Photo credit: Dennis Schroeder/National Renewable Energy Lab

PENN STATE AEROSPACE ENGINEERING

FALL 2016 NEWSLETTER

Pictured above: members and advisers of the Penn State Wind Energy Club

Messages from the Department Heads

Penn State aerospace engineers continue to have a global impact and make the world a better place. Our faculty and staff are dedicated to the education of productive and ethical citizens, and we continue to advance aerospace technology and systems that address critical societal issues related to air and space vehicles, defense, and energy.

Our undergraduate curriculum is distinguished by opportunities for students to participate in team-based, hands-on projects and design competitions. One group, advised by Associate Professor **Susan Stewart** and **Rick Auhl**, senior research associate, took 1st place again in the DOE Collegiate Wind Competition. Another group, advised by Professors **Ed Smith** (B.S. '88) and **Joe Horn**, and **Dr. Kobi Enciu**, took 2nd place in the AHS Undergraduate Student Design Competition. Many additional student activities are highlighted within this newsletter.

Penn State once again topped the list of preferred suppliers of engineering talent to the aerospace and defense industry, according to the *Aviation Week* 2016 Workforce Study. And our major continues to be in high demand, with 130 entering juniors—up from 100 in just one year.

Faculty continue to garner well-deserved recognition. **Joe Horn** received the 2017 AIAA de Florez Award for Flight Simulation, and Professor **Victor Sparrow** presented the prestigious Rayleigh Lecture at the ASME International Mechanical Engineering Congress and Exposition.

Our alumni and students earned additional awards. **John B. Johns** (B.S. '82) was named a 2016 Outstanding Engineering Alumnus by Penn State's College of Engineering. We had two exciting McCormick Lecturers this year: Professor **Michael Selig** (Ph.D. '92), University of Illinois at Urbana-Champaign, and Professor **William Liou** (Ph.D. '91), Western Michigan. Boeing Emeritus Professor **Barnes McCormick** (B.S. '48, M.S. '49, Ph.D. '54) celebrated his 90th birthday and 70th wedding anniversary in July! **Mike Rudy** (B.S. '70, M.S. '73) served as overall chair of the College of Engineering's IPAC committee.

Through your collective generosity, we awarded almost $184,000 of departmental and college scholarships to more than 48 students this year. We appreciate your assistance and loyalty to Penn State, as we depend on your gifts to support initiatives that provide the foundation for our future curriculum.

As many of you know, I recently began service as associate dean for research in the College of Engineering. Professor **Philip Morris** has graciously agreed to lead the department as we launch a search for a successor. It has been a privilege for me to serve as head of this great department for 12 years. I can't imagine a more dedicated faculty and staff; we never tire of helping our students thrive during their time with us and then watching them go off to make a positive difference with their work and in their communities. We are also passionate about service and student-accomplished research that impacts the aerospace enterprise and improves people's lives. One of the best parts of the job for me has been interacting with all of you – the department is extremely lucky to have such committed and enthusiastic alums and friends. Thanks for your ongoing support of Penn State Aerospace Engineering; it has truly been a pleasure working with you to advance the department. I hope to see you around campus, at a meeting somewhere, or in an airport sometime (it happens!).

Best regards,

George A. Lesieutre

George A. Lesieutre

On behalf of the faculty, staff, students, and alumni, I would like to express our gratitude to George for his excellent leadership over the last 12 years. I have been lucky enough to have served under three exceptional department heads since I joined Penn State: **Barney McCormick**, **Dennis McLaughlin**, and **George Lesieutre**. I will only be in my new position for one year, and I plan to work diligently to ensure a smooth transition for the new department head, who is expected to start in fall 2017. With the support of my colleagues and the staff, I expect that things will run smoothly.

Philip J. Morris

Upcoming Alumni Events

Reception at AIAA Science and Technology Forum & Exposition (SciTech 2017)

January 9, 2017 – Grapevine, TX

Please visit www.aero.psu.edu/events for information regarding upcoming events.

PennState College of Engineering | AEROSPACE ENGINEERING

Awards & Recognition

PROMOTIONS

Sven Schmitz was promoted to associate professor of aerospace engineering, effective July 1. Schmitz, who joined the department in 2010, received his diploma degree from RWTH Aachen University (Germany) in 2002 and his Ph.D. from the University of California, Davis in 2006. His research is in the areas of computational fluid dynamics, rotorcraft, aeromechanics, and wind energy.

Susan Stewart was promoted to senior research associate and associate professor of aerospace engineering in July. Stewart joined the department in 2011. She received her M.S. and Ph.D. in mechanical engineering in 2001 and 2003, respectively, from Georgia Tech. Stewart is also the lead strategic adviser for the Penn State Wind Energy Club.

George Lesieutre, who served as department head from 2004 to 2016, was appointed associate dean for research for the College of Engineering in July. He will continue his teaching and research efforts in the department.

Philip J. Morris, Boeing/A.D. Welliver Professor of Aerospace Engineering, was named interim department head in August. Morris has been with the department since 1977.

FACULTY AWARDS/RECOGNITION

Joe Horn, professor of aerospace engineering, received the American Institute of Aeronautics and Astronautics (AIAA) 2017 de Florez Award for Flight Simulation. Horn was cited for pioneering contributions to rotorcraft flight simulation and education, including piloted ship-board landing, real-time simulation of coupled flight dynamics and ship-air wake modeling, and flight simulation with acoustics predictions. He was also named editor-in-chief of the Journal of the American Helicopter Society.

Namiko Yamamoto, assistant professor of aerospace engineering, was awarded $376,599 through the Office of Naval Research (ONR) Navy and Marine Corps Science and Technology program for her research proposal titled "1D-Patterned Nanocomposites Structured Using Oscillating Magnetic Fields." Yamamoto is working to develop a scalable manufacturing capability of hierarchical 1D-patterned nanocomposites that will enable bulk application of multifunctional polymer-nanocomposites in aerospace structures. The proposed research aligns with ONR's interest in the field of Sea-Based Aviation National Naval Responsibility – Airframe Structures and Materials.

Sven Bilén, head of the School of Engineering Design, Technology, and Professional Programs at Penn State and professor of engineering design, electrical engineering, and aerospace engineering, served as the co-chair of the fifth International Conference on Tethers in Space, held in May at the University of Michigan in Ann Arbor. Bilén was also part of a team of Penn State researchers that received a best paper award for its paper titled "Networked, Real Time Translation of 3D Mesh Data to Immersive Virtual Reality Environments," presented at the American Society of Mechanical Engineers' 36th Computers and Information in Engineering Conference – Virtual Environments and Systems.

Edward Smith, professor of aerospace engineering and director of the Vertical Lift Research Center of Excellence, was named a 2017 AIAA Associate Fellow. He will be inducted with the Class of 2017 during a recognition ceremony and dinner on January 9, 2017, in conjunction with SciTech 2017.

Richard Auhl, laboratory director and research associate in aerospace engineering, and **Victor W. Sparrow**, professor and director of the Graduate Program in Acoustics, were honored for 25 years of service to Penn State at a College of Engineering ceremony held in September.

SABBATICALS

Kenneth Brentner, professor of aerospace engineering, performed research that focused on the acoustics of coaxial rotors and rotor noise prediction for conceptual design in collaboration with the Rotorcraft Aeromechanics Branch at NASA Ames Research Center in Mountain View, CA, and with the U.S. Army. He also worked with researchers at Stanford University.

Jack Langelaan, associate professor of aerospace engineering, worked with Ben Franklin Technology Partners, Vayu LLC, and the Innovation Center through its Cool Blue mentoring services to develop hands-on experiences in entrepreneurship to bring back to the classroom.

