Spring 2014

AEROCONTACT

AEROSPACE ENGINEERING
A. JAMES CLARK SCHOOL *of* ENGINEERING
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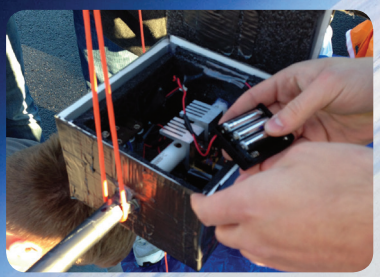


Expanding Horizons in Aerospace Engineering

Chairman's Corner

NORMAN WERELEY

Every issue of AeroContact is a time to celebrate the amazing accomplishments of our students, faculty, staff and alumni. In this edition of AeroContact, the spotlight shines on several undergraduate activities that bolster our educational mission. By providing students with an outlet for their "hands-on" creative energies, they gain valuable problem-solving skills and are better prepared to meet future engineering challenges.

From Team Gamera's International Aeronautical Federation certified world record for longest flight of a human powered helicopter (97 seconds!)—they were also a finalist for the 2014 Collier Trophy—to the high altitude scientific balloon payloads launched and recovered by the Balloon Project Team, our undergraduate students are working together with graduate students, staff and professors to achieve truly impressive results.

Our freshmen dive right into engineering from the start with ENAE-100, Introduction to the Aerospace Engineering Profession. During this class, students form groups and work under the mentorship of graduate students and professors to develop diverse aerospace projects such as: a spin stabilized balloon payload, an environmental study of wind turbine noise, the design and mock-up of inflatable or composite lunar habitats or optimizing the range of a catapult launch. To keep the competitive juices flowing, student groups present their work before a judging panel during a final poster competition where they compete for cash prizes and glory!

Graduate students keep the department's momentum in excellence going. A student design team from the Alfred Gessow Rotorcraft Center won first place in the AHS 30th Annual Student Design Competition's graduate division by designing a tiltrotor search and rescue helicopter to rescue victims of natural disasters. Students also won second place overall at the Revolutionary Aerospace Systems Concepts–Academic Linkage (RASC-AL) competition for their Modular Affordable Mixed-Fleet Architectures and Programs for Sustainable Human Exploration and won best in theme—Human Lunar Access and Initial Exploration—among other awards.

The Department of Aerospace Engineering has outstanding students, and this fact was never more evident than on April 1, 2014, when six of our current aerospace engineering students, three undergraduate students (Sylvie Delahunt, Cody Karcher and Nelson Yanes) and three graduate students (Robert Fievisohn, Elaine Petro and Tom Pillsbury), were awarded National Science Foundation Graduate Research Fellowships—the premier national fellowship for basic research given to the very best students in the nation. This year, our students were awarded more fellowships in aerospace engineering from the NSF than any other department in the nation. That caliber of achievement is a tremendous compliment to our undergraduate and graduate programs.

I am pleased to welcome a new faculty member to the department, Dr. Christine Hartzell, who comes to us from the University of Colorado-Boulder by way of a post-doc at CalTech's Jet Propulsion Laboratory. Dr. Hartzell is developing a research program focused on how spacecraft will interact with planetary bodies and asteroids, and the impact of those interactions with the regolith—loose, surface material—on astronomical bodies.

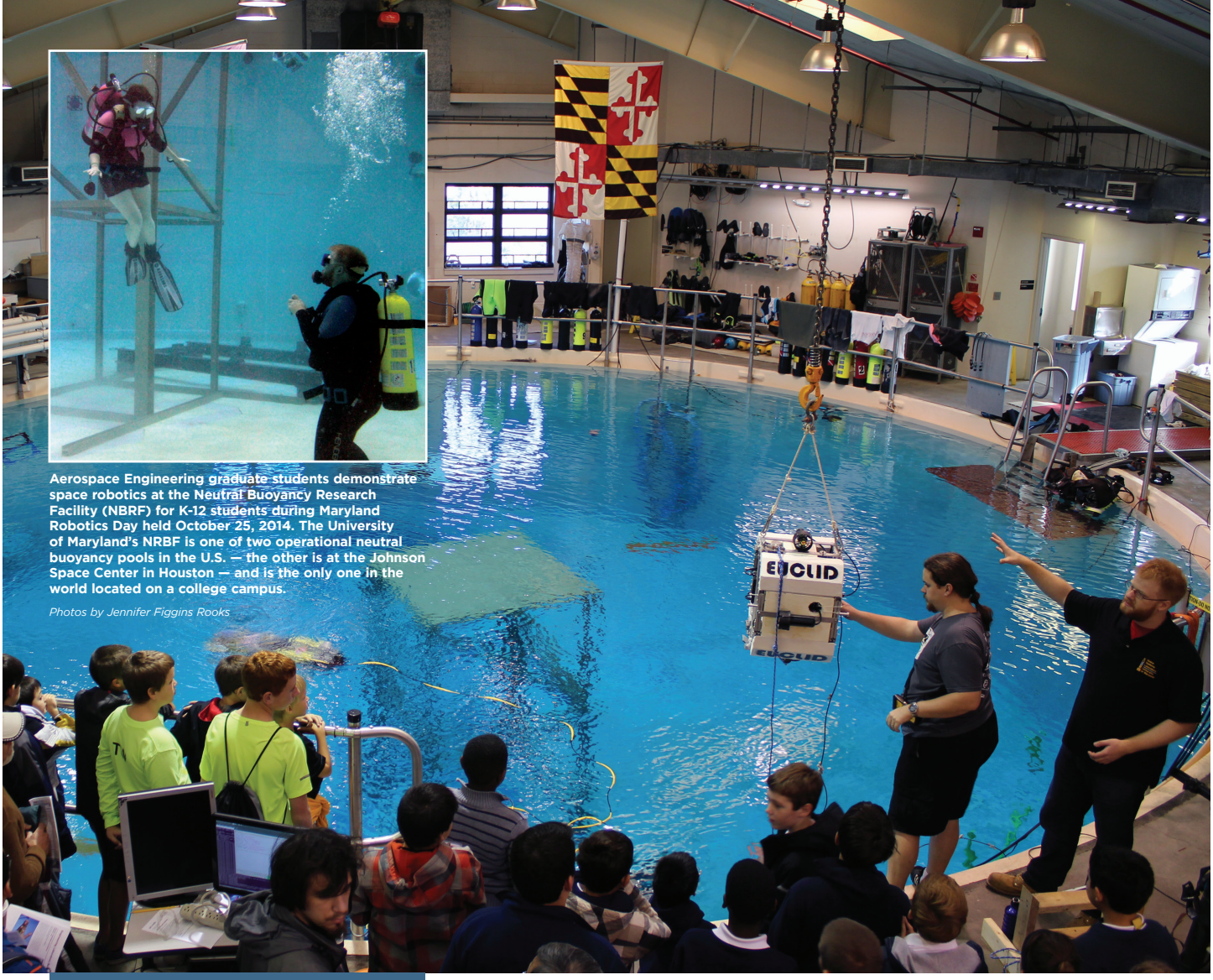
The Aerospace Engineering faculty continue to achieve recognition for their commitment and enterprise in our mission of outstanding education and research. Dr. Sean Humbert was named the Techno-Sciences Professor of Aerospace Innovation, and Dr. Derek Paley was named the Willis J. Young Jr. Professor for Aerospace Education. These named professorships recognize their accomplishments and contributions to the Department of Aerospace Engineering. In addition, Dr. Paley was awarded the Presidential Early Career Award in Science and Engineering (PECASE)—the highest honor bestowed by the U.S. government on engineers and scientists early in their independent research careers.

The University of Maryland has also teamed up with Virginia Tech, and fellow future Big Ten member Rutgers, to win one of six Federal Aviation Administration (FAA) Test Centers to begin integrating unmanned aerial vehicles (UAVs) into the national air space. Access to the FAA Test Center will also provide additional opportunities in the future for faculty and students to make greater contributions in the area of UAV research.

We welcome hearing from you, so don't forget to send us your news! You can find us on Facebook, and alumni can now connect with us through LinkedIn.

Enjoy reading this issue of AeroContact and take advantage of the opportunity to stay in touch.

Norman M. Wereley
Minta Martin Professor and Chair
Department of Aerospace Engineering
wereley@umd.edu



Aerospace Engineering graduate students demonstrate space robotics at the Neutral Buoyancy Research Facility (NBRF) for K-12 students during Maryland Robotics Day held October 25, 2014. The University of Maryland's NRBF is one of two operational neutral buoyancy pools in the U.S. — the other is at the Johnson Space Center in Houston — and is the only one in the world located on a college campus.

Photos by Jennifer Figgins Rooks

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Your alumni news and comments are welcome. Please send them to:
Tom Hurst
Department of Aerospace Engineering
3181 Martin Hall
College Park, MD 20742
thurst@umd.edu
Visit our web site at:
www.aero.umd.edu

Chair: Dr. Norman Wereley
Editor: Jennifer Figgins Rooks
Graphic Designer: Jason Quick

SPRING 2014
ON THE COVER
The View from Above: Images from Aerospace Engineering's Balloon Payload Program.

