AERONEWS

COLLEGE OF ENGINEERING | DEPARTMENT OF AEROSPACE ENGINEERING

2022 ISSUE

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#3

UNDERGRADUATE
ENGINEERING
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DAYTONA BEACH, FLORIDA CAMPUS

"U.S. News & World Report"

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Message from the Chair

2022 was another year of significant growth for the Department of Aerospace Engineering (AE). The department is the largest in the country with 1,974 bachelor's, 104 master's and 57 doctoral students as of Fall 2022 — another record year for enrollments. Roughly 11.5% of our undergraduates are honors students, while the rest of the Daytona Beach Campus has 6.1% honors students.

I am also proud to report the undergraduate AE program continues to rank very highly at #8 (tied) in the nation, according to U.S. News & World Report. This is the fourth time our program has been ranked in the top 10. Our program offers unique experiential learning through various competitions and yields excellent results, including a second-place finish in the AIAA Design, Build, Fly competition in April 2022. Several of our students have also earned prestigious fellowships this year.

The graduate program continues to thrive, ranking #32 (tied) in the nation. Thanks to the Graduate Assistance in Areas of National Need (GAANN) grant from the Department of Education, we are also able to support 10-12 Ph.D. students per year.

Researchers and students at the Eagle Flight Research Center (EFRC) are continuing to advance manned and unmanned flight, with a current focus on green aviation, electric and hybrid-electric propulsion, noise reduction, advanced and urban air mobility and the controls that guide those aircraft.

Research expenditures also continue to increase significantly, with expenditures tripling in the last five years.

Many of these accomplishments are detailed in the forthcoming pages. I hope you enjoy this edition of AeroNews.

Best regards,

A Lyrintzis

Dr. Tasos Lyrintzis
Distinguished Professor, Department Chair

Grants awarded in 2022 include:

- **Vertical Lift Research Center of Excellence** (subcontract from Georgia Tech) — "Holistic Representation of Ship-Airwake-Rotor Interactions for Naval UAS Operations." PIs: Leishman, Gnanamanickam.
- **NASA** — "Phase II: Development of an SE(3)-Based Rigid Body Pose Estimation Scheme for Unknown Moments of Inertia," a.i. Solutions, Inc. PIs: Nazari, Henderson, Prazenica.
- **Federal Aviation Administration (FAA)** "Investigate Detect and Avoid Track Classification and Filtering." PIs: Prazenica, Henderson, Nazari, Song.
- **Air Force Office of Scientific Research** "Novel Space Science Test via Adaptive Control and Integral Concurrent Learning Leveraging On-orbit CubeSat Structural Identification." PI: Bevilacqua.
- **NASA** — "GNC efforts in support of the University of Florida's research for NASA's Instrument Incubator Program (IIP)." PI: Bevilacqua.
- **National Science Foundation (NSF)** "Understanding the Coupled Interactions Between Hair-Like Micromechanoreceptors and Wall Turbulence." PI: Gnanamanickam.
- **NSF** — "FMSG: Cyber: Perceptual and Cognitive Additive Manufacturing (PCAM)." PIs: Kim, Rojas, Song.
- **Army Research Office** — "Understanding the Coupled Dynamics of Particles and Wall Turbulence." PIs: Gnanamanickam, Zhang.
- **U.S. Air Force STTR** — "Vision & Wireless-Based Surveying for Intelligent OSAM Navigation (VISION)." PIs: Moncayo, Dogan.
- **Supernal** — "Inceptor Configuration Study for Simplified Vehicle Operations." PIs: Collins, Anderson.
- **FAA** — "Integrated Flight and Propulsion Controls for Rotorcraft – Phase 2." PIs: Collins, Anderson, Dogan, Prazenica.
- **Moog Inc. Aircraft Group** — "Multi-copter Coaxial Rotor Design, Analysis, and Testing." PIs: Collins, Ricklick, Currier, Leishman.

Photo: Dr. James Gregory

Photo: Dr. Tasos Lyrintzis

Gregory, Lyrintzis Named AIAA Fellows

Two College of Engineering faculty members were named Fellows of the American Institute of Aeronautics and Astronautics (AIAA) on February 1. They were among only 28 new AIAA Fellows nationwide to earn the distinction this year.

Dr. James Gregory, dean, and Dr. Tasos Lyrintzis, chair and distinguished professor of Aerospace Engineering, were among the Class of 2022 AIAA Honorary Fellows and Fellows.

"Whenever our faculty members' contributions are recognized by other scholars in the field, it benefits our students, too, by enhancing the value of the degrees they are earning," said Embry-Riddle's Senior Vice President for Academic Affairs and Provost Lon Moeller. "The AIAA Fellows distinction is richly deserved, and we are tremendously proud of and happy for Jim and Tasos."

Gregory was recognized as a Fellow of the AIAA "for transformational contributions to unmanned aircraft system technologies in the future flight environment, academic leadership and significant impact on aerospace education."

Lyrintzis was recognized by the AIAA "for seminal contributions to the development of computational methods for quiet fixed-wing aircraft and rotorcraft."

According to the AIAA, the world's largest aerospace technical society, the distinction of Fellow recognizes "notable and valuable contributions to the arts, sciences or technology of aeronautics and astronautics."

The Class of 2022 AIAA Honorary Fellows and Fellows "are among the best minds in the aerospace profession," said Basil Hassan, AIAA president. "This distinguished set of individuals has earned the respect and gratitude of the aerospace community. We are in awe of their creativity and valued contributions to the understanding of our universe."

Embry-Riddle Visiting Distinguished Professor Dr. Mark Balas was previously named a Fellow of the AIAA. In addition, more than a half-dozen Embry-Riddle faculty members across the university have been named Associate Fellows over the years.

This story was originally written by Ginger Pinholster with Embry-Riddle's News Team.

Photo: Polaris Program/John Kraus

Embry-Riddle Developing LLAMAS Camera System for Upcoming Polaris Dawn Space Mission

Dr. Troy Henderson

Polaris Dawn Commander and Embry-Riddle alumnus Jared Isaacman ('11), who led the first-ever all-civilian space mission in 2021, paid a visit to Embry-Riddle's Space Technologies Laboratory in April 2022. This laboratory is where a new multi-camera system is being finalized that will fly aboard a SpaceX Dragon capsule with the goal of capturing VR and stereo video of the first-ever commercial spacewalk. The system is dubbed LLAMAS, or "Literally Looking at More Astronauts in Space."

Embry-Riddle's involvement in the mission does not end at the camera's construction, according to Dr. Troy Henderson, Space Technologies Lab director and associate professor of Aerospace Engineering. The team will endeavor to use the camera imagery to create virtual reality simulations later. They also plan to collect thermal data on the space suits using an IR camera, as well as radiation data.

"With the successful delivery of EagleCam hardware, the Polaris team approached us about providing a camera payload for the Polaris Dawn mission — and of course the students jumped at the opportunity," Henderson said.

"Working through astronaut safety and the physical payload requirements in collaboration with Polaris and SpaceX is invaluable for our students, in terms of building both their technical skills and networking abilities. And who wouldn't want to be part of the first-ever commercial spacewalk?"

The hardware is scheduled for delivery 13 months from mission conception, which is a rapid turnaround. Students used lessons learned from the EagleCam build in order to drastically reduce the production and integration time. The Polaris Dawn mission is currently scheduled to launch in summer 2023.