Robert Melton, professor of aerospace engineering, spent six months at Sapienza University of Rome, working on three projects in optimal attitude control with faculty and graduate students in the School of Aerospace Engineering. His work resulted in two conference papers and continuing collaboration with his Italian colleagues. Melton is presently hosting one of the Ph.D. student-collaborators as a visiting scholar here at University Park for the fall semester, with an emphasis on identifying new research directions.

Editors: Philip J. Morris, Deborah Mayes, Michelle Barnyak, and Chris Spallino, with contributions from the College of Engineering Office of Communications.

Scholarships/Fellowships 2015-16

Department of Aerospace Engineering

Aero General Scholarship
Kyle Snowberger

Aero Pioneers Class of 1944 Scholarship
Samuel Maszkiewicz, Max McCandless, Rachel Schellberg

Lou Borges Scholarship
Julia Balla, Matthew Cavorsi, Jason Cornelius

Brian Chappel and Marion Stone Chappel Scholarship
Brian Murphy, Christopher Shoemaker

Mary Ilgen Scholarship
Garrett Neal

Richard W. Leonhard Scholarship
Bryce Connelly, Christopher Covert, Alexander Borowski, Christopher Curry, Ian Fitzsimmons, Jacob Johnson, Kyle Kochel, Christian O'Toole, Creed Reilly, Timothy Sam, Joshua Shaffer, Matthew Shaw, Darren Slotnick, Daniel Streeter, Jason Turner

James Reynolds Norris Memorial Scholarship
Max Winn

David J. Peery Memorial Scholarship
Kevin Parlak

Carl A. Shollenberger Memorial Scholarship
Tirth Patel

Donald G. and Jayne L. Steva Scholarship
Joshua Moser, Yufei Zhu

College of Engineering

Brown Family Endowed Award in the College of Engineering
Shreya Trivedi

Diefenderfer Scholarship
Kara Morgan

Gary and Ralphine Gentzler Trustee Scholarship
David Getz

Engineering General Scholarship Fund
Bryce Connelly

SE & EL Klein Engineering Scholarship
Darren Slotnick

David P. and JoAnne C. Kulig Trustee Scholarship
Thomas Dauber II

Ethel Durchschlag Levin Scholarship
Kyle Knight

Theodore A. and Catherine M. Mathias Scholarship
Darren Slotnick

McMurtry Family Scholarship
Lindsey Evans

John R. and Brenda T. Myers Trustee Scholarship
Davendra Chatterpaul

Penn State Engineering Society Endowed Scholarship
Alexander Borowski

Richard A. and Donna G. Schutz Trustee Scholarship in COE
Christopher Cuascut

William F. Seeley Scholarship
Zachary Ladonis

John E. and Lynn A. Shavinsky Scholarship in the College of Engineering
Amelia Batcha

Loren and Bernardine Stolp Family Trustee Scholarship
Yoonah Nam, Alexandro Retamozo

Paul E. White '30 and Rachel W. White Trustee Scholarship
Jason Cornelius

Ernest Weidhaas Memorial Fund
Cody Dillinger

Wormley Family Trustee Scholarship in the College of Engineering
Michael Fendler

Graduate Scholarships/Fellowships

AHS Vertical Flight Foundation Scholarship
David Reich

Bell Graduate Fellowship
Reed Kopp, Kalki Sharma, Gregory Walsh

College of Engineering Graduate Excellence Fellowship
Belen Veras-Alba, Miguel Alvarez, Reed Kopp, Jessica Morgan, Edward Rocco

DoD SMART Scholarship
Scott Hromisin, Jason Reiter

Richard W. Leonhard Graduate Scholarship
Gregory Walsh

LORD Corporation Graduate Fellowship
Alexandre Bondoux

NASA Aeronautic Fellowship
Zachary Cameron

National Defense Science and Engineering Graduate Fellowship
Ethan Corle, Guillermo Costa

PA Space Grant Consortium Graduate Fellowship
Neal Parsons

Eric Walker Fellowship (Penn State/Applied Research Laboratory)
David Hanson, Seam McIntyre, David Reich

SEMINARS AND SHORT COURSES

DAVID MILLER, chief technologist, Office of the Chief Technologist, NASA, "NASA Technology Drives Exploration (and How You Can Get Involved)" – November 2015

STEPHEN BLANCHETTE, JR., deputy director of client technical solutions, chief engineer for Army Programs, Software Engineering Institute, Carnegie Mellon University, "Software in Aerospace Systems" – February 2016

SERGIO PELLEGRINO, Joyce and Kent Kresa Professor of Aeronautics and professor of civil engineering, California Institute of Technology, JPL Senior Research Scientist, "Ultralight Deployable Structures for Space Solar Power" – April 2016

JOHN B. JOHNS, Deputy Assistant Secretary of Defense for Maintenance, Office of the Secretary of Defense, U.S. Department of Defense (ret.), "Engineering Ethics – The Challenge of Recognizing, Saying, and Doing the Right Thing" – April 2016

ANNA-MARIA RIVAS MCGOWAN, senior engineer for complex systems design, NASA, "Design and Engineering of Complex Systems" – April 2016

SVEN SCHMITZ, associate professor of aerospace engineering, Penn State, "1st Rotor Hub Flow Prediction Workshop" – June 2016

EDWARD SMITH, professor of aerospace engineering, Penn State, "49th Rotary Wing Technology Short Course" – August 2016

Awards & Recognition

STAFF AWARDS/RECOGNITION

Kirk Heller receives his PSEAS Staff Innovation Award from College of Engineering Dean Amr Elnashai.

Austin (Kirk) Heller, systems administrator, was a recipient of the 2016 Penn State Engineering Alumni Society (PSEAS) Staff Innovation Award. The Staff Innovation Award recognizes a full-time staff member who has worked for the College of Engineering for at least two years and has used creativity appropriately to develop new and/or improved processes, methods, systems, products, or services and encouraged others to do the same. Heller, a Penn State alumnus (B.S. E E '01), joined the aerospace engineering staff in September 2005. Prior to joining the department, he was a programmer with MPM Technologies, Inc.

ADDITIONS TO THE DEPARTMENT

Alan R. Wagner joined the aerospace engineering faculty as an assistant professor in August, having previously been a social robotics researcher at the Georgia Tech Research Institute. Wagner will also be affiliated with, and co-funded by, the Penn State Rock Ethics Institute. His research focus will be on developing the theoretical underpinnings necessary for human-robot social relations and the design and creation of systems which can interact with people pro-socially as they relate to unmanned aerial vehicles in search-and-rescue and humanitarian missions. Wagner received his B.S. in Psychology from Northwestern University, his M.S. in Computer Science from Boston University, and his Ph.D. in Computer Science from Georgia Tech.

INDUSTRIAL AND PROFESSIONAL ADVISORY COUNCIL

IPAC members, standing from left: **D. Heverly**, **D. Hallman**, **C. Tweets**, **D. Senft**, **J. Cole**, **L. Trick**.

Each year a group of prominent individuals from industry, government, and academia are invited to serve on the department's external advisory committee—the Industrial and Professional Advisory Council (IPAC). IPAC is tasked with reviewing the department's activities and plans, and presents a report of its findings. This year's meeting was held March 23-24. Findings included: online education is important in meeting the department's needs; interdisciplinary education at the graduate level could create more cutting-edge, marketable degrees; and department resources are limited. Recommendations included: implement alternative online educational approaches, establish cross-college collaboration, and increase and infuse resources to meet enrollment growth.