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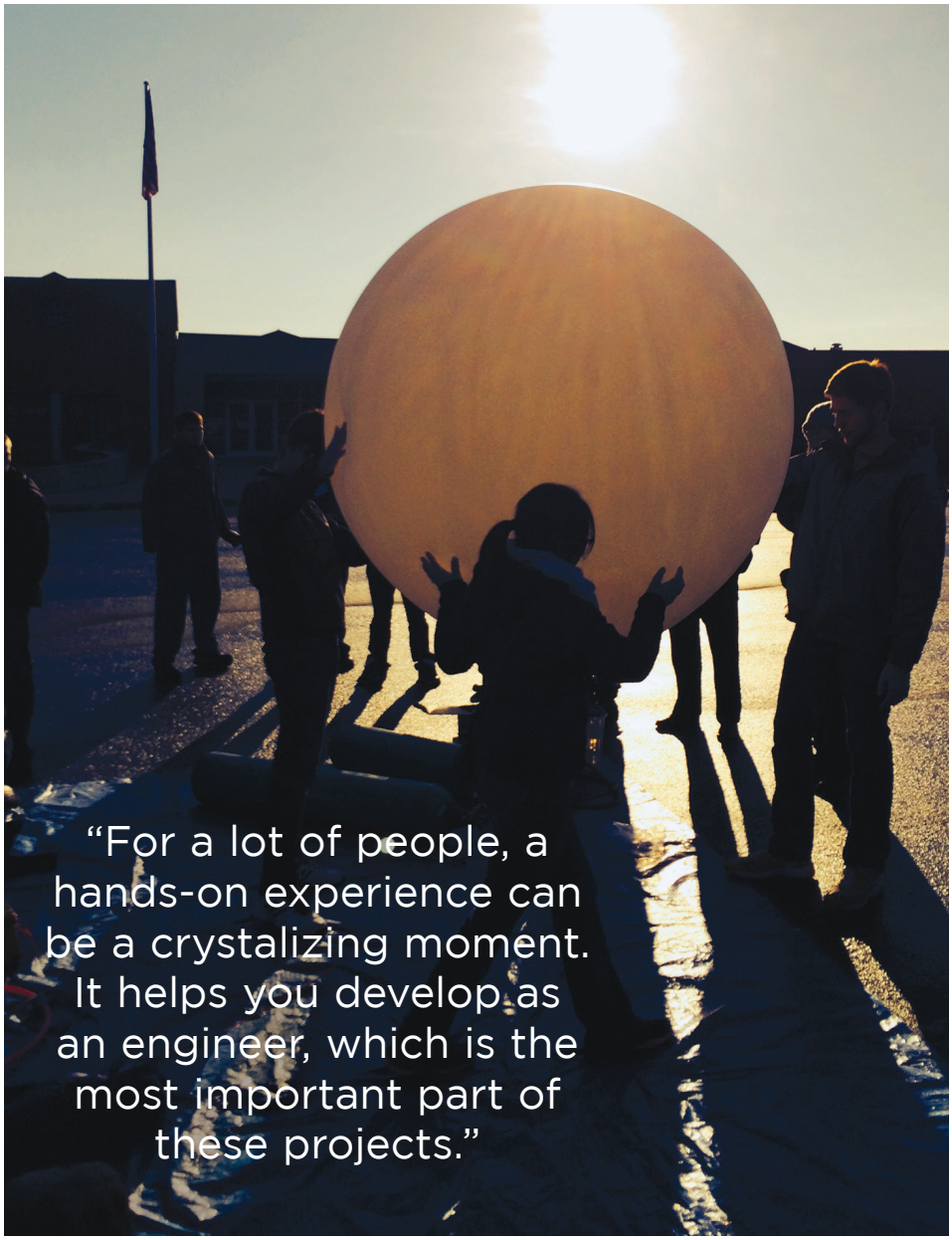
Expanding Student Horizons: The NearSpace Balloon Payload Program

The NearSpace Balloon Payload Program (BPP) is an ongoing program funded by the Maryland Space Grant Consortium (MDSGC). Initiated in September 2003, the program enables easier access to "near space" for students in programs that cannot afford a launch vehicle. The University of Maryland's NearSpace BPP provides aerospace engineering students the opportunity to build payloads that can perform experiments, collect data or address a technical challenge—either on the way up, or on the way down—aboard a high-altitude balloon ascending to the upper reaches of earth's atmosphere.

This semester, thirty students from the Department of Aerospace Engineering are working in teams to develop three independent and very different NearSpace Balloon Payload Program projects: a Spin-Stabilized Payload, a Supersonic Payload and a Weather and Pollutant-Sensing Payload.



Multiple payloads are launched on a large, helium-filled weather balloon that can reach altitudes of 80,000 to 100,000 feet. At altitude, the balloon bursts, and the payload string descends to earth on a parachute. At the balloon's apex, the payloads are subjected to environmental conditions similar to space: temperature extremes, near vacuum air pressure and radiation effects.

Working on balloon payloads, students gain valuable engineering design experience, and even freshman get the opportunity to jump right into the engineering process. Aerospace engineering freshman Zachary Plotkin worked as a designer on the "Bad Attitude" Spin Stabilization Payload.

"This project was the first hands-on aerospace project I took part in during college," said Plotkin. "It taught me how the engineering process works and how to attack problems that may come up in aerospace [engineering]."

Students are actively involved in every step of the balloon payload project—from construction to launch and recovery—and each payload is designed, assembled and tested by a team that includes five to six freshmen and two to three upperclassmen. Students hold weekly workshops to encourage collaboration, innovation and real-time problem-solving for the design challenges that each project faces.

"When you have a big project that you are passionate about, all the hours you put in the lab don't feel like work," said Bryan Hetzer, a junior working as a project manager and team lead on the Supersonic Payload Project.

Many students who begin participating in the program as freshman stick with it throughout their undergraduate careers. Not only do they continue to develop their BPP projects, but they also engage with incoming classes of freshman through student mentoring and team leadership.

Junior Lauren Powers began working in the balloon program during her very first semester at college. Her project, Skidbladnir, is a simulation of a reentry vehicle—also

referred to as a parashield. Nicknamed 'Skippy,' the parashield acts as both a parachute and a heat shield during reentry. She has continued to develop and refine her project, and she has mentored a team of students in Aerospace's ENAE 100 class, Introduction to the Aerospace Engineering Profession, to conduct dynamic studies of Skippy.

The hands-on experience Powers has gained working on the Near Space High Altitude Balloon Team has been more rewarding than she expected. The highlight of her participation with the program was an opportunity to travel to New Mexico and launch one of the team's payloads with NASA's High Altitude Student Platform (HASP) Program.

"The scale of the [NASA] balloon launches and operations is truly incredible. I was able to recognize how my work with the NearSpace program is transferable to research in the industry," said Powers. "The NearSpace program has offered me many invaluable experiences, all of which have allowed me to further pursue my passion for aerospace in unique ways."

UMD's payloads are slated to be ready for launch in April. For many students, the project's culmination comes with the launch.

Aerospace engineering students prepare project payloads for launch.

"The most exciting part of working on the Balloon Payload Project is the launch," said Hetzer. "Everything comes to a head, and everyone's project is ready to perform. The launch, chase and recovery are some of the greatest adventures I've had while at UMD."

Balloon Payload Projects at a Glance

Spin-Stabilized Payload: A number of balloon experiments have been proposed over the years that could have significantly benefited from a method to mount the payload on a directionally stabilized platform. The 'Spin-Stabilized Payload' project addresses this challenge by developing a rotationally controllable payload that can both sense an inertial direction and respond by actively pointing in that direction—regardless of how the balloon above, or the payload below, was spinning.

This concept was developed into a hoop payload with a high moment of inertia and controllable fans that can be used to maintain a given rotational position. The first flight of this payload showed great promise so the project's next steps will be to integrate a sun sensor and improve the control methodology.

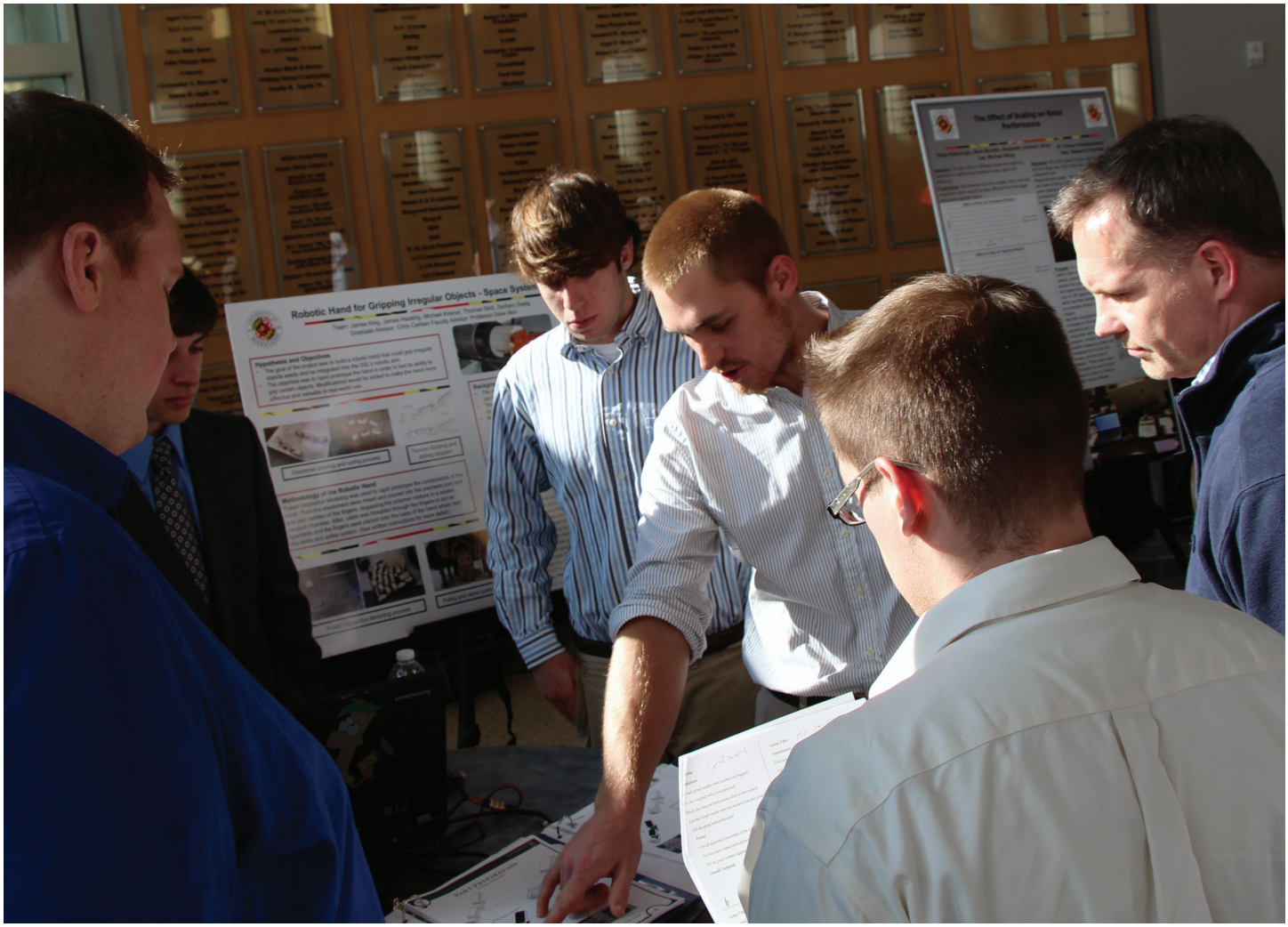
Supersonic Payload: Inspired by Felix Baumgartner's jump from a high-altitude balloon last year, the Supersonic Payload team's goal is to design a vehicle that can be cut-off from the payload string, fall through the thin upper atmosphere—ideally achieving supersonic velocity—and deploy a parachute to land safely. Key operations, such as activating the cut-down and the parachute's deployment, are currently initiated by a timing circuit. The project team's next steps will include using either altitude or pressure sensors or a remote switch to initiate these operations.

Weather and Pollutant-Sensing Payload: The Weather and Pollutant-Sensing Payload will gather a host of atmospheric- and weather-related data through an array of onboard tools. The payload includes pressure, temperature and humidity sensors, a pollutant sensor (carbon dioxide or ozone), a data logger and on-board cameras. The payload's data capacity has been enhanced so it can gather large amounts of data throughout the full flight. Freshmen students on the project have assembled a working system, while the upperclassmen, including students from UMD's Meteorology Department, are planning to spend time post-flight analyzing the data set gathered from the payload.

