women pursuing careers in the aerospace industry. Members get to be part of social, networking and professional development events that lead to industry connections, new skills and lifelong friendships.

WAE OFFERS "PEER MENTORSHIP, SOCIAL ACTIVITIES, CAREER/ NETWORKING OPPORTUNITIES, AND ACADEMIC COLLABORATION WITH WOMEN OF SIMILAR BACKGROUNDS AND INTERESTS"—CAN YOU ELABORATE ON ANY OF THESE FACETS OF THE CLUB?

Our club focuses on supporting our members in a variety of ways. Some of our past and future peer-mentoring events include résumé-review nights, study hall and tutoring sessions, and mentor/mentee matchups. Our club has also been able to hold and attend social- and career-related events, including *Reinvented Magazine*'s Space Gala, aerospace movie nights, industry guest speakers, High School Robotics Club collaborations and more!

HOW HAS YOUR MEMBERSHIP (AND NOW PRESIDENCY) IN WAE AFFECTED YOUR COLLEGE EXPERIENCE? HOW HAS IT BENEFITED YOU?

From WAE, I've been able to step into leadership and connect with so many aerospace industry and academia professionals. I'm also one of many who has made so many friendships from WAE!

ANYTHING YOU WOULD LIKE TO ADD?

WAE is an amazing club, and we encourage everyone to support us on our Instagram: @wae_floridatech!

Happenings

REOPENING A WINDOW TO SPACE

Florida Tech Students, Faculty Carry Out Interdisciplinary Quest to Refurbish Ortega Telescope

Luis Quiroga-Nuñez, director of Florida Tech's Ortega Observatory, is on a mission to refurbish the observatory's primary tenant—a nonfunctioning 32-inch telescope.

The aging telescope, commissioned in 2008, has sat dormant for the last several years. With restoration, the telescope could serve as a powerful tool to train students to use professional telescopes and make observations—critical skills that will help prepare them for their future careers.

Quiroga-Nuñez and engineering instructor Lee Caraway recruited students from areas such as astronomy, electrical engineering and computer science to help with the reverse engineering project, which offers unique, hands-on-learning opportunities, Quiroga-Nuñez said.

"This is like a big Lego for them," he said. "They are learning the process, and the students, I think, will have found a very valuable life experience."

The telescope recently moved for the first time in years. Here's how they made it happen:

New Computer

» Before the telescope could even run, students built and programmed their own computer to replace the previous outdated computer.

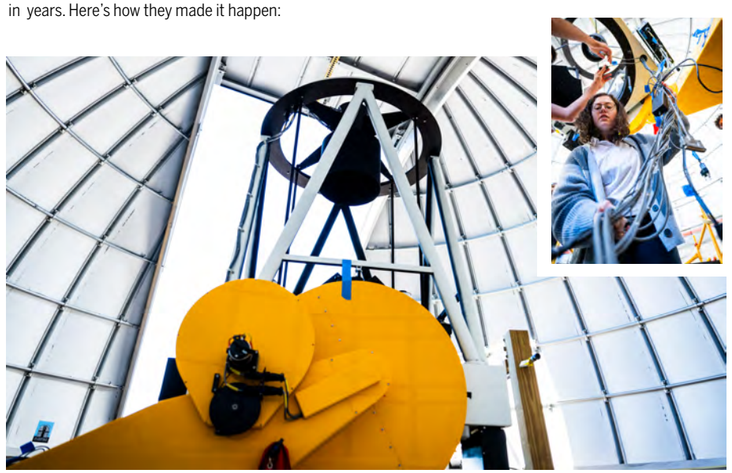
New Motors

» Marissa Guerra '24 developed a blueprint to replace the telescope's old, 40-pound motors using knowledge from her senior design project—a robotic arm. The motors now weigh 2 pounds.

New Communication System

» Adrianna Agustin '24 spent her senior design project researching internal circuit systems and simplified the telescope's chaotic system, which dated back to the '80s, from 20 wires to two.

Next, they're tackling high astrometric precision—a crucial element of properly tracking movement in space. Perfecting precise movement is expected to take some time, which isn't a bad thing, Quiroga-Nuñez said; it gives even more students a chance to get involved.



NEW COES ACADEMIC PROGRAMS

The College of Engineering and Science continues to grow its robust academic offerings to meet the needs of students and the greater community. New programs within the college include:

Cellular Technology Certification

Cellular data plays a vital role in modern criminal investigations, providing crucial insights into a suspect's movements, communication patterns and associations. Call detail records (CDRs), tower dumps and other network-generated data often serve as key evidence in prosecutions, helping to establish timelines and corroborate witness statements. The cellular technology certification program, funded by an FBI research grant, trains agents to interpret such data.