IPAC members participating in 2016 include:

Jennifer Cole (B.S. '98), aeronautics research mission directorate, NASA Armstrong Flight Research Center, Edwards Air Force Base, CA

Douglas G. Hallman (B.S. '85), program manager for the F-35 Aircraft Program in Turkey, Lockheed Martin Aeronautics Company, Fort Worth, TX

David E. Heverly II (B.S. '90, M.S. '91, Ph.D. M E '02), principal engineer - structural dynamics, Bell Helicopter Textron, Inc., Fort Worth, TX

Donna Cowell Senft (B.S. E SCI '83), chief scientist, Air Mobility Command, Scott Air Force Base, IL

Cecil W. Teets (B.S. '85), president and CEO, Automated Systems in Aircraft Performance, Inc., Cranberry Township, PA

Lawrence L. Trick (B.S. '82, M.Eng. '94), lead government air vehicle systems engineer, H-60 Seahawk, Naval Air Systems Command, Patuxent River, MD

Unable to attend this year were Juan J. Alonso, professor of aeronautics and astronautics, Stanford University, Stanford, CA, and **Kevin Leath** (B.S. '85), director, System Integration for the KC-46 Tanker program, Boeing Defense, Space and Security, St. Louis, MO.

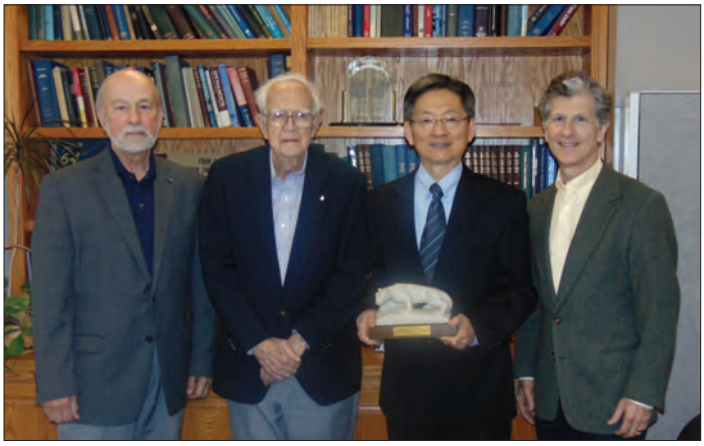
The department would like to extend a special thank you to IPAC member **Donna Cowell Senft**, who rotated off IPAC following this year's meeting.

Awards & Recognition

BARNES W. MCCORMICK HONORARY ALUMNI LECTURES

Michael Selig (center), the fall 2015 Barnes W. McCormick Honorary Alumni Lecturer, pictured with **Mark Maughmer** (left) and **George Lesieutre** (right).

Michael Selig (Ph.D. '92), the fall 2015 Barnes W. McCormick Honorary Alumni Lecturer, presented "Low-Speed Airfoil Design and Application." Selig's lecture addressed how airfoil design can be influenced by a broad spectrum of considerations, including low Reynolds number performance, low drag, high lift, robustness to roughness, and maximum endurance. Examples included airfoils for UAVs, wind turbines, motorsports, record-breaking solar powered aircraft, and yacht racing. Selig, professor of aerospace engineering at the University of Illinois at Urbana-Champaign (UIUC), leads the UIUC Applied Aerodynamics Group and is co-director of the UIUC Subsonic Aerodynamics Research Lab.



William Liou (second from right), the spring 2016 Barnes W. McCormick Honorary Alumni Lecturer, pictured with **Philip J. Morris** (left), **Barnes McCormick** (second from left), and **George Lesieutre** (right).

William Liou (Ph.D. '91) presented the spring 2016 Barnes W. McCormick Honorary Lecture titled "Wait, aerodynamics and what?" Liou's lecture focused on how physics-based computer simulations solve the model differential equations of single, or multiple physics (fluid, solid, heat transfer, motions), in a coupled manner. Numerical methods and computational results were presented for a number of aerodynamic and fluid flow problems that are of fundamental and applied research interest. After graduating from Penn State, Liou worked at the NASA Glenn Research Center for six years. In 1997, he joined Western Michigan University, where he is currently professor of mechanical and aerospace engineering and has founded a number of centers, labs, and externally funded research units.

OUTSTANDING ENGINEERING ALUMNUS

John B. Johns (B.S. '82) was honored as an Outstanding Engineering Alumnus (OEA) of the Penn State College of Engineering in spring 2016. Johns, retired Deputy Assistant Secretary of Defense (Maintenance) for the U.S. Department of Defense (DoD), and Pittsburgh, PA, native, spent almost 34 years serving three military departments in technology development, engineering, program management, and logistics positions. Between his junior and senior years, he interned at the Air Force Flight Test Center at Edwards Air Force Base, where he worked in the F-16 Joint Test Group supporting senior flight test engineers. Upon graduation, Johns began his career at the Naval Air Development Center in Warminster, PA, performing flying qualities analyses on U.S. Navy fleet aircraft. Later assignments with the U.S. Army Aviation and Missile Command included Associate Director for Systems, Aviation Research, Development, and Engineering Center; Principal Assistant Deputy for Systems Acquisition; and Deputy Commander for Systems Support. In August 2005, he joined the U.S. Navy as the Director of Industrial Operations and Deputy/Acting Commander of Fleet Readiness Centers, where he was responsible for maintenance operations across eight subordinate commands, as well as managing 14,000 personnel and a $4 billion operating budget. In 2008, he was named Deputy Assistant Secretary of Defense (Maintenance), overseeing an $80 billion-per-year global military equipment maintenance program ensuring material readiness in support of our armed forces. In 2010, he served in Iraq as Director, Training and Advisory Mission, Iraqi Ministry of Defense, and Director, Iraqi Security Forces Logistics. Johns resides in Alexandria, VA, and also holds a master's degree in aeronautics and astronautics from Purdue University.

John B. Johns receives his OEA award from College of Engineering Dean Amr Elnashai.

Attention Aerospace Grads!

What are you doing now?

If you have some exciting news or a success story, we want to hear about it—and share it with our community of alumni and peers! Email us at aerospace@engr.psu.edu and tell us what you've been up to lately.

If you've moved, please remember to update your address with the Alumni Association at www.alumni.psu.edu.

Alumni News

Photo credit: University of Illinois at Urbana-Champaign

Phil Ansell (B.S. '08) was named to the 2016 *Forbes Magazine* 30 Under 30 List for the Science category. Assistant professor in the Department of Aerospace Engineering at the University of Illinois at Urbana-Champaign, Ansell is currently working with the U.S. Air Force and NASA to understand physics problems associated with wing design.

Mike Arata (B.S. '91), director of engineering at United Airlines and Penn State Brandywine advisory board member, was the guest speaker at Penn State Brandywine's fall commencement ceremony.

Jason A. Borrelli (B.S. '94) was named a new member of Penn State Smeal College of Business's Institute for Real Estate Studies Advisory Board.

Robert D. Braun (B.S. '87) was named the new dean of the College of Engineering and Applied Science at the University of Colorado Boulder, effective January 2017. Previously, he was the Andrew Lewis Professor of Space Technology and director of the Space Systems Design Laboratory at Georgia Tech. Braun was also the keynote speaker at Penn State's 2016 College of Engineering Research Symposium. His talk was titled "Entry, Descent and Landing Technology Investments to Enable a New Era of Mars Exploration."

Photo credit: U.S. Navy photo/Released

Tom Briggs (B.S. '90) won the 2015 Department of the Navy Test and Evaluation Award for Lead Tester. Briggs, air vehicle engineering department head - F-35 ITF at the Naval Air Warfare Center Aircraft Division, is responsible for keeping the engineering corps of approximately 225 flight test engineers ready to plan for, execute, and report on all aspects of F-35 flight testing for the U.S. Navy and U.S. Marine Corps.

