AE Illinois

Newsletter of the Department of Aerospace Engineering
University of Illinois at Urbana-Champaign

Vol. 16 • 2014

Extracurricular Projects Enhance Student Learning

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AE to Gain Composites Manufacturing, Nanosatellite Labs

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Welcome to the 2014 Edition of the Alumni Newsletter of AE at Illinois

At the start of a new academic year, I am delighted to report that four new faculty members will join AE during the 2014-15 academic year and reinforce our strength in research and teaching in computational fluid dynamics (CFD) and applied aerodynamics. Dr. Deborah Levin (PhD Caltech, 1979) is a recognized world leader in the area of computational multi-physics modeling of reacting and plasma flows, such as those encountered in hypersonic and reentry vehicles under extremely high Mach numbers. Dr. Vincent Le Chenadec brings his unique expertise in computational combustion, and Dr. Taraneh Sayadi specializes in the large-scale simulation of turbulence and in data driven decomposition techniques related to CFD. Both Le Chenadec and Sayadi obtained their PhDs from Stanford in 2012 and will join our Department this fall as Blue Waters assistant professors, which will give them access to the unique supercomputing facility available on our campus. Last but not least, Dr. Phil Ansell, who graduated last year from our Department and will join AE as Assistant Professor in January 2015 at the conclusion of his postdoctoral appointment, brings to AE his experimental expertise in unsteady applied aerodynamics. I encourage you to read their profiles starting on page 4.

The cover story (starting from page 18) chosen for this edition of the newsletter describes the involvement of our students in a wide variety of extracurricular

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projects. Our objective is to make sure that every AE student participates and takes a leadership role in at least one extracurricular project while on campus. Together with my AE colleagues, I strongly believe these extracurricular activities are an essential component of the education of our students. These projects constitute an ideal complement to the strong theoretical education they receive at Illinois and to the increasing number of hands-on courses that are now part of our curriculum (see the cover story of last year's newsletter, aerospace.illinois.edu/news-events/ae-publications). The College shares this vision and has decided this year to dedicate part of the Grainger Engineering Library to collaborative design and manufacturing space.

We have multiple projects in store for this academic year, starting with the first offering of our on-line master's degree program. As described on page 16, the emphasis has been placed on the quality of the program, with the on-line courses being identical (same instructors, same semesters, same exams, same homework assignments) to those taught on campus.

Another major project for the Department is the recently approved $3.2 million campus investment in the remodeling of Talbot Lab. As part of this renovation, AE will create two state-of-the-art educational laboratories dedicated to composite manufacturing and nano-satellite technology. More details about this major project can be found on page 15.

I encourage you to learn about these and other AE stories in this newsletter and on the Department's website, www.aerospace.illinois.edu, where you can find many more stories about AE alumni, students and faculty that could not fit in this publication. As always, I look forward to your comments.

Philippe H. Geubelle
Bliss Professor and Head

On the cover: **This photo captured the launch of the AE at Illinois team's entry in the NASA Student Rocket Launch competition.**

Department of Aerospace Engineering

Faculty

Phillip J. Ansell
Lawrence A. Bergman
Daniel J. Bodony
Timothy W. Bretl
Ioannis Chasiotis
Huck Beng Chew
Soon-Jo Chung
Victoria L. Coverstone
J. Craig Dutton
Gregory S. Elliott
Jonathan B. Freund
Grace X. Gao
Philippe H. Geubelle
John Lambros
Cedric Langbort
Vincent Le Chenadec
Deborah A. Levin
N. Sri Namachchivaya
Marco Panesi
Taraneh Sayadi
Michael S. Selig
Petros G. Voulgaris
Scott R. White

Lecturers

Steven J. D'Urso
Gail C. Jonkouski
Brian S. Woodard

Emeritus Faculty

Michael B. Bragg
John D. Buckmaster
Rodney L. Burton
Bruce A. Conway
Harry H. Hilton
Ki D. Lee
John E. Prussing
Kenneth R. Sivier
Wayne C. Solomon
Shee Mang Yen

Affiliate/Adjunct Faculty

Joseph Bentsman
David Leon Carroll
Naira Hovakimyan
Eric Loth
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D. Michael McFarland
George H. Miley
James W. Phillips
Srinivasa M. Salapaka
Nancy R. Sottos
Alexander F. Vakakis

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Lee A. Booher
Timothy A. Cochrane
David E. Farrow
Laura A. Gerhold
Diane E. Jeffers
Mark S. Hart
Kendra Lindsey
Stephen S. Mathine
Gregory S. Milner
Susan K. Mumm
Staci L. Tankersley

Shared Services

Gregory N. Anderson
Tessa M. Hile
Lori Ann Ballinger-Pankau
Leslie L. Reinhart
Lori A. Rairden Willoughby

Teachers Ranked Excellent by Their Students

Fall 2013
Soon-Jo Chung
J. Craig Dutton
Grace X. Gao
Thomas L. Jackson

Spring 2014
Daniel J. Bodony
Timothy W. Bretl
Bruce A. Conway
Steven J. D'Urso
J. Craig Dutton
Gregory S. Elliott
Ruben Hortensius
Brian Woodard

Four New Faculty Join AE at Illinois

Newcomers Build on AE's Strengths in Computational Fluid Dynamics, Applied Aerodynamics