The program covers the fundamentals of modern cellular networks and the types of data they generate, with a focus on how these records can be analyzed for crime investigative purposes. In addition to structured coursework, the program includes occasional case-by-case advisement, offering direct support to FBI agents during active investigations. This ensures that real-world applications align with technical understanding, allowing investigators to navigate complex cellular evidence effectively.

AI Undergraduate Certificate & Concentration

The artificial intelligence undergraduate certificate program provides students with fundamental knowledge and practical skills in AI applications, ethical considerations and specialized AI topics. Consisting of seven courses, the program covers how to use AI effectively and ethically. Students enrolled in the computer science bachelor's program can also enhance their degree with an AI concentration.

GRAD STUDENT APPEARS ON NATIONAL GEOGRAPHIC'S SHARKFEST

Shannon Barry is a biological sciences Ph.D. student researching bull shark behavior under associate professor Toby Daly-Engel. On July 8, her research was in the national spotlight with a feature on National Geographic's SharkFest series, "Investigation Shark Attack."

Each episode in the six-part series offered a "forensic investigation" of shark encounters by a panel of scientists. It was part of more than 25 hours of shark-focused programming that began July 5.

This marked Barry's second SharkFest appearance; her first was in 2021 on "World's Biggest Bull Shark," an exciting adventure around the Indian River Lagoon.

Barry's research focuses on how climate change can impact bull sharks' use of nearshore areas, such as the Indian River Lagoon, as nursery habitats. These habitats are essential to the sharks' health; they are where female sharks tend to give birth and where juveniles grow up, she explained. Bull sharks are also philopatric, which means females return to the nursery where they were born to give birth later in life.

Barry's episode, "Gulf Trouble," can be streamed on Disney+ and Hulu.

NEW SITE AT PSFB

In June, Florida Tech opened a new instructional location at Patrick Space Force Base (PSFB), expanding access to graduate education for military personnel, civilian employees and working professionals on the Space Coast.

The PSFB site offers four of Florida Tech's most in-demand master's programs: an MBA, the M.S. in acquisition and contract management, the M.S. in space systems and the M.S. in space systems management. Each program is designed for working professionals looking to lead in sectors vital to aerospace advancement, homeland security and economic innovation.

Courses are taught in eight-week, hybrid terms through a combination of online and classroom instruction, which will be on base in its Education and Training Center. Florida Tech's site at PSFB reflects a shared commitment to preparing leaders for the complex challenges of tomorrow—on Earth and beyond.

STUDENTS EXCEL IN COMPETITIONS ACROSS DISCIPLINES

Students participated in a variety of academic competitions this year, showcasing their technical expertise, research skills and hands-on problem-solving across disciplines—from research proposals bound for space to hands-on engineering challenges here, on Earth.

Student Spaceflight Experiments Program (SSEP)

In the university's inaugural participation in the SSEP, a team of engineering students earned the opportunity to send their project, Hydrogel-Radiation Shielding Viability Under the Influence of Microgravity, to the International Space Station.

Northrop Grumman Engineering and Science Student Design Showcase

At the 17th annual showcase, more than 100 student-led projects were on display, presenting original research and innovations to judges, industry professionals and peers. Winning entries ranged from a system for autonomous rapid transport to regolith-based sustainability projects and deep-learning applications for medical imaging.

Lockheed Martin Ethics in Engineering Competition

Sloan Hatter and Ryan Fox, accompanied by philosophy professor Moti Mizrahi, represented the university at the 8th annual competition in Bethesda, Maryland, where they worked on ethical decision-making solutions related to wildfire management using advanced technologies like artificial intelligence.

American Society of Civil Engineers (ASCE) Southeast Student Symposium

Florida Tech's ASCE chapter stood out among teams from 18 universities across Florida, Georgia and Puerto Rico, taking first place in the UESI Surveying Competition—securing a spot at the ASCE Civil Engineering Student Championships—placing third

in the men's and women's Concrete Canoe Slalom with their creatively designed, corn-themed canoe, the "Cornoe," and earning top 10 finishes in several other events, including the T-shirt, geo-wall and mystery competitions.

Pete Under Pressure

In a challenge organized by students Stephen Coster and Jolie Elliott in one of professor Stephen Wood's classes, student teams designed resin enclosures to protect a 3D-printed Pete the Panther from the crushing forces of a deep-water pressurization chamber. Then freshman Mazlen Bogden's entry reached an impressive 517 feet before imploding, winning the deepest depth award. Other winners included then senior Henry Hill '25 for best depth-to-weight ratio and then sophomore Collin Morr for most creative design.

STUDENTS BRING CLEAN WATER, CULTURAL EXCHANGE TO DOMINICAN REPUBLIC

Five students from the College of Engineering and Science (COES), accompanied by the Rev. Randall Meissen, Florida Tech chaplain and Catholic Campus Ministry director, spent part of their winter break on a humanitarian service trip to the central mountainous region of the Dominican Republic.