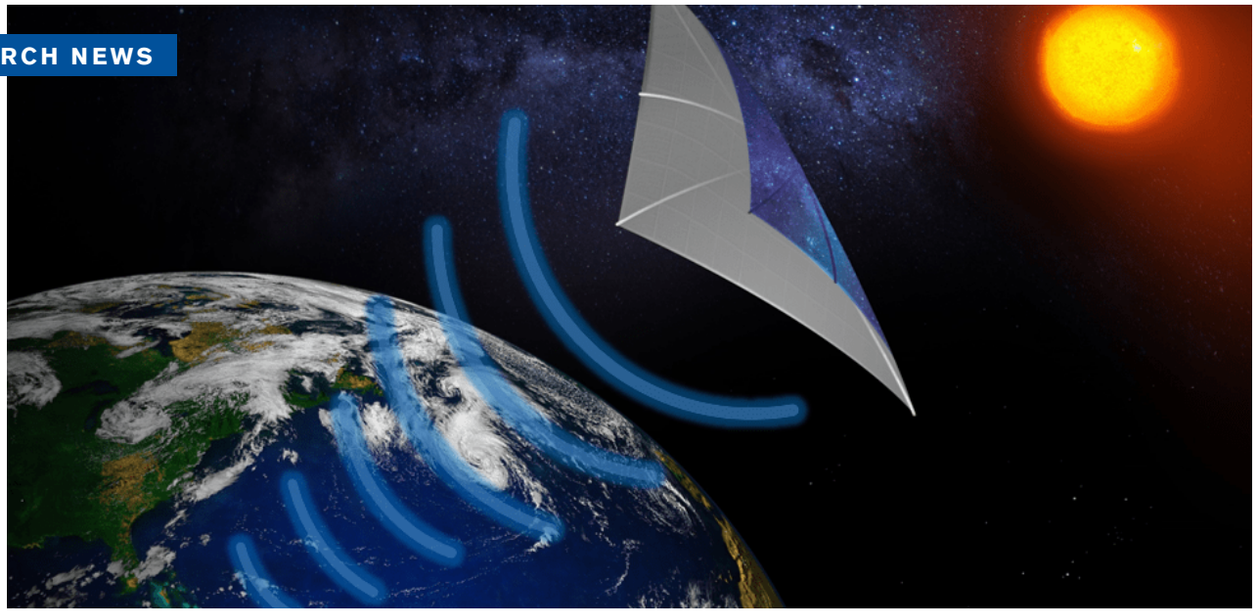
The mission motto, "Nova Sententia" — which means "a new view" — perfectly describes what LLAMAS will capture: video of history in the making.

"This project will provide a new, immersive perspective by recording the astronauts as they perform the first civilian [extravehicular activity]," said Daniel Posada, an Aerospace Engineering Ph.D. student on the team.

Posada was one of five Embry-Riddle students who visited SpaceX headquarters to learn from the pros and hone their LLAMAS hardware design in October 2022. The students were determining how to best mount the camera to the SpaceX Dragon capsule. They were successful and now have a clear picture of exactly what footage the LLAMAS camera will capture following the launch of the capsule/rocket. The other students included Jarred Jordan, Daniel Lopez, Joseph Nicolich and Taylor Yow.

This story was originally written by Mike Cavaliere and Melanie Azam with Embry-Riddle's News Team.

RESEARCH NEWS



Eagle Professor Wins Air Force Grant to Control Flexible Satellites

Dr. Riccardo Bevilacqua (Funded by the Air Force Office of Scientific Research)

Dr. Riccardo Bevilacqua is on a mission. His goal: enable flexible spacecraft, equipped with either mounting appendages or large membranes, to autonomously control their motion in orbit.

The three-year project, funded by a $450,000 Air Force Office of Scientific Research grant, could yield a variety of applications upon its completion — repairing damaged satellites, deploying solar sails or supporting future Air Force missions.

“We will create new control and estimation methodologies able to control a spacecraft with flexible systems,” Bevilacqua said. “We will also use robotics systems in the [Embry-Riddle] Advanced Autonomous Multiple Spacecraft Laboratory to test some of our algorithms.”

In the first year of research, Bevilacqua developed and modified spacecraft simulators to add flexible appendages. Experimentation on those simulators, including a 3D-printed mockup of a CubeSat, will take place in year two. Finally, in year three, laboratory testing will occur, along with application for launch of the CubeSat, under NASA’s CubeSat Launch Initiative.

One Ph.D. student and several undergraduates will assist Bevilacqua in his research and development.

One of the ways this research could impact the commercial space industry is by shortening the amount of time between testing and launch, thereby reducing cost:

“The outcome may reduce spacecraft testing requirements on the ground, enabling complex systems to perform on-orbit identification of their own dynamics and adjusting their control strategies autonomously,” Bevilacqua said.

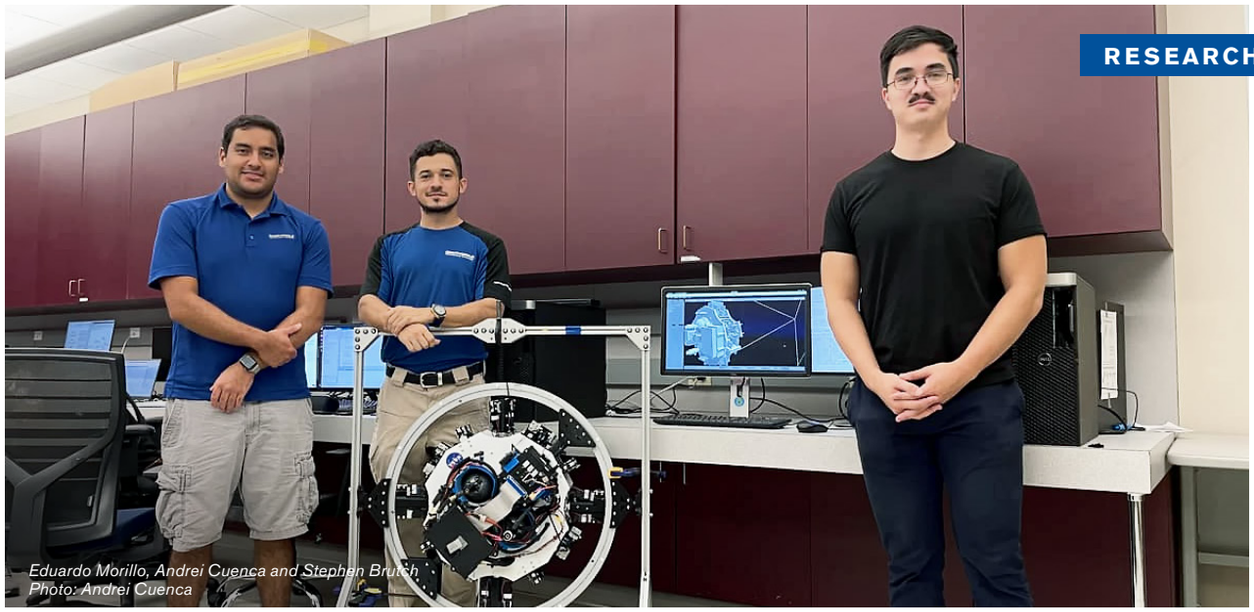
Just as important as the research itself, he added, are the opportunities the research will provide students to play hands-on roles in developing technology to push space travel forward.

Aerospace Engineering Ph.D. student, Nicolo Woodward, who has worked with Bevilacqua on two previous CubeSat projects, is one of those students benefitting from the grant through his participation in the research.

“This project will expand my network in the aerospace field, and it will be the first step for me to fully lead a spacecraft simulation project,” he said. “I will bring a refined work ethic and engineering skills into my new job once I graduate to explore and study even more complex and state-of-the-art topics.”

Woodward will lead a group of undergraduate students in building the spacecraft simulator that will investigate the dynamics behavior of an adaptive controller for a spacecraft with flexible appendages.

This story was originally written by Mike Cavaliere with Embry-Riddle’s News Team.



Eduardo Morillo, Andrei Cuenca and Stephan Brutch
Photo: Andrei Cuenca

Eagle-Designed Space Drones Target In-Orbit Construction

Dr. Hever Moncayo and Dr. K. Merve Dogan (Funded by the U.S. Air Force)

What if vehicles could be assembled in space without human supervision? What if autonomous spacecraft could conduct routine maintenance and inspections on satellites, while flying in orbit around the Earth?

Dr. Hever Moncayo believes all of this is possible, and he's helping advance the technology that will accomplish these goals by developing high-precision navigation algorithms that would allow space systems to get to work building a better future.