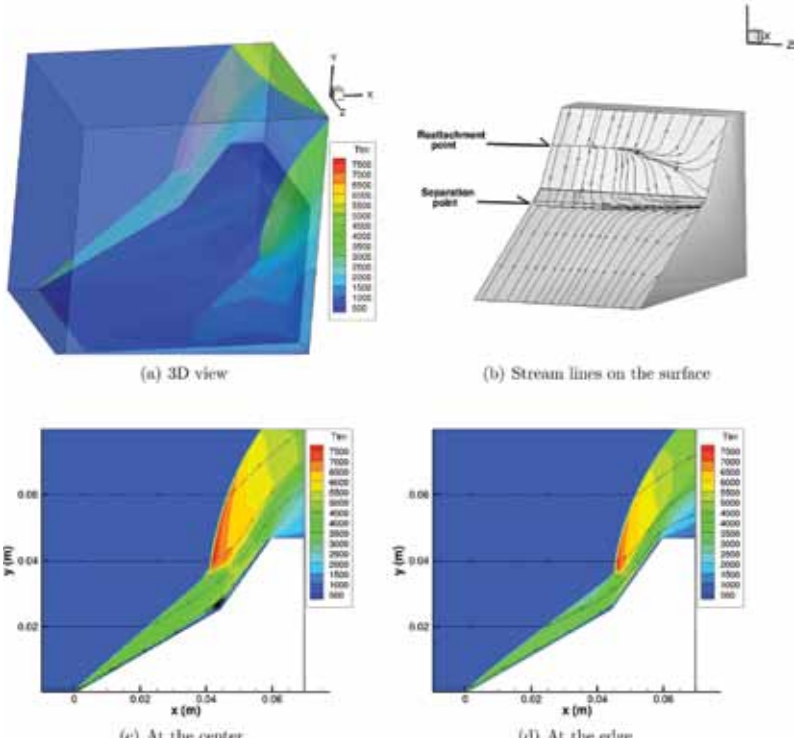
Levin

Levin Brings to AE Expertise in Modeling, Simulation of Chemical Reacting Flows

Having established herself as an international authority in modeling and simulation of chemical reacting flows through a 34-year career, including in the Institute for Defense Analyses and at The Pennsylvania State University, Deborah A. Levin this fall has brought her considerable knowledge to AE at Illinois.

"The focus of the (AE) department is very strong in compressible flows," Levin said. "I'm very excited about the possibility of collaborating with a lot of people here."

Coming into the department as a full professor, Levin has had a strong impact on the United States' national space surveillance policy and practice. She also has contributed to the aerospace engineering areas of micro-propulsion, thermal protection materials, and spacecraft contamination, as well as theoretical particle approaches to modeling extreme thermochemical nonequilibrium.



Translational temperature contours at 240μs simulated using the 3-D wedge geometry.

Bringing six graduate students and a postdoctoral research associate with her to Illinois, Levin plans to expand her research into hypersonic flow-materials interactions.

"The modeling of the flow into porous materials is a hard problem," Levin said. "We have an understanding of it at the nanometer scale, but I want to work at the micron and millimeter scale. There's no fundamental connection of how the material responds to the flow, and there's no computer capable of doing traditional molecular dynamics at millimeter length scales."

To approach the problem, she said, her team will need to think more about the mechanical effects on the materials, and explore new algorithms. "It is a gold nugget for someone to make a credible extension to the larger scale," Levin believes.

In her work, Levin will collaborate with AE Assistant Prof. Marco Panesi, whom Levin has known since Panesi's graduate school days. Among his research interests are plasma-assisted combustion, hypersonics and hypersonic flows, and weakly ionized plasmas.

Levin is also considering the interaction of materials in the space plasma environment. Her team takes into account the space environment consisting of atomic oxygen, high energy ions, chemical and small electric propulsion thruster plumes, space debris, and combinations of future propellant systems such as electrospray/ionic liquids. A better understanding of these material interactions will enable the more efficient use of satellite platforms.

Levin's research has been funded by the National Aeronautics and Space Administration, the Air Force Office of Scientific Research, the Missile Defense Agency and the National Science Foundation. She has published over 300 publications (142 refereed and 170 conference papers) that have been cited approximately 500 times, and she has been an invited speaker at key international conferences and symposia.

Levin is a 2014 Fellow of the American Institute of Aeronautics and Astronautics (AIAA). She is a 2013 recipient of the Penn State Engineering Society (PSES) Premier Research Award, and 2006 recipient of the PSES Outstanding Research Award.

Levin earned a bachelor's degree in chemistry from the State University of New York at Stony Brook in 1974. She earned a PhD in chemistry in 1979 from the California Institute of Technology.

Her husband, Arne Fliflet, started working this fall as a lecturer in the Electrical and Computer Engineering Department. He had retired from the Naval Research Laboratory in Washington, D.C., after having worked there 32 years as a plasma physicist.

Image from Vincent Le Chenadec's research.

New Assistant Professor Specializes in Multi-Phase Flows

Specializing in the numerical simulation and modeling of complex multi-phase flows, Vincent Le Chenadec joined Aerospace Engineering at Illinois in October as a new assistant professor.

His wife, Taraneh Sayadi, an expert in big data and the simulation of turbulent flows, also joined the AE Department as a new faculty member. Both Le Chenadec and Sayadi will have access to Illinois' facility, Blue Waters, one of the most powerful supercomputers in the world and the fastest supercomputer on a university campus.

"Illinois has a really strong computational science background— it stands out in the U.S. and on the scale of the world," Le Chenadec said, citing one of his reasons for coming to work at the university. "There is a continuous effort within the College of Engineering to promote (computational sciences), and to have collaborations across departments."

