AEROSPACE ENGINEERING NEWS

A publication of the Department of Aerospace Engineering at Texas A&M University
AEROSPACE ENGINEERING

At A Glance

As a department within the Dwight Look College of Engineering, we are excited and proud to be among the top aerospace engineering programs in the United States providing unique cutting-edge educational and research opportunities, including space exploration, national defense, air transportation, communications and sustainable energy.

Our students are offered a modern curriculum that is balanced across the three principal disciplines of aerospace engineering: aerodynamics and propulsion, dynamics and control, and materials and structures. The program also benefits from strong connections to major aerospace industries, the Department of Defense and NASA.

US News & World Report Rankings

Rankings among public institutions

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Fall 2015 Enrollment

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Outstanding Faculty

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Degrees Awarded (AY 2013-2014)

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On the front:
AggieSat 4 satellite from Texas A&M University’s AggieSat Lab integrating with the Bevo-2 satellite from the Texas Spacecraft Laboratory at the University of Texas. With the satellites combined, the LONESTAR-2 payload is finally complete after years of hard work.

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Dear Aggie Aerospace Network,

Happy holidays!

The year 2015 has been a very special one in College Station.

First, we recognized the careful planning and hard work of the faculty, staff and administration that led to the ascension from a very humble beginning in 1940, with just two students graduating in 1944, to becoming one of the largest nationally-ranked programs in the United States. Student and faculty involvement in extracurricular aerospace activities is at an all time high, where designs included a robotic hummingbird, a 50-kg AggieSat4 that launched into space in early December, airplanes, high altitude balloons, sounding rockets, and a “flying pod” for the Space-X Hyperloop Competition round out the design efforts.

Second, the list of faculty and student accolades this year is simply remarkable. Notably, Professor Terry Alfriend was elected Honorary Fellow of the American Institute of Aeronautics and Astronautic. This is the top honor from our professional society, where 0.01 percent of the membership is elected each year. Dr. Alfriend also received the AIAA Guidance, Navigation and Controls Award. Professor Ramesh Talreja received the Scala Award, which is a prestigious World Fellow title from the International Committee on Composite Materials. A complete listing of awards is featured in the newsletter.

Third, as we wrap up the 75th anniversary celebrations, we are actively planning for the next 25 years by enhancing the educational experiences, creating new research laboratories and centers, acquiring more space in the Bright building, and strategic hiring of new faculty. For example, this year, Professor Robert Skelton joined our faculty. Skelton is a world leader in controls theory and flexible structures. He has worked on many important programs including SKYLAB and the Hubble Space Telescope. Skelton plans to establish an interdisciplinary center in cyber-physical systems, which is driven by federal goals for jobs creation.

Finally, I am grateful Mike Slack and the Advisory Board for its generosity in providing financial support to allow all of the graduating seniors to attend the 2015 Awards Banquet for free. The 2015 banquet was the largest and most attended on record. At the awards banquet, we recognize scholarship awardees, student awards, and former students inducted into the Aerospace Alumni Academy. This year, we hope to raise enough funds to extend the 2016 banquet attendance to both the junior and senior classes. We are also actively soliciting nominations for the Aerospace Alumni Academy (for more information and to nominate someone, see http://engineering.tamu.edu/aerospace/former-students/alumni-academy/nomination-procedure).

We hope that you enjoy reading about some of the aerospace highlights this year!

Rodney Bowersox
Professor and Department Head

Credits
Published by the Department of Aerospace Engineering in the Dwight Look College of Engineering at Texas A&M University to keep current and former students, industry and trade organizations, and friends of the department informed on the accomplishments and discoveries achieved by one of the nation’s most prominent departments of its kind.

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AggieSat4 heads to outer space
Safely packed in a custom foam box on board the Cygnus spacecraft for the OA-4 International Space Station cargo resupply mission, the AggieSat4 (AGS4), a satellite constructed by students from Texas A&M University’s AggieSat Laboratory, lifted off on December 6 to the International Space Station (ISS) with the Bevo-2 cubsat tucked safely inside. OA-4 launched from Space Launch Complex 41 at the Cape Canaveral Air Force Station in Florida.

Once aboard the ISS, it will be stowed by the crew until the tentative deployment date of Feb. 22. Prior to deployment, the satellite will be attached to the NASA JSC Space Station Integrated Kinetic Launcher for Orbital Payload Systems (SSIKLOPS) ejection system, developed for use on the JEM-EF robotic arm. The satellite will be launched from the Japanese airlock into outer space where, once in an independent orbital trajectory, Bevo-2, a satellite constructed by students from The University of Texas at Austin, will be released from AGS4. The two satellites will then interact with each other, transmitting information to a ground station at Texas A&M’s Riverside campus.

Aggiesat4 1 WebThe constructing of AGS4, a 50-kilogram satellite, was started in 2010 as the second mission of the Low Earth Orbiting Navigation Experiment for Spacecraft Testing Autonomous Rendezvous and Docking (LONESTAR) campaign. Sponsored by the Aerospace and Flight Mechanics Division (AFMD) at Johnson Space Center (JSC), Lonestar is a multi-year multi-mission collaborative program between Texas A&M’s AggieSat Lab and The University of Texas, with the purpose of developing autonomous rendezvous and docking (ARD) technologies.