"In the aerospace industry, there is an increased interest in enhancing autonomy of space robotic systems," he said. "All these applications make relevant the goals of this project."

Additionally, the research will greatly advance the United States Space Force's plans for robust space system target acquisition and intelligent space system operations, which is part of the reason why Moncayo recently received a Small Business Technology Transfer award from the U.S. Air Force to continue his research through Embry-Riddle's Advanced Dynamics and Control Lab (ADCL). He is partnering with Modularity Space to tackle the complex problems associated with in-orbit servicing, assembling and manufacturing operations, especially within multi-agent, systems-based applications.

This is not the first time Moncayo has worked to develop artificially intelligent spacecraft. Previously, he focused on building robotic systems capable of prospecting asteroids for natural resources. Later, that work evolved to integrate 3D-printed robotic vehicles that could "jump" on asteroids to collect research samples.

"Our previous work relied on vision-aided relative position estimation of agents flying within a distributed network," Moncayo explained, adding that the technology supported "adaptive control systems with fault-tolerant and health monitoring capabilities."

The new iteration of the research, on which Dr. K. Merve Dogan is serving as co-principal investigator, allows autonomous spacecraft to not only identify and travel toward moving targets but also repair them, inspect them or assemble new objects entirely from scratch, using a vision-based navigation system that employs wireless communication for tracking and formation flight. The algorithm also uses neural network-based machine learning to identify, track and estimate the positions and intent of other nearby flying agents.

Moncayo has a team of student researchers who will assist him in the work.

This story was originally written by Mike Cavaliere with Embry-Riddle's News Team.

New FAA Grant to Help Embry-Riddle Researchers Improve Drone Safety

Dr. Richard Prazenica (Funded by the FAA)

Researchers at Embry-Riddle recently received a $371,000 grant from the FAA to study the detection systems of uncrewed aerial systems (UAS), or drones, to improve the safety of their operation.

“The research will inform the development of standards and requirements for the accuracy of detect-and-avoid (DAA) systems, which will improve safety, especially in scenarios where there are multiple UAS operating in the same airspace,” said Dr. Richard Prazenica, principal investigator of the project. “For example, a radar system might detect and track birds, which could be mistakenly identified as another vehicle that poses a collision threat. If too much false information is presented, it can overwhelm a human operator, making it difficult to discern real threats from false ones.”

Nathan Schaff, who graduated from Embry-Riddle with a bachelor’s degree in Aerospace Engineering and is now a Ph.D. student in the same department, has been researching the many different types of UAS in order to help provide the FAA with enough information to “properly regulate them,” said Schaff, adding that the project is key to the progress of UAS.

“I think that advanced air mobility and unmanned aerial systems will be a defining aspect of the 21st century, but before that can happen, a great deal of time and effort must be put into making sure that when the first aircraft start to fly, people won’t get hurt,” he said. “For this project, we are fundamentally focused on maximizing safety, and there’s no greater job than that.”

Dr. Aryslan Malik, a postdoctoral research scholar working on the project who earned his Ph.D. at Embry-Riddle, said the inaccurate or misleading information that can be conveyed by UAS sensors creates “a barrier to the widespread implementation of Beyond Visual Line of Sight missions in the National Airspace System.”

The project, which will continue through March of 2024, is a collaboration between Embry-Riddle, Mississippi State University, The Ohio State University, University of North Dakota and Cal Analytics. Other Embry-Riddle professors who are participating include Dr. Morad Nazari, assistant professor of Aerospace Engineering; Dr. Troy Henderson, associate professor of Aerospace Engineering; Dr. Richard Stansbury, associate professor and program coordinator for the master’s degree in Unmanned and Autonomous Systems Engineering; and Dr. Tyler Spence, assistant professor in the Department of Aeronautical Science.

This story was originally written by Michaela Jarvis with Embry-Riddle’s News Team.

Two Faculty Members Contribute to New Understanding of Ship Airwakes

Dr. J. Gordon Leishman and Dr. Ebenezer Gnanamanickam (Subcontract from the Georgia Tech Vertical Lift Research Center of Excellence)

Ship airwakes are the unsteady flows generated by the Earth's atmospheric boundary layer — the wind — blowing over a ship. These flows are highly turbulent, difficult to predict and can couple with a similar wake flow generated by a rotorcraft operating close to the ship. This coupling is also extremely difficult to predict, let alone simulate in a flight simulator, and can have catastrophic consequences for the operation of rotorcraft (including UAS) in the vicinity of naval ships.

While ship airwakes have been studied for several decades, there remain many unanswered questions and challenges in understanding these three-dimensional flows. Drs. J. Gordon Leishman and Ebenezer Gnanamanickam are working to address some of them via a five-year $636,000 grant.

Navy personnel and aircraft safety remains the primary motivating factor for understanding these airwakes and their interactions. Developing a versatile, high-fidelity mathematical model to represent the ship airwake in a flight simulation has been one grant priority. This goal is critical for contemporary ship shapes typical of the current U.S. Naval inventory and requires fluid dynamic studies of the airwake.

Furthermore, a vast majority of ship airwake measurements have not considered the interactions between an operating rotorcraft and the airwake, which Leishman and Gnanamanickam also aim to address with the help of two Ph.D. students (Kaijus Palm and Guillermo Mazzilli).

To achieve these goals, time-dependent particle image velocimetry measurements with high spatio-temporal resolution will be conducted. A representative rotor system will also be introduced into the airwake to study the resulting interactions. The focus will be on carrying out dual-plane measurements, which allow for spatially and temporally synchronous measurements.

These datasets will then be used to represent the flow field using reduced-order models (ROMs). These models will be used to acquire physical insights into the complex airwake environment, while describing the flow in a manner that is more relevant to the scale of UAS.

RESEARCH NEWS

Aerospace Engineering Professor Secures NSF Grant

Dr. Ebenezer Gnanamanickam (Funded by the NSF)

How can we use fluid dynamic interactions for our benefit? What can nature teach us about these interactions? Dr. Ebenezer Gnanamanickam will explore these and other questions thanks to a $275,000 NSF grant.

Gnanamanickam will examine the relationship between turbulent flows and long, flexible hair-like microstructures. These microstructures are similar to the airflow sensors that bats use in flight, lateral line sensors that fish use while swimming or the hair cover of animals.

The exact interactions that lead to balanced flight (in the case of bats) or the manner in which fish use their sensors to detect predators are poorly understood, in part because of the complex physics at play. Gnanamanickam and Ph.D. student Pratik Deshpande hope to shed more light on this relationship by using advanced image-based flow diagnostic tools to measure and describe the interactions between these microstructures and the background turbulent flow.

Dr. Lyrintzis, distinguished professor and chair of Aerospace Engineering, mentioned that “Understanding how nature works is an important step in designing efficient aerospace vehicles.”