Most recently, Le Chenadec has been a postdoctoral fellow in the Energetics and Combustion Laboratory (E.M2.C) in Paris, France.

He completed his undergraduate studies at Ecole Centrale Paris in June 2007, and received a master's degree in mechanical engineering in September 2009 from Stanford University. In September 2012, he completed a PhD degree in mechanical engineering under the guidance of Prof. Heinz Pitsch at the Center for Turbulence Research, Stanford University.

Le Chenadec's research focuses on large-scale numerical modeling of multi-scale, multi-physics and multi-phase flows. His work emphasizes the development of computational fluid dynamic (CFD) algorithms, and the use of high-performance computing capabilities for the simulation of turbulent reactive flows relevant to energy conversion and transportation systems.

The physics of fluids involving aircraft engines is very complex, Le Chenadec said. Through his studies, he gains understanding of the energy conversion process as the fuel mixes with the air, evaporates, and starts to burn to propel the aircraft. This involves a close examination of interface boundaries between fluids and solids, and liquids and gases. Only recently has computer power been sufficient to provide this detail.

Le Chenadec uses the information to develop equations aircraft designers can then employ to gain cost savings and fuel conservation.

Le Chenadec expects to collaborate with AE Profs. Philippe Geubelle and Jonathan Freund, and Associate Prof. Daniel Bodony, as well as with colleagues in other Engineering at Illinois departments, including Mechanical Science and Engineering.

Both Le Chenadec and Sayadi will move to the Urbana campus in October. In addition to conducting research, he will begin teaching courses in the areas of computational fluid dynamics and numerical analysis in Spring 2015. He also hopes to design new courses.

Le Chenadec

Sayadi

New Faculty Member Studies Turbulence, Combustion Instabilities

Having established numerical analysis research into turbulent flow, Taraneh Sayadi is now expanding her studies by examining combustion instabilities, optimization and control as she begins her faculty career at Aerospace Engineering at Illinois this fall.

Sayadi's research has focused on the direct and large eddy simulation of complex turbulent flows with the objective of designing reduced-order models and control strategies. She is also interested in thermoacoustic instabilities relevant to energy conversion and transportation systems, as well as data-driven spectral analysis techniques and their integration with large-scale data processing tools.

Her husband, Vincent Le Chenadec, an expert in numerical simulation and modeling of complex multi-phase flows, also has joined the AE Department as a new faculty member. Both scientists will have access to Illinois' facility, Blue Waters, one of the most powerful supercomputers in the world and the fastest supercomputer on a university campus.

continued on next page

In fact, the Blue Waters facility and the University of Illinois' reputation in computer science expertise played key roles in attracting the couple to Illinois. "It's a great combination of people who do computational work and a supercomputer to which faculty have access," Sayadi said. "I don't think there are many universities in the United States that offer that type of possibilities. Illinois is one of the frontrunners in doing computational work."

Blue Waters will play an important role in advancing the frontiers of data analysis. "Blue Waters will enable us to go beyond the limits of currently existing algorithms and hardware," she said. "One example would be to perform data-driven analysis and automatically extract the interesting features in the flow."

Sayadi comes to Illinois from a position as a research associate in the Department of Mathematics at Imperial College in London. Prior to that appointment, she was a postdoctoral fellow at LadHyX-E´cole Polytechnique in France.

She earned a PhD in mechanical engineering in 2012 at Stanford University, under the direction of Prof. Parviz Moin. In 2007, Sayadi earned a master's degree in fluid mechanics from the Technical University of Munich in Germany, and, in 2005, she earned a bachelor's in mechanical engineering from Sharif University of Technology in Tehran, Iran.

In AE, Sayadi hopes to collaborate with Associate Prof. Dan Bodony, with expertise in aeroacoustics and computational fluid mechanics, Prof. Jonathan Freund, whose research interests include fluid mechanics and thermal sciences, and Assistant Prof. Marco Panesi, who has expertise in hypersonic flow.

Ansell

Experimentalist Ansell Joins AE Faculty

Already a familiar face in Aerospace Engineering at Illinois as a graduate student and postdoctoral research associate, Phillip J. Ansell has joined AE as an assistant professor.

Having completed his graduate work under the direction of AE Emeritus Prof. Michael B. Bragg, Ansell is an experimental aerodynamicist working in unsteady flow.

"All flows are inherently unsteady, though to simplify certain problems in aerodynamics we will often ignore the unsteady contributions. However, there are times when these unsteady components become increasingly important," he said. "We can actually measure and use these unsteady components of the flow to tell us the state of the aerodynamics around an aircraft."

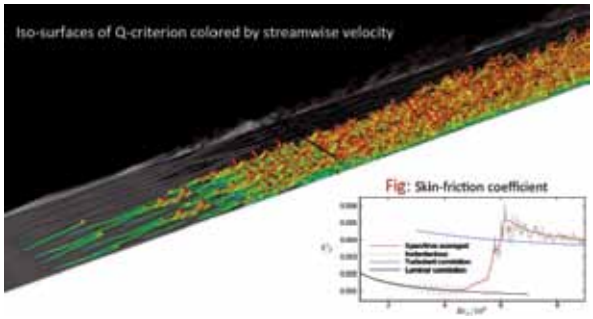


Image from Taraneh Sayadi's research.