ARD will be utilized in future exploration programs for unmanned cargo vehicles and in assembly of future space structures. Data from LONESTAR will have a direct impact on the development of that capability. For successful travel beyond low Earth orbit to the moon, Mars and beyond, the ability for two spacecraft to autonomously rendezvous and dock in space must be demonstrated. The use of small satellites such as AGS4 for research has become very popular because of tighter federal budgets and the availability of launch vehicles to transport them into space. Multiple satellites can be placed on one rocket and delivered into orbit. This allows new technologies to be tested without putting them on larger, much more expensive spacecraft.

“We’re using these small satellites to demonstrate that they can go up, they can maneuver around each other, they can dock and undock and they can pass information back and forth with the ground,” said Dr. Helen Reed, director of the AggieSat Lab and professor in the Department of Aerospace Engineering at Texas A&M.

LONESTAR is a low-cost, low-risk project designed to prove that ARD procedures can be performed successfully in space, and it provides NASA with actual flight data that is directly linked to the Space Technology Roadmap TA05 Communication and Navigation: Position, Navigation and Timing. It will provide invaluable flight data for the global positioning system (GPS) receiver, designed strictly for space applications, to demonstrate precision relative navigation and precision real-time navigation, as well as orbit determination.

Aggiesat And BevoAfter Bevo-2 is released from AGS4, the two satellites will track and videotape each other, passing

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information back and forth to calculate where they are. The focus of the experiment is to demonstrate three-axis attitude determination and control (within two degrees), collect DRAGON carrier phase GPS data, capture video of Bevo-2 release, compute and crosslink relative navigation solutions and track Bevo-2. Texas A&M students will be tracking and collecting this information at the Riverside ground station. The experiment will test the detachment and cross-linked communication protocols between the two satellites and the ground stations. Additionally, the flight serves as a technology demonstration platform for the relative navigation positioning and attitude control and translation systems.

“There will be some long nights where we’re out there as the satellite passes overhead collecting data down from our satellite,” said Reed.

The AGS4 project is entirely student staffed and run, with daily oversight from Reed, who serves as the primary contact with NASA. Graduate students lead, manage and participate in all decisions and activities, while a mix of undergraduate and graduate students from freshmen to Ph.D. candidates makes up the complete team.

“We invite anybody on campus who has an interest in space to join us, independent of what their major is,” said Reed. “They don’t have to be engineers. The only requirement is that they be U.S. citizens, per federal law.”

A small satellite, from concept to launch, can be done in the order of three to four years, so it fits very neatly into the average student’s timeline while they are at the university.

Each incremental stage in the LONESTAR project benefits NASA by increasing the agency’s knowledge of a currently emerging field where rapid development and cost-effective projects are a major focus. For future projects, they will take the technologies they have demonstrated in the past projects and build on their complexities for the next satellite to send into orbit. The goal of getting small satellites to mate with larger objects in space opens all sorts of possibilities, among them: on-orbit servicing of dead satellites in space, objects coming together to make larger habitats in space, as well as affixing to a piece of space junk and de-orbiting it out of harms’ way.

“Doing things autonomously with small missions is going to be especially important as we venture as humans out into the solar system and do these same kinds of tasks: building larger structures, building habitats, collecting information, transmitting it back to Earth, things like this,” said Reed. “These small satellites are really going to be game changers in our space mission.”

About AggieSat Lab
AggieSat Lab, founded by Dr. Helen Reed, is a student satellite program housed within the Department of Aerospace Engineering at Texas A&M University. The goal of the lab is to develop and demonstrate modern technologies by using a small satellite platform, while educating students and enriching the undergraduate experience. The lab takes an integrated approach to small spacecraft research, design-build-fly and education for multidisciplinary teams of freshmen through graduate students, along with industry and government affiliates. Students are responsible for the design process from concept to end-of-mission. Students simultaneously pursue degrees and participate in a business environment with real-world deliverables, quality-assurance checks, documentation, design and safety reviews, and organization. The goal is for students to gain hands-on mastery in current tools, systems engineering, and industry practices related to specification, design, analysis, fabrication and testing of space vehicle systems, while actively applying and extending complementary concepts taught in classes and making critical decisions. The context for this program is in advancing small real satellites, yet the skill set learned is applicable to a wide variety of disciplines and industries.
On December 5, the Aerial International Robotic Racing of Unmanned Systems (AIRUS) took place at Texas A&M University and The University of Sydney in Australia where teams were able to successfully demonstrate remote piloting of an unmanned aerial vehicle (UAV, also known as a quadrotor, or sometimes a drone) over 8000 miles away.

Pilots in Texas could use a joystick to control the UAV in Australia, while at the same time pilots in Sydney could control the UAV in Texas. A camera mounted on the front of the UAV captured video which was sent over the internet to the pilot on the other side of the world.

The top pilots achieved an international landing. They controlled the sideways movement to bring the UAV down to land on a small target. Additionally, everyone in attendance at the event had the opportunity to become an international pilot: controlling the spinning motion (yaw) of the UAV, and appreciate the difficulty of dealing with the half second delay through the international communications. Despite this delay, it is believed to be the lowest latency (delay) achieved for controlling an aircraft internationally.

Having successfully demonstrated the international piloting, AIRUS members have applied for a World Record of the Longest Distance Remote Piloting of a UAV, which is now pending assessment.

At the Texas event there was also a showcase of UAVs, with students in attendance given the opportunity to test their skills in a race of small UAVs. This first successful event is a stepping stone to the full plans for AIRUS: to involve many more universities around the world, each having local pilots controlling, and racing UAVs at the different international locations.