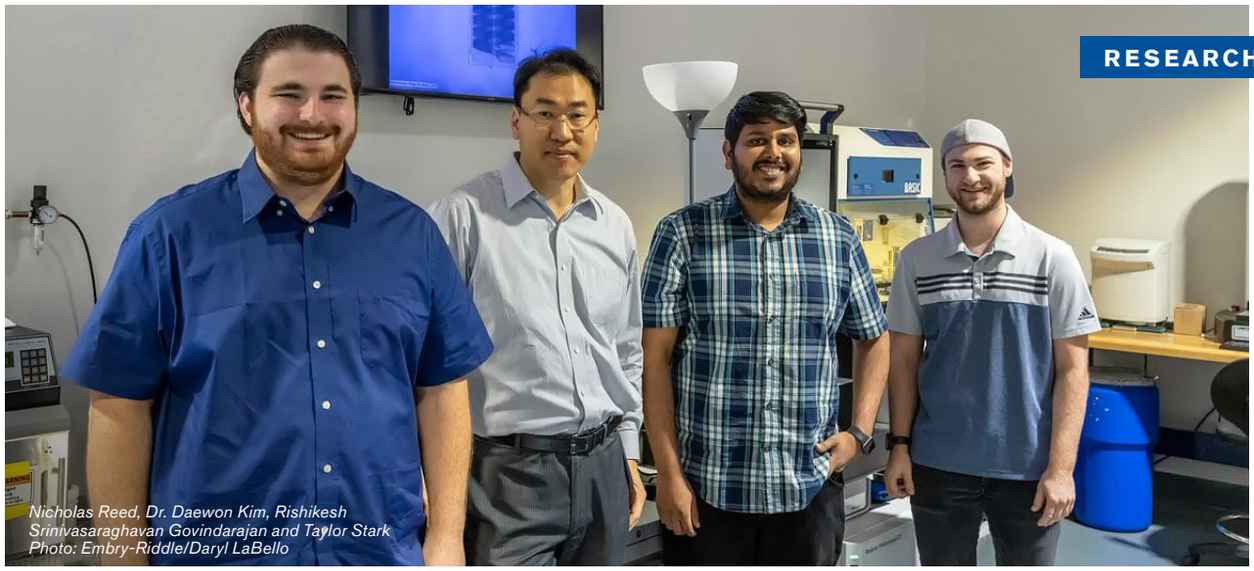
Gnanamanickam’s research will continue through at least 2025, with the measurements he collects poised to impact fields ranging from aerospace engineering to non-linear energy systems and physiology.

This story was originally written by Caroline Duda.

$275,000

NSF GRANT

Gnanamanickam will examine the relationship between turbulent flows and long, flexible hair-like microstructures.



Nicholas Reed, Dr. Daewon Kim, Rishikesh Srinivasaraghavan Govindarajan and Taylor Stark
Photo: Embry-Riddle/Daryl LaBello

National Science Foundation Backs Eagle Research To Enable 'Smart' 3D Manufacturing

Dr. Daewon Kim, Dr. Eduardo Rojas and Dr. Houbing Song (Funded by the NSF)

Three Embry-Riddle researchers, led by Dr. Daewon Kim, have been awarded a $500,000 grant (the Future Manufacturing Seed Grant entitled "Cyber: Perceptual and Cognitive Additive Manufacturing [PCAM]") to study a new manufacturing approach to provide real-time assessment of products during their fabrication — an approach that could help factories reduce waste and produce lighter, energy-saving products for the aerospace industry.

The research explores embedding wireless sensors in products during manufacture and using artificial intelligence and machine learning to evaluate the quality of the products and detect defects.

While the purpose of this grant is to investigate the viability of the approach, Kim is confident the technology will be valuable in additive manufacturing, a promising new process of building products layer by layer using 3D printing. Conventional manufacturing more often involves starting with a block of material and removing parts of it in a "subtractive" method.

This story was originally written by Michaela Jarvis with Embry-Riddle's News Team.

Award-Winning Startup, Novineer, Takes 3D Printing to the Next Level

Dr. Ali Tamijani

A game-changing idea born at Embry-Riddle promises faster, more environmentally benign production of lightweight, high-quality aircraft and rocket parts, biomedical implants and a host of other consumer products. The company's big idea — the brainchild of Embry-Riddle faculty member Dr. Ali Tamijani — could accelerate the widespread use of 3D printing in the manufacture of a wide range of end-use parts and products.

Novineer design and simulation software can simplify and accelerate the process of designing, modeling and fabricating high-performance 3D-printed parts, Tamijani explained. Using the technology, a design that might take four days to complete using current methods could be accomplished in no more than four hours with Novineer's software. The company was born out of three research projects: multi-metal 3D printing for NASA, composite 3D printing technology for the U.S. Navy and what is known as latticework for the National Science Foundation.

This story was originally written by Ginger Pinholster with Embry-Riddle's News Team.

Eagle Flight Research Center Continues Groundbreaking Research

The College of Engineering's Eagle Flight Research Center (EFRC) is a leading-edge aeronautical research institution. The mission of the EFRC is to advance manned and unmanned flight through the fusion of theoretical and hardware-based research related to alternative propulsion, flight control, autonomy and the development of novel aircraft. In 2022, the EFRC focused on four main projects:

Integrated Propulsion and Flight Control for Rotorcrafts (FAA)

This research project evaluated the performance of various control strategies that multi-rotor vertical take-off and landing (VTOL) aircraft could employ for both nominal and degraded modes of flight.

The lessons learned during Phase 1 are beneficial to urban and advanced air mobility vehicle developers. They promote increased awareness of flight safety through the benefits that a collective-cyclic pitch mixed (CCPM)-capable rotor system can offer when used on a multi-rotor platform. A large, unmanned quadcopter was built with unique CCPM-capable distributed electric propulsion units and proved that sustained flight with one disabled rotor is possible.

Dynamic simulation models were developed for both the individual rotor systems and the entire vehicle to predict the in-flight behavior of nominal and motor-out modes of quadrotor, hexarotor and octorotor flight. Traditional thrust differential-based control logic did not provide adequate control for sustained flight in any failure mode.

Inceptor Configuration Study for Simplified Vehicle Operations (SVO) (Supernal Aero)

The EFRC developed and evaluated several inceptor concepts with the goal of providing Simplified Vehicle Operations (SVO) for Supernal Aero. As part of this effort, the EFRC built a two-axis motion simulator with a 180-degree field of view.

The urban air mobility vehicle flight model with SVO flight control laws was also developed by the EFRC. The Human Factors department at Embry-Riddle, led by Dr. Alex Chaparro, developed the human subject testing protocol. The team evaluated the inceptor concepts with human subjects of varying flight experience and analyzed their flight performance data and inceptor preferences. The goal of this evaluation was to assist in analysis and down-selection of inceptor concepts.

Multi-Copter Coaxial Rotor Design, Analysis and Testing (Moog Aircraft)

Moog's SureFly S250 vehicle is a multi-rotor vehicle that can fly either as a manned or unmanned vehicle. The vehicle utilizes four coaxial rotor systems for a total of eight rotors. Each rotor operates independently and together provides the lift, propulsion and control for the vehicle. Currently, the system is all-electric but plans are in place to modify the system with a hybrid-electric power system.

Moog plans to utilize the expertise of the EFRC to perform a design space exploration of the coaxial rotor system using comprehensive rotor analysis, as well as to optimize the coaxial rotor system pods of the SureFly S250, which currently uses 92-inch diameter rotors. As part of the design space exploration, the EFRC will investigate the performance and efficiency of the rotor system as a function of design variables such as airfoil, upper and lower blade pitch, rotor spacing, number of blades, chord distribution and twist distribution.

Internal Hybrid-Electric Research

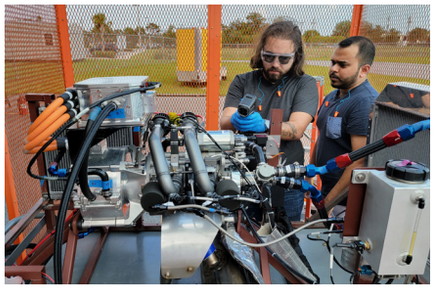
As the aerospace industry continues to advance, non-conventional means of propulsion are being explored. One option that is being heavily researched is electric. With electric propulsion, mission requirements such as low operating noise, reduced emissions or a tiltrotor vehicle design can be achieved.

Electric propulsion can be broken down into upstream and downstream components. The source of electricity in the vehicle is the upstream component, while the downstream component is the drive motor(s) and rotors that produce the thrust. The upstream component can be batteries or a hybrid-electric system which converts fuel to electricity using a conventional aviation engine and an electric generator. Using batteries as the upstream component eliminates the need for onboard fossil fuels since the batteries would be charged on the ground and the emissions impact would be determined by the power grid.

A significant drawback to using batteries is the relative weight of equal energy systems. When comparing conventional fossil fuels to battery packs, the specific energy ratio is 73:1 versus 20:1, which means conventional fuel has more energy for the same weight. With modern battery technology, a battery-only system as the upstream component of an aerospace vehicle will have reduced range.