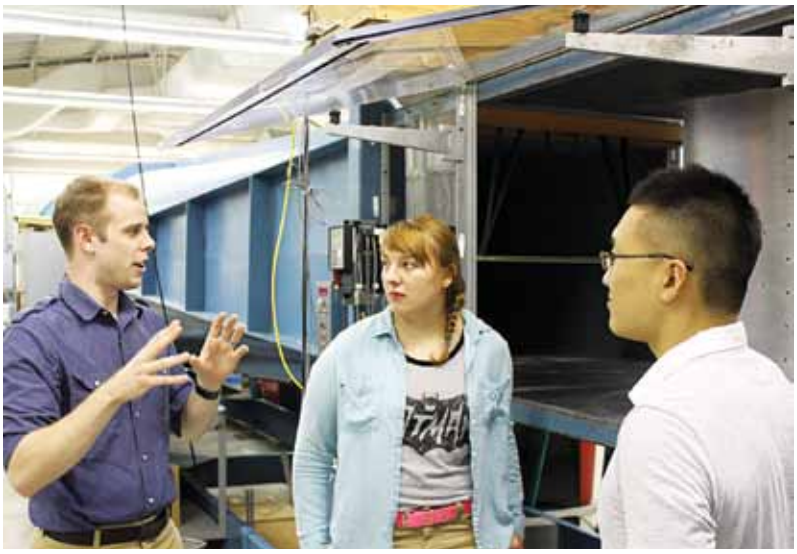
Ansell has been conducting experiments on airfoils, which are the cross-sectional shapes that make up wings, using a large wind tunnel in the Aerodynamics Research Laboratory on the east end of the Urbana campus. One of his areas of active research is related to airfoil stall. As the angle of attack is increased, the lift produced by the airfoil also increases. However, pushing the limits of an aircraft's lift can result in stall. At a critical angle of attack, flow separation at the airfoil surface becomes so dominant that further increases in the angle of attack produce less lift and vastly more drag, the force opposing the vehicle's motion through the air.

This phenomena can be predicted and avoided by studying the air flow, Ansell maintains. "Stalls are typically undesirable. They cause an aircraft to lose lift and impair controllability," he said. "There's a drastic increase in unsteady content right before an aircraft goes into a stall. By identifying that unsteadiness we can predict an impending stall and use various methods to manipulate the flow in order to prevent stall from occurring."

As a faculty member, Ansell wants to expand his research to study effects of unsteady flow of vortices for formation flying and other complex flows, particularly working with rotorcraft.

He said energy efficiency in aircraft can be gained by mimicking collective groups of birds flying in nature, in which the lead expends the most energy and subsequent flyers conserve energy. When a bird flies, it sheds wingtip vortices, the circular patterns of rotating air left behind a wing as it generates lift. Birds that fly in formation with these vortices can use them to achieve lower drag than flying ~~alone. Though~~, some of the unsteady aspects of formation flight have made it difficult to achieve in a practical sense. "We want to find that sweet spot to conserve energy," he said.

Unsteady flow with rotorcraft, such as in Army and Air Force helicopters, becomes even more complicated. "You're taking a wing and swinging it," Ansell



New AE Assistant Prof. Phillip Ansell, left, discusses with students Gabrielle Wroblewski and Je Won Hong research using the wind tunnel.

said. "This produces a flowfield that is constantly changing, and can lead to some complicated aerodynamic problems that we don't know how to deal with very effectively." One of these problems is dynamic stall, which occurs on airfoils during a rapid change in angle of attack. "Dynamic stall can lead to excessive vibration, large increases in unsteadiness, and an overall impairment of vehicle performance. By better understanding it we can find ways to avoid these issues."

He hopes to collaborate with AE Associate Profs. Daniel Bodony and Michael Selig on future work. In addition to research, Ansell will start teaching courses in flight mechanics and wing theory in Spring 2015.

He came to Illinois in 2009 after earning a bachelor's degree in aerospace engineering from Pennsylvania State University. He was a stellar graduate student, having won the American Institute of Aeronautics and Astronautics William T. Piper General Aviation Systems Graduate Award, and, from the AE Department, the Roger A. Strehlow Memorial Award, the Aerospace Alumni Advisory Board Fellowship, and the Aerospace Engineering Graduate Teaching Fellowship, the department's highest teaching honor for doctoral students. The College of Engineering chose Ansell for the Mavis Future Faculty Fellowship, and after teaching an applied aerodynamics course in 2012 he was included among the List of Teachers Ranked as Excellent by their Students.

In explaining his choice of Illinois to begin his faculty career, Ansell said, "At the end of the day, the reason I wanted to start here was the same reason why I came to graduate school here. Illinois is one of the world leaders in engineering education and research. The aerospace engineering department at Illinois provides a place where faculty members can make a large impact, through both active scientific research and inspiring future leaders in the field. It has also been amazing to see how supportive and cohesive the faculty body is. Everyone genuinely wants to see you succeed as a new faculty member, and will do whatever they can to help you get there. Illinois is a great place to be," he said.

Ansell credits AE Profs. Greg Elliott and J. Craig Dutton for mentoring him.

Hilton Made Fellow of ASC

Hilton

A patriarch of Aerospace Engineering at Illinois, Emeritus Prof. Harry H. Hilton has been made a 2014 Fellow of the American Society for Composites (ASC).

Hilton is an internationally recognized authority in viscoelasticity and aero-viscoelasticity. He has published or had accepted for publication over 300 papers in archival journals or conference proceedings.