The immediate plans for the coming year are to further develop the control systems to grant the international pilot a higher level of control, to build towards being able to race the UAV around an obstacle course on the other side of the world. This work also will lead to research on enhancing long distance remote control of aircraft and robotics at both universities.
Texas A&M receives $1.5 million NSF-DMREF grant

Six faculty members in the Dwight Look College of Engineering at Texas A&M University have received a $1.5 million grant from the National Science Foundation’s (NSF) Designing Materials to Revolutionize and Engineer our Future (DMREF) program to speed up the development and application of high temperature shape memory alloys (HTMAs).

The project, “DMREF: Accelerating the Development of Phase-Transforming Heterogeneous Materials: Application to High Temperature Shape Memory Alloys,” is led by Dr. Raymundo Arróyave, associate professor in the Department of Materials Science and Engineering.

Collaborators on the project include: Dr. Ibrahim Karaman, head and Chevron Professor I in materials science and engineering; Dr. Amine Benzerga, associate professor in aerospace engineering; Dr. Dimitris Lagoudas, John and Bea Slattery Chair Professor and senior associate dean for research in aerospace engineering; Dr. Theocharis Baxevanis, TEES assistant research professor in aerospace engineering, and Dr. Edward R. Dougherty, Robert M. Kennedy ’26 Chair and distinguished professor in electrical and computer engineering.

The NSF, in support of the multi-agency federal Materials Genome Initiative (MGI), seeks to target one of the primary MGI goals — to halve the current time and cost for transitioning breakthroughs from the laboratory to the marketplace — a process that can take as long as two decades.

Texas A&M’s project attempts to accelerate the development of HTSMAs for compact and efficient solid-state actuation devices with applications in the aerospace and automotive industry. It combines ideas from informatics and design with experimental and computational materials science.

Vadali receives Mechanics and Control of Flight Award

Dr. Srinivas Rao Vadali was awarded the Mechanics and Flight Control Award, the highest award given by the American Institute of Aeronautics and Astronautics. This award, presented for an outstanding recent technical or scientific contribution by an individual in the mechanics, guidance or control of flight in space or the atmosphere, honors Vadali for his lasting contribution to the understanding of the relative motion of satellite formations and the control of this relative motion. The award will be presented during the AIAA Science and Technology (SCITECH) Forum in January.

Vadali is a professor in the Department of Aerospace Engineering at Texas A&M University. He has more than 30 years of academic teaching and research experience. His current research interests are focused on spacecraft relative motion and formation flying. He is a co-author of the book Spacecraft Formation Flying: Dynamics, Control and Navigation. He has served as an Associate Editor of the AIAA Journal of Guidance, Control, and Dynamics and is currently an Associate Editor of the International Journal of Aerospace Engineering. He is a Fellow of the AAS and an AIAA Associate Fellow.
Research conducted in the Advanced Vertical Flight Laboratory (AVFL) at Texas A&M University was featured in the recent IEEE Spectrum online magazine.

The project highlighted was the robotic hummingbird being developed by graduate student David Coleman and Mobile Benedict, an assistant professor in the Department of Aerospace Engineering.

The hummingbird robot is capable of controlled, hovering flight, and does so via a custom-developed ultra-light autopilot with an on-board microprocessor and IMU. Employing a set of light-weight actuators, the vehicle is able to modulate the flapping wing kinematics in order to stabilize itself. This is the second hover-capable two-winged flapping-wing platform ever built; the other one being the DARPA funded Nano-Hummingbird developed by Aerovironment in 2011.

The project results have been presented at several regional and national level conferences with good peer reception. Research at the AVFL is focused on next-generation hover-capable UAVs, particularly small-scale cycloidal-rotor and flapping-wing based vehicles.


Benedict wins 2015 DURIP grant

Dr. Mobile Benedict, assistant professor in the Department of Aerospace Engineering at Texas A&M University, has received a 2015 Defense University Research Instrumentation Program (DURIP) grant from the Army Research Office for his proposal titled “Instrumentation for Performance, Blade-Loads and Flowfield Measurement of Novel Hover-Capable Meso-Scale Aerial Platforms”. Benedict directs the recently founded Advanced Vertical Flight Lab (AVFL), which focuses on the development of the next generation of vertical take-off and landing capable aircraft concepts.

This grant will provide $110,000 towards the development of a state-of-the-art micro air vehicle test facility at AVFL. This fully instrumented facility will be capable of measuring not only the fixed-frame hub loads, but also the blade airloads/surface pressure distribution in the rotating frame and the unsteady flowfield.

The test rig will be designed to have the resolution and bandwidth to accurately measure low-magnitude/high-frequency airloads and also resolve highly unsteady/vortex-dominated velocity field, which are typical of these small-scale hovering concepts such as cycloidal rotors and flapping wings. Once developed, the facility will be a significant step in the direction toward the development of next-generation meso-scale hover-capable aerial robotic platforms for Army and Department of Defense applications.
Texas A&M hosts fourth IIMEC Summer School on Computational Materials Science Across Scales

Scholars and graduate students from institutions across Europe, North Africa, the Middle East and North America attended the fourth International Institute on Multifunctional Materials for Energy Conversion (IIMEC) School on Computational Materials Science Across Scales at Texas A&M University in July.