Another option to achieve the same mission requirements is a hybrid-electric system. This system would be comprised of an internal combustion engine and an electric generator. Using a hybrid-electric system provides better specific energy than any modern lithium-ion battery pack. A hybrid system could be easily incorporated into present methods of operation with fewer issues due to using a conventional aviation engine as the main power generation device. By using a hybrid-electric propulsion system, longer-range flights can be achieved for systems requiring electric power than using batteries alone.

The EFRC is building a 100+ hp hybrid-electric power generation system under the Voltron project. The system consists of a twin-rotor rotary Wankel engine, a radial flux permanent magnet synchronous machine used as the generator along with its inverter/controller, a 400 V lead-acid battery pack, a vehicle control unit and the associated thermal systems. The system is estimated to achieve peak power of 134 hp with the high-voltage battery and sustained power of 70 hp with just the hybrid-electric system. With eight gallons of fuel, the system is estimated to realize a specific energy of 0.37 hp-h/lb. and a specific power of 0.46 hp/lb. The benefits of this system include its small size, high energy density, low weight and fuel operational flexibility.



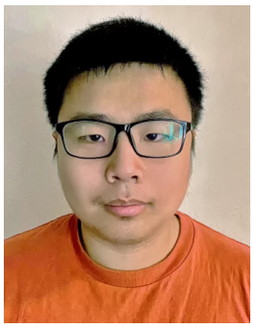
New Faculty

Dr. Alan Lovell

Dr. Lovell has served for 20 years as a Senior Aerospace Engineer in the Space Vehicles Directorate of the U.S. Air Force Research Laboratory at Kirtland Air Force Base in New Mexico. He received his M.S. from Arizona State University in 1994 and his Ph.D. from Auburn University in 2001 – both degrees are in Aerospace Engineering. His research interests include astrodynamics, orbit determination, trajectory optimization and feedback control design.

Dr. David Canales Garcia

Dr. Canales Garcia holds an M.S. in Aerospace Engineering from the Polytechnic University of Catalonia, Spain. He also holds an M.S. degree in Astrophysics, Particle Physics and Cosmology from the University of Barcelona and a Ph.D. in Astrodynamics and Space Applications from Purdue University. His research interests include astrodynamics, astronomy, orbit determination, applied mathematics and many different space applications, such as telecommunications, signal processing and mission planning.

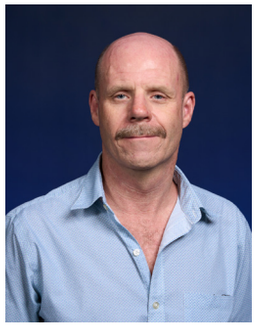


Dr. Yizhou Jiang

Dr. Jiang holds a Ph.D. in Industrial Engineering and Operations Research and an M.S. in Electrical Engineering from the University of Illinois Chicago. Before joining Embry-Riddle, he was a postdoctoral researcher at the University of Southern California. His research interests include the novel additive manufacturing processes of functional material for applications including aerospace structures, energy harvest, robotics, bio-inspired designs, etc.

Kimberly Heinzer

Professor Heinzer holds an M.S. degree in Aerospace Engineering from Embry-Riddle. She has over 15 years of experience working in the aerospace industry and eight years of college-level teaching experience. At Boeing, she supported the Delta II and IV expendable launch vehicles, and at Kosola and Associates she designed major aircraft repairs and modifications, proposed and conducted static tests and coordinated projects with the FAA as an engineer, manager and vice president.



Dr. Scott Martin

Dr. Martin holds an M.S. in Aeronautical and Astronautical Engineering and a Ph.D. in Mechanical Engineering from the University of Washington. He also completed a postdoctoral fellowship at the Center for Turbulence Research at Stanford University. Martin's research interests include combustion, rockets, air-breathing propulsion and computational fluid dynamics. Prior to joining Embry-Riddle, he was a combustion scientist at Siemens Energy in Orlando, FL. He has also worked for the Ford Motor Company in Dearborn, MI and Boeing in Seattle, WA.

Dr. Surabhi Singh

Dr. Singh holds M.S. and Ph.D. degrees in Mechanical Engineering from the University of Florida. Her research interests include high-speed experimental aerodynamics, flow control and reduced-order modeling of fluid flows.

Dr. Magdy Attia and Dr. Yechiel Crispin Retire as Aerospace Engineering Professors

After nearly 20 years of service to the university and Aerospace Engineering department, Dr. Magdy Attia retired in late 2022.

Attia is known for his teaching and research excellence in jet propulsion, turbomachinery, lean engineering, pressure gain combustion and applied and innovative problem-solving methods. Attia was unique in the Aerospace Engineering department: a true designer who brought a surplus of industry experience to the lab and classroom.

Attia received his Ph.D. from Texas A&M University. After graduating, Attia moved to central Florida and joined Westinghouse Electric Company (now Siemens Energy) in Orlando as an aero-thermal engineer in the Gas Turbine Engine Advanced Engine Design Group. As a senior engineer, he led the team that designed a 16-stage compressor that holds the record for the most efficient industrial compressor, at 94% polytropic efficiency.

In 2003, Attia joined the Aerospace Engineering department as an assistant professor. He achieved the rank of full professor in 2011, during which time he founded and directed the Gas Turbine Lab. This lab is home to over $2.8M in applied and basic research and has supported 25 M.S. theses.

Attia served as the associate chair and graduate program coordinator from 2016-2020. He also developed the first graduate course in lean engineering and mentored several successful AIAA Student Engine Design Competition teams. He is a member of the AIAA Gas Turbine Engines committee, ASME and Sigma Gamma Tau. He is also the author of several patents.

Outside the university, Attia is president and founder of AbM Engineering, where he provides engineering services like expert witness, training and analysis.

Dr. Yechiel Crispin, who also retired, joined the AE department in Fall 1992. Dr. Crispin was one of the university's first hires in the Astronautics area and pioneered our transformation from an Aeronautics to an Aerospace Engineering department. He obtained his Ph.D. from Technion Institute of Technology in Israel and worked at NASA Ames, in the Israel aircraft industry and at the University of Florida before joining the AE department. Over all these years, Dr. Crispin exhibited a delightful and amiable personality, punctuality, a love of teaching and conducting research and service to our department and the university.

Faculty Accomplishments and Awards

- Elsevier has created an international list of the world's top 2% of scientists recognized for their scholarly impact (excluding self-citations): **elsevier.digitalcommonsdata.com/datasets/btchxktzyw/4**

  The following faculty are recognized in the list (1,109 researchers are in the Aerospace Engineering sub-list):

  - Dr. J. Gordon Leishman, #25
  - Dr. Mark Balas (visiting), #39
  - Dr. John Ekaterinaris, #200
  - Dr. Tasos Lyrintzis, #441
  - Dr. James Gregory, #446
  - Dr. Reda Mankbadi, #676

- Dr. Riccardo Bevilacqua and Dr. Hancheol Cho were co-authors on a publication that won an award for Best Paper at the 2nd International Conference on Applied Intelligence and Informatics (AII 2022).
- Dr. K. Merve Dogan was selected to receive the 2022 Dave Ward Memorial Lecture Award from the Aerospace Control and Guidance Systems Committee.
- Dr. Sirish Namilae was named the College of Engineering's Researcher of the Year.
- Professor Lawrence Fineberg received the 2022 Embry-Riddle Aerospace Engineering undergraduate teaching award.
- Dr. William Engblom received the 2022 Embry-Riddle Aerospace Engineering graduate teaching award.

Photo: Joseph Nicolich

Eagles Make University History with Top Finish at AIAA DBF Aircraft-Design Competition

A team of Embry-Riddle students recently made school history by placing second in the 2022 Design, Build, Fly aircraft competition hosted by the American Institute of Aeronautics and Astronautics.

“This is a highly competitive event, and this year is our best-ever finish,” said Dr. Jim Gregory, dean of the College of Engineering.