In the rural village of Los Guayuyos, then sophomores Bailey Astor, Elias Orellana and Matt Barfield and then freshmen Jacob Ewasko and Aydyn Jones joined with local community members Jan. 5-11 to install a sustainable, low-maintenance, gravity-fed water system designed to provide clean water to the village. The project was a continuation of long-term development initiatives between the Catholic Diocese of Orlando and the partner Diocese of San Juan de la Maguana in the Dominican Republic.

This interfaith team from Florida Tech, backed by the Catholic Campus Ministry, the Newman Club and the Student Government Association, spent time gluing PVC pipes, digging trenches and burying water distribution lines. The project's approach centered on community involvement and awareness to ensure the water system could be easily maintained and repaired by village residents, while also seeking to instill a sense of ownership and solidarity among them.

UP, UP AND AWAY

On April 19, meteorology students and faculty on Crawford Green released a weather balloon towing a battery-powered instrument, called a radiosonde, that gathers and transmits data on temperature, humidity, wind speed and more.

The balloon, made of 100% biodegradable natural latex and designed to "shatter" into small pieces for easier biodegradation should it burst, could travel to an altitude of up to 30 kilometers, or about 18 miles, before bursting.

Sponsored by the American Meteorological Society Florida Tech chapter, the event aimed to teach students both the process and value of setting up and launching weather balloons.

CCBC PRESENTS RESEARCH AT ONR WORKSHOP

In June, members of Florida Tech's Center for Corrosion and Biofouling Control (CCBC) traveled to Honolulu for the 2025 Office of Naval Research (ONR) Biofouling and Coatings Review.

During the workshop, associate professor Kelli Hunsucker '07 M.S., '13 Ph.D., presented her research developing UV light as an environmentally friendly method for biofouling management. Likewise, professor Geoffrey Swain and oceanography Ph.D. student Dylan Eggers '23 M.S. summarized findings from the Port Canaveral test site—one of four global sites used to test and develop novel methods for biofouling control.

"The annual review is invaluable. It allows you to connect in-person with colleagues to discuss progress on specific projects, general updates on biofouling research and establish new collaborations," Hunsucker said. "The whole review puts into perspective where the biofouling field is going, what can still be done and how all of us can work together for noble solutions."

TOP RESEARCH FUNDING

College of Engineering and Science faculty received a number of valuable, prestigious grants. They include:

Associate Professor Toufiq Reza
Chemistry and Chemical Engineering Department

Florida Department of Environmental Protection (FDEP): $999,952
"Control of HABs by Poly-Aluminum Chloride-Modified Biochar"

Environmental Protection Agency (EPA): $499,998
"Modified Biochar Technology for Simultaneous Red Tide Mitigation, Nutrient Reduction and Carbon Sequestration"

National Science Foundation (NSF): $244,017
"Collaborative Research: Liquid Fert Fertilizer and Engineered Carbon From pH-Swing Hydrothermal Carbonization of Animal Manure for Sustainable Circular Bioeconomy"

National Science Foundation (NSF): $382,214
"INFEWS/T2: Organic Waste Lifecycles at the Interface of Food, Energy, Water Systems (OWL-FEWs)"

National Science Foundation (NSF): $455,391
"REU Site: DESSA (Deep Eutectic Solvents, from Synthesis to Applications)"

American Chemistry Council: $24,934
"Evaluation of Flame Retardancy of ABS and PC/ABS Materials at Various Environmental Conditions"

Seagrass Restoration Initiative: $75,693
"Influence of Biochar on Seagrass Growth, Health, and Ecological interactions"

Assistant Professor Melissa Borgen
Biomedical Engineering and Science Department

National Institutes of Health (NIH): $389,851
"The Role of PHR Signaling in Tauopathy-Related Neurodegeneration"

Associate Professor Shaohua Xu
Biomedical Engineering and Science Department

Community Foundation of Brevard: $100,000
"Artificial Intelligence for Alzheimer's Disease Research: Causes and Prevention"

A+ Accolades

INCOSE RECOGNITION FOR ACADEMIC EQUIVALENCY

International Council on Systems Engineering

Florida Tech's systems engineering master's degree program has been recognized by the International Council on Systems Engineering (INCOSE) for academic equivalency, making it one of just two Florida universities and fewer than three dozen universities nationwide to hold the distinction. The equivalency designation also means that, starting in fall 2025, Florida Tech systems engineering master's students who successfully complete the equivalent INCOSE coursework can bypass the INCOSE Knowledge exam required to earn the council's widely recognized Associate Systems Engineering Professional (ASEP) and Certified Systems Engineering Professional (CSEP) certifications. The nearly yearlong effort also granted Florida Tech membership to the INCOSE Corporate Advisory Board.