Present and Future Collaboration

Over the years, the UMCP near-space program has launched payloads for a number of other educational institutions, including Hagerstown Community College, Morgan State University, UMBC, and Carver Center High School. The April launch included two payloads from Capitol College, and future collaboration may include the United States Naval Academy in Annapolis, Md., which has demonstrated a successful balloon payload launch capability, and expertise in the area of radio communications.

Fostering Student and Faculty Interactions through ENAE100



The Department of Aerospace Engineering recognizes the importance of fostering meaningful student and faculty interactions both inside and outside of the classroom. These values are upheld and demonstrated in multiple ways throughout the department, but perhaps most prominently in the course ENAE100: Introduction to the Aerospace Engineering Profession.

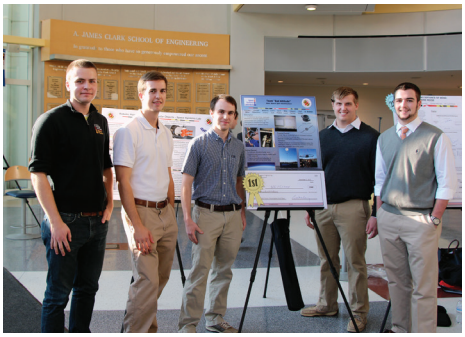
Offered every fall semester for first-time aerospace engineering undergraduate students, this course was specifically designed to build students' momentum and enthusiasm for aerospace engineering. The course provides an overview of aerospace engineering's professional practice through presentations from faculty, students and aerospace industry professionals. Students are also introduced to Department of Aerospace Engineering resources such as faculty, research laboratories and student societies as well as resources offered by the Clark School of Engineering and the University of Maryland.

As part of the course, students participate in team projects that culminate in a poster competition. Faculty members submit research project proposals while students select one to work on as part of a faculty mentored team. At the end of the semester, groups are required to present their research as part of the poster competition, and the top three teams win a cash prize.

This past fall 2013 semester, the top three teams were:

FIRST PLACE

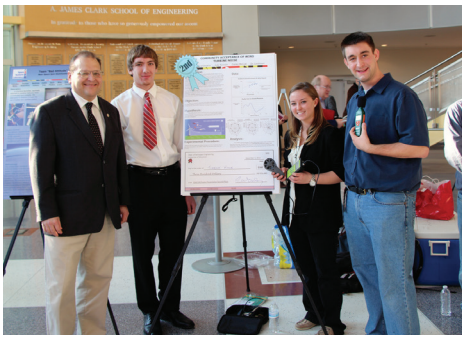
"Bad Attitude" Spin Stabilized Balloon Payload



Team Members: Justin Coe, Matthew Juliano, Michael Lucci, Camden Miller, Zach Plotkin, Forrest Ridenhour
Faculty Mentor: Professor Mary Bowden
Student Mentors: Edward Carney, Kurt Gonter
Overview: Students designed, built, tested and flew a small engineering payload in the "near space" environment of the upper atmosphere. Students developed a rotationally controllable payload capable of sensing an inertial direction and respond by actively pointing in that direction regardless of how the balloon above the payload, or other payloads below, were spinning.

SECOND PLACE

Wind Turbine Noise



Team Members: Charles D'Onofrio, Julie Kessler, Daniel McColl
Faculty Mentor: Professor Gordon Leishman
Overview: The community acceptance issues associated with locating wind turbines and wind farms have never been more acute. In particular, the noise generated by wind turbines has become much more of an issue as the turbines are placed closer and closer to communities where more people live. This project looked at the noise sources on wind turbines, and how the noise is propagated to receptor locations. The study involved the examination of noise regulations for wind turbines, methods of measuring wind turbine noise, and how noise levels are predicted for the wind farm site planning process. The study involved a field trip to a wind farm where the team worked with the faculty mentor to make actual noise measurements from a wind turbine.

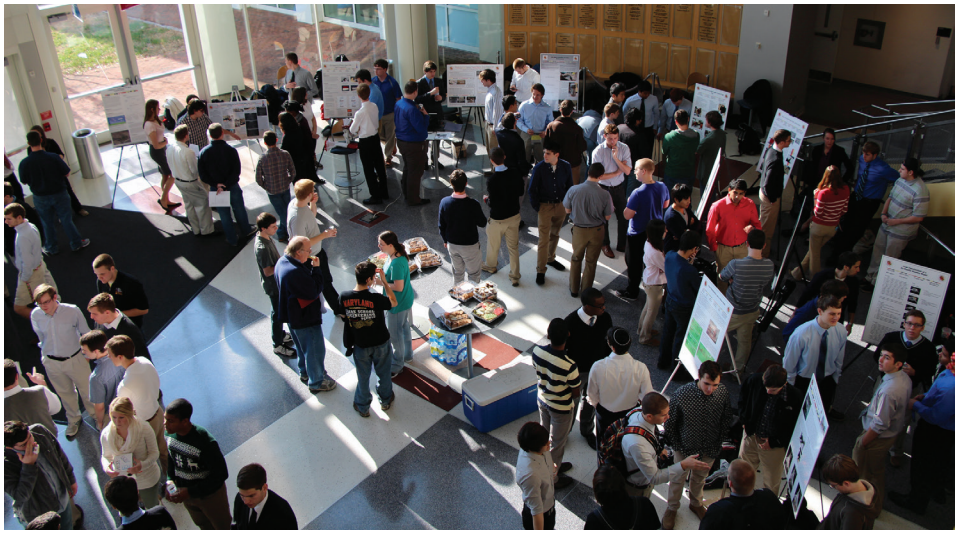
THIRD PLACE

Catapult Geometry

Team Members: Andy Budimirovic, Ralph Erickson, Brian Kelly, Tim Maher, Miller Spencer, Adam Zwick
Faculty Mentor: Professor Sean Humbert
Overview: In this project, the geometry for a single-arm catapult was experimentally optimized to maximize projectile distance. Students were responsible for constructing a simple catapult to launch 3-5 pound weights and performing experiments to determine optimal lever arm lengths. This project introduced the students to the importance of inertia, geometry and external forces (gravity) in motion.

Through the ENAE100 course and group projects, students gain hands-on experience conducting meaningful research in an aerospace engineering laboratory. In addition, students have the opportunity to meet fellow classmates, gain teamwork and communication skills and have the opportunity to form valuable relationships with aerospace engineering faculty members. For students who are not sure if aerospace engineering is the right fit for them, they have the chance to explore the major, talk with current students and connect with faculty who can help them get a better sense of the major and the field. For students who know that aerospace engineering is the major and career path for them, they have the chance to immediately get involved and connect to the department. ENAE100 projects frequently lead to additional research opportunities, and in some cases, students have continued the research they started in ENAE100 into graduate school.

Although ENAE100 requires a large amount of faculty commitment and time, faculty members recognize the importance of inspiring future generations of aerospace engineers. In return, faculty are also inspired and impressed by the caliber of work students put into the group projects and the innovation and new perspectives students offer when learning how to approach complex technical problems.



Rotorcraft Excellence at UMD

Gamera Honored for Landmark Achievements in Human-Powered Flight

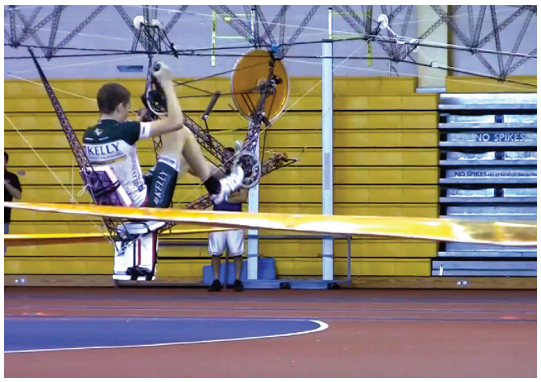
Mark Miller of Sikorsky (4th from right) and J. Michael McQuade of UTC (far left) joined Clark School Dean Darryll Pines (far right) in congratulating the Gamera team members.

On Saturday, October 26, 2013, University of Maryland President Wallace Loh and senior officials from the Sikorsky Aircraft Corporation, United Technologies Corporation and the American Helicopter Society (AHS) International were on hand to celebrate the landmark achievements of Team Gamera.

"The outstanding achievements of Team Gamera's record-breaking flights with their human powered helicopter as part of the AHS Sikorsky Human Powered Helicopter Competition are a perfect example of how a grand challenge to do the impossible can spark innovation and learning," said Vice President of Research and Engineering of Sikorsky Aircraft Corporation Mark F. Miller.

"The AHS Sikorsky Prize wasn't intended to produce a practical human powered helicopter," said Executive Director of AHS International Mike Hirschberg. "We set up the prize to inspire the next generation of vertical flight pioneers, and we were tremendously successful in this goal. But, perhaps unexpectedly, the world was inspired even more by the incredible accomplishments of the University of Maryland's Gamera team."

During the event, Sikorsky and United Technologies Corporation representatives presented a trophy and a check for $50,000 to honor the team's achievements.



Gamera Human-Powered Helicopter Team's 97-Second Flight Record Certified by NAA

Students from the University of Maryland A. James Clark School of Engineering Team Gamera have been awarded the official U.S. record of 97 seconds for duration of a human-powered helicopter flight. The record-setting flight was officially approved by National Aeronautic Association (NAA) on January 27, 2014.

NAA officials were on hand to witness the record-setting flight achieved Wednesday, September 25, 2013 at the Prince George's County Sports and Learning Complex in Hyattsville, MD. Recently recruited pilot and competitive cyclist Justin Mauch, powered the helicopter through its 97-second flight.

While the September test flights marked a closing chapter for Gamera since Canadian team AeroVelo secured the Sikorsky Prize in June of 2013, this flight surpasses AeroVelo's currently submitted duration record of 86 seconds.

Gamera's 97-second time has also been submitted to the Fédération Aéronautique Internationale for certification as a world record.

Since August of 2008, Team Gamera has been engaged in an ongoing effort to advance innovation in human powered helicopter flight. The team has included more than 100 undergraduate and graduate students from the University of Maryland A. James Clark School of Engineering. The students, along with their faculty advisors Inderjit Chopra and V.T. Nagaraj, have collectively invested thousands of hours into the project, as the group continued to reach new landmark achievements over the past five years.

UMD Team Does It Again

Wins AHS Student Design Competition

2013 UMD Student Design Team: Front row, from left to right: Jaime Reel, Benjamin Jimenez, Erik Levin, James Lankford, Elizabeth Weiner; Back row, from left to right: Nishan Jain, Tejaswi Jarugumilli, Bharath Govindarajan, Zak Kaler.