Monica Christiansen (M.S. '14) was promoted to senior engineer in the Aero/Thermal group at AeroSystems/FluiDyne. She is currently working on a project to design and build a wind tunnel at Embry-Riddle Aeronautical University.

Jeffrey B. Gray (B.S. '93) retired from the U.S. Air Force as a Lieutenant Colonel in October after a 21-year active duty career. Lt Col Gray served as the transition director for Space-Based Infrared Systems (SBIRS) at Buckley Air Force Base, CO, where he was responsible for consolidating SBIRS satellite/ground operations. His military career included a broad range of Air Force, Joint Service, Coalition Service, and Intelligence Community assignments.

Ryan Hedges (B.S. '10) and U.S. Marine Corps **Maj. Allen D. Wold** (B.S. '03) graduated from the U.S. Naval Test Pilot School as part of Class 149. Maj. Wold also received the Syd Sherby Leadership Award, presented to the student who displays exemplary leadership in the class.

Ken Hibbard (B.S. '86), principal project systems engineer and deputy program development manager for Civil Space at the Johns Hopkins University Applied Physics Laboratory, gave a special presentation on the Solar and Heliospheric Observatory recovery effort to the Penn State Lunar Lion team in April.

Seongkyu Lee (Ph.D. '09) became an assistant professor of mechanical and aerospace engineering at the University of California, Davis, where he will work on aerodynamic and aeroacoustics research. He was previously lead mechanical engineer and advanced design tools program manager for GE Global Research.

James Moore (B.S. '60) was inducted into the Monaca Community Hall of Fame in October.

Peter Phillips (B.S. '90, M.S. I E '97), Vaeros Systems Director for NASA and other civil space programs, received The Aerospace Corporation's President's Achievement Award for his outstanding leadership in program execution on several high-priority NASA programs.

Photo credit: U.S. Air Force photo/Tech. Sgt. Sam King

Col. Regina Sabric (B.S. '95) became the first female commander of the 919th Special Operations Group. Sabric, a 20-year veteran and senior pilot, took the command after serving at Headquarters Air Force at the Pentagon in Washington D.C.

James Shade (B.S. '87), senior engineer at Belcan Corporation, published his debut fantasy novel, THIEVES OF ISLAR, a coming-of-age story about three siblings facing tragedy, and the meaning of family and friends in a criminal community. His book is available in e-book format for Kindle readers and in softcover on Amazon.

Greg Scott (B.S. '99) was inducted as an Associate Fellow of the American Institute of Aeronautics and Astronautics. Scott is the co-founder of Service Robotics & Technologies.

The Graduates

FALL 2015

Bachelor of Science

Amelia L. Batcha
Thomaslee K. Boyce
Scott E. Cowan
Clay M. Dawson
Paige N. Dumke
Michael D. Fusco, Jr.
Christopher J. Greer
Peter B. Jackson
Joseph Kurtz, Jr.
Jason O. LaPre
Edward F. Lauser III
Casey S. Leavens
Alexandro N. Retamozo
Priscilla M. Sangama Campos
Daniel S. Scala
Michael L. Stoklosa
Galen I. Stuski
Richard F. Zang

Master of Science

Alexandre F. Bondoux
Ahmad M. Haidar
Skyler M. Shuford
Qiuling Suo
Vidullan Surendran
Albert Zheng

Master of Engineering

Ruoyu Tan

Doctor of Philosophy

Burak Korkut
Tong Zhu

SPRING 2016

Bachelor of Science

Anton J. Antolick
Harley B. Austin
Christopher J. Axten§
David Baranov
Joshua W. Baumann
James C. Beidleman
Alexander D. Borowski§
Abigail R. Brandtmeier
Nathan T. Brockett
Ryan J. Burke
Cory C. Caldwell§
Joshua F. Carden
Nicholas R. Carlson
Christopher J. Cavanaugh
Davendra Chatterpaul
Michael J. Cleek
Angelina M. Conti§
Joel D. Croce
Colton E. Crockett
Christopher P. Crowley
Christopher M. Curry
Joseph F. Damis
John P. DeGennaro
Wesley M. Doe
Brandon M. Dreese
Kyle M. Ellingson
Michael N. Fendler
Hui Feng
Ian M. Fitzsimmons
Matthew F. Flaig
Peter T. Flanagan§
Gregory M. Frasch
David Getz
Brandon M. Goss
Melissa D. Hensler
David J. Irizarry
Alfredo C. Iturralde
Jacob D. Johnson
Jenna L. Jurich
Meghan E. Kaminski
Mark Kelly
Zachary G. Klotz
Kyle P. Knight
William C. Koffler
Garrett Kolmer
Brett R. Larson
Christopher P. Lawler
Christopher A. Leigh
Gregory E. Lerch
Travis R. Lommock
Ashley K. Louge
John C. MacNamara
Amy M. Maffei
Ryan S. McGill
Adam Mohammed
Joshua A. Moser
Wonsik Nam
Matthew J. Nelson
Christian T. O'Toole
Alex M. Parkhill
Seth J. Pileggi
Anthony P. Ragusa
Raja Akif Bin Raja Zahirudin
Sean A. Ruiz
Alexander I. G. Savadelis
Joseph R. Schreckengost
James R. Scrobola
Mitansh S. Shah
Matthew J. Shaw§#
Christopher M. Shoemaker
Darren P. Slotnick§
Tobie M. Sneeringer
Kyle R. Snowberger
Harrison C. Stoebe
Luke Storey
Daniel R. Streeter*
John A. Targonski
Harrison S. Teplitz
Spencer P. Tighe
Shreya S. Trivedi
Kalman V. Wagner
Andrew J. Willard
Connor M. Wilson
Louis G. Witalec
Eitaro Yamakawa
Bolor-Erdene Zolbayar

Master of Science

Brennan T. Blumenthal
Matthew D. Drury
Andrew M. Goodyear
Koundinya Kuppa
Jacob J. Lampenfield
Jason A. Reiter
Peter C. Scarcella

Master of Engineering

David S. Brown
Guanwei He
Linghan Qian

Doctor of Philosophy

Yiqiang Han
Sean M. McIntyre
Grant M. Skidmore

SUMMER 2016

Bachelor of Science

Philip L. Burt
Dylan P. Engle
Karol Kolc
Michael G. Welch

Master of Science

Sagar Sangame Ananthanarayanan
Junyi Geng
Jatin P. Haibat
Brian F. Imperiale
Reed A. Kopp
Philip B. Mainwaring
Nicholas A. Rudenko
Umberto Saetti
Gregory D. Walsh
Sihong Yan

Master of Engineering

Thomas Y. Belaid
Romain Boscher
Nour Cherkaoui
Andrea C. Cordova Cruzatty
Lei Lei
Yi Ren
Christopher P. Tombasco

Doctor of Philosophy

Sandilya Kambampati

§ Schreyer Scholar
# Aerospace Student Marshal
* ROTC Student Marshal

Above: Penn State Aerospace Engineering faculty, students, and alumni at the 2016 AHS Forum in West Palm Beach, FL.

Right: **Barnes (Barney) McCormick** (B.S. '48, M.S. '49, Ph.D. '54), Boeing Emeritus Professor, celebrating his wife's and his 90th birthdays and 70th wedding anniversary.

Below: Undergraduate student **Castle Leonard** sets up a high-speed camera for a demonstration at STEM Rotor Day.