2025-2026 COLLEGE OF DISTINCTION

Colleges of Distinction

Florida Tech has been named a 2025–2026 College of Distinction, a national honor in recognition of the university's success in helping students learn, grow and succeed.

One of just 12 Florida colleges and universities to receive the recognition, Florida Tech also earned College of Distinction honors for its business, engineering, career development, international and military support programs.

DARSHAN PAHINKAR

Heat to Run a Refrigerator?

HEAT-DRIVEN SYSTEMS IN THE CURRENT LANDSCAPE

One of the most significant engineering and societal challenges of today is the continued availability of clean energy with minimal environmental penalties. The current energy landscape is dominated by fossil fuel combustion, which releases waste heat and carbon dioxide into the atmosphere. This leads to significant environmental consequences that are worsening each year.

Heat-driven energy systems have the potential to address these concerns effectively and offer additional advantages, such as durability, flexibility and energy efficiency. Funded by the U.S. Department of Energy and National Science Foundation, my Adsorption and Energy Technology Laboratory at Florida Tech focuses on designing and demonstrating a portfolio of these heat-driven energy conversion and storage systems.

The central theme in my research is an energy transport phenomenon called "adsorption." It's a process of preferential attraction in which low-density gaseous molecules, such as those making up carbon dioxide (CO_2), cling at a high density onto a solid surface. This phenomenon can be controlled by either the temperature of the solid or the pressure of the gas. The existing embodiments of these adsorption systems, however, suffer in performance and scalability. They use easy-to-fabricate packed adsorbent beds (like silica gel sachets in medicine jars), that limit heat and mass transport.

These two issues can be solved using adsorbent-coated channels, which provide excellent heat and mass transfer characteristics. Such designs eliminate the flow resistance because dedicated flow passages and thin adsorbent layers result in rapid heat and mass exchange, unlike in clunkier adsorbent blocks.

> "One of the most significant engineering and societal challenges of today is the continued availability of clean energy with minimal environmental penalties."

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Darshan G. Pahinkar
Assistant Professor, Department of Mechanical and Civil Engineering

Darshan G. Pahinkar is an assistant professor in the mechanical and civil engineering department. He is the director of the Adsorption and Energy Technology Laboratory, and his research is focused on devising heat-driven energy systems.

I have demonstrated that this geometry can improve the adsorption-based CO_2 separation system capacity by up to two orders of magnitude while maintaining the purity, recovery factors and energy requirement of existing systems. Analogous design can also make very compact heat-driven refrigeration, cooling and heat storage systems.

Thin and porous adsorbent coatings are required to materialize these designs. Our lab has created a portfolio of adsorbent coating techniques that are well-calibrated for void volumes, gas uptake (water and CO_2), strength and durability. These techniques, including dipcoating, capillary insertion, photopolymer resin curing and yeast engineering, are diverse in terms of approach.

We are also studying the rheology of these complex adsorbent slurries for further refining these manufacturing techniques. These techniques have yielded excellent results in creating spongy and robust adsorbent coatings on the walls of channels. We are also involved in engineering the surface of these coatings to make them hydrophobic for seamless interactions with liquid water.

Our lab has incorporated these techniques to explore removal of carbon dioxide from post-combustion and industrial gaseous waste in an energy-efficient and spatially competitive manner. We have also demonstrated a cooling system that uses resin-cured adsorbent coatings. This system uses heat to circulate refrigerant water in one minute and provide cooling for more than five minutes without using any electricity. This cooling system can be highly competitive in the mainstream HVAC landscape.

With an interdisciplinary approach involving materials, chemical and mechanical engineering, we hope to generate decentralized solutions to mitigate environmental concerns.

Research Highlights

RESEARCHERS REFURBISH DEEP-WATER PRESSURIZATION CHAMBER TO STUDY SUBMARINE BIOFOULING

A group of Florida Tech researchers is working to understand how deep-sea water pressure affects biofilms and larger biofouling organisms by refurbishing a handy tool: a deep-water pressure chamber.

Biofouling is the growth of a bacterial film or larger marine life, such as barnacles, after an object's surface is submerged in water. It can inhibit a ship's functionality by slowing it down, which forces the ship to use more fuel and emit more greenhouse gases. All existing commercial antifouling paints and coatings were designed for use on surface vessels. The U.S. Navy is interested in how those materials are affected by hydrostatic pressure and if repeated pressure cycling negatively impacts their ability to discourage or prevent biofouling.

The chamber was donated and originally built by Edwin Link, the visionary inventor of the flight simulator, ally of Florida Tech founding president Jerome Keuper and co-founder of the Harbor Branch Oceanographic Institution.

The chamber can simulate the pressure of up to 1,000 feet below the surface of the ocean but hasn't been able to reach that depth due to a faulty pump.