Aerospace Engineering's Student Design Team (SDT) has again won first place in the graduate division of the American Helicopter Society's (AHS) 30th Annual Student Design Competition with their HeliX helicopter design. The AHS Student Design Competition challenges students to design a vertical lift aircraft that meets specified requirements, providing a practical exercise for engineering students while promoting student interest in vertical flight technology.

This year's competition required students to design a search and rescue helicopter for extracting victims of a natural disaster. The helicopter had to feature a large payload capacity—to accommodate both humans and supply cargo—and operate safely across a wide variety of terrain to support removing victims trapped in dangerous areas.

The University of Maryland design team was led by aerospace engineering graduate student Elizabeth Weiner, who was also a member on the Gamera II project, and included fellow students Teju Jarugumilli, James Lankford, Jaime Reel, Bharath Govindarajan, Nishan Jain, Erik Levin, Benjamin Jimenez and Zak Kaler. The team also included faculty advisors Dr. V. T. Nagaraj, Dr. Inderjit Chopra and Dr. J. Gordon Leishman.

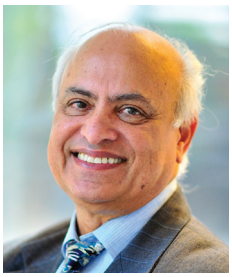
The team's HeliX design featured key components such as a variable diameter tiltrotor and outboard wing extensions (OWEs). A tiltrotor provides increased speed, range and altitude capabilities, while the ability to change the diameter of the rotor enables the craft to function efficiently in both helicopter and airplane modes. The HeliX's unique, telescoping blade system allowed for varying the rotor diameter when moving between hover and forward flight modes while maintaining a high level of operational safety, reliability and structural efficiency. The HeliX's OWEs increased the wing aspect ratio, enabling the HeliX to achieve airspeeds in excess of 240 knots.

Department of Aerospace Engineering Chair Dr. Norman Wereley said, "Once again, the AHS Student Design Team was exceptionally innovative and worked hard to achieve this outstanding result!"

The project, which began in 2012, required students to put in long hours of work and even some sleepless nights to complete their proposal and design.

"The dedication and innovation that this team showed in order to create this design was remarkable," said Weiner. "As team leader this year I am proud to have worked with a team that extended the University of Maryland's legacy for greatness."

Chopra Receives Inaugural Wang Shicun Award



Inderjit Chopra

Aerospace Engineering Professor Inderjit Chopra was awarded the inaugural Wang Shicun Award at the 2nd Asian/Australian Rotorcraft Forum (ARF) and the 4th International Basic Research Conference on Rotorcraft Technology at Tianjin, China on September 12, 2013. Chopra received the award for his "outstanding work in education, research and development of rotorcraft technology."

Chopra has been a professor at the University of Maryland since 1981, served as the Director of the Alfred Gessow Rotorcraft Center since 1991 and has been a faculty advisor for University of Maryland's Team Gamera human-powered helicopter project.

The ARF award was named for the late Professor Wang Shicun, who was a distinguished helicopter pioneer in China and responsible for starting a rotorcraft program at Nanjing University of Aeronautics and Astronautics. He was a friend of late Professor Alfred Gessow, a University of Maryland professor and a pioneer in the helicopter field, and also the author of the famous classic text, Aerodynamics of the Helicopter.

The Wang Shicun Award was established by the ARF and will be awarded annually to outstanding individuals working in the field of education, research and development of helicopter technology. The winner is selected by the ARF International Executive Committee and International Technical Advisory Committee and is awarded the Certificate issued by the General Chairman of the ARF.

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UMD Team Demonstrates First Stable Cyclocopter Flight

The University of Maryland Cyclocopter team, which includes Moble Benedict, Elena Shresthra, Vikram Hrishikeshavan and Inderjit Chopra, has demonstrated the first ever stable flight of a twin cyclocopter micro-air vehicle (MAV).

Photo by Jason Pereira, AHS

A cyclocopter utilizes cycloidal-rotors (cyclorotors), a revolutionary horizontal axis propulsion concept that has many advantages over conventional helicopter rotors such as higher aerodynamic efficiency and maneuverability and a high gust tolerance. The cyclocopter is also capable of maintaining steady, level flight in a power efficient manner. Unlike a conventional helicopter, the forward flight of a cyclocopter is performed purely utilizing thrust vectoring (varying cyclic pitch phasing) and not by pitching the entire vehicle forward.

This demonstration was the first time the team had demonstrated steady, level forward flight of a cyclocopter using thrust vectoring of the cycloidal rotors. The cyclocopter team was featured in the winter 2013 issue of *Aerocontact* when they made history as having the first cyclocopter ever reported in the literature to perform both a piloted and autonomous stable flight in hover.

WWW.TER.PS/CYCLOCOPTER

Aerospace Department Welcomes New Faculty

Elaine Oran

Elaine Oran

Dr. Elaine Oran has joined the Department of Aerospace Engineering as a Glenn L. Martin Institute Professor of Engineering. Prior to joining the University of Maryland, Oran was the Senior Scientist for Reactive Flow Physics at the U.S. Naval Research Laboratory where she was responsible for carrying out theoretical and computational research on the fluid and molecular properties of complex dynamic systems and where she will continue serving as an Emeritus Scientist. She is an Adjunct Professor at the University of Michigan and a Visiting Professor at Leeds University.

Oran's research includes work on chemically reactive flows, turbulence, numerical analysis, high-performance computing and parallel architectures, shocks and shock interactions, rarefied gases and microfluidics, with applications to combustion, propulsion, astrophysical explosions and micro-sensor design.

She received her A.B. in Chemistry and Physics from Bryn Mawr College and both her M.Ph. in Physics and Ph.D. in Engineering and Applied Science from Yale University.

Oran is as a member of the National Academy of Engineering, the highest honor to which any aerospace engineer can aspire. She is a fellow of the American Society of Mechanical Engineers, the Society of Industrial and Applied Mathematics, and the American Physical Society (APS). Oran also has the distinction of being both an American Institute of Aeronautics and Astronautics (AIAA) Fellow and an AIAA Honorary Fellow.

In 2002, Oran received the AIAA Dryden Lectureship in Research, which recognizes extraordinary contributions to basic and applied research in aeronautics and astronautics, and she has continued to be recognized for her excellence in scholarship and research accomplishments. She has been awarded the Zel'dovich Gold Medal from the Combustion Institute, Society of Women Engineers Achievement Award (2006), two Presidential Rank Awards (2004, 2007), AIAA Propellants and Combustion Award (2008) and the Oppenheim Prize (1999).

Most recently, Oran was awarded the American Physical Society (APS) 2013 Fluid Dynamics Prize at the Annual American Physical Society Division of Fluid Dynamics 66th Annual Meeting held November 24-26, 2013 in Pittsburgh, Pa.

The APS Fluid Dynamics prize recognizes major contributions to fundamental fluid dynamics made during a career of outstanding work, and Oran was selected for her "seminal contributions to the understanding of reactive flows through computational simulations, especially the deflagration-to-detonation transition in gases and supernovae." As part of the APS prize, Oran also presented the Otto Laporte Lecture on 'The reactive flow of ideas.'

Oran has published hundreds of refereed technical articles for both journals and conferences, numerous book chapters and has delivered over 250 invited presentations. Her book, *Numerical Simulation of Reactive Flow*, written with Dr. Jay Boris, is considered to be a classic in the field.

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Stuart Laurence

Stuart Laurence

Dr. Stuart Laurence joined the department as an assistant professor in fall 2013. Laurence comes to the department from the German Aerospace Center in Goettingen where he worked in the Institute of Aerodynamics and Flow Technology since 2009.

He received both his M.S. (2002) and Ph.D. (2006) in Aeronautics from the California Institute of Technology, where he also completed his postdoctoral work. He received his B.Sc. (Hons.)/B.A. (2001) in Applied Mathematics, Physics, and Philosophy from the University of Auckland, New Zealand.

Laurence's research focuses on hypersonic aerodynamics and aerothermodynamics, supersonic combustion and propulsion, boundary-layer transition, naturally occurring hypersonic flows, and the development of experimental techniques.

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Christine Hartzell

Christine Hartzell

Dr. Christine Hartzell joined the department as an assistant professor in January 2014. Hartzell comes to the department after being a postdoctoral fellow with the Keck Institute for Space Studies at the California Institute of Technology where she studied granular media, materials made of small grains, like sand. Hartzell wants to apply this research to studying how spacecraft wheels and scoops might interact with the different materials—such as sand and dust—on planets' surfaces where gravity is weaker than earth.

She received her Ph.D. in aerospace engineering sciences from the University of Colorado at Boulder in 2012 where her thesis focused on electrostatic dust motion near the surface of asteroids and the Moon. Hartzell received her B.S. in aerospace engineering from the Georgia Institute of Technology in 2008.

Hartzell's research interests are in the areas of planetary science, orbital mechanics, plasma physics, granular mechanics and spacecraft design. Her current research focuses on dust motion on airless bodies—such as some moons, asteroids and comets—for the purpose of understanding how these bodies evolve and applying that knowledge to improving the design of spacecraft to explore them.

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Raghunath Wins SMS Best Paper Award at SMASIS 2013

Ganesh Raghunath

Ganesh Raghunath won the Smart Materials and Structures prize for the best paper at the ASME 2013 Conference on Smart Materials, Adaptive Structures and Intelligent Systems (SMASIS 2013) held September 16-18, 2013 in Snowbird, Utah.

Raghunath's paper 'Non-contact torque measurement using magnetostrictive Galfenol' presented research on the development of a non-contact torque sensor system prototype made from rolled and textured Galfenol, a magnetostrictive alloy of Iron and Gallium.

The magnetic change in a Galfenol patch attached to a shaft experiencing torque was picked up using Hall effect sensors and magnetic coils to derive torque information. This system provides real-time measurements with high sensitivity and minimal signal conditioning requirements making it attractive for applications such as condition based maintenance. Features also included being easily retrofitted, passive to the shaft, compact, accurate and cost effective.

Aerospace Engineering Students Win Vertical Flight Foundation Scholarships

Four Department of Aerospace Engineering students have been awarded Vertical Flight Foundation (VFF) Scholarships. VFF scholarships are awarded to promising undergraduate and graduate students who plan to pursue careers in vertical flight.

The University of Maryland recipients were:

- **Cody Karcher** (Undergraduate Category - Barry Baskett Scholarship)
- **Elena Shrestha** (M.S. Category - Joseph P. Cribbins Scholarship)
- **Andrew Lind** (Ph.D. Category - Feri Farassat Scholarship)
- **Harinder Jit Singh** (Ph.D. Category - Evan A. Fradenburgh Scholarship)

The VFF was established in 1967 as the philanthropic arm of the American Helicopter Society (AHS). The scholarship program was established in 1977, and since 1980 has awarded over 400 scholarships. Many VFF scholarship recipients are now leaders in the vertical flight technical community.