Photo credit: Abby Drey, Centre Daily Times

Below: **David Spencer** (left), professor of aerospace engineering, graduate student **Davide Conte** (second from left), and members of the Dream Team at the RASC-AL Forum in Cocoa Beach, FL. The team took first place at RASC-AL and also won the RASC-AL volleyball tournament, beating the NASA team.

Photo credit: RASC-AL, RASC-AL Forum

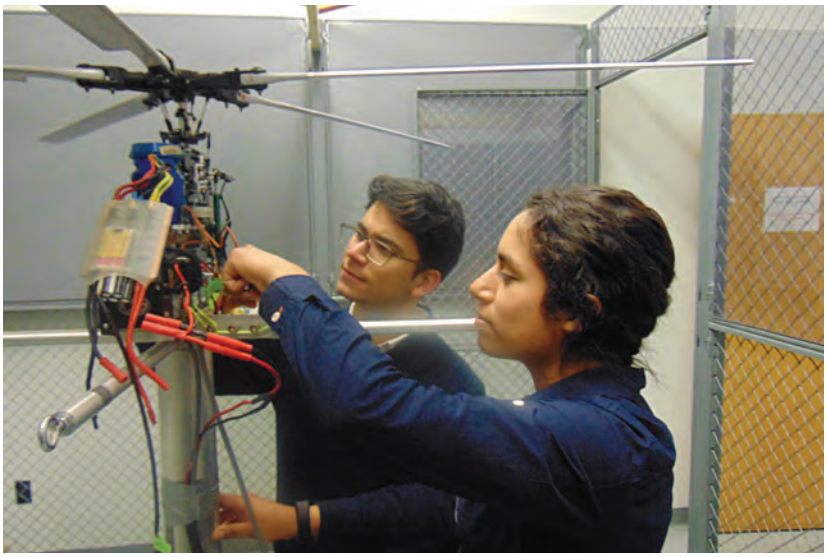
Top Left: **Sven Schmitz** (right), associate professor of aerospace engineering, and attendees of the 1st Rotor Hub Flow Prediction Workshop at University Park, PA.

Top Right: **Jim Coder** (right) (B.S. '08, M.S. '10, Ph.D. '14), assistant professor, University of Tennessee, competed on Jeopardy in June.

Left: **Mychal Spencer** (left), aerospace engineering graduate student, makes a diluted solution of deionized water and iron oxide nanoparticles to help study how small magnetic particles assemble, while **Jatin Haibat** (right) (M.S. '16), graduate research assistant, prepares a substrate for carbon nanotube growth to load into a chemical vapor deposition furnace in the Nano-/Micro-engineered Materials Lab.

Bottom Left: Graduate student **Will Holmes** makes adjustments to a drone while working in the Indoor Flight Research Lab.

Bottom Right: **Belen Veras-Alba** (B.S. '15, M.S. '17) and **Miguel Alvarez** (B.S. '15, M.S. '17) troubleshoot sensors and controls on a rotor stand.



Student Highlights

Photo credit: American Institute of Aeronautics and Astronautics

Kirsten Muirhead, a junior in aerospace engineering, won first place in the undergraduate student presentation competition at the AIAA Region I Young Professional, Student, and Education Conference 2015 for her presentation titled "Interaction of High Turbulence Dilution Flow with Turbine Vanes in Gas Turbine Engines."

Jason Cornelius, a junior in aerospace engineering, completed a research and design of rotorcraft aeromechanics internship in the spring at the Rotorcraft Aeromechanics Branch of NASA Ames Research Center in Moffett Field, CA. Cornelius had the opportunity to conduct research on the development of rotary wing vehicles with four undergraduate students and three international graduate students.

Adam Cheskey, a junior in aerospace engineering, took first place in the College of Engineering's fall 2016 Leonhard Center Speaking Contest with his talk on rocket science advancement. His professional delivery and great sense of humor stood out from other contestants and got him the most votes.

Jessica Morgan, graduate student in aerospace engineering, was named a top-five winner at the 2nd annual Millennium Café Pitch Competition held at the Penn State Millennium Science Complex in May. Morgan's presentation, titled "Noise Reduction of Military Aircraft," focused on reducing military aircraft noise to mitigate hearing loss and compensation costs for military personnel.

Davendra Chatterpaul, a senior in aerospace engineering, is the project manager for the Penn State Advanced Vehicle Team, a team of approximately 70 students from multiple engineering disciplines and majors across the University, who are competing in EcoCAR3, a four-year-long competition that is part of the U.S. Department of Energy Advanced Vehicle Technology Competition series. The team's mission is to take a 2016 Chevrolet Camaro and re-engineer it from a gas-gulping sports car into a fuel-efficient hybrid—without sacrificing a Camaro's signature performance characteristics.

Aerospace engineering graduate students **Philip B. Mainwaring** and **Jason Reiter** took first and second place, respectively, in the Afternoon Paper/Oral Presentations category at the 13th annual College of Engineering Research Symposium (CERS) held in April. The 2016 CERS event featured 60 paper presentations and 64 poster presentations. Reiter also won the Space Automation and Robotics Technical Committee Best Paper Award at the AIAA Region I Young Professional, Student, and Education Conference 2015 for his presentation titled "An Analytical Solution to Quick-Response Collision Avoidance Maneuvers in Low Earth Orbit."

Sergio Gallucci, graduate student in aerospace engineering, received a National Science Foundation (NSF) Graduate Student Fellowship. The NSF program supports outstanding graduate students in the science, technology, engineering, and mathematics disciplines.

Photo credit: RASC-AL, RASC-AL Forum

Davide Conte (third from left), graduate student in aerospace engineering, led a team of international graduate students to a sweep at the 2016 Revolutionary Aerospace Systems Concepts Academic Linkage (RASC-AL) Forum—a university-level, full mission architecture engineering design competition. Conte assembled the Dream Team, an interdisciplinary team of 15 students from 11 universities, representing eight countries. The team won First Place Overall, Best in Theme, and the Pioneering Exceptional Achievement Concept Honor Award, which recognizes the most innovative and meaningful idea presented at RASC-AL. **David Spencer** (third from right), professor of aerospace engineering, served as team adviser. Conte was also part of a multi-university team that took first place in the European Space Agency (ESA) Moon Challenge contest at the European Space Research and Technology Centre in The Netherlands in December 2015. The ESA Moon Challenge is an international student contest that focuses on human-robotic partnership for lunar exploration and is part of the Symposium *Moon 2020-2030: A new Era of Human and Robotic Exploration*.

Matthew Shaw served as the aerospace engineering student marshal for the College of Engineering's spring 2016 commencement ceremony. A native of North Huntingdon, PA, Shaw is a Schreyer Scholar, vice president of Sigma Gamma Tau Aerospace Engineering Honor Society, and corresponding secretary of Tau Beta Pi Engineering Honor Society. He is the recipient of the Boeing Company Scholarship, Tau Beta Pi Scholarship, Leonhard Scholarship, Pennsylvania Ready to Succeed Scholarship, Alumni Scholarship Award, Aero Pioneers Class of 1944 Scholarship, and the Blue and White Scholarship. Shaw's academic honors include the President's Freshman Award, the President Sparks Award, and the Penn State Greater Allegheny Faculty Award for Academic Excellence in Engineering. He is presently pursuing a master's degree in aerospace engineering at Penn State under the supervision of **Robert Melton**, professor of aerospace engineering.