IIMEC is a National Science Foundation-funded International Material Institute, established at Texas A&M, in partnership with Georgia Institute of Technology, the University of Houston and international research collaborators at universities in North Africa, the Middle East and Mediterranean countries.

The summer school served as part of IIMEC’s mission to provide students and faculty from the United States and participating countries with global research and international leadership experience.

Dr. Amine Benzerga, associate professor in the Department of Aerospace Engineering, and Dr. Raymundo Arróyave, associate professor in the Department of Materials Science, jointly organized the summer school with the support of the Dwight Look College of Engineering, the College of Science and the Office of the Associate Vice Chancellor for Engineering Research.

The school boasted instructors from Texas A&M, Georgia Tech, National Institutes for Standards and Technology, Los Alamos National Laboratories, Lawrence Livermore National Laboratory, Pierre and Marie Curie University (France), Arts et Métiers ParisTech (France), University of Cambridge (England) and The University of Duisburg-Essen (Germany).

Summer school participants included students from more than a dozen institutions, including six of the top universities in the United States, as well as universities and research institutes in Mexico, France, Greece, the United Kingdom, Egypt and Saudi Arabia.

Over a period of 10 days, students were exposed to theory and practice sessions focused on different computational materials simulation tools, ranging from continuum to the electronic structure level. Hands-on computational laboratory activities were part of the class structure.

Students had access to Linux Cluster consisting of several hundred nodes/cores. State-of-the-art computational codes such as VASP, ABAQUS, LAMMPS, ParaDis, MatCalc, VPSC and MATLAB were used to illustrate the concepts covered in the school. Software and hardware infrastructure was facilitated by Dr. Lisa Perez, manager of the Laboratory of Molecular Simulation under Dr. Michael B. Hall, executive associate dean of the College of Science and professor of chemistry.
The International Space Station (ISS) will soon be printing a 3-D design created by Stellarponics, a student team that placed first in the most recent Aggies Invent competition. The winning team created an innovative hydroponic system to allow fruits and vegetables to be grown more efficiently and sustainably in space.

Stellarponics Copy 2Aggies Invent is a unique and innovative competition that allows students the opportunity to produce and “sell” a creative solution to a proposed problem within 48 hours. This intensive, hands-on experience is held in the Engineering Innovation Center (EIC) within the Dwight Look College of Engineering at Texas A&M University.

The competition is organized into four main stages: team formation, design conceptualizing, prototyping and fabrication, and presentations. The goal of this format is to help students become successful innovators, communicators and entrepreneurs in their fields.

This Aggies Invent competition focused on 3-D printing in space. Using 3-D printers in space is revolutionizing how engineers are thinking about prototypes, manufacturing and preparing for space missions. Teams were tasked with solving problems for ISS crews and long-term space missions. Needs statements for tool development, biomedical applications, crew enhancement and space station components were given to each team.

Sabre Astronautics, NASA, the Department of Aerospace Engineering and others provided the needs statements. During the event teams generated more than 150 3-D print jobs representing over 500 individual parts during the almost 30 hour prototype phase.

Industry mentors and judges were present to guide the students in their design and share real world experience. Three former astronauts, Dr. Joe Kerwin, Ken Bowersox and Dr. Greg Chamitoff, were among the mentors. The feedback from mentors pushes students toward success and expands their knowledge base.

“The opportunity to talk with heroes in our field and hear stories from space made this event special,” said Katie Schneider, a sophomore in mechanical engineering.

Other students echoed that sentiment saying that the presence of astronauts and leaders in the aerospace industry stood out as the highlight of this Aggies Invent.

The first place team, Stellarponics, consisted of Cade Capps, Sneha Chawla, Wesley Kuehn, JC Park, Joseph Valencia and Reynaldo Villarreal. Team Direct to Mars, Gilberto Arizpe, Iskander El Amri, Carlos Mejia, Milan Pandya, Mack Ragland and Fuhna Song, came in second place and SpaceSip, Bryan Carlat, Julio Gonzalez, Evan Gonzalez, Alex Jennings, Nathaniel Peirson and Victor Trujillo Jr, came in third place. The top three teams received awards of $1,000, $750 and $500, respectively.

Fifty-eight students, making up 10 multidisciplinary teams, participated in the competition. The students ranged from freshman to graduate students and came from 14 different majors.

More information on Aggies Invent can be found at engineering.tamu.edu/aggiesinvent.

The Department of Aerospace Engineering is ranked eighth in undergraduate programs among public institutions and fifth in graduate programs.
The Zero Robotics (ZR) Middle School Summer Program, a programming competition where SPHERES satellites (robots) inside the ISS are controlled by programs developed by students, held its final competition on board the International Space Station (ISS) at the Johnson Space Center in August.

The Texas A&M Engineering Experiment Station (TEES), Texas A&M University’s Dwight Look College of Engineering, the Department of Aerospace Engineering at Texas A&M, the Texas Partnership for Out of School Time and NASA’s Johnson Space Center were the statewide sponsors for this second year of participation in the state of Texas. Dr. Greg Chamitoff and Dr. David Hyland, from the aerospace department, were co-directors of the statewide program and Katharine Leysath, from the Educational Outreach Programs office, was the statewide program manager.

The ZR Middle School Program is a five-week program with curriculum designed for students to participate approximately 15 hours per week. The program is designed to engage students in science, technology, engineering and mathematics (STEM) through the ZR game and to make clear connections between STEM and space science.