Students were presented with their scholarship certificates and checks at the Grand Awards Banquet held during the 69th AHS Annual Forum on May 22, 2013 in Phoenix, Arizona.

Nelson Yanes Named Philip Merrill Scholar

From left: Christopher Cadou, Joe Magdelinskas and Nelson Yanes

Aerospace senior Nelson Yanes was among three A. James Clark School of Engineering undergraduate students named 2013-2014 Philip Merrill Presidential Scholars. This program honors the University of Maryland's most successful seniors and the university faculty and K-12 teachers who mentored and inspired them.

Yanes was selected based on his academic excellence, research accomplishments and his commitment to mentoring high school students. As part of his nomination, Yanes named Joe Magdelinskas, his honors Chemistry teacher at Northwestern High School in Hyattsville, Md., as his K-12 mentor and identified Magdelinskas as being a positive influence and tremendous role model. Yanes identified Aerospace Engineering professor and research advisor Christopher Cadou as his faculty mentor. He credits Cadou for inspiring his love of research and expressed admiration for Cadou's dedication to his students

Yanes is a member of the Aerospace Honors Program, University Honors Program and the Society of Hispanic Professional Engineers. He currently works with Cadou in the Propulsion Laboratory conducting research on the combustion losses of two-stroke engines. Yanes is also a volunteer with Precollege Programs, and he teaches Mathematics and Physics to students around the Washington Metropolitan region every Saturday.

Merrill scholars and their mentors were honored during a luncheon held November 15, 2013 in the University of Maryland Riggs Alumni Center.

Lind Named Clark School 2014 Future Faculty

Andrew Lind

Graduate student Andrew Lind has been selected by the A. James Clark School of Engineering for the 2014 Future Faculty Program. This program was created to cultivate the next generation of engineering teachers.

A third year Ph.D. student, Lind works with Dr. Anya Jones in her Aerodynamics Lab. His research is on the experimental evaluation of helicopter rotor blades in reverse flow and developing high-speed helicopters by providing improved understanding of the fundamental flow physics of a rotor blade in reverse flow.

Lind is passionate about teaching, and he worked as an instructor at the Benjamin Franklin Institute of Technology in Boston teaching courses in math, physics and mechanical engineering prior to joining Jones's lab in 2011. Lind is also currently a Graduate Lilly Teaching Fellow through the UMD Center for Teaching Excellence.

Lind received his Sc.B. from Brown University and his M.Eng. from Cornell University.

The Future Faculty Program's mission is to increase the number of highly qualified professors the Clark School produces for the world's engineering school and prepares selected Clark School doctoral students to achieve career-long success in the academic world as educators and researchers. As part of the program, students are provided with a $3,000 travel stipend to present their research at professional conferences and placed in leading institutions where their impact can be greatest and where they can continue to partner with the Clark School.

Continued on next page

Robinson and Young Awarded Society of Satellite Professionals International Fellowships


Ryan Robinson

The University of Maryland (UMD) Department of Aerospace Engineering and the Society of Satellite Professionals International (SSPI) have awarded scholarships to aerospace doctoral students Ryan Robinson, B.S. '09, M.S. '11, and Jarred Young, B.S. '09. Each student will each receive $4000 toward his Ph.D. studies.

Robinson works in UMD's Smart Structures Lab and has been researching robotic manipulators that employ pneumatic artificial muscles (PAMs). PAMs are extremely lightweight actuators that provide high power to weight ratios but are also naturally compliant.


Jarred Young

Young works on research in the area of plasma-material interactions under Dr. Raymond Sedwick with the Space Power and Propulsion Lab. His research interests include space propulsion systems, electrostatic thruster technology and plasma-material interactions. Young was inspired to work with space technology by his family, in particular, his grand-father William who was a machinist for NASA Goddard Space Flight Center.

The SSPI scholarship is awarded to individuals who have demonstrated a commitment to pursue education and career opportunities in the satellite industry or a field making direct use of satellite technology.

Singh Awarded Kalpana Chawla Scholarship


Harinder Jit Singh

Graduate student Harinder Jit Singh was awarded the Kalpana Chawla Scholarship from the American Society for Engineers of Indian Origin (ASEIO). The ASEIO scholarship, named in honor of Dr. Kalpana Chawla, the first Indian-born woman in space, is given to an engineering student in space sciences and is awarded based on academic success and research strength.

Singh is a doctoral student pursuing research on the theoretical and experimental study of crash protection systems for helicopters. He is working under the guidance of Department of Aerospace Engineering Chair

Continued on next page

Five Aerospace Engineering Students Win Honors at AIAA Conference

Aerospace engineering students won three out of the top four spots in the graduate student paper competition at the 2013 American Institute of Aeronautics and Astronautics (AIAA) Region I Young Professional, Student, and Education (YPSE) Conference held November 15, 2013 at John Hopkins University Applied Physics Laboratory.

- 1st Place - Elena Shrestha, 'Forward Flight Capability of a 500-gram Cycloidal-Rotor Micro Air Vehicle' (Advisor: Professor Inderjit Chopra)
- 3rd Place - Nicholas Limparis, 'Exo-SPHERES: Design of a Free-Flying Spacecraft for Operations Interior and Exterior to the International Space Station' (Advisor: Professor Dave Akin)
- Honorable Mention - Jonathan Geerts, 'Quantitative Design of the Background Oriented Schlieren Particle Pattern' (Advisor: Professor Kenneth Yu)

Shrestha is a graduate research assistant at the Micro Air Vehicle Lab working under the guidance of Dr. Inderjit Chopra. She was previously awarded the Vertical Flight Foundation (VFF) scholarship as an undergraduate student in aerospace engineering at the University of Maryland (UMD) in 2012. Her research focuses on the development of the cyclocopter, a micro air vehicle that utilizes cycloidal rotors, and she has made history with the very first cyclocopter ever reported in literature to successfully achieve hover and forward flight.

Shrestha's paper describes the design, development and forward flight testing of a cycloidal-rotor aircraft (cyclocopter) at Micro Air Vehicle (MAV) scale. Cycloidal rotor (cyclorotor) is a revolutionary vertical take-off and landing concept, which has both a horizontal axis of rotation with the blade span parallel to axis and cyclically pitching as it goes around the azimuth to produce a net thrust. Read more cyclocopter research on page 7.

Limparis is a Ph.D. student at UMD's Space Systems Laboratory. He received both his B.S. ('08) in electrical engineering and a M.S. ('12) in

aerospace engineering from UMD. Limparis is also a scientific diver with over 50 hours of dive time working with robotic systems at UMD'S Neutral Buoyancy Research Facility. His research involves the study and application of robotics for space and deep ocean environments. Currently he is studying highly coupled dynamics between a space manipulator and a similarly massed host spacecraft to generate better models to improve the viability of small and inexpensive robotic satellite servicing missions.

Geerts is a master's student with the Advanced Propulsion Research Laboratory working under the guidance of Dr. Kenneth Yu. His AIAA paper described efforts to refine a non-traditional flow visualization technique for the study of confined shock-boundary layer interactions in scramjet related flowfields.

Aerospace engineering students also swept the AAIA YPSE Conference's Space Robotics special category. The awards were won by Limparis and Kate McBryan, both advised by Akin, and Justin Brannan advised by Dr. Craig Carignan.

The AIAA YPSE Conference is intended to highlight the future of aerospace engineering with presentations from participants who range in age from kindergarten to 35.

and Minta Martin Professor of Aerospace Engineering Norman Wereley.

Singh's project is supported by the U.S. Naval Air Warfare Center at Patuxtant, Md. and aims to utilize a state of the art adaptive seat suspension system to minimize potential injuries to a helicopter occupant during a crash.

Singh was presented with the scholarship award during ASEIO's 28th Annual National Convention on September 28, 2013.

Singh said, "Hard work alone is not enough, a direction is extremely important to be successful. I am honored to receive this scholarship and the credit goes to my advisor, Dr. Norman Wereley, who encouraged me consistently at every level."

Palacio Awarded ABWA Legacy Scholarship

Gladys Palacio

Undergraduate Gladys Palacio has been awarded the 2013 American Business Women's Association (ABWA) Legacy Scholarship. The Legacy Scholarship is a national scholarship and is awarded in honor of ABWA member Freda Zimmerman.

Palacio is a sophomore in the space track of aerospace engineering. During her freshman year, she participated in the High Altitude Balloon Payload Project with Dr. Mary Bowden in the Space Systems Laboratory.

Over the summer, Palacio was a program coordinator and teacher for the Engineering Science and Technology to Energize and Expand Young Minds (ESTEEM/SER-Quest) program run by the Center of Minorities in Science and Engineering, and this fall she will be working as a Clark School Ambassador talking to prospective high school students about the engineering field. Palacio also serves as the Junior Chair for the Society of Hispanic Professional Engineers (SHPE) and a part of the Flexus: Women in Engineering Living and Learning Community.

The scholarship includes a $5000 award and is given through the Stephen Bufton Memorial Education Fund established to assist women in achieving success through educational opportunities.

Levine Selected as ARCS Scholar

Edward (Teddy) Levine

Honors student Edward (Teddy) Levine was selected as an Advancing Science in America (ARCS) scholar. Levine, who is studying aerospace engineering with a minor in physics is a member of the American Institute of Aeronautics and Astronautics (AIAA) and the Tau Beta Pi professional engineering society.

Levine currently serves as a Clark School of Engineering Ambassador educating prospective high school students about engineering. Teddy will be working with Dr. Christopher Cadou and NASA researching the use of a focused Schlieren system to measure film cooling properties in supersonic flow.

ARCS scholars are chosen from America's outstanding science, engineering and medical research graduate and undergraduate students and ARCS Foundation's scholars have contributed significant research, founded companies, received numerous patents and published extensively.

Mittra Selected for Lend for America Fellowship

Atin Mittra

Aerospace engineering student Atin Mittra was selected to receive Lend for America's Growing National Initiative fellowship. This yearlong fellowship is intended for young student leaders interested in microfinance.

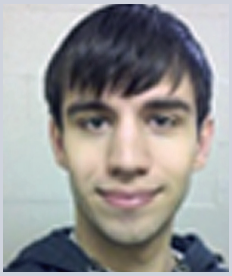
Atin, who is also studying technology entrepreneurship, was selected among hundreds of students from across the country. As part of the fellowship, Atin spent the summer in Providence, R.I. interning at The Capital Good Fund (CGF), the fastest growing microfinance institutions in the United States.

Atin plans to use the experiences he gained at CGF and launch the campus initiative MADE (Maryland Asset Development and Education) Microfinance this fall. MADE's services will include financial coaching, tax preparation and consumer microloans for low-income community members. By September Atin needed to raise $500 and fill five student staff positions.