Although "officially" retired from AE the past 24 years, Hilton has remained extremely active in research, graduate teaching, and public and professional service. In addition to his role with ASC, Hilton is a Fellow of the American Institute of Aeronautics and Astronautics, and is a member of several other organizations including the Society of Experimental Mechanics, the Society of Engineering Science, the International Community for Composites Engineering, the International Association for Computational Mechanics, the American Institute of Physics, the American Society for Aerospace Education, and the American Academy of Mechanics.

Prior to retirement, Hilton's career in AE spanned from 1949 to 1990. By 1957 he was a full professor, and served as department head from 1974 to 1985. He served stints as an assistant dean in the College of Engineering at Illinois, and had taught every AE undergraduate course except propulsion to thousands of students.

Chew: Searching the Small for the Strong and the Tough

Chew

In a search for the extremely strong and the extremely tough, Aerospace Engineering at Illinois Assistant Prof. Huck Beng Chew starts by looking at the extremely small.

Through computer simulations of nano and micro materials, Chew hopes to achieve a fundamental understanding of the materials' strength, toughness, and other properties to design and optimize the materials' structures for particular uses.

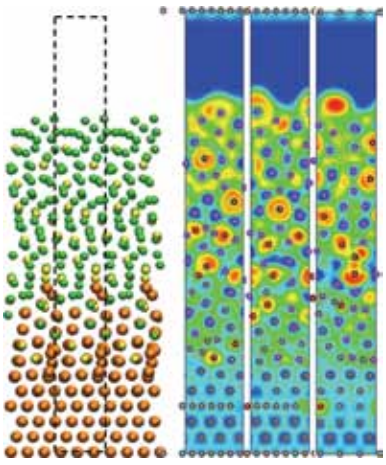
Strength Versus Fracture Toughness

Chew quantifies a material's strength by how much load it can take before it fails. Toughness on the other hand, is determined by how much energy the material can withstand— or sudden impact it can absorb— before failure.

"Usually a material is either strong or tough, but not both," he said.

Enhanced materials can be designed, Chew believes, after observing simulations of multiple nanoscale materials combined together, or by studying the interfaces separating the grain structure of a single material. "We want to create them to be not just stronger, but tougher, and with multifunctional properties."

Nanoscale materials are special because they tend to be exceptionally strong, Chew said. They have multiple interfaces that prevent defects from moving across and this gives rise to high strength. However, these qualities also mean the materials' ability to dissipate damage becomes highly localized, making them extremely brittle.



Characterization of the atomic structure of the interface bonding silicon electrode and copper current conductor.

Controlling the structure of the materials interface may counteract this problem. As an example, Chew said a combined material of copper and silver contains interfaces that become wavy upon being damaged. Highly periodic stress concentration sites that develop along the wavy interfaces serve to control the spread of defects, thereby enabling scientists to achieve simultaneous control over both the strength and toughness of the material.

Nanolayered materials could provide a substantial weight savings for the turbine blades in aircraft engines, Chew believes. Currently, the blades are made from single-crystal metals that have very high strength and high fatigue resistance. Nanolayered materials could achieve the same strength but with substantially reduced thickness, thus resulting in increased fuel efficiency.

Chew currently collaborates with AE Prof. John Lambros on this project.

Fundamental Mechanics Issues in Lithium Ion Batteries

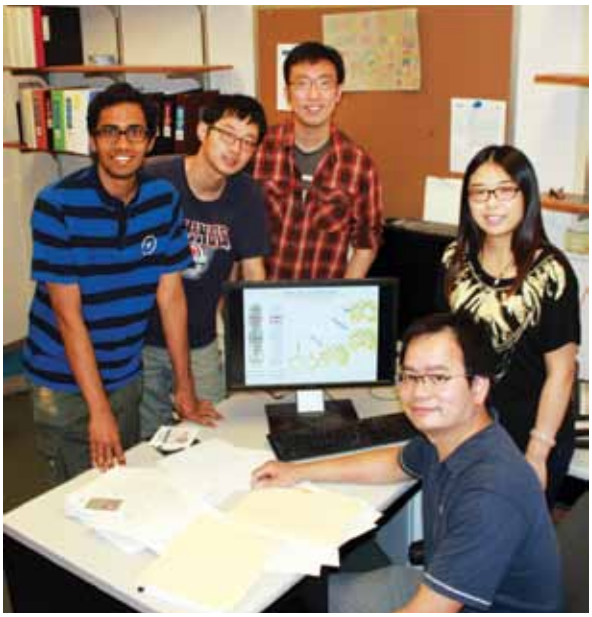
The storage capacity for lithium ion batteries has not improved much since such batteries were first introduced in the 1990s. This is because the theoretical charge capacity of current graphite electrodes have already been reached, Chew said.

"Achieving high capacity lithium ion batteries will be the critical step towards replacing conventional gasoline engines in automotive vehicles."

Silicon electrodes, a promising replacement, "has an order of magnitude higher storage capacity than conventional graphite electrodes, but massively cracks during the charging process," Chew said. Since March 2013 he and his group have been observing how the cracking process occurs. "We focus on the interface separating the silicon electrode and copper conductor substrate, using density functional theory simulations."

He and collaborators also want to quantify the fracture toughness of lithiated silicon, since such measurements would have fundamental implications in the design of nanostructured silicon electrodes.

Chew works on this National Science Foundation-funded project in collaboration with Shuman Xia, an experimentalist from the Georgia Institute of Technology's Mechanical Engineering Department.



From left, graduate students Abhilash Harpale, Ruizhi Li, Haoran Wang and Qijun Liu with Chew, seated.