“Zero Robotics is a fantastic education program,” said Benjamin Morrell, lead student mentor for the program. “Over five weeks in summer, the students not only learn a critical skill of how to program and get to program a space robot, they learn about space science, physics, engineering, teamwork, collaboration and problem solving. All while having a fun time.”

This year’s competition was CORONA SPHERES — Conducting Research on Nearby Asteroids (CORONA) utilizing the Synchronized Position Hold Engage Reorient Experimental Satellites (SPHERES). The mission was to use a robotic satellite to take pictures of points of interest on an asteroid. Students wrote code for the robotic satellite to collect and upload as many new pictures as possible while avoiding effects of solar flares.

“The SPHERES robots are advanced research tools on board the International Space Station, a beacon of human achievement and international collaboration that is an incredible, one-of-a-kind facility, and Texas middle school students get to control these robots,” said Morrell.

The MIT Space Systems Laboratory, in conjunction with NASA, DARPA, and Aurora Flight Sciences, developed and operates the SPHERES system to provide a safe and reusable zero gravity platform to test sensor, control and autonomy technologies for use in satellites. There are currently three SPHERES satellites onboard the ISS, capable of rotation and translation in all directions. SPHERES is the only free floating experiment onboard the station, and is used by a range of guest scientists and engineers, including Texas A&M, for experiments that require three dimension unconstrained by gravity.

Texas, one of 11 states invited to join the program, has seven teams participating from regions across the state: Indian Spring Middle School (Waco); YMCA of Greater San Antonio; Boys and Girls Club of Edinburg; Boys and Girls Club of McAllen; Spillane Math and Science Club (Cypress-Fairbanks); Houston Museum of African American Culture; and Bread of Life, INC (Houston).

Over the course of the five weeks, students honed their programs and competed against each other to come up with a final winning team from Texas. From there, all of the teams worked together to refine the final code that was used during the competition.

During the event at Johnson Space Center, the Texas teams communicated live with the astronauts on the ISS and watched the combined Texas code control the robots on the ISS in microgravity, competing against other states codes.

Zero Robotics seeks to inspire the next generation of great minds by allowing them unprecedented access to space at the high school and middle school level. By making the benefits and resources of the space program tangible to students, Zero Robotics aims to cultivate an appreciation of science, technology, engineering and math through healthy, immersive, collaborative competition.
 Cadigan first Aggie to participate in Stanford’s U.S.-Russia Forum

Maura Cadigan, a third-year aerospace engineering honors student, recently became the first Aggie to participate in Stanford University’s U.S.-Russia Forum — a program that aims to bring together the brightest students in the U.S. and Russia to collaborate on research.

The Baton Rouge, Louisiana, native said she almost didn’t apply when she looked at the accomplishments of past delegates. “It was pretty intimidating,” she said, adding that many former delegates attended Ivy League schools or elite technical institutions. “I just thought, ‘Oh, that’s not me.’ I decided to apply anyway.” Her decision paid off. According to the program’s website, 40 students were selected from 550 applicants from 157 universities in 37 countries.

On Sept. 4, Cadigan departed for Russia, where she met the other delegates in the program. The students were split into 10 groups, with four people on each team — two Americans and two Russians.

The delegates spent half the week in Moscow, Russia’s capital, and half the week in Tyumen, Siberia. The purpose of the trip, she said, was to meet their mentors. For Cadigan’s group, the mentors were representatives from Boeing Russia. Her group was tasked with researching efficient ways for Russian aviation manufacturers to break into emerging markets. “They used to have a strong aviation industry, but when the Soviet Union collapsed, everything collapsed,” she said. “There’s a lot of prestige that goes into having an international carrier.”

One emerging market they are researching is China. “China has a rapidly developing middle class, so their plan is to break into the Chinese market,” she said.

Over the next eight months, Cadigan’s group will be researching China’s needs based on their routes, the airline specifications and technology needed on the planes. They will be using Skype and other messaging technologies to interact with their Russian teammates. In April, all of the delegates will present their research at Stanford University.

Cadigan said the experience was rewarding. “It’s really exciting,” she said. “You get to meet a lot of really cool people and do really awesome work.” Cadigan said ultimately her career goal is to launch rockets into space. “I think that, as far as careers go, it’s a pretty important one,” she said. “Space really is the final frontier.”

Bertagne takes second place in SPIE/ASME Student Paper Competition

Christopher Bertagne, a graduate student in the Department of Aerospace Engineering at Texas A&M University, working under the advisement of Dr. Darren Hartl and Dr. John Whitcomb, was awarded second place in the SPIE/ASME 2015 Student Paper Competition. The International Society for Optics and Photonics (SPIE), held its 22nd international symposium on smart structures and materials and nondestructive evaluation and health monitoring (SPIE Smart Structures/NDE) in March. The conference generally averages 800 to 900 attendees, most of them authors/presenters.

The paper, “Simulating Coupled Thermal-Mechanical Interactions in Morphing Radiators,” was presented at the conference in San Diego. Nearly 60 papers were submitted from around the world for this year’s student paper competition. Bertagne’s second-place prize included a certificate and $300. The first and third place prizes went to students from Georgia Tech and Princeton, respectively.

“Considering that Chris has only been in graduate school for a year, his performance in this venue was truly impressive,” said Hartl. “He certainly held his own against a number of more senior Ph.D. students.”