With recent funding from the Naval Undersea Warfare Center, assistant professor Kelli Hunsucker '07 M.S., '13 Ph.D., and Ph.D. candidate Geligne Franklin are conducting deep-sea biofouling research using the pressure chamber. Though the chamber functions, part of their funding supports refurbishing it to make it fully operational. This was done through Florida Tech's machine shop and L3Harris Student Design Center.

Their first phase of testing has involved growing a biofilm on surfaces in-house, then pressurizing the surfaces inside the chamber to see how they are affected. The second phase will take place in the Bahamas to compare the results of the chamber to pressure in an actual ocean environment.

GOING FOR A SPIN: EXPERIMENT TO EXPERIENCE LUNAR GRAVITY FROM ROTATING CAPSULE AFTER LAUNCH

Working with 4SPACE LLC, space biologists John Z. Kiss and Karl Hasenstein designed an experiment in fluid dynamics that was conducted in lunar gravity aboard a rotating Blue Origin capsule during its suborbital journey.

The 10-minute New Shepard NS-29 mission lifted off at 11 a.m. Feb. 4 from Blue Origin's West Texas spaceport and produced about two minutes of lunar gravity.

The experiment compared the effect of lunar gravity on aqueous solutions of different viscosities and their interaction with surfaces at different angles. As the U.S. works toward returning to the moon, research like this will be critical.

While water distribution in plants and its percolation through soil is gravity-dependent, we don't know whether the reduced lunar gravity, which is one-sixth of Earth's gravity, is sufficient to maintain these processes in plants. Equally important is the effect of gravity for the distribution of water in lunar soil.

"While we know a great deal about biology and fluid dynamics in microgravity, we know little about these processes in terms of the lunar gravity environment," said Kiss, Florida Tech professor and provost. "This project presented a unique opportunity to test fluid dynamics in lunar gravity to gain insights into the cultivation of plants, which is important for bioregenerative life support on the Moon."

During the experiment—Kiss' ninth to fly into space—acceleration, temperature, time and images of the fluid distribution were recorded.

LINGHAM EXPLORES LIKELIHOOD OF LIFE ORIGINATING ON EARTH

"A Bayesian Analysis of the Probability of the Origin of Life per Site Conducive to Abiogenesis," published Aug. 19 in the journal *Astrobiology* by Manasvi Lingam, Ruth Nichols '24 and University of Rome astrobiologist Amedeo Balbi, models the relationship between hypotheses predicting varying numbers of potential sites for abiogenesis—the emergence of life from nonlife—on Earth and the likelihood of life's emergence at those sites.

A Bayesian analysis is one in which prior knowledge is used to estimate subsequent probability. For the sake of this model, the researchers focused on the possibility of life originating on Earth itself. So, since it's established that there is life on Earth, this model assumes that life originated on Earth at least once.

The researchers compiled potentially urable sites—those viable for life to start—identified in previous research, each with different levels of conduciveness for the genesis of life. They included several environments, ranging from underwater volcanoes to soap bubbles and tar to natural nuclear reactors akin to one that formed in Gabon 2 billion years ago.

Two main questions shaped their models: From how many sites on Earth could life have emerged? And what is the probability of life actually emerging from one of those sites? The goal of the study was not to directly answer the questions but to find the most accurate way of interpreting the data the models generate.

The researchers modeled three different scenarios: one with 10 urable sites; one with 10^{31} (that's 10 million-trillion-trillion, or 1 followed by 31 zeroes) urable sites; and one close to the middle with 10^{16} urable sites.

Lingam initially anticipated that access to larger pools of urable sites would create a higher likelihood of life emerging on Earth. Think: When you buy more lottery tickets, your chances of winning will go up.

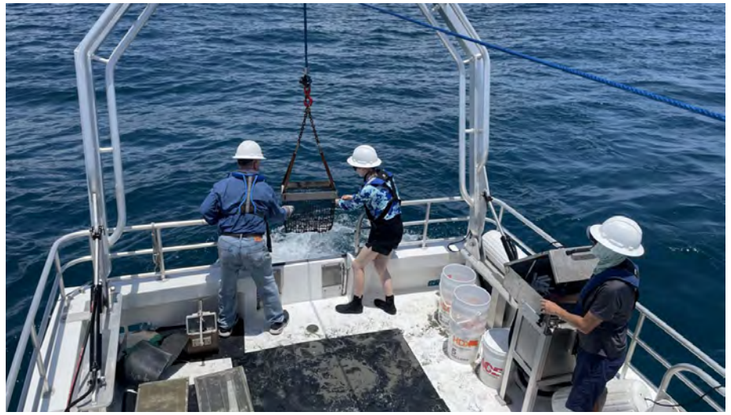
Instead, the results were the complete opposite in this agnostic scenario. Lingam found that when comparing the larger number of sites to the smaller number, the probability of life per pool was almost inversely related to the number of pools.