Nanoscale Patterning to Achieve Precisely-designed Nanostructured Materials

In this AE Multidisciplinary Initiative project, Chew and his group are simulating nanoscale patterning of graphene, a single atomic sheet material that is only 1/1000th of a human hair in thickness, but is the strongest known material in the world.

With amazing electrical and conductive properties, graphene has been considered as a potential replacement for silicon in transistors. However, without a bandgap, graphene behaves more like a metal rather than a semi-conductor, and its potential for nanoscale electronics cannot be realized. Such bandgaps in graphene can be introduced by controlled patterning of graphene.

Chew said graphene also is being considered for nanopourous membranes to filtrate water, but it is challenging to create multiple holes within the entire sheet of material for filtration. "The holes can't be random; they need to be in certain locations and of certain sizes," he said.

He is working with AE Assistant Prof. Marco Panesi in using plasma processes to create holes in the graphene sheets with well-controlled hole size and distributions.

Campus Recognizes Geubelle for Guiding Undergraduate Research

Geubelle

Philippe Geubelle, Bliss Professor in the College of Engineering and Aerospace Engineering Department Head, is the 2014 winner of the University of Illinois at Urbana-Champaign Campus Award for Excellence in Guiding Undergraduate Research.

Geubelle has made providing research opportunities to undergraduates a priority both in his own research program in computational mechanics and in his role as an administrator.

He averages advising four or five undergraduate research projects annually, particularly during the summer months. While he meets weekly with each undergraduate researcher to set key directions, ensure resources are available and determine progress, Geubelle has a graduate student mentor provide day-to-day technical input. He creates opportunities in his own research programs for students from several College of Engineering departments as well as French students participating in an exchange program between Illinois and Ecole Centrale de Lille.

Geubelle has extended his advocacy for undergraduate research through his role in the Illinois Space Grant Consortium (ISGC). As director of ISGC, a National Aeronautics and Space Administration-sponsored higher education workforce development program within Illinois, he has made undergraduate research the major recipient of ISGC funding. He also stretched the number of spots available for interested undergrads by encouraging industry and other individual faculty members to participate in and help finance research projects.

At the University of Illinois, Geubelle created the Undergraduate Research Opportunity Program (UROP) in aerospace engineering and science in which about 15 undergraduate students take part every summer in a variety of research projects. In addition to doing research, the student interns participate in weekly workshops covering diverse topics such as research ethics, discussion with an aerospace engineer, how to apply to graduate school, and how to give technical talks and write a technical document.

In addition to these accomplishments, Geubelle was the Principal Investigator of a National Science Foundation Research Experiences for Undergraduates (REU) Site award between 2006 and 2008. This allowed him to recruit about 30 undergraduates from outside universities to come to Illinois for a summer to do research.

Selig Selected for AIAA 2014 Aerodynamics Award

Selig

Prof. Michael Selig has received one of the top recognitions from the American Institute of Aeronautics and Astronautics— the AIAA Aerodynamics Award for 2014.

The award is presented for meritorious achievement in the field of applied aerodynamics, recognizing notable contributions in the development, application, and evaluation of aerodynamic concepts and methods. Selig was chosen "in recognition of outstanding contributions to applied aerodynamics research, design, and education, including leadership in the development and public dissemination of airfoil and propeller data."

As part of the honor, Selig presented the 2014 Aerodynamics Lecture in June during the AIAA Aviation and Aeronautics Forum and Exposition (AVIATION 2014).

For 22 years as an AE faculty member, Selig has led the Applied Aerodynamics Group and has published widely in the areas of low-speed aerodynamics, low Reynolds number aerodynamics, airfoil design, wind energy, wind tunnel testing and real-time flight simulation, including aircraft icing upset simulation and modeling. His aerodynamics research and design expertise has been applied to unmanned aerial vehicles/systems, kilowatt thru multi-megawatt scale wind turbines, record breaking solar powered aircraft, appendage design and wing-sail design for the America's Cup, front and rear wing designs in motorsports (CART and Formula 1), and many other areas.

His codes and methods for airfoil design and wind turbine blade design are used in both the aerospace and wind turbine industries. His airfoil designs and data are available in the open/online literature and used worldwide in the RC and UAV/UAS arenas.

He and his collaborators have published over 120 articles, books, and conference papers, and over 40 technical reports. Selig holds four patents and has one patent pending.

Research honors include the AIAA Co-Founder Award for the AIAA Design/Build/Fly Competition (2007), LSF Le Gray Award for "For Outstanding Service to Soaring"— for his continuing experiments in low Reynolds number airfoil designs (2005), American Wind Energy Association, Wind Energy Academic Award given in recognition of exceptional contributions to the advancement of wind energy technology (2002), NASA TGIR Award "Revolutionize Aviation" to Aircraft Icing Project Team (2001), Sigma Gamma Tau Aerospace Engineering National Honor Society (inducted 1999), UIUC Campus Research Board Award (1994), Department of Energy Summer Faculty Fellowship Award (1993).

Selig is an Associate Fellow of AIAA.

Selig earned a B.S. in Aeronautical and Astronautical Engineering from the University of Illinois (1984), a M.S.E. in Mechanical and Aerospace Engineering from Princeton University (1988), and a Ph.D. in Aerospace Engineering from Penn State (1992).

Dutton, Jeffers, Gain Teacher, Staff of the Year Awards

Dutton

Jeffers

Prof. J. Craig Dutton and Diane Jeffers are Aerospace Engineering at Illinois' 2014 Teacher and Staff of the Year, respectively. The Student Chapter of the American Institute of Aeronautics and Astronautics selects the award winners.