Bertagne’s research is sponsored by a NASA Space Technical Research Fellowship (NSTRF) and involves the development of high-performance radiators that utilize shape memory alloys (SMAs) to change shape. Radiators such as these have applications in future space missions, particularly long-term crewed missions.
Graduate student receives NSF Graduate Research Fellowship

William Scholten ’14, a graduate student in the Department of Aerospace Engineering at Texas A&M University, has received the National Science Foundation Graduate Research Fellowship Program (NSF GRFP). The NSF GRFP is a highly competitive fellowship awarded to students pursuing master’s and doctoral degrees in NSF-supported fields of science, mathematics, and engineering. The fellowship lasts for three years, pays for awardees’ tuition and fees, and provides a monthly stipend.

Scholten received his undergraduate degree in aerospace engineering from Texas A&M in December 2014, and has been doing research with Dr. Darren Hartl (research professor at Texas A&M) and Dr. Travis Turner (researcher at NASA Langley) for the past two years as an undergraduate. Scholten is now a graduate student and is co-advised by Dr. Thomas Strganac (professor at Texas A&M).

His current research focuses on the development of a new shape memory alloy (SMA) implementation for aircraft noise reduction. The leading edge slat device of transport aircraft is a significant source of airframe in the vicinity of airports. The proposed solution, developed by researchers at both Texas A&M and NASA-Langley, is the concept of the slat-cove filler (SCF), which reduces aeroacoustic noise by removing the cavity between the main wing and slat. Currently, the team is looking into different methods of active SCF retraction and is studying its interaction will the flow field during take-off and landing.

Aerospace students win at regional AIAA Conference

Three students from the Department of Aerospace Engineering at Texas A&M University presented and won awards at the AIAA Region IV Student Conference. There were 20 presentations in various categories.

David Coleman won first place in the graduate category for his paper and presentation, “On the Development of a Robotic Hummingbird.” Coleman works under the guidance of Assistant Professor Dr. Moble Benedict on developing a biologically inspired hummingbird capable of controlled, hovering flight. Coleman will receive a $500 cash prize. Benedict works on next-generation hover-capable UAVs, and heads the recently founded Advanced Vertical Flight Laboratory in the aerospace department.

Alejandro Azocar won first place in the undergraduate category. Azocar will receive a $500 cash prize. Azocar’s presentation was on “Preliminary Evaluation of an Electromyographically Controlled Quadrotor (Undergraduate Technical Category).” The OpenBCI system was used to record electromyographic (EMG) signals — electrical activity produced by muscles — in order to control the thrust of a high fidelity quadrotor simulation. Although the quadrotor simulation was controlled using individual eye winks, the ultimate goal of this project is to use electroencephalography (EEG) to control and fly a real quadrotor using only one’s thoughts.

Mauricio Coen won first place in the community outreach category and second place in the undergraduate category. He will receive a $200 cash prize for the outreach category and a $300 prize for the undergraduate category. Coen’s presentations were on “Recovery of an Uncontrolled, Asymmetric Spacecraft with Limited Control,” (undergraduate technical) and “Bringing Zero Robotics to Texas,” (community outreach)

Coen’s presentation in the community outreach category was inspired by the recent movie Interstellar, where a novel failure scenario is examined using accurate dynamics and control systems. This gives insight into future space vehicle contingency operations and ways to design them with failure mitigation in mind.

Coen’s community outreach presentation focused on a Zero Robotics Middle School Competition that was brought to Texas for the first time in the summer of 2014 with the help of the ASTRO Center, the Department of Aerospace Engineering, and Engineering Academic and Student Affairs. The presentation highlights this effort, the mentoring experience provided by undergraduate students at Texas A&M, and benefits of the competition to middle schools around Texas.

The three students will travel to the 2016 AIAA Science and Technology Forum and Exposition (SciTech) in San Diego courtesy of AIAA due to their achievements in the student conference. They will present their papers at the International Student Conference.
Aerospace undergraduate student receives awards

Alejandro Azocar, an undergraduate student in the Department of Aerospace Engineering at Texas A&M University, received the 2015 Ammon Andes National Award from Sigma Gamma Tau (SGT), the national aerospace engineering honor society. In addition, Azocar was awarded the National Science Foundation Graduate Research Fellowship.

A memorial to the late University of Kansas administrator and longtime SGT executive secretary-treasurer, the Andes award is presented annually to one outstanding student for exceptional academic achievement and participation in extracurricular activities.

This prestigious award honors Azocar as the top outstanding aerospace engineering student in the United States, based upon his academic, service and extracurricular accomplishments. The honorarium is in the form of a check for $750 and a plaque documenting his award. In addition, a brass nameplate will be installed on the department’s Sigma Gamma Tau Award perpetual plaque.

The Sigma Gamma Tau undergraduate awards serve to select outstanding aerospace engineering students at both the regional and national levels, to recognize the accomplishments of these young students as they start their professional careers. Texas A&M is a member of the Southwest Region, which also includes the University of Oklahoma, Oklahoma State University, the University of Texas at Arlington, and the University of Texas at Austin. The Texas A&M University chapter leads the country with the most national winners, six in total. The national winners are designated as the top aerospace engineering senior in the United States for that year. The most recent Texas A&M national winners were Joseph E. Bishop (1989), John Michael Fife (1992) Justin Wilkerson (2009) and Kristin Nichols (2013).