Daniel Streeter served as the student marshal for the Reserve Officer Training Corps (ROTC) for the College of Engineering's spring 2016 commencement ceremony. Streeter, a native of Westfield, PA, is a member of Scabbard and Blade, a collegiate military honor society, as well as a recipient of the American Legion Scholarship Excellence Medal in 2013, 2014, and 2015. He was also the recipient of the Air Force ROTC Scholarship and the Leonhard Scholarship for Scholastic Excellence. He was named to the Dean's List every semester. Streeter is presently an operations research analyst for the U.S. Air Force.

Student Highlights

STUDENT AWARDS

Anthony E. Wolk Senior Thesis Award

Matthew Shaw (B.S. '16) was the recipient of the Anthony E. Wolk Senior Thesis Award for the 2015-2016 academic year. His thesis, titled "An Experimental Collision of Unmanned Aerial Vehicles with Aircraft Lifting Surfaces," was advised by **Robert Melton**, professor of aerospace engineering. He is currently pursuing a master's degree in aerospace engineering at Penn State under the supervision of **Robert Melton**, professor of aerospace engineering.

Anthony E. Wolk Citizenship Award

This year, we honored two of our student leaders, **Christopher Axten** (B.S. '16) and **Ryan Burke** (B.S. '16) with the Anthony E. Wolk Citizenship Award. Axten was a member of Sigma Gamma Tau; served as an undergraduate teaching intern; was a volunteer for Penn State's Spend a Summer Day, Schreyer Honors College Scholars Day, and Aerospace Engineering Major Night; and served as an Aerospace Engineering Envoy providing lab tours to prospective students. Burke was a volunteer for Penn State's Spend a Summer Day, Schreyer Honors College Scholars Day, and Aerospace Engineering Major Night.

Pauling-Eisenhuth Award

Ahmad Haidar (B.S. '14, M.S. '16) was this year's recipient of the Pauling-Eisenhuth Award, which honors outstanding academic achievement by a master's degree student whose studies focus on national defense or homeland security. Advised by **Jose Palacios**, assistant professor of aerospace engineering, Haidar's M.S. thesis research focused on the comprehensive modeling and experimental validation of passive vibration suppression for supercritical rotary machines. He was also awarded an Engineering Graduate Fellowship to continue his research.

STUDENT SOCIETIES

American Helicopter Society (AHS)

AHS members at STEM Rotor Day.

It was a busy year for the Penn State chapter of AHS International as it continued to host informative and inspiring seminars for students, as well as host and participate in new and ongoing local STEM outreach activities. The chapter held a distinguished pilot panel, which included Penn State alumnus **Maj. Chris Knarr**, U.S. Marine Corps, where students learned about helicopter and fixed wing pilots. Additional seminars included presentations on the current portfolio and future of the Aviation Development Directorate with respect to science and technology; the past, present, and future development of Boeing Vertical Lift by mechanical engineering alumna **Patricia Stevens**; career development in the rotorcraft industry by **David Heverly**; and Bell Helicopter programs under development.

The chapter also held its 3rd annual STEM Rotor Day to educate children in the local community and get them excited about the STEM fields through various demonstrations and lab tours. In collaboration with the Penn State Eberly College of Science, the chapter hosted and participated in several new STEM events: Exploration-U, which focused on innovative, hands-on science activities; Expanding Your Horizons – STEM Career Day for Girls, where young women learned about STEM disciplines; and PA Cyber Discovery Night, where PA Cyber students learned through engaging, hands-on STEM demonstrations with a small-scale wind tunnel, high-speed cameras, and gyroscope table. The chapter has many more exciting activities planned for the upcoming year.

American Institute of Aeronautics and Astronautics (AIAA)

AIAA members at the Boeing Rotorcraft Systems facility in Ridley Park, PA.

The Penn State student chapter of AIAA held many new and exciting events this year. It hosted the 2nd annual Boost Glider Competition where students and professors built rocket-launched gliders and attempted to have their glider fly for as long as possible. The chapter was also happy to have Greg Meholic, project engineer from The Aerospace Corporation, come and give a talk about interstellar travel. In the spring, the chapter began its weekly Study Nights where a computer room is reserved for students to study and work on group projects. Sixteen members of the chapter traveled to the Boeing Rotorcraft Systems facility in Ridley Park, PA, where they were given special access to, and toured, the production lines of the V-22 Osprey and the CH-47 Chinook Helicopter. The students also had the opportunity to network with young engineers and hear presentations about projects and future technologies.

Sigma Gamma Tau (SGT)

The Penn State chapter of Sigma Gamma Tau continued its commitment to serving the aerospace engineering department and its students this year. The 5th annual Aerospace Engineering Reception was a success as students were able to meet with representatives from GKN Aerospace, Pratt and Whitney, and UTC Aerospace Systems to further develop employer relations. Both groups agreed that the event was very beneficial, with many qualified candidates. Society members **Julie Scheffler**, **Steven Ceneviva**, and **Yufei Zhu** provided lab tours to high school students and prospective master's degree candidates to showcase some of the excellent labs in Hammond Building and to inform them of the many benefits of being a Penn State Aerospace Engineering student. **Gerard Littrell**, SGT president, also provided tutoring sessions to help juniors better understand class material. Future goals of the society are to work with the AIAA to plan a field trip to the National Museum of the U.S. Air Force in Dayton, OH, in January, and to plan an initiation ceremony for the spring 2017 inductees, most likely in February.

Student Highlights

STUDENT ORGANIZATIONS/EVENTS

Mark Maughmer (center) with members of Penn State's Design/Build/Fly Competition team.

Members of Penn State LionTech Rocket Labs.

The AIAA Student Design/Build/Fly Competition

In April, a team of Penn State students participated in the 2016 Textron Aviation/Raytheon Missile Systems/AIAA Design/Build/Fly Competition Flyoff, held at Cessna East Field in Wichita, KS. A total of 145 entries were received, and a new requirement was implemented to write a proposal for review. 137 proposals were submitted and 93 teams were selected for the next phase. 80 teams submitted written reports to be judged, and 69 teams competed in the flyoff. Team members included aerospace engineering undergraduates **George Loubimov**, **Adam Proulx**, **Luke Roman**, and **Pierre Troillard**. **Chris Saunders** (B.S. '08) was the aircraft's pilot. **Mark Maughmer**, professor of aerospace engineering, served as the faculty adviser, and **Nick Grasser** (B.S. '14, M.S. '16) was the graduate student adviser. This year's mission, to simulate a distributed manufacturing system, was particularly challenging because of the requirement to build two different aircraft: a production aircraft which had to carry a 32 oz Gatorade bottle as payload and a manufacturing support aircraft to carry the production airplane internally. The team successfully completed the first mission but was unable to complete the second mission due to prevailing strong winds and rain, thus, resulting in a 34th-place finish. The team will be looking for redemption in 2017, having finished in the top 10 two out of the last three years.

LionTech Rocket Labs

Penn State's competitive high-powered rocketry club, LionTech Rocket Labs, competed in the 2016 NASA University Student Launch Initiative (USLI) competition in April in Huntsville, AL. The competition, sponsored by Orbital ATK, involved completing an engineering design project where the teams must design, build, launch, and fly a payload(s) and vehicle components that support NASA research on high-power rockets to an altitude of 5,280 feet above ground level. The year-long project also involved several graded design reports and presentations to NASA representatives. LionTech Rocket Labs's project, named Valhalla, designed a launch vehicle, called Valkyrie, that utilized control surfaces on the fins for stabilization during ascent and a ground surveillance system to detect landing hazards during descent. The team came third closest in the altitude event out of more than 20 university participants. With the increasing talent and interest within the club, the team, which has grown to more than 90 students, including both undergraduate and graduate, will compete in the 2017 USLI competition and aim to perform better than ever before.