Also chosen for the AIAA award in 2011, Dutton is noted for his teaching excellence and effectiveness, having been included more than 35 times on the List of Teachers Ranked as Excellent by Their Students. He gained university-wide acclaim for his skills when he won the Campus Award for Excellence in Undergraduate Teaching in 1988.

Jeffers is the Associate Director of the NASA Illinois Space Grant Consortium (ISGC) and AE's Coordinator of External Affairs. In addition to ISGC and department administrative responsibilities, Jeffers develops and directs science, technology, engineering and math (STEM) education programs for K-12 students. Programs include the Illinois Aerospace Institute, Aerospace GAMES camp, and the Aerospace Illini 4-H Academy. She also coordinates and oversees undergraduate research intern programs supported by ISGC, including the Undergraduate Research Opportunities Program (UROP). Most recently, ~~Ms.~~ Jeffers has been working with AE student organizations that are participating in regional and national competitions, and supporting student outreach efforts.

Bodony Named Blue Waters Associate Professor; AIAA Associate Fellow

Daniel J. Bodony has been designated a Blue Waters Associate Professor and, as such, gains significant access to one of the most powerful supercomputers in the world.

In other news, Bodony, an associate professor in Aerospace Engineering at Illinois, has been named an Associate Fellow of the American Institute of Aeronautics and Astronautics.

As part of his allocation on Blue Waters, Bodony is working on the project "Reducing Jet Aircraft Noise by Harnessing the Heterogeneous XK Nodes." Hearing loss resulting from noise pollution accounts for nearly $1 billion annually in military health care, Bodony maintains. "The main source of aircraft generated noise is the jet engine exhaust, where the unsteady motion of the engine's exhaust gases generates sound. The conceptual challenge of reducing turbulent jet noise is immense: the fundamental flow is turbulent and we, as a scientific community, do not understand how a turbulent flow generates sound."

Without a guiding theory, reducing aircraft noise has been left to trial-and-error experiments and, more recently, simulations. The turbulence-induced sound is generated over a very large region leading to a multi-scale nonlinear fluid dynamics problem where the relevant energy is contained over six-to-ten decades of spatial and temporal scales. Simulations that capture the full range of spatial and temporal scales are beyond current computing capacity but remain the best hope for quieter aircraft.

"A paradigm shift in computational science, enabled by the XK nodes on Blue Waters, is desperately needed to advance the fields of compressible turbulence and aeroacoustics to reduce the noise from jet aircraft," Bodony believes.

Bodony

Chung Named Center for Advanced Study Fellow; Recognized for Research

Assistant Prof. Soon-Jo Chung this year was appointed a Fellow of the Center for Advanced Study (CAS) at the University of Illinois at Urbana-Champaign. Chung, an expert in estimation and control of autonomous aerospace vehicles, also was named a 2014 winner of the College of Engineering at Illinois Dean's Award for Excellence in Research.

The first AE at Illinois faculty member to have been honored with the CAS designation, Chung is awarded a semester of release time during the 2014-15 academic year to pursue a research project. He will spend the time developing robotic falcons to chase away from airfields flocks of birds that can cause damage when they fly into the path of ascending or descending airplanes. Such bird strikes cause more than $715 million in damage each year, according to the Federal Aviation Administration.

Chung was a 2013 recipient of a National Science Foundation CAREER Award to fund his work on the project. Developing robotic birds that can move up and down, make 180-degree turns and switch between gliding and flapping presents significant dynamics and control challenges. The project builds upon Chung's earlier work in developing a robotic bat capable of flapping flight. In addition to mimicking flight characteristics, the robotic falcons will need to identify targets and then navigate and herd real birds away from the airfield.

"Our robots must fly like real falcons, look like real falcons and even sound like real falcons," Chung has said.

Chung

White Achieves International Recognition for Research; Earns Local Honors for Graduate Student Mentoring

White

Internationally honored for pioneering several areas of composite materials research, Aerospace Engineering at Illinois Prof. Scott R. White is the 2014 national winner of the **American Society for Composites (ASC) Outstanding Research Award.**

Aiding White in the research he leads has been the Autonomous Materials Systems Group that has included many graduate students over White's 24 years at the University of Illinois at Urbana-Champaign. White's passion in nurturing his students and encouraging their input for ideas to develop new biomimetic materials has led to him also being recognized this year with the university's **Campus Award for Excellence in Graduate Student Mentoring.**

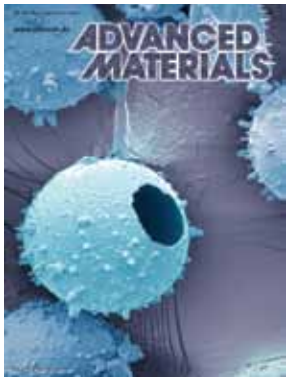
White's outstanding career achievements further led to his being named a **finalist this year for the Champaign County Economic Development Corporation's Innovation Transfer Award**. The recognition was part of Innovation Celebration 2014, honoring individuals and organizations that have made significant contributions, taken risks, and provided leadership to ensure the continuing economic success of Champaign County, the ongoing success of the University's economic development mission, and the growth of entrepreneurial talent and energy in the community.

Under White's direction, the Autonomous Materials Systems Group's overarching goal is to create bio-inspired materials systems that improve the safety and reliability of many aerospace composite structures.