The NSF Graduate Research Fellowship Program recognizes and supports outstanding graduate students in NSF-supported science, technology, engineering, and mathematics disciplines who are pursuing research-based Master’s and doctoral degrees at accredited United States institutions. He conducted research as a freshmen with Dr. John Hurtado in the Land, Air, and Space Robotics Lab. As a junior he worked with Dr. John Valasek in the Vehicle Systems and Control Lab, and this year he conducted research with Dr. Aaron Ames in mechanical engineering. He also spent five terms as a co-op at NASA Johnson Space Center.

Azocar graduated in May and will continue his studies pursuing a Ph.D. in biomedical engineering at Northwestern University. He will be working at the Rehabilitation Institute of Chicago with a research focus on either bionics or brain-machine interfaces. He hopes to develop prosthetic arms, legs, and exoskeletons that can be robustly controlled using

Engineering students part of team that wins award for excellence

A team of three undergraduates, including two from the Dwight Look College of Engineering at Texas A&M University, won the “Deep Space, Deep Ocean Student Award for Excellence,” for its research poster at the Deep Space, Deep Ocean forum hosted by Aramco.

The Texas A&M team, organized by the Student Chapter of the Society for Underwater Technology (SUT), was composed of aerospace engineering student Farid Saemi, ocean engineering student Carson Pepper and geography student Matthew Ballard.

The team’s poster was titled “Improving Remote Operations: Intuitive Controls and Rover Automation,” and the team was awarded certificates and $2,500.

“Attending the forum was a great experience,” said Saemi, who was the team leader. “Through the lectures guided by industry experts, we learned about the technical similarities both industries face in designing reliable systems for extreme environments.”

The team was mentored by SUT student members Weston Gallo (mechanical engineering), Natalie Zielinski (oceanography) and SUT faculty advisor Dr. Zenon Medina-Cetina from the Department of Civil Engineering at Texas A&M.

The Deep Space, Deep Ocean forum, provided a platform for participants to go on a “deep dive” to analyze similar operational challenges between the two industries then set the stage to solve these challenges through technology collaboration.
Dr. Ramesh Talreja, professor in the Department of Aerospace Engineering at Texas A&M University, has been named the 2013 winner of the Scala Award by the executive council of the International Committee on Composite Materials (ICCM). With the award comes the privilege of using the title World Fellow of ICCM.

The council meets every two years during the ICCM conference. Talreja was elected to receive the Scala Award during the 19th conference in 2013, and received the award at the 20th conference in Copenhagen, Denmark, in July. Talreja was invited to deliver the opening plenary lecture (the Scala Award lecture), which was titled “Integration of Manufacturing and Failure Analyses for Sustainable Design of Composites.” More than 1,800 delegates from 55 countries attended the ICCM conference.

The designation of World Fellow is an award given by the ICCM in recognition of one or more of the following: (1) an outstanding contribution to the field of composite materials through research and/or industrial development; (2) international recognition and contribution to the work of ICCM; and (3) other contributions to the field, e.g., through education, contributions to other major conference series, development of standards/design codes, editorial work, etc. World Fellows are designated as life members. Further, at every ICCM since 2005, the outstanding contribution of one individual to the field is recognized through the Scala Award, which carries with it the designation of World Fellow.

“I am humbled by this honor. I did not apply for it and had no inkling I was being considered,” said Talreja. He has been with the department for more than 14 years, serving as department head from 2001-2003. His current interests are cost-effective manufacturing of composites through engineering of defects.

Banks recognizes Faculty Award winners

Dr. M. Katherine Banks, vice chancellor and dean of engineering and director of the Texas A&M Engineering Experiment Station (TEES) recognized Faculty and Staff Award winners during the 2015 Faculty and Staff Awards banquet.

“IBelieve that excellence should be recognized and rewarded,” said Banks. “This year 50 faculty and 17 staff members were honored for their contributions, their passion and commitment to elevating our programs.”

Faculty awards were given to the following aerospace faculty:

**College of Engineering Teaching Awards**

Instructional Faculty Teaching Award - Dr. Kristi Shryock

**College of Engineering Contribution Awards**

William Keeler Memorial Award - Dr. Daniele Mortari

TEES Young Faculty Fellow - Dr. Diego Donzis

TEES Senior Fellow - Dr. Sharath Girimaji

Association of Former Students

College Level Distinguished Teaching Award - Dr. Sharath Girimaji

Herbert H. Richardson Faculty Fellow - Dr. Daniele Mortari

William O. and Montine P. Head Faculty Fellow - Dr. Amine Benzerga
FACULTY ACHIEVEMENTS

Bhattacharya awarded AFOSR grant to improve space situational awareness

Dr. Raktim Bhattacharya, associate professor in the Department of Aerospace Engineering and director of the Laboratory for Uncertainty Quantification at Texas A&M University, has received a $670,000 grant from the Air Force Office of Scientific Research to develop new algorithms for space situational awareness. The grant covers a three-year time period. Space situational awareness (SSA) refers to the ability to view, understand and predict the physical location of natural and manmade objects in orbit around the Earth, with the objective of avoiding collisions. As space becomes more congested, maintaining a timely and accurate picture of space activities becomes both more important and difficult.

In this research, titled Cloud Computing Based Robust Space Situational Awareness, Bhattacharya, along with Co-PI Dr. Bani Mallick, distinguished professor from the Department of Statistics of Texas A&M, will develop new algorithms for accurate uncertainty propagation in nonlinear manifolds, and nonlinear non-Gaussian state estimation of satellite characteristics for more accurate prediction of possible collisions. The research will incorporate real-time streaming data from geographically-dispersed satellite observatories, and national astrodynamic databases such as JGM-2, NEOS, USNO, IERS, NOAA, JPL, Goddard Flight Center, and NIMA, which provides real-time updates on various physical parameters necessary to model the astrodynamics forces acting on space objects. This research will also address challenges in real-time computing with large-scale geographically distributed data sets.