The DOE Collegiate Wind Competition

The Penn State Wind Energy Club, advised by **Susan Stewart**, senior research associate and associate professor of aerospace engineering, blew away the competition at the U.S. Department of Energy Collegiate Wind Competition 2016 in May. Competing against 11 teams from universities across the nation and Puerto Rico, the team, comprised of 21 students from various majors, was the competition's overall winner, claiming its second consecutive title. The team also grabbed first place in the Business Plan and Turbine Testing contests. The Collegiate Wind Competition challenges interdisciplinary undergraduate teams from a variety of degree programs to offer a unique solution to a complex wind energy project. Each team is required to design a wind-driven power system – a wind turbine – to supply electricity to non-grid connected devices for off-grid applications. Each team must also develop and deliver a business plan based on market research and establish a deployment strategy. Aerospace engineering team members included **Jason Cornelius**, **Adam DiPillo**, **John Macnamara**, and **Bolor-Erdene Zolbayar**. Additional team advisers included **Sven Schmitz**, associate professor of engineering; **Rick Auhl**, senior research associate; and Dr. Frank Archibald, retired faculty member of the Penn State Applied Research Laboratory.

American Helicopter Society (AHS) Student Design Competition

A team of Penn State aerospace engineering students, named Droplet, took third place in the University Undergraduate category at the American Helicopter Society International's 33rd annual Student Design Competition. Sponsored by Bell Helicopter Textron, the 2016 competition, for an "Air Launched Unmanned Disaster Relief Delivery Vehicle," challenged students to design an unmanned rotorcraft capable of deployment from the ramp of a C-130J in flight cargo airplane. The rotorcraft needed to arrest its descent and transition into its own flight mode to deliver supplies to remote areas from a hover and subsequently return to a recovery base. Team Droplet included aerospace engineering undergraduates **Bryce Connelly**, **Meghan Kaminski**, **Bill Koffler**, **Adam Mohammed**, **Kevin Muck**, and **Luke Storey**. The students were advised by **Joseph Horn** and **Edward Smith**, professors of aerospace engineering, and **Dr. Jacob Enciu**, post-doctoral researcher in aerospace engineering. A total of six teams from around the world competed.

Student Highlights

Members of SSPL.

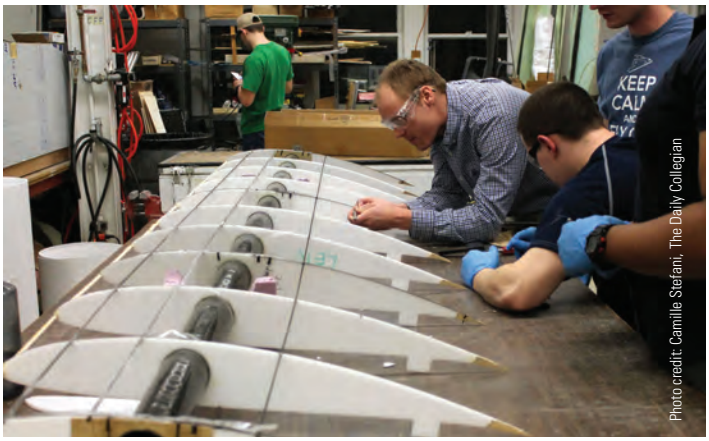


Photo credit: Camille Stefani, The Daily Collegian

HPA project students work on the airfoil of a human powered airplane.

Student Space Programs Laboratory (SSPL)

SSPL continued to thrive in the 2015-2106 academic year. Students continued development of the OSIRIS-3U CubeSat, and participated in the Student Training Program (STP). The OSIRIS-3U CubeSat, expected to launch in early 2017, will investigate various space-weather phenomena and their interactions with the Earth's ionosphere. The satellite will also investigate regions of the atmosphere synthetically heated by the Arecibo Observatory in Puerto Rico. STP, managed by fellow SSPL members, is used as an introduction to the design of space systems for new members. The program also quickly introduces new students to the lab culture and the systems engineering mindset. Participants in the program build a rocket, design a payload, and then launch it during the last week of the semester. The payload must record telemetry and video data. SSPL students also staffed a table at the State College Exploration-U. Participants were able to build and decorate their own film canister rockets, which were fueled by antacid tablets and water. SSPL is advised by **Sven Bilén**, head of the School of Engineering Design, Technology, and Professional Programs at Penn State and professor of engineering design, electrical engineering, and aerospace engineering.

The Lunar Lion prototype lander, Puma 2.0.

Lunar Lions

During the summer, 25 undergraduate students from the Penn State Lunar Lion Team dedicated more than 500 working hours each to the pursuit of achieving the first static firing demonstration of the team's prototype lander, Puma 2.0. The team has grown to nearly 70 undergraduate members and has adopted a new subsystem dedicated to the research and development of a science payload, led by students in the earth and mineral sciences department. This year, the team plans on continuing a higher level of system-wide testing to bring the program one step closer to its next technical milestone of achieving fully-controlled and autonomous terrestrial flight.

Human Powered Airplane Project

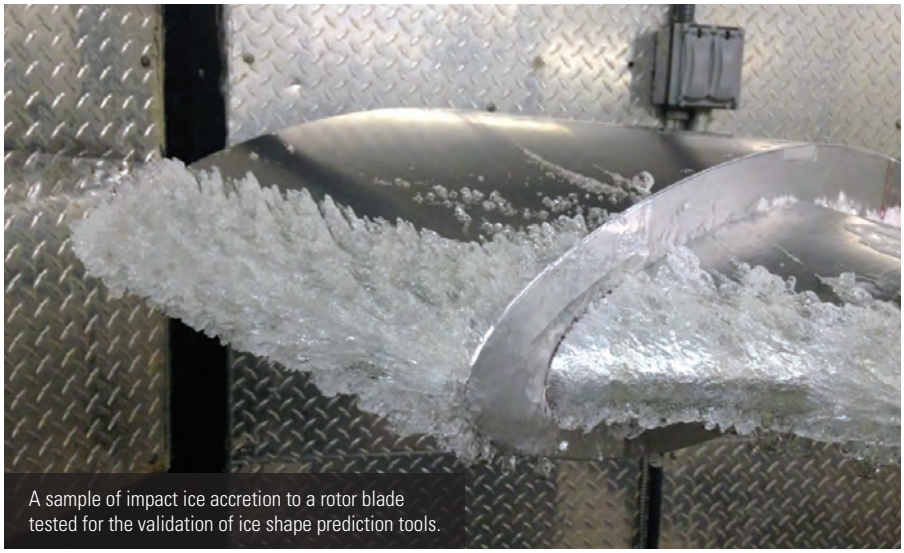
The Penn State Flight Vehicle Design and Fabrication course continued working on the Human Powered Airplane (HPA) project in pursuit of completing the Kremer International Sporting Aircraft Competition. The first iteration of the Zephyrus flew with electric model airplane motors and propellers, and completed several flight test campaigns over the last several years. This past year, the project team focused on constructing the second iteration, completing seven of the nine wing sections, both tail surfaces, and most of the aircraft's structural members, while also refining the structural design, manufacturing methods, and flight models. After relocating to a larger lab space, the team hopes to complete and begin flight testing the second iteration, driving the finalized drive-train and propellers first with electric power, and then later under human power. The class ended the year with a rubber band launched glider competition, where only flying wings were permissible.