Yes, this outcome is counterintuitive, he says. That's why it's important.

In the model where Earth had fewer urable sites overall, the researchers inferred that the probability of life emerging on a given site is enhanced. They established that a greater chance of generation of life could be more likely when urable sites are rare, and plentiful urable sites might lessen the likelihood of life from a given site.

From there, they drew the inference that the smaller sample of sites, which revealed a higher probability of life at a given site, likely contained more conducive environments.

Their findings suggest that within the Bayesian framework, placing constraints on the availability of suitable environments for the origin(s) of life on Earth may offer valuable insights into the probability of abiogenesis and the frequency of life elsewhere in the universe.



'BENTHIC BIOBLITZ': A SPEEDY SURVEY OF LOCAL BIODIVERSITY

Professor emeritus Richard Turner joined several Florida Tech alumni and dozens of other scientists from academia, government and the private sector for June's 2025 Ocean DNA Benthic BioBlitz: a 10-day burst of intense species discovery in the Indian River Lagoon.

Scientists catalogued roughly 1,800 specimens from 32 sites across the Smithsonian Marine Station in Fort Pierce. Their collection will add invaluable data to the marine station's DNA reference libraries.

What might a bioblitz look like?

GATHER
Participants gather in a local, natural area. A group can include scientists and community members who want to learn about species in their environment.

COLLECT
Over a short period of time, participants collect sampling off boats or by wading. Some have specialties that guide their focus, such as Turner, who focused on echinoderms.

PROCESS
Once collected, samples are sent to a lab. Since a bioblitz happens fast, a different group is often responsible for simultaneously processing the samples.

TALLY
Specialists then receive the samples and identify each at the species level to create a tally of species found, organized by taxonomic group.

ANALYZE
The samples may be sent for further DNA analysis. At the June event, specimens were collected for deposition in museum collections.

In addition to Turner, several Panthers were involved in the 2025 Ocean DNA Benthic BioBlitz, including: co-organizer Holly Sweat, '10 M.S., '16 Ph.D., a marine community ecologist and head of the Benthic Ecology Program at the Smithsonian Marine Station; David Karlen '91, '93 M.S., Ph.D., general manager and Benthic Monitoring Section supervisor at the Environmental Protection Commission of Hillsborough County; and Matthew Scripter, '01, '06 M.S., '15 Ph.D., senior scientist at Ecological Associates Inc. in Jensen Beach.

NASA GRANT FUNDS RESEARCH EXPLORING METHODS OF TRAINING VISION-BASED AUTONOMOUS SYSTEMS

Associate professor Siddhartha Bhattacharyya and Ph.D. students Mohammed Abdul, Hafeez Khan and Parth Ganeriwala are developing a more efficient framework for creating and evaluating image-based machine learning classification models for autonomous systems, such as those guiding cars and aircraft.

With these kinds of models, it can take more than 100,000 images to help the algorithm learn and adapt to an environment. Today's technology demands a pronounced human effort to manually label and classify each image.

To combat that, Bhattacharyya was awarded funding from NASA Langley Research Center to advance existing machine learning/computer vision-based systems, such as his lab's "Advanced Line Identification and Notation Algorithm" (ALINA), by exploring automated labeling that would enable the model to learn and classify data itself—with humans intervening only as necessary. This measure would ease the overwhelming human demand, he said.

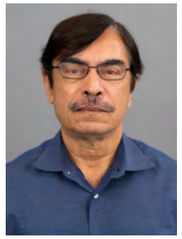
ALINA is an annotation framework that Khan and Ganeriwala developed under Bhattacharyya's guidance to detect and label data for algorithms, such as taxiway line markings for autonomous aircraft.

Bhattacharyya will use NASA's funding to explore transfer learning-based approaches, led by Ganeriwala, and few-shot learning (FSL) approaches, led by Khan. The researchers are collecting images via GoPro of runways and taxiways at airports in Melbourne and Grant-Valkaria with help from Florida Tech's College of Aeronautics.

Bhattacharyya's students will take the data they collect from the airports and train their models to, in theory, drive an aircraft autonomously. They are working to collect diverse images of the runways so that the model learns to identify patterns that determine the most accurate course regardless of environment or conditions.

Learning when results may or may not be reliable is a key part of this research. Bhattacharyya said identifying degradation in the autonomous system's performance will help guide the development of online monitors that can catch errors and alert human operators to take corrective action.

MITRA USING MACHINE LEARNING TO HELP DIGITIZE ANCIENT TEXTS FROM INDUS CIVILIZATION



The Indus Valley civilization, considered one of the earliest in history, boasted upward of 500 symbols and signs for communicating. However, for decades, scholars have debated whether the characters were a language or more akin to pictograms. Even as some experts begin to translate the right-to-left script found in Indus inscriptions, there is little agreement.