Since 2001, college students across the country have led the development of non-profit lending institutions to spur economic development in their campus communities. There are currently 23 member organizations of Lend for America, a national network started in 2009 to support the growth of the student-led microfinance movement.

WWW.MADEMICROFINANCE.ORG

Chuang and Clagg Receive NIST Summer Undergraduate Research Fellowships



Justin Clagg

Undergraduate students Justin Clagg, B.S. '15, and Kevin Chuang, B.S. '15, were selected to receive National Institute of Standards and Technology (NIST) Summer Undergraduate Research Fellowships (SURF).

Clagg worked for Aerospace Engineering Professor Derek Paley in the Collective Dynamics and Controls Laboratory on an unmanned underwater vehicle. He also assisted Dr. Paley in programming instruments using Labview. Clagg's main goal is to continue gaining research experience in a variety of scientific fields, making the NIST SURF program a great opportunity, and he plans to pursue a master's degree.

Chuang is double majoring in Aerospace Engineering and Physics. Upon acceptance into the NIST SURF fellowship program, he has been engaged in a sustainable energy modeling project that focuses on industry manufacturing and assembly processes. He also takes great interest in a variety of cutting-edge technologies, regardless of their relation to his immediate studies. Chuang is keeping graduate school open as an option, but he also has potential entrepreneurial ventures in the works.

Kevin Chuang

NIST Fellows must be students who are undergraduates at a U.S. university or college with a scientific major, have a G.P.A. of 3.0/4.0 or better, and are considering pursuing a graduate degree. Students with physics, material science, chemistry, applied mathematics, computer science, or engineering majors are always encouraged to apply.

undergraduate SPOTLIGHT

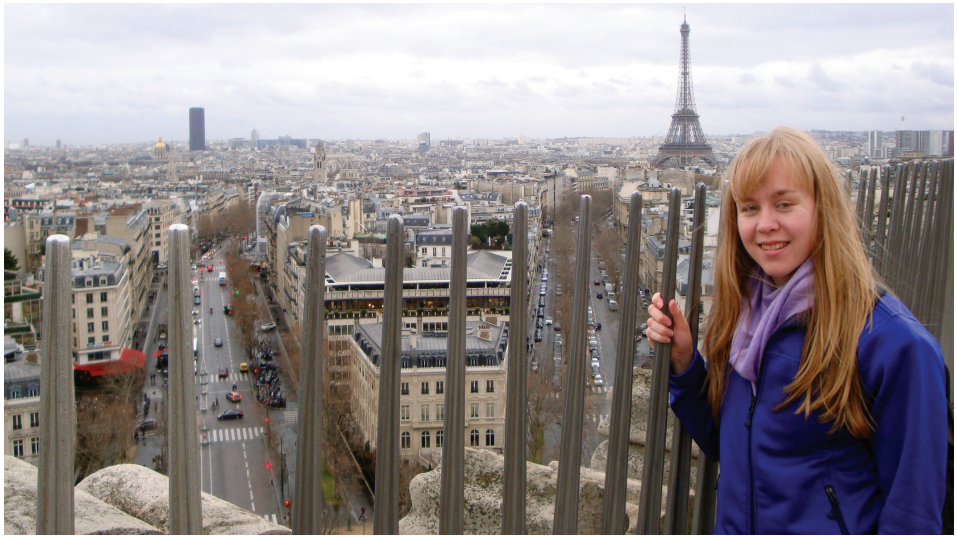
Sylvie DeLahunt

Students are told to do it all—get involved with special programs, research, internships, graduate school, study abroad and service. Making time for all of those activities can be daunting, but some students do manage to do it all. Sylvie DeLaHunt is one of those students.

DeLaHunt, now a senior, has demonstrated her passion for aerospace engineering by being active in a number of research activities, outreach and honors programs, and she has even pursued overseas opportunities in the European aviation industry.

Since she started at UMD, DeLaHunt has not held back on her enthusiasm for research. She has been a member of the Gamera Human-Powered Helicopter team, while simultaneously working on research developing crashworthy aircraft seat designs. As part of Team Gamera, DeLaHunt managed the pilot search and selection process, oversaw pilot communications and testing, collected and analyzed performance data and assisted with the set-up, testing and flight of the helicopter during testing sessions.

After her junior year, DeLaHunt worked for Department Chair Norman Wereley in the Composites Research Laboratory as part of the Maryland Summer Scholars program. During her time in the Composites Research Lab, DeLaHunt developed a drop test stand to evaluate and compare the relative impact properties of energy-absorbing materials that can be used in crashworthy aircraft seat designs.



"My research included developing CAD models, machining and assembling the structure and writing LabView code to collect data from a force sensor," explained DeLaHunt. She plans to present her work at UMD's 2014 Undergraduate Research Day and the AIAA Regional Student Conference in Ithaca, NY.

DeLaHunt is not only active in engineering research, but she is also involved with international outreach. DeLaHunt is minoring in International Engineering, and her engagement in international activities and outreach has garnered her the A. James Clark School of Engineering International Student Award and an Erik B. Young, M.D. International Travel Study Award.

The International Travel Study Award enabled DeLaHunt to travel abroad to Toulouse, France. There, she had the opportunity to learn about the European aviation industry and regulations, and how it compares and relates to those in the United States.

"The classes on aviation safety and economics covered topics that, while not traditionally taught at Maryland, are essential for students who wish to work in the aviation industry," said DeLaHunt, and she considered her studies abroad a great supplement to the aerospace engineering coursework at UMD.

> "I would definitely enjoy a job that would allow me to interact with members of the international community."

"My favorite part of the experience (besides eating French pastries) was living with international students. We would regularly spend evenings playing soccer or Frisbee with French, Mexican and other international students attending the university, and I loved going into the city in the evening with groups of people to watch Euro Cup soccer matches"

In addition to study abroad, DeLaHunt conducted outreach for the International Engineering and Education Abroad departments. She assisted with study abroad information sessions, sat in on information panels and worked at informational tables. As a volunteer for the Women in Engineering DREAM Conference held at the University of Maryland, DeLaHunt participated in an international engineering panel and presented on the Human-Powered Helicopter Team with a graduate team member.

"I eventually hope to work for a government laboratory or a major aerospace company, and am interested holding project management roles after gaining more technical experience," said DaLaHunt, "I would definitely enjoy a job that would allow me to interact with members of the international community."

DeLaHunt is involved in not only the Aerospace Honors program, but she is an active member of UMD's Honors College. She serves as an Honors Ambassador, an Honors College Student Worker and a teaching assistant for the Honors 100 program. In addition to those roles, she is also the Vice-President and a founding member of the Banneker Key Community Council and was recently inducted as a member of Omicron Delta Kappa, the National Leadership Honor Society.

DeLaHunt's dedicated hard work has been paying off. She received a Delta Air Lines Engineering Scholarship that enabled her to attend the Women in Aviation International Conference in Nashville, Tenn., and this April, she was announced as a 2014 recipient of a prestigious National Science Foundation (NSF) Graduate Research Fellowship. The NSF Fellowship award provides a $32,000/year stipend for graduate school in addition to international internship opportunities and tuition assistance.

So, what's in store for DeLaHunt after graduation?

"I am planning to attend UMD. After receiving my graduate degree, I plan to work for a government laboratory or a large aerospace company and am eventually interested in moving onto project management activities. I would also eventually like a job that allows me to interact with international representatives."

Andrew Becnel

Like many aerospace engineering students, doctoral candidate Andrew Becnel wanted to be an astronaut. He became involved with engineering during high school and went on to pursue a B.S. in Mechanical Engineering at Louisiana State University (LSU) where he worked with Dr. Sunggook Park on nanolithography fabrication techniques.

As an undergraduate, Becnel developed and installed portable solar power solutions—as part of his senior design course—for hurricane victims in his native Louisiana and served as Vice President of LSU's American Institute of Aeronautics and Astronautics (AIAA) Student Chapter. It was during his time as an undergrad that Becnel decided to focus on advancing human spaceflight safety and access, rather than becoming an astronaut, so he could bring his friends and family along for the journey.

In addition to his work at LSU, Becnel participated in the NASA Academy at Goddard Spaceflight Center where he developed satellite packing schemes for the Global Precipitation Measurement program—an international satellite mission setting a new standard for precipitation measurements from space. His time at Goddard introduced him to the University of Maryland, and he came onboard as a graduate student in 2008.

Becnel earned his M.S. in Aerospace Engineering in 2011. During that time, he worked as a graduate research assistant with Department Chair Norman Wereley in the Smart Structures Laboratory researching adaptive shock absorbers for helicopter crew seats.

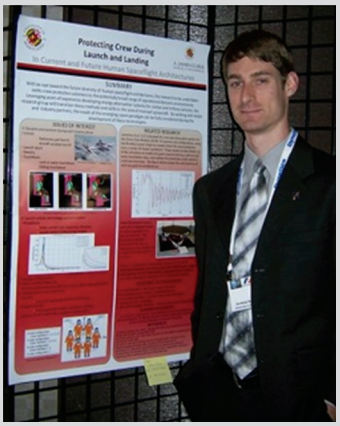
Becnel's favorite thing about working with Wereley? "When I get tired of reading journal articles, I can [go to the lab,] get my hands dirty and build stuff!" said Becnel.

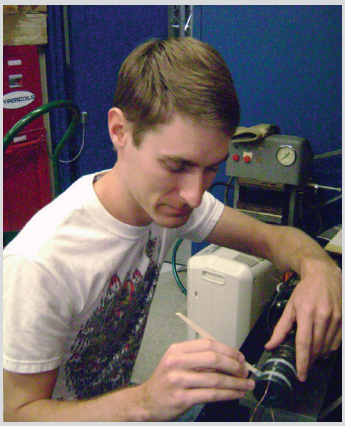
Building on his master's work, Becnel went on to pursue his Ph.D. in Aerospace Engineering at UMD and was awarded a prestigious National Defense Science and Engineering Graduate (NDSEG) Fellowship to support three years of Ph.D. research. Under his NDSEG funding, Becnel has been working on a rotary magnetorheological energy absorber (MREA) for crew seats to improve crash protection systems, and he has presented his work at national and international conferences, including the 12th Japan International SAMPE Symposium & Exhibition (JISSE12) in Tokyo, Japan.

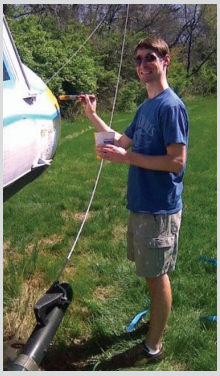
Becnel is not only passionate about his research, but he is a dedicated advocate for engineering education and has participated in a number of outreach activities to foster engineering interest in K-12 students. He has taught students about aerospace engineering at the National Building Museum's annual Engineering Family Days and the USA Science and Engineering Festival and has served as a volunteer at local magnet schools giving presentations on aerospace technologies. In addition, Becnel has lent his expertise to testing KerbalEdu, a space education program for secondary schools.