Thon 2016 Participation by Aerospace Students

Safa Azhar, *Rules & Regulations, Event Safety*
Joshua Baumann, *Communications Committee*
Abby Brandtmeier, *Rules & Regulations Captain*
Cory Caldwell, *OPP Committee, The JENgle Book*
Matthew Cavorsi, *danced for Club Baseball*
Steven Ceneviva, *danced for ACF*
Kyle Ellingson, *Chair for Club Croquet and OPP Committee*
Peter Flanagan, *Dancer Relations Committee*
Ryan George, *Communications Committee, Sleep Shift Officer*
Sohum Haribhakti, *Dancer Relations Committee*
William Haunstein, *Communications Committee*
Kenny Le, *Communications Committee, Faculty & Staff Outreach*
Shane Martin, *Dancer Relations Committee*
Ryan McGill, *danced for Delta Sigma Phi*
Nathan Sakal, *Rules & Regulations Committee*
Mitansh Shah, *Rules & Regulations Pass Committee*

Ice or Shine

THE QUEST FOR ALL-WEATHER CAPABILITY



A sample of impact ice accretion to a rotor blade tested for the validation of ice shape prediction tools.

Jose Palacios, assistant professor of aerospace engineering, and his group of passionate graduate students, conduct research in the area of aircraft and wind turbine icing, as well as rotor aeromechanics, with an emphasis on active and passive vibration mitigation systems. A few of the current activities relating to his aircraft icing research areas are highlighted below.

Graduate student **Ed Rocco** makes adjustments to the rotor stand in the AERTS facility.

Adverse Environment Rotor Test Stand (AERTS) Facility

Rotorcraft and fixed-wing aircraft, unmanned aerial vehicles, wind turbines, and engines share issues related to adverse icing weather. Icing continues to limit operation envelopes and has been attributed to 28 percent of all loss of control aircraft accidents between 2009 and 2014, according to the European Aviation Safety Agency. Wind energy production is a major concern for turbine operators due to revenue losses and turbine damage, and engine icing has forced flying envelope reductions of some of our most modern fleets.

The testing of icing conditions is costly and specialized facilities for the testing of rotor blades and engines is very limited. At Penn State, the AERTS facility fills the need for ice testing of rotors. The facility is formed by a 20′ x 20′ x 15′ cold chamber where temperatures between -25 °C and 0 °C (-22 °F to 32 °F) can be controlled. The chamber is used for the test and evaluation of novel low-power, low-weight ice protection systems; ice protection coatings; and fundamental ice accretion physics.

The facility has been a critical tool in the design and testing of novel ice protection systems, such as ultrasonic de-icing and centrifugally powered pneumatic ice protection systems for rotor blades. The extremely low-power, robustness, and low weight of the pneumatic concept, makes it a candidate for full-scale demonstrations.

The system has the capability to remove ice layers less than 1.5 mm thick (0.06″), with a power consumption less than 2,500 W. As a comparison, the power consumption of a typical electrothermal de-icing system for a similar size vehicle is 26 kW.

In addition to active ice protection systems, passive ice protective coatings are being evaluated in the facility. The ice adhesion strength of coatings provided by NASA, PPG, GE, and 3M, among others, have been tested in the AERTS laboratory under representative aircraft icing conditions. The facility is the only one available to do this kind of testing.

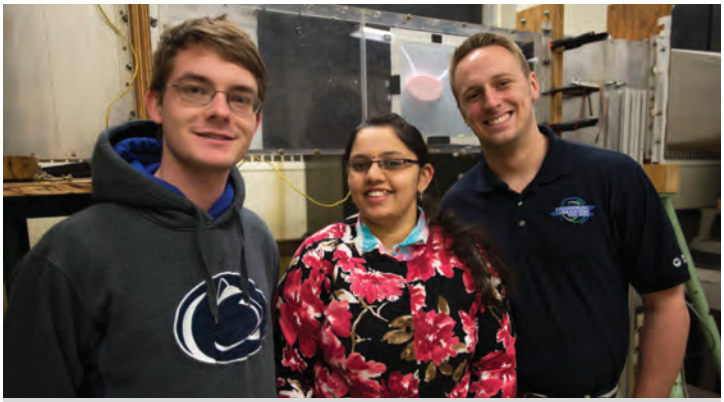
Icing Wind Tunnel

The rotor test stand is not suitable for the testing of fixed-wing ice protection configurations or engine icing environments. For this reason, a novel icing wind tunnel has also been designed and constructed. Operational in 2015, the tunnel can reproduce fully glaciated water drops that are then partially melted to reproduce the ice accretion phenomena that occurs inside engines. The tunnel can also reproduce standard supercooled water droplets.

The tunnel is currently being used for the proof-of-concept testing of a novel hybrid electrothermal/ice protective coating system for the MQ-9 reaper. This latest research effort, sponsored by the U.S. Air Force, attempts to protect the unmanned vehicle using only 1,000 W. A “parting strip” heater at the stagnation point of the airfoil splits the ice shape into two sections.

The shedding heaters only warm up the surface to -8 °C, such that aerodynamic forces can remove thin layers of the accreted ice given the low ice adhesion strength. The subfreezing temperatures needed to remove the ice not only limit the power consumption of the system, but also prevent the formation of any water that could travel aft to then re-freeze. Testing will be conducted in the 18″ x 18″ test section of the tunnel at 150 kn and at varying icing conditions.

Outreach and Other News



2016 Top Schools to Hire for Aerospace and Defense

For the fourth time in six years, Penn State topped the list of **Preferred Suppliers** of engineering talent to the aerospace and defense industry, according to the *Aviation Week* 2016 Workforce Study. The University also ranked fourth, up one spot from 2015's study, in the **Alma Mater by Young Professionals** category, which ranks universities that young professionals, ages 35 and younger, believe are the most influential to their career success.

WE ARE Hiring!

The aerospace engineering department currently has two open faculty positions.

Department Head of Aerospace Engineering
The College of Engineering seeks an individual who will provide innovative and energetic leadership with effective administrative skills and a strong commitment to higher education.

Astronautics Faculty Position (Full-time, tenure-track or tenured open-rank faculty)
Expertise is sought in the general subject of astronautics, with particular interest in spacecraft dynamics and control, space propulsion, the space environment, rarefied flows and plasmas, and space systems engineering.

Visit www.aero.psu.edu/department/job-opportunities.aspx for more information.

Photo credit: Abby Drey, Centre Daily Times

Congratulations, Barney!

In July, **Barnes (Barney) McCormick** (B.S. '48, M.S. '49, Ph.D. '54), Boeing Emeritus Professor, and his wife, Emily, celebrated their 90th birthdays and 70th wedding anniversary. McCormick served as aerospace engineering department head from 1969 to 1985. Throughout his career, he has made numerous and significant contributions to the field of aerospace engineering, primarily in the areas of wake turbulence, low-speed aerodynamics, flight mechanics, aerodynamics of vertical flight, and propeller design. McCormick has also authored several books including *Aerodynamics of V/STOL Flight* and *Aerodynamics, Aeronautics, and Flight Mechanics*. Congratulations to Barney and Emily!

Barnes McCormick and Emily McCormick celebrate their 90th birthdays and 70th wedding anniversary.

The Department of Aerospace Engineering
The Pennsylvania State University
229 Hammond Building
University Park, PA 16802

PennState College of Engineering | AEROSPACE ENGINEERING

THANK YOU TO ALL WHO HAVE CONTRIBUTED TO THE DEPARTMENT!

The department is grateful to all who have provided financial support of its students and activities. Following is a list of individual donors to the department from July 1, 2015, to June 30, 2016. We apologize if there are any omissions. If you contributed and have not been acknowledged below, please contact us so we can correct our records. If you are already giving to Penn State, you might consider directing your future gifts to the Department of Aerospace Engineering.

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3. Complete the form with your contact information and gift information

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