The team’s aircraft was named MULLET, which stands for Medical Unmanned Low-Level Electric Transport. For good luck, several members of the 40-person team rocked mullet haircuts at the competition.

“When we started designing the aircraft, we needed to come up with an interesting name. This acronym kind of fit perfectly,” said Joseph Ayd, the Aerospace Engineering student who led the Daytona Beach team.

This year’s competition, which 69 teams attended, required students to design and produce a medical support aircraft that could transport syringes and deliver vaccine vial packages. Entries were scored based on how many syringes and packages could be carried, plus the aircraft’s speed and performance.

“The annual AIAA competition teaches our students about the essential engineering trade-offs in aircraft design to meet specific flight performance and mission requirements, similar to the actual design problems faced by industry,” said Dr. J. Gordon Leishman, distinguished professor of Aerospace Engineering and the team’s faculty advisor. Students must develop an extensive range of skills to succeed in this competition, fully demonstrating that their aircraft can fly and efficiently perform the required missions, said Leishman. This year, with the advantages of a growing knowledge base and lessons learned from previous years, Embry-Riddle ranked first place in the fly-off part of the competition.

Additionally, the team worked briskly to accelerate their schedule early in the year, flying their first prototype just nine weeks after the requirements were released in September.

“My team put in about 9,000 hours of work on this project,” Ayd said. “We failed early and often, crashing our first aircraft and redesigning structures throughout the year. We did some aerodynamic tests in the wind tunnel to ensure we could meet critical requirements even before first flight. Getting in the wind tunnel was extremely important for us to have that data early on in the design process.”

The Daytona Beach Campus team was comprised of the following students: John-David Adams; Joseph Alnabr; Joseph Ayd; Brandon Babey; Isaiah Barak; Joseph Borrelli; Andrew Bunn; Ariana Cardines; Victor Chang; Daniel Chen; Riley Cox-Gross; Nahuel Damoudt; Dikko Dikko; Camdyn Doucette; Caroline Dougherty; Fuping Duan; Danielle Gabel; Daniel Garlock; Ariel Goya; Zachary Herman; Brock Jorgensen; Frederick Kennedy; Jonathan Kumm; Cody Kuskie; Zachary Leonard; Nicholas Marshall; Alex McConkie; Joe McDonald; Marissa Murphy; Joseph Nicolich; Harshil Patel; Vikas Patel; Noah Pecor; Alexander Roy; Kat Ternus; Pony Tom; and Evan Zielke.

This story was originally written by Melanie Azam with Embry-Riddle’s News Team.

Embry-Riddle Future Space Explorers and Developers Society (ERFSEDS)

ERFSEDS achieved an important milestone in October 2022: the successful testing of rocket fuel that the student club made itself. Dubbed Project Prometheus, the initiative was 11 years in the making, and is just the start of what ERFSEDS hopes to achieve.

Next, the Project Prometheus team will test their fuel on larger motors, with the aim of assessing the manmade fuel's scalability. Their ultimate goal is to fly ERFSEDS rockets on their own in-house motors.

Embry-Riddle Orbital Research Association (ERORA)

ERORA currently has three ongoing projects: Project Hermes, Project Copernicus and Project SATLASS.

Project Hermes is a 1U CubeSat, named Radiation Orbital Shielding Investigation Satellite (ROSIsat), that will be researching radiation shielding with various materials including lunar regolith and Martian soil simulant. Project Copernicus is a 3U CubeSat that is still in the early stages of research and is currently determining its mission objective.

Project SATLASS started with the objective of designing a space station for in-situ satellite manufacturing. However, over the course of two years, the idea has been honed to a single dynamic CubeSat deployer. In Fall 2022, the team focused on the overall mechanical structure integration and the thrust system and concluded its first design iteration with a finalized structural configuration.

Experimental Jet Engine Propulsion (XJEP) Club

XJEP, the student club that exposes students to the field of jet propulsion, has grown considerably since its inception in 2020 — to a roster of 100 students in 2022. The group is currently working on two primary projects, supported through philanthropy, Student Government Association and College of Engineering funds.

The first is the design of a modular afterburner with noise abatement features and novel, low-loss fuel injection designs. Several hardware pieces have been successfully designed, fabricated and tested on a running engine, including a custom nozzle design.

The second project will enable XJEP to test the JetCat P200 at simulated forward airspeeds of up to 80 MPH. The group is also working on submitting conference papers and securing external funds.

Search and Rescue Club

The Search and Rescue Club was founded in 2022 with the mission of developing unmanned aerial vehicles (UAV) for search and rescue applications. With over 50 members, the club quickly set to work on several projects, including the development of a prototype UAV for testing and refinement. The club is now focusing on a new UAV project known as Project Red Tail.

Project Red Tail is being built with a specific purpose: to serve as a fully autonomous search and rescue tool. To achieve this goal, the club is using cutting-edge technology and materials, including a carbon fiber composite frame that will allow the UAV to be light and durable. The club expects that the UAV will be able to assist with a wide range of search and rescue missions, from locating missing persons to providing aid in the aftermath of natural disasters.

Embry-Riddle Secures the Highest Number of Patti Grace Smith Fellowships for the Second Year

Exemplifying Black excellence in aerospace, six Embry-Riddle students won 2022 Patti Grace Smith Fellowships, which is more than at any other university. These Fellowships set the students up with paid summer internships at respected space firms. The Daytona Beach Campus Aerospace Engineering recipients were:

- Madison Newbell, who interned at Masten Space Systems.
- Liam Johnson, who interned at Hawkeye 360.
- Maya Benson, who interned at SpaceX.
- Christian Reid, who interned at First Mode.

"The Patti Grace Smith Fellowship focuses on addressing matters of racial and ethnic equity and inclusion in the aerospace industry," said Dr. Brittany Davis, director of Embry-Riddle's Office of Prestigious Awards and Fellowships. "In addition to providing Black undergraduates with their first hands-on work experience at one of the nation's premiere aerospace firms, recipients are given two personal mentors to help them navigate their future career."

"My motivation is my mother," Johnson, one of the recipients, said, adding that he admires how his mother battled adversity her entire life to, first, emigrate to the United States, and then graduate in the top of her classes at both Harvard and the Mayo Clinic before becoming a dentist.

"My family reminds me that I can do better and that I need to work hard to bring the life I want to live, and the change I want to accomplish to fruition."

"I feel like the Patti Grace Smith Fellowship would allow me the opportunity to experience the best aspects of Aerospace Engineering and see all this profession has to offer," added Newbell, who is also chair of the Black Students Association. "After graduation, I would like to create something that one day will help to influence space exploration."

This story was originally written by Mike Cavaliere with Embry-Riddle's News Team.

Additional 2022 Honors

- Jarred Jordan was selected to join the Astronaut Scholarship program for the 2022-2023 academic school year. Jordan, who studies machine learning and computer vision applications for spacecraft, was previously named undergraduate researcher of the year by Embry-Riddle's Office of Undergraduate Research.
- Brennan McCann, a Ph.D. student who researches spacecraft guidance, navigation and control, has been accepted to the Planetary Science Summer School internship program. The development program is hosted by the NASA Jet Propulsion Laboratory and focuses on robotic space exploration missions.

Aerospace Engineering Students Awarded DoD SMART Scholarship

Aerospace Engineering graduate student Katharine Larsen was recently chosen to receive a U.S. Department of Defense (DoD) Science, Mathematics and Research for Transformation (SMART) Scholarship, which will cover her tuition in full and include an annual stipend.

The SMART scholarship is part of a highly competitive and prestigious scholarship-for-service program sponsored by the DoD. It recruits talented and innovative scientists, engineers and researchers, who then work within labs and agencies of the U.S. Army, Navy and Air Force.

John (Will) Sandor, an Aerospace Engineering undergraduate, also won a DoD SMART scholarship, as did Ph.D. student John Zelina.