It was this enthusiasm and passion that made Becnel the inaugural recipient in December 2013 of the Alex Brown Leadership Award. Becnel was selected for his outstanding work as both a scholar and a student, and his strong leadership skills.

According to Aerospace Engineering Professor Alison Flatau, "He's one of those rare students who, much like Alex Brown, really has a great deal of fun in sharing his enthusiasm for technical aspects of the field of Aerospace Engineering with others. He leads by sharing his passion and excitement about our field with others."







Clockwise from top left: Becnel presenting at the International Space Development Conference in Chicago; fabricating a magnetic coil for an MR damper; painting the UMD Huey helicopter; Becnel and Dr. Wereley at the National Building Museum's Engineering Family Day.

Becnel is active in the Aerospace Engineering's graduate student advisory committee (GSAC) at UMD to serve the aerospace graduate student body and foster camaraderie, growth and success among the graduate student body. His commitment to service and campus involvement also earned Becnel a nomination for the University of Maryland's Graduate Student Distinguished Service Award.

When he hasn't been tackling engineering challenges, Becnel has been bending his talents as a regular participant in No Talent Grass Clowns, the Aerospace Engineering Department's intramural soccer team in addition to squeezing in some hiking, rock climbing and travel.

So what's in store next for Becnel?

After successfully defending his dissertation on March 28th, Becnel traveled to the Institute of Electrical and Electronics Engineers (IEEE) International Magnetics Conference in May to present his research. Becnel is interested in working in commercial flight services and is pursuing options in both technical and business development roles.

"I'm really excited about enhancing cooperation between public and private entities in the space industry," said Becnel, "[This] is key to developing the low-cost and reliable systems that will help realize my goal of increasing the general public's access to space."

The Alex Brown Leadership Award was established in memory and honor of the late Alex Brown, who was a Ph.D. candidate in the Aerospace Engineering program. Brown was well known for his energy and great leadership potential. He was optimistic and upbeat, and even under intense pressure, radiated positive feelings that created resonance. He inspired others through courage and hope, and he encouraged others to continue the quest for success and innovation.

Give to the Alex Brown Memorial Fund to support future graduates: www.aero.umd.edu/giving/alexbrown

Paley Receives Presidential Early Career Award

Derek Paley

Associate Professor Derek Paley was one of two A. James Clark School of Engineering faculty selected for a 2014 Presidential Early Career Award for Scientists and Engineers (PECASE), the highest honor bestowed by the United States Government on science and engineering professionals in the early stages of their independent research careers.

"The impressive achievements of these early-stage scientists and engineers are promising indicators of even greater successes ahead," President Obama said in a White House press release. "We are grateful for their commitment to generating the scientific and technical advancements that will ensure America's global leadership for many years to come."

Paley is an expert in both aerial and submersible unmanned vehicles, and he is applying biological principles from fish to the next generation of autonomous submersible vehicles. These autonomous unmanned vehicles (AUV) have applications from ocean exploration and data collection to anti-submarine warfare and explosive ordinance removal.

The ocean has been called one of the final frontiers of exploration left on earth, and even with today's technology, many parts of the sea present challenges to exploration and navigation due to extremes in temperature, pressure, and available light. However, Paley's work on bio-inspired research in sensory technology and unmanned submersible vehicles may offer more effective and efficient solutions for maritime applications and exploration.

Paley is the founding director of the University of Maryland's Collective Dynamics and Control Laboratory, and he became intrigued with autonomous underwater vehicles while working for a scientific consulting company after completing his B.S. in applied physics at Yale. "I quickly knew this was what I wanted to work on. Collective behavior and bio-inspired engineering were related interests that quickly followed," said Paley.

Paley's PECASE nomination was sponsored by the Department of Defense, and most of his research—dynamics and control, cooperative control of autonomous vehicles, adaptive sampling with mobile networks and spatial modeling of biological groups—is based on support from the U.S. Army, the Office of Naval Research (ONR), and the National Science Foundation.

With ONR's support, he is now leading a team of biologists and engineers to improve understanding of the hydrodynamic sensing in fish to improve sensory navigation technology and create a closed-loop control system for undersea autonomous vehicles. Fish use a system of sensory organs located along their sides called the lateral line system. This specialized sensory system enables a fish to detect changes in water currents, such as pressure gradients and flow velocity, providing them with spatial awareness and navigational cues.

Paley and his team have developed a robotic 'fish' with a bio-inspired flow sensing and control system that uses 'whisker' and pressure sensors to detect changes in water flow. The sensors provide data the 'fish' can use to not only detect changes, but use that information to generate a response. When an object is placed near the robotic fish, altering the water flow or direction, the robot can sense the flow changes, use the data to implement dynamic feedback control and respond by adjusting its heading or altering course to maintain position. This orientation to water currents is known as rheotaxis and the translation into an obstacle wake is known as station-holding—the same method a fish would use to maintain position behind a rock without being swept downstream.

Using artificial lateral line sensor systems in submersible vehicles could enable increased collection of environmental data and allow vehicles to navigate autonomously

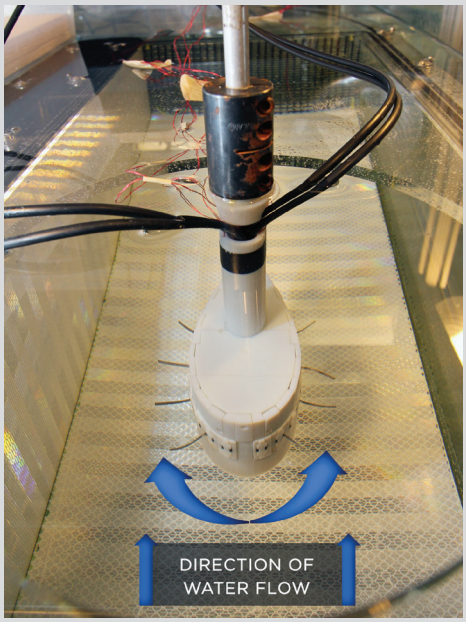


Photo by Jennifer Figgins Rooks

Whisker and pressure sensors enable Assoc. Prof. Derek Paley's bio-inspired robotic fish to sense and respond to changes in water flow.

in areas where traditional sensors such as sonar are unavailable. Teams of these vehicles will be better equipped to explore the dynamic environments of the ocean and provide valuable insights on climate change by collecting information on water temperature, salinity, and density variations.

"I am very proud of both faculty members and delighted to see this outstanding recognition of their research and educational activities," said Clark School Dean and Farvardin Professor Darryll Pines.

Paley holds a joint appointment with the Institute for Systems Research. Paley received his B.S. in Applied Physics from Yale University in 1997 and his Ph.D. in Mechanical and Aerospace Engineering from Princeton University in 2007. He has received the National Science Foundation CAREER award, is the co-author of *Engineering Dynamics: A Comprehensive Introduction* and is an Associate Fellow of AIAA and a Senior Member of IEEE.'

WWW.AERO.UMD.EDU/FACULTY/PALEY

Paley Receives Willis H. Young Jr. Faculty Fellowship

Paley was also awarded the Willis H. Young Jr. Faculty Fellowship and appointed to a three-year term as the Willis H. Young Jr. Professor of Aerospace Engineering Education. The Willis H. Young Jr. Faculty Fellowship is awarded to a tenured faculty member in aerospace engineering with outstanding contributions to aerospace engineering instruction and education at both the undergraduate and graduate levels.

The Willis H. Young Jr. Faculty Fellowship includes $5000/year in additional resources to be used for travel, equipment, or other needs. The award will be formally presented during a ceremony in the spring of 2014.

Humbert Awarded Techno-Sciences Faculty Fellowship

J. Sean Humbert

Associate Professor J. Sean Humbert was awarded the Techno-Sciences Faculty Fellowship and appointed to a three-year term as the Techno-Sciences Professor of Aerospace Engineering Innovation. The Techno-Sciences Faculty Fellowship is awarded to a tenured faculty member in aerospace engineering with outstanding contributions to innovation, research and technology transfer in aerospace engineering.

Humbert is the associate director of the University of Maryland's MAST-CTA on Microsystem Mechanics and director of the Autonomous Vehicle Laboratory.

Humbert's research interests are the intersection of dynamics, control and estimation theory with bio-inspired sensing and locomotion. His recent work has focused on the flight mechanics, distributed sensing and estimation approaches in small-scale organisms and how they can be applied to autonomous vehicles.

The Techno-Sciences Faculty Fellowship consists of a Glenn L. Martin Medal and $5000/year in additional resources to be used for travel, equipment, patent fees or other needs.

WWW.AERO.UMD.EDU/FACULTY/HUMBERT

Anderson and Pines Win Best Paper Award from AIAA

Left: The image of the Crab Nebula and Pulsar, in the optical (red) and X-ray (blue) portions of the spectrum superimposed. Right: The Crab Pulsar shown in only the X-ray portion of the spectrum. (NASA/CXC/ASU/J. Hester et al.)

Aerospace Engineering doctoral candidate Kevin D. Anderson and Dean and Farvardin Professor of Aerospace Engineering Darryll Pines co-authored a research paper that was selected as Best Paper in Guidance, Navigation and Control at the 2013 American Institute of Aeronautics and Astronautics (AIAA) Guidance, Navigation and Control Conference.

Their paper, "Experimental Validation of Pulse Phase Tracking for X-ray Pulsar Based Spacecraft Navigation," provided an experimental approach for using pulsars—rotating neutron stars that emit beams of radiation—for "autonomous, deep space navigation." While stars have been used as navigational aids for millennia, the stars traditionally used were those that are constant in the light they emit. Pulsars could be used as a "natural celestial lighthouse system" for deep space navigation because they emit radiation throughout the electromagnetic spectrum, tend to have regular, stable and periodic signals and are uniformly distributed throughout the sky compared to other stars.

Anderson and Pines' work outlines a model that could be used to time the arrivals of X-ray photons from a pulsar to a spacecraft and then use those measurements to determine a spacecraft's position and trajectory. This form of navigational could be used for autonomous deep space navigation or as a means for reducing errors when used in conjunction with other navigational systems.

Anderson and Pines were presented a Certificate of Merit in recognition of technical and scientific excellence during AIAA's Science and Technology Forum and Exposition (SciTech2014) held January 13-17, 2014 at the Gaylord National Hotel and Convention Center in National Harbor, MD.

Hubbard Chosen for HistoryMakers Oral History Collection

Department of Aerospace Engineering Samuel P. Langley Distinguished Professor James E. Hubbard, Jr. was selected for inclusion in HistoryMakers' archive of oral histories. HistoryMakers houses the nation's largest African American video oral history collection and records the stories and achievements of African American's lives, history and culture to educate and archive the diversity of American history.