"That's a controversy, which is not yet settled," said Debasis Mitra, a professor of computer science who is now connected to this quest thanks to a novel grant he was awarded from the National Endowment for the Humanities: "Ancient Script Digitization and Archival (ASDA) of Indus Valley Artifacts using Deep Learning."

Former graduate student assistant Deva Atturu '24 M.S. is helping Mitra conduct the grant-funded research. The writings they are studying may be a series of symbols, the equivalent of dollar signs and business transaction images, or those symbols may be graphemes, individual letters or groups of letters that represent speech sounds.

"Both sides have very strong arguments," Mitra said.

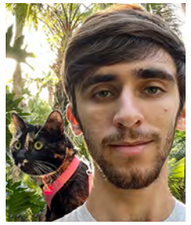
He is not looking to solve the argument but to empower those who will by developing a machine learning algorithm for identifying and digitizing the Indus civilization's ancient script. There is a paucity of digitized data that Mitra is hoping to address.

The process uses an automated script recognition (ASR) system to extract coded sequences of graphemes from a dataset of more than 1,000 photographs of Indus seals. Using two-staged artificial neural networks, the ASR has achieved 88% success in detecting graphemes.

He also enlists the help of students at the Indian Statistical Institute in his native India. Together, they are making progress. They can digitize some motifs and graphemes and, depending on the amount of data, even create a script. Doing that and getting it into a database is the goal of the initial grant funding.

The next phase? Create a system that allows archaeologists in the field to snap a smartphone photo of a text or symbols and have it routed into the database for digitization.

Siddhartha Bhattacharyya



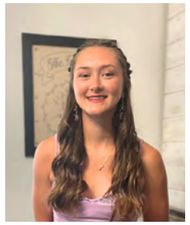
Nathaniel Isabella

Marc Ortner

Manasvi Lingam

Sloan Hatter

Peyton Hay



Alexa Garofalo

Jake Martin

Lauren Hoffman

And the Award Goes to . . .

Siddhartha Bhattacharyya

NASA University Leadership Initiative (ULI) Award

Over the next three years, associate professor of computer science and software engineering Bhattacharyya and professor of aviation human factors Meredith Carroll '03 M.S. will work to understand the vital role of trust in autonomy as part of the initiative, which aims to solve challenges in aviation. Their project, "Trustworthy Resilient Autonomous Agents for Safe City Transportation in the Evolving New Decade" (TRANSCEND), aims to establish a common framework for engineers and human operators to determine the trustworthiness of machine-learning-enabled autonomous aviation safety systems.

Nathaniel Isabella and Marc Ortner

Dr. Kerry Bruce Clark Endowed Scholarship

Isabella, who hopes to work in conservation of Elasmobranchii—the subclass of cartilaginous fish that includes sharks, rays and sawfish—or invertebrates, and Ortner, who dreams of studying the deep sea and hydrothermal vents, are both marine biology students who emphasize the importance of conservation and ocean exploration to combat environmental degradation created by human activity and exploitation.

Manasvi Lingam

2024 Rosalind Franklin Society Award for Year's Best Astrobiology Paper

Astrobiologist and assistant professor Lingam received the award for his paper exploring the likelihoods of life originating on Earth. "A Bayesian Analysis of the Probability of the Origin of Life per Site Conducive to Abiogenesis," published Aug. 19 in the journal *Astrobiology* with help from Ruth Nichols '24 and University of Rome astrobiologist Amedeo Balbi, was declared the organization's best astrobiology paper of 2024.

Sloan Hatter and Peyton Hay

2025 Astronaut Scholarship

While pursuing a bachelor's degree in computer science with minors in computational mathematics and philosophy, Hatter has tutored elementary school students, worked as a robotics lab technician and completed several engineering internships.

Hay, after nine years in the U.S. Marine Corps, is pursuing a bachelor's degree in electrical engineering. As a student, he has been selected for the NASA Pathways internship program at Kennedy Space Center, has worked as a research assistant and is president of Florida Tech's SCUBA Club.