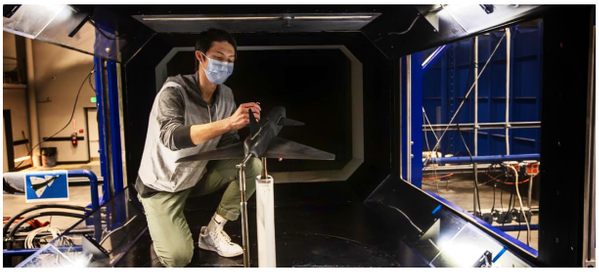
Zelina tried to keep an open mind when choosing his future career field: “I just wanted a career where I get to do challenging and interesting things,” said Zelina, who also earned his master’s from Embry-Riddle in Aeronautical and Astronautical Engineering.

So far, the approach is working. Zelina was recently awarded a DoD SMART scholarship with the Naval Surface Warfare Center (NSWC) in Panama City, Florida.

Zelina will apply his research — which focuses on developing adaptive control methods for systems that change over time, such as when fuel burn changes an aircraft’s weight — to problems of interest to NSWC, such as the control of autonomous underwater vehicles.

This story was originally written by Michaela Jarvis with Embry-Riddle’s News Team.

Nicholas Zhu Awarded Vertical Flight Foundation Scholarship



Ph.D. student Nicholas Zhu, who is conducting research on experimental aerodynamics in Embry-Riddle’s subsonic wind tunnel, was awarded a Vertical Flight Foundation Scholarship in 2022. The prestigious scholarship was given to 22 of the world’s most talented engineering students interested in vertical flight. This is the first-ever Vertical Flight Foundation Scholarship awarded to an Embry-Riddle student. Zhu is also a SMART Fellow.

Zhu’s research aims to better understand and eventually model ship aerodynamics. Navy ships, which are usually not streamlined, generate unsteadiness and turbulent airflow, Zhu said, making rotorcraft take-offs and landings extremely challenging on windy days.

This story was originally written by Melanie Azam with Embry-Riddle’s News Team.

Boeing Scholar Offers Tips to Help Students Thrive

With two internships under his belt and a Boeing Scholarship to his name, Embry-Riddle Aerospace Engineering senior Alijah McDonald is closer now than ever before to achieving his dream of working in the aerospace industry. He still remembers when he began his college career, however, and the nerves he felt in his first days.

In that spirit, McDonald offered advice to incoming college students:

Tip No. 1: Remember Why You're Here

McDonald grew up going to airshows, planetariums and robotics competitions, so he was excited to study aerospace engineering in college. Acclimating to a new environment and more rigorous courses, however, can be an adjustment for new students, he said.

"Sometimes you don't get it on the first try," said the Little River, South Carolina, native. "You have to work for it. Remember why you are here and keep going."

Tip No. 2: Focus on Your Strengths, Then Use Them to Contribute

When McDonald first became interested in flight, he decided to focus on the positives: what he excelled at and could bring to the aerospace industry.

"I have moderate to severe hearing loss, and I wear hearing aids in both ears, so I know there may be certain limitations on what I can do," he said. "I may not be able to be an astronaut or pilot because you have to meet certain medical requirements."

On his high school robotics team, however, he stood out as one of the few members who were highly skilled in programming and electronics. When he came to Embry-Riddle, he was able to bring those same technical strengths to the campus organizations he joined, such as the Embry-Riddle Future Space Explorers and Developers Society.

"Leadership has many different definitions, but, to me, it means building something that benefits yourself and the people around you," he said.

Tip No. 3: Get Hands-On Experience Outside the Classroom

For McDonald, Embry-Riddle's Rocket Laboratory became his refuge when he was not in class or studying.

"The rocket lab has given a lot of people a home and a family to work with," he said. "Everybody in that lab is passionate about spaceflight. I think it is a great place for people to come in and get project experience."

During the summer, McDonald sought internships to learn more about the aerospace industry, benefitting from the university's extensive network of global aerospace companies.

Last summer, he was a controls engineering intern with Rolls-Royce, for example, and this past summer, he was a guidance and controls engineering intern with The Boeing Company.

McDonald said his goal when he chose Embry-Riddle was to grow not only as an engineer but also as an individual — one who can make an impact. Looking back, he said he picked the right place.

"The experiences I've had at Embry-Riddle, the lifelong friendships I've made and the lessons I've learned are all worth it," he said.

This story was originally written by Melanie Azam with Embry-Riddle's News Team.

Dr. Lyrintzis and GAANN Fellow Nicholas Peters
Photo: Embry-Riddle/David Massey

Aerospace Engineering Ph.D. Program Gets $840,000 Boost From U.S. Department of Education

14 Aerospace Engineering doctoral students were recently supported with funds from an $840,000 GAANN (Graduate Assistance in Areas of National Need) grant, awarded by the U.S. Department of Education.

Thanks to grant programs like GAANN, students can weather difficult periods without interrupting their studies.

“Last year, the active volcano on my home island erupted, and my family was temporarily displaced and faced crippling expenses,” one Ph.D. student said. “Without the GAANN aid, I would not have had the financial support needed to continue my research and education. The funding enables me to become more knowledgeable in highly specialized areas, so I may one day apply my expertise in industry for the betterment of technology and our society as a whole.”

That sort of impact is attainable, Aerospace Engineering Department Chair Dr. Tasos Lyrintzis said, thanks to the Aerospace Engineering Department’s commitment to students.

“The GAANN program has had a tremendous impact because every single dollar goes directly to the students,” he said. “Embry-Riddle is not charging any overhead, and it is also contributing to the tuition and fees.”

Lyrintzis, who also serves as principal investigator on the grant — he secured the funding working alongside fellow Aerospace Engineering professors Drs. Marwan Al-Haik, William Engblom, Troy Henderson and J. Gordon Leishman — noted that the three-year program provides financial assistance to graduate students in need, as well as instructional training.

The $840,000 grant includes an additional $450,000 cost-share and is a continuation of a previous $650,000 award, which included an additional $350,000 cost-share.

GAANN fellows explore effective teaching techniques, gain hands-on experience with classroom instruction and observe experienced instructors. In the Aerospace Engineering department, this includes 34 faculty members who are distinguished in research and teaching.

This story was originally written by Mike Cavaliere with Embry-Riddle’s News Team.

Eagle Named to Aviation Week's 20 Twenties

Grace Robertson has always been one of the few women in the room throughout her training to become a space industry worker — and that makes sense, considering that women represent less than 12% of global aerospace engineers. But, she says, that's "just a statistic."

"As children, we dream of becoming firefighters, doctors or even rocket scientists," said the recent Aerospace Engineering alumna ('22, BSAE), who was named to Aviation Week Network's 20 Twenties Class of 2022. "It takes someone telling us we can't to convince us we shouldn't try. Sticking to your convictions and pursuing your goals despite those doubts is what makes dreams a reality."

Now, as one of only 20 people selected nationwide for Aviation Week's annual awards program, and working as a systems engineer on the Dream Chaser spaceplane at Sierra Space, in Colorado, she knows her years of dedication have paid off.

"If I can contribute to even a fraction of the greater vision of space exploration — or be the light that young women are looking for to shine on the image of themselves in the future — I've left my mark," she said. "Then everything I've done has been worth it."

This story was originally written by Mike Cavaliere with Embry-Riddle's News Team.

Artemis Connection

When America got its first good look at the Artemis 1 Moon mission, Scott Cieslak ('09, BSAE) was watching from the firing room in the launch control center at Kennedy Space Center.

Since 2019, Cieslak has played a pivotal role in authoring, reviewing and executing arms and umbilical mate procedures as an operations engineer in NASA's Launch Accessories Engineering Branch.

Growing up with car buffs, Cieslak often visited the Daytona International Speedway. As a sophomore, he added a side trip to the Embry-Riddle Daytona Beach Campus and liked the atmosphere. Living in Maryland, he was familiar with Goddard Space Flight Center, and he thought his strong math skills could lead to a career as a mechanical engineer. Learning more about Embry-Riddle refined that ambition to aerospace engineering.