For more information about Bhattacharya’s research visit the Laboratory for Uncertainty Quantification website at http://uq.tamu.edu/.

Donzis keynote speaker at Rocky Mountain Fluid Mechanics Research Symposium

Dr. Diego Donzis, associate professor in the Department of Aerospace Engineering at Texas A&M University, was the keynote speaker at the first annual Rocky Mountain Fluid Mechanics Research Symposium held in Boulder, Colorado. Donzis spoke on extreme events in turbulence: scaling and direct numerical simulations.

The symposium brought together students, faculty and professional researchers with a common interest in fluid mechanics. The primary purpose of the symposium was to provide student researchers along the Colorado Front Range the opportunity to present and discuss their work.

Donzis has been with the department since 2009 and his research interests include large-scale, high-performance computing, fluid dynamics, turbulence and turbulent mixing. He received his bachelor’s degree in aeronautical engineering from Universidad Tecnologica Nacional, Argentina in 2001, his master’s degree in aerospace engineering from Georgia Institute of Technology in 2004 and Ph.D. in aerospace engineering from Georgia Institute of Technology in 2007. He has received the Francois Frenkiel award, the NSF CAREER award, two TEES Select Young Faculty awards, two INCITE awards by DOE and best graduates from Argentina by the National Academy of Engineering of Argentina.
Hurtado selected for SEC Academic Leadership Program

Dr. John Hurtado, professor in the Department of Aerospace Engineering at Texas A&M University and senior director for interdisciplinary engineering programs, has been selected by the Southeastern Conference (SEC) to participate in the SECU Academic Leadership Program (ALDP) for 2015-16.

SECU is the academic initiative of the SEC and serves as the primary mechanism through which collaborative academic endeavors and achievement of SEC universities are promoted and advanced.

Hurtado is one of four professors from Texas A&M selected to participate in the ALDP, joining Ginger E. Carney from the College of Science, Violet Showers from the College of Liberal Arts and Kathleen L. Kavanagh from the College of Agriculture and Life Sciences.

Using its SECU academic initiative, the SEC sponsors, supports and promotes collaborative higher education programs and activities involving administrators, faculty and students at its member universities.

The goals of the SECU initiative include highlighting the endeavors and achievements of SECU faculty and universities; advancing the merit and reputation of SEC universities outside of the traditional SEC region; identifying and preparing future leaders for high-level service in academia; increasing the amount and type of education-abroad opportunities available to SEC students; and providing opportunities for collaboration among SEC university personnel.

Valasek speaks to HTPP workshop

Dr. John Valasek, director of the Center for Autonomous Vehicles and Sensor Systems (CANVASS) and a professor in the Department of Aerospace Engineering at Texas A&M University, spoke recently at the “High-Throughput Plant Phenotyping and Unmanned Aerial Vehicles in Agriculture” workshop. The goal of the workshop was to provide attendees with an expert overview and keen practical insights into the two related research topics.

Speakers from both aerospace and agriculture focused on how UAVs and high-resolution remote sensing as well as automated sensor platforms can be used to efficiently measure phenotypic traits to facilitate advances in plant breeding and genetics.

The workshop also included multiple UAV demonstrations at the Texas A&M AgriLife Research Farm. Sponsors for the workshop included CANVASS, Texas A&M Agriculture and Life Sciences and Feeding Our World.
Ten inducted into Aerospace Alumni Academy

The Department of Aerospace Engineering in the Dwight Look College of Engineering at Texas A&M University inducted the individuals into the Aerospace Engineering Distinguished Alumni Academy during the Aerospace Engineering 75th Anniversary and Annual Awards Banquet.

Receiving the Outstanding Young Engineer Award were Maruthi Akella, Ph.D. ’98, Darren Hartl, Ph.D. ’03, and Kayleen Helms, Ph.D. ’00. This award is presented to an alumnus under the age of 40 who has shown outstanding work in their field and is a promising leader for the future. This person must have a strong commitment and interest in the university and the Department of Aerospace Engineering.

The Outstanding Aerospace Engineer award is presented to an alumnus 40 years or older who has proven superior professional achievement, community service and service to the university. This person is a role model for all to follow, and their example of distinguished professional practice deserves recognition. The alumni receiving this award were David Bodden ’76, Richard Matus, Ph.D. ’80 and Rush Robinett III, Ph.D. ’82.

The Aerospace Engineering Honorary Engineer Award is presented to non-Texas A&M University alumni who have made major contributions to the engineering profession and whose support of the Department of Aerospace Engineering at Texas A&M merits recognition. The two honorees given this distinction were Oran Nicks and John Slattery, Ph.D.

Two alumni were honored with the highest distinction in the academy, the Distinguished Aerospace Engineering Alumni award. This award is presented to an alumnus who is retired or near retirement with outstanding career records. This award recognizes sustained and meritorious contributions to engineering and engineering management. The two honorees were Charles Haines ’57 and Benjamin “Ben” Smith ’65.

For more information on the Distinguished Aerospace Engineering Alumni Academy, see /aerospace/former-students/alumni-academy.
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