Alexa Garofalo and Jake Martin

2025 Phillip W. Farmer Scholarship

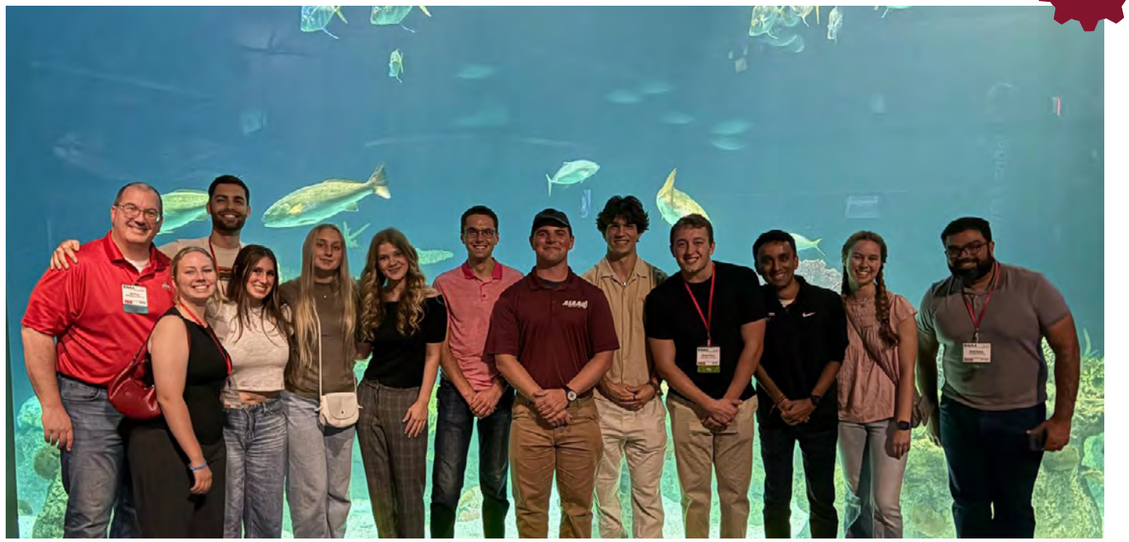
Garofalo graduated from the Academy for Innovative Education Charter School in Miami Springs, Florida and is pursuing a biomedical engineering degree. She will also join Florida Tech's varsity softball team.

Martin graduated from Gulliver Preparatory School in Miami and is majoring in mechanical engineering. He also looks forward to joining Florida Tech's Formula SAE Motorsports team.

Lauren Hoffman

NASA Future Investigators in NASA Earth and Space Science and Technology (FINESST) Research Grant

Hoffman, a Ph.D. student in space sciences, has been awarded the research grant—one of NASA's most competitive graduate research awards, with only 5% of applicants funded annually—for her project, "Investigating the Period-Luminosity Relation of Long Period Variable Stars in the Local Milky Way." Supervised by assistant professor Luis Quiroga-Nuñez as principal investigator, the project uses data from astronomical survey instruments such as Gaia, Zwicky Transient Facility (ZTF) and Very Large Array (VLA) to analyze long-period variable stars within 10,000 light-years of the Sun. Hoffman hopes her findings will refine period-luminosity relation when used within the Milky Way to better map its stellar environment.



American Institute of Aeronautics and Astronautics Region II Student Conference

Conference Wins

American Institute of Aeronautics and Astronautics Region II Student Conference

Yash Malik, second place, Open Topic: "The Orbiter: Pushing the Boundaries of Conventional Amateur Rocketry"

Nicholas Pisani and Peter Waszowski, third place, Open Topic, "A Review of Hypersonic Vehicle Engine Optimization"

Southern Section of the American Society of Plant Biologists Meeting

McKenna Taylor '25, second place, "The use of International Space Station Derived mixed cultures to Improve Plant Growth"

Lucy Turner '25, second place, "Potential involvement of Chlamydomonas reinhardtii chromosome 16 in quorum sensing"

Florida Section of the American Society of Agricultural and Biological Engineers 2025 Annual Meeting

Robert Cheatham '24, second place, Oral Presentation

Bilash Devnath, third place, Oral Presentation

Florida Academy of Sciences 88th Annual Meeting

Atmospheric and Oceanographic Sciences

Tenzin Yeshi, Jessica Lauren Cline

Biological Sciences

Arthur Jones, Lucy Turner

Engineering

Brandon Naumann '23, '24 M.S., Laura Fronchetti Guidugli '22, Swarna Saha, Corbin Freeland '24, Savannah Madairy, Russell Smith

Environmental Chemistry and Chemical Sciences

Bilash Devnath, Rana Abbood

Medical Sciences

Nithyashri Muthu Vijayan, Briannamarie Wallace, Joseph Mazzaro '24, Rohan Surapaneni, Anna Grimm

Physics and Space Sciences

Haley Murphy, Emily Soucy '25

American Society of Plant Biologists Meeting

Florida Academy of Sciences Meeting

College of Engineering and Science
Florida Institute of Technology
150 W. University Blvd.
Melbourne, FL 32901-6975

Photo by: Brice Smith

TANZANIA TREK: SUMMER FIELD WORK COURSE TAKES STUDENTS ON SAFARI

In May, 19 Florida Tech students went on safari to the famous wild spaces of Tanzania in East Africa. Led by professors Mark Bush and Rich Aronson, the students observed local wildlife and collected data on the abundance and biodiversity of birds and mammals in Arusha, Tarangire, Serengeti and Ngorongoro Crater national parks. After returning to campus, students analyzed their findings and prepared research reports.