While working on his aerospace engineering degree, Cieslak spent two semesters as a co-op student working for a shuttle contractor at Kennedy Space Center. "I was an operations engineer for the umbilicals for the shuttle. That was an introduction to working with a launch vehicle and real hardware and understanding to get a mission off the ground and bring it back safely, process it and turn around and support astronauts."

"The umbilicals are the last things to touch the vehicle before it goes into space, so their importance to the Artemis program can't be overstated," Cieslak added.

This story was originally written by Kim Sheeter with Embry-Riddle's Lift Magazine.

Other Alumni Happenings

- Justin Martin ('14, BSAE) served as a safety inspector for Blue Origin's New Shepherd flight NS-16 — the first human-rated space launch.
- Tyler Grinnell ('08, BSAE) visited campus in May as the university's latest Presidential Speaker. Grinnell discussed his unique career path and experiences working in the space industry.

FACULTY ROSTER

Marwan Al-Haik
Visiting Professor
Ph.D., Florida State University

Richard Anderson
Professor
Ph.D., University of Central Florida

Magdy Attia
Professor
Ph.D., Texas A&M University

Mark Balas
Visiting Distinguished Professor
Ph.D., University of Denver

Riccardo Bevilacqua
Professor
Ph.D., Universita degli Studi
di Roma La Sapienza

David Canales-Garcia
Assistant Professor
Ph.D., Purdue University

Hancheol Cho
Assistant Professor
Ph.D., University of Southern California

Kyle Collins
Research Assistant Professor & Interim
Director of Eagle Flight Research Center
Ph.D., Georgia Institute of Technology

K. Merve Dogan
Assistant Professor
Ph.D., University of South Florida

John Ekaterinaris
Distinguished Professor
Ph.D., Georgia Institute of Technology

William Engblom
Professor
Ph.D., University of Texas

Habib Eslami
Professor
Ph.D., Old Dominion University

Ebenezer Gnanamanickam
Associate Professor
Ph.D., Purdue University

Vladimir Golubev
Professor
Ph.D., University of Notre Dame

James Gregory
Professor & Dean of the College of Engineering
Ph.D., Purdue University

Glenn Greiner
Associate Professor
M.S., Embry-Riddle Aeronautical University

Kim Heinzer
Associate Professor
M.S., Embry-Riddle Aeronautical University

Troy Henderson
Associate Professor
& Honors Program Coordinator
Ph.D., Texas A&M University

Yizhou Jiang
Assistant Professor
Ph.D., University of Illinois-Chicago

Daewon Kim
Professor
Ph.D., Virginia Polytechnic Institute
& State University

Mandar Kulkarni
Assistant Professor
Ph.D., Virginia Polytechnic Institute
& State University

J. Gordon Leishman
Distinguished Professor
Ph.D., Glasgow University

T. Alan Lovell
Professor
Ph.D., Auburn University

Anastasios Lyrintzis
Distinguished Professor & Chair
Ph.D., Cornell University

Reda Mankbadi
Distinguished Professor
Ph.D., Brown University

Scott Martin
Professor
Ph.D., University of Washington

Alberto Mello
Associate Professor
Ph.D., University of Texas at Austin

Hever Moncayo
Associate Professor
& M.S. Program Coordinator
Ph.D., West Virginia University

Sirish Namilae
Professor & Ph.D. Program Coordinator
Ph.D., Florida State University

Lakshman Narayanaswami
Professor
Ph.D., Georgia Institute of Technology

Morad Nazari
Assistant Professor
Ph.D., New Mexico State University

Eric Perrell
Professor
Ph.D., North Carolina State University

Richard Prazenica
Associate Professor & Associate Chair
Ph.D., University of Florida

Frank Radosta
Professor
Ph.D., University of Florida

Mark Ricklick
Associate Professor
Ph.D., University of Central Florida

Dongeun Seo
Associate Professor
& BSAE Program Coordinator
Ph.D., University of Texas

Surabhi Singh
Assistant Professor
Ph.D., University of Florida

Jennifer Smith
Professor
Ph.D., Utah State University

David Sypeck
Professor
Ph.D., University of Virginia

Ali Yeilaghi Tamijani
Professor
Ph.D., Virginia Polytechnic Institute
& State University

Yi Zhao
Professor
Ph.D., Louisiana State University

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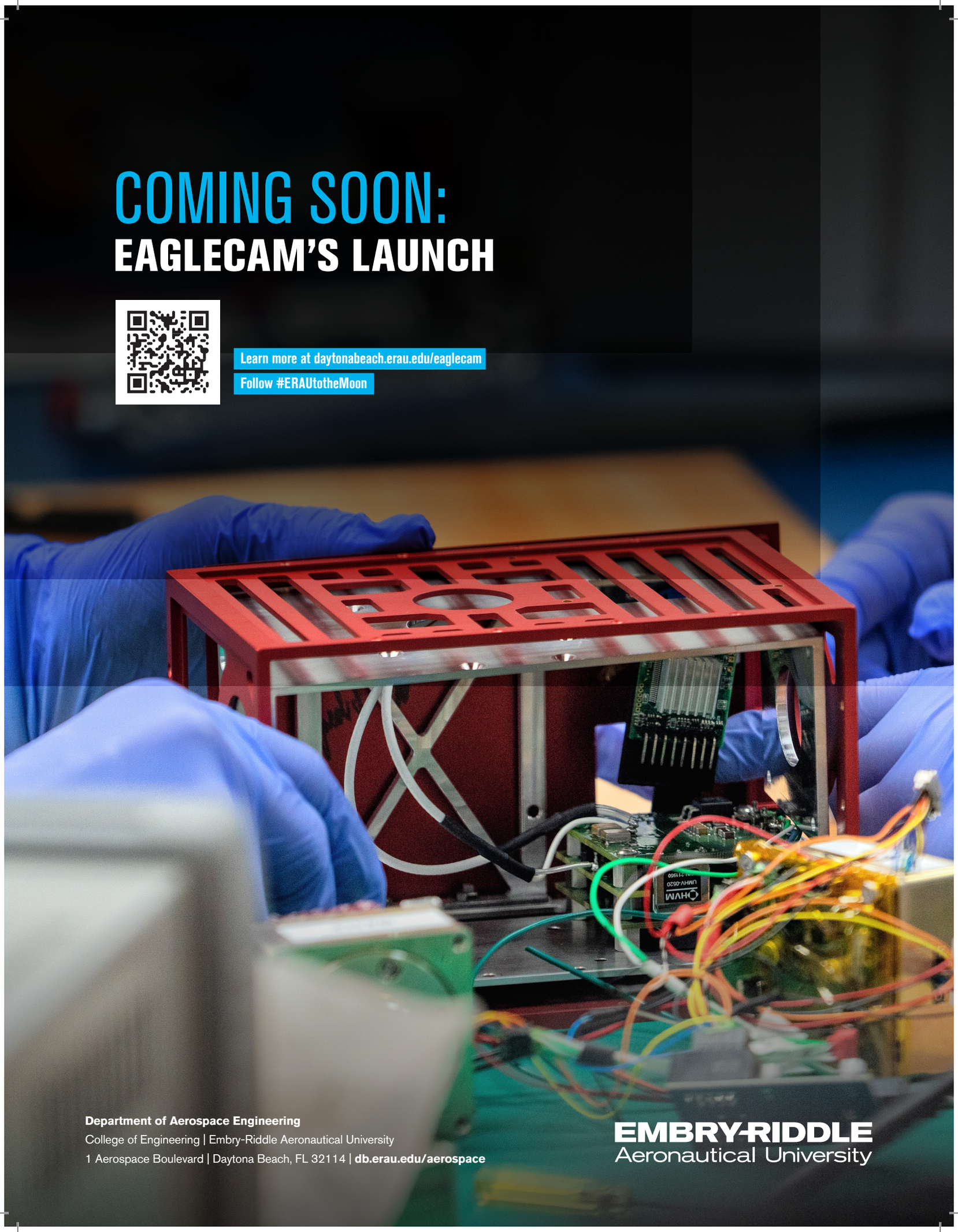

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