Hubbard's 30-plus year career has spanned both industrial and academic settings, and he has received several awards for his work, including the International Society for Optical Engineering's 2009 Smart Structures Innovation Award and U.S. Black Engineer & Information Technology magazine's 2002 Black Engineer of the President's Award. His work has resulted in 2 dozen patents, and he has served as a member of the Air Force Studies Board, the Naval Research Advisory Committee and the Committee on Space Defense Technology.

James E. Hubbard, Jr.

"After more than 30 years in Engineering I'm still amazed at how much I love my work, how satisfying my interactions are with students, and how close my friendships with colleagues have become. I am blessed indeed," said Hubbard.

Hubbard is the Director of both the University of Maryland's Morpheus Laboratory and the National Institute of Aerospace's Alex Brown Center for Adaptive Aerospace Research.

To date HistoryMakers has interviewed over 2,000 individuals, recorded over 8,000 hours of interviews and has been featured on Public Broadcasting System's "An Evening With" programs.

Wereley Lead Editor and Contributor for New Book on Magnetorheological Fluids

Department Chair and Minta Martin Professor of Aerospace Engineering Norman Wereley is lead editor and a contributing author for a new book *Magnetorheology: Advances and Applications* published by the Royal Society of Chemistry as part of their series on smart materials.

Magnetorheological fluids are a type of smart fluid that can change viscosity in the presence of a magnetic field. They are important for many engineering applications such as shock absorbers and dampers in aerospace.

According to the publisher's description, *Magnetorheology: Advances and Applications* "provides an update on the key developments in the physics, chemistry and uses of magnetorheological fluids. Edited by a leading expert and with contributions from distinguished scientists in the field this timely book is suitable for chemists, physicists and engineers wanting to gain a comprehensive overview of these smart materials."

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Epps Delivers Winter Commencement Speech

"Once you define who you are and who you want to be, you must believe that you are that person."

Alumna and NASA astronaut, Dr. Jeanette J. Epps, M.S. '94, Ph.D. '00, was the guest speaker at the A. James Clark School of Engineering Winter Commencement Ceremony held Sunday, December 22, 2013.

During her speech, Epps shared her path to becoming an astronaut. She was honest about her challenges and encouraged graduates to believe in themselves, work hard and pursue their dreams.

Epps was selected as one of 14 members of the 20th NASA astronaut class in July 2009. She is a graduate of Astronaut Candidate Training, which included scientific and technical briefings, intensive instruction in International Space Station systems, Extravehicular Activity (EVA), robotics, physiological training, T-38 flight training and water and wilderness survival training. Epps is the first Ph.D. graduate from the University of Maryland Department of Aerospace Engineering to become a NASA astronaut. Electrical Engineering alumna, Judith Resnik, also served as a NASA astronaut.

A NASA Fellow during graduate school, Epps authored several highly referenced journal and conference articles. Her research has involved extensive testing of composite swept-tip beams, comparative analysis of analytical models and experimental data for shape memory alloys, and the application of shape memory alloy actuators for tracking helicopter rotor blades.

> "My message to you today is to always believe in yourself, your accomplishments and abilities. When you do this, no matter what happens, you will achieve a great level of personal success and satisfaction in life."

After completing graduate school, Epps was a technical specialist in the Scientific Research Laboratory at Ford Motor Company where she developed magnetostrictive actuators to reduce vibrations that enter vehicles through suspension control arms. Epps investigation of automobile collision location detection and countermeasure systems resulted in a U.S. Patent. In 2002, Epps joined the Central Intelligence Agency (CIA) where she spent more than 7 years working as a Technical Intelligence Officer. She received multiple performance rewards for her work at the CIA and was a three-time recipient of the Exceptional Performance Award (2003, 2004 and 2008). Epps is a member of the American Institute of Aeronautics and Astronautics and the Society for Science and the Public.

Hart Selected as One of *Aviation Week's* "Twenty20s"

Kenneth "Kip" Hart

Alumnus Kenneth 'Kip' Hart, B.S. '13, was selected as one of *Aviation Week's* "Tomorrow's Engineering Leaders: The Twenty20s." The award recognizes top science, technology, engineering and math (STEM) students that represent the next generation of aerospace and defense talent.

"With the Twenty20 awards, *Aviation Week* seeks to identify students who are already making a difference, through their academic performance, the projects and research they undertake, and their engagement with the world beyond their classrooms," said Greg Hamilton, Aviation Week president.

At the University of Maryland, Hart worked with Department Chair and Minta Martin Professor of Aerospace Engineering Norman Wereley as an undergraduate research assistant in the Composites Research Laboratory where he applied pneumatic artificial muscles to active control of morphing aircraft.

Hart is now a graduate student at Georgia Institute of Technology and works as a graduate research assistant, researching the aerodynamic effects on satellites and debris in low earth orbit.

Schoonover Honored at UMD Annual Alumni Gala

Kevin M. Schoonover

Alumnus Kevin M. Schoonover, B.S. '06, was awarded the Outstanding Young Alumnus Award at the University of Maryland's 13th Annual Alumni Association Awards Gala, held on October 25, 2013. The gala's award ceremony celebrates alumni who have made their mark on the university. Schoonover was one of three A. James Clark School alumni honored.

Schoonover is currently a director of strategy and business development for Alliant Techsystems and has already been named a "rising star in the global aerospace and defense industry" by Aviation Week & Space Technology's "40 Under 40." While attending the University of Maryland (UMD), he completed honors certifications from the Quality

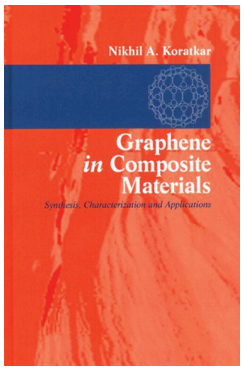
Enhancement Systems and Teams (QUEST) Honors Program and earned a Six Sigma Green Belt certification.

As an undergraduate, Schoonover took on a leadership role in the Clark Ambassadors recruiting program, and he continues to remain active within the UMD community by serving as committee chair for University of Maryland Engineering Alumni Chapter's student relations, as a member of the QUEST Alumni Board and as a competition manager of the Alumni Cup Competition.

The Young Alumnus Award is presented annually to a University of Maryland alumna/us not older than 35, who completed their undergraduate degree within the last 10 years, and who has distinguished themselves personally and professionally.

Koratkar Publishes New Book

Alumnus Nikhil Koratkar, M.S. '98, Ph.D. '00, published a new book *Graphene in Composite Materials: Synthesis, Characterization and Applications.* Koratkar's book provides an overview of graphene within the carbon



chemistry alternatives available to materials engineers and explains how it is incorporated into polymer-matrix and ceramic- and metal-matrix composite materials.

The book also describes how different forms of graphene can be synthesized and added to polymer composites as main or hybrid nanofillers, with a focus on how graphene affects electrical and mechanical properties. Graphene is a crystalline form of carbon and is very strong, light, nearly transparent and an excellent conductor of heat and electricity.

After completing his doctoral work at the University of Maryland, Koratkar joined Rensselaer Polytechnic Institute's Department of Mechanical, Aerospace and Nuclear Engineering as an assistant professor in 2001. He was named associate professor in 2006 and full professor in 2009, and in 2012, Koratkar was named the John A. Clark and Edward T. Crossan Professor of Engineering. He also holds a joint appointment as a full professor in Rensselaer's Department of Materials Science and Engineering.

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The Department of Aerospace recently created an alumni group on LinkedIn to help our graduates keep in touch and network with each other. To join, simply search "University of Maryland Department of Aerospace Engineering" and click "Join."

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In Memoriam

Elaine Gessow Passes at 88

Elaine Silverman Gessow, wife of Professor Alfred Gessow, a pioneer in the helicopter field and former chair of the University of Maryland's Department of Aerospace Engineering, passed away peacefully on January 2, 2014, surrounded by family and friends. She was 88.

Mrs. Gessow was born in Baltimore, Md. in 1925 and raised in Newport News, Va. She graduated from Madison College with a bachelor's degree in education and then taught elementary school. She met Alfred Gessow while he was a young aeronautical engineer and they were married in 1947. Mrs. Gessow retired from teaching to stay home with her children, but remained active in her community. Eventually, Mrs. Gessow returned to school and obtained a master's degree in education from the College of William and Mary. After her family's move to the Washington, D.C. area in 1959, Mrs. Gessow received a further advanced degree in education from the University of Maryland, where she worked as a counselor.

Members of the Gessow family celebrated the legacy of Alfred Gessow at the 25th anniversary of the Gessow Rotorcraft Center named in his honor in November 2007. Pictured with the Alfred Gessow Medal, which recognizes significant contributions in rotorcraft, are, from back left, sons Jory and Jody Gessow, Elaine Gessow (front left) and daughters Laura Goldman and Lisa Michelson

She was a dedicated volunteer for many years at WTOP's Call for Action in Washington, D.C., Suburban Hospital in Bethesda, Md., a CASA volunteer and very active at her synagogue. Mrs. Gessow served and often chaired the Board of Education at the synagogue, which oversaw an outreach program to college students that later developed into the College Connection Committee.

In 1980, her husband, Professor Alfred Gessow, became chair of the Department of Aerospace Engineering at the University of Maryland. He served in this post for the next eight years, expanding the department's research and education activities in rotorcraft, composite structures, hypersonics and space system design. In 1981, Professor Gessow founded the university's Center for Rotorcraft Education and Research and was its director until 1992 when he took emeritus status. The center, renamed the Alfred Gessow Rotorcraft Center in his honor in 1997, is one of the nation's leading institutions of rotorcraft research and education.

Mrs. Gessow, or Mama Elaine as she was affectionately called, was defined by her vivaciousness, self-confidence, cheerful disposition, zest for life, and positive attitude. "We are deeply saddened by the passing of Elaine Gessow," said Dean of the A. James Clark School of Engineering and Farvardin Professor of Aerospace Engineering Darryll Pines. "Our thoughts go out to the entire Gessow family, who have been such an important part of the Clark School of Engineering."

Mrs. Gessow is survived by her children, Lisa Michelson (Dr. Marc) of Birmingham, Miles Jory Gessow (Lisa) of Oakland, Calif., Andrew Jody S. Gessow (Rhonda) of Woodside, Calif., and Laura Goldman (Dr. Yale) of Merion, Penn.; grandchildren, Dr. Jennifer Michelson, Courtney Michelson, Samuel Gessow, Jeremy Gessow, Danielle Gessow, Julie Gessow, Dr. Jason Goldman, and Dr. Roger Goldman; three great grandchildren; and her special niece and nephew Marsha and Bill Rademacher of Urbana, Md.

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The Department of Aerospace Engineering
3181 Glenn L. Martin Hall
University of Maryland
College Park, MD 20742-2111

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