White's team produced the first conclusive evidence of self-healing in a synthetic materials system in 2001. That breakthrough, which achieved healing by incorporating a microencapsulated healing agent and a catalytic chemical trigger within a polymer matrix, evolved into microvascular-based healing approaches, mimicking the repeated healing ability of human skin. More complex microvascular networks followed.

Over the past year, even more spectacular results have been achieved as White's group has successfully developed materials that not only heal, but can also regenerate and can restore large damage zones. The latest work was reported in the May 9 issue of the journal *Science*.

International media have feted White's work. He was a featured expert on "Self-Healing Materials," a segment of BBC Radio's *Frontiers Program* airing in later November 2013. The research discussed in the January 15 issue and highlighted on the cover of *Advanced Materials* featured White's group investigation into increasing the efficiency of self-healing in polymers that are cured at high temperatures. And the January 28 issue and cover of *Soft Matter* showed how White and his group seek to mitigate premature failure in unreinforced microchannels by inserting nanoscale skeleton-like structures into the materials.



Prominent journals featured on their covers graphics from Scott White's research.

Starting with his early work on composite manufacturing and analysis of residual stress development and continuing on with his innovative work on smart, multifunctional composite systems, White, a Willett Professor in the College of Engineering, has published over 150 archival publications, many with over 100 citations each.

White has been a leader in transferring to industrial applications the composite technologies developed under his basic research programs. He currently holds 31 U.S. and 22 foreign patents and patent applications, primarily in the field of self-healing polymers and composites. White is a founding partner of CU Aerospace, LLC, a Champaign, Illinois, research and development company focusing on technology transition within the aerospace industry. He also founded Autonomic Materials Incorporated (AMI), a start-up company that develops self-healing coatings for applications within the coatings industry from architectural materials to oil production and distribution to marine and defense systems.

Conway Retires; Continues Research, Teaching

Bruce A. Conway gained the title, "Professor Emeritus" with his retirement in January, but continues his research and teaching activities in Aerospace Engineering at Illinois. Conway's career in AE has spanned 34 years since he joined the department in 1980.

In research, he has made significant contributions to optimal control and celestial mechanics. He is a Fellow of the American Astronautical Society (AAS), and from that organization won the 2010 Dirk Brouwer Award. He also won the 2010 John V. Breakwell Memorial Award of the International Astronautical Federation.

Conway's prowess in teaching has been well-rewarded: he has been the recipient of the Campus Award for Excellence in Graduate and Professional Teaching (2011); the Campus Award for Excellence in Undergraduate Teaching (2007); the College of Engineering Teaching Excellence Award (2007); the College of Engineering Everitt Award for Teaching Excellence (2006); the College of Engineering Rose Award for Excellence in Teaching (2005); and the AE Department Teacher of the Year (multiple times). He has been included over 50 times on the List of Teachers Ranked as Excellent by Their Students.

In the practical side of aerospace engineering, Conway is certificated as an Airline Transport Pilot and has more than 2,500 hours of flight experience.

Conway

Elliott Wins 2014 Pierce Award

AE Prof. Gregory S. Elliott is the 2014 winner of the College of Engineering at Illinois Stanley H. Pierce Award.

One of the most highly-regarded faculty members by students within the College, Elliott has developed student-faculty interactive lab classes that provide students a hands-on experience.

In recent years, Elliott has developed AE 498UAV, where students learn about, design, and construct small UAV aircraft. One colleague noted, "Greg plays a key part in the construction phase of the UAVs, even machining some of the parts himself in his home workshop."

Elliott's teaching has been regularly recognized in the decade-plus at the College, earning the AIAA Teacher of the Year Award in 2006, the Collins Award for Innovative Teaching Excellence in 2007, and the Rose Award for Teaching Excellence in 2013. He has also frequently been named to the Incomplete List of Teachers Ranked as Excellent by the Their Students.

In addition to teaching, Elliott served as associate head for the Undergraduate Program in AE, where he gained recognition for developing an open dialogue between students and faculty. Currently he serves as the advisor for the Design/Build/Fly project.

Elliott earned BS and MS degrees and a PhD from The Ohio State University. He joined the University of Illinois aerospace engineering faculty in 2003, was promoted to full professor in 2008. His research focuses on thermal and fluid sciences.

Elliot

Freund Organizes/Chairs Symposium

Aerospace Engineering Prof. Jonathan Freund organized and chaired a symposium on "Directions in Computational Flow Physics" honoring Prof. Parviz Moin of Stanford for his leadership and groundbreaking simulation-based investigations of flow physics, particularly turbulence.

This symposium generated a special section of the November issue of *Physics of Fluids*. Freund, also a professor of Mechanical Sciences and Engineering, edited the section.

Papers by authors including Prof. Philippe H. Geubelle and Associate Prof. Daniel J. Bodony were featured in this section. Bodony and Geubelle were joined by Christopher M. Ostoich, a computational science and engineering graduate student, in the paper, "Interaction of a Mach 2.25 Turbulent Boundary Layer with a Fluttering Panel Using Direct Numerical Simulation."

Freund

Lambros Wins Frocht Award

Lambros

Prof. John Lambros is the 2014 winner of the Society for Experimental Mechanics M.M. Frocht Award.

In his 14 years as an Illinois faculty member, Lambros has developed a graduate experimental mechanics program that has been educating students in AE, Mechanical Engineering, Theoretical and Applied Mechanics, and Civil Engineering. He developed and taught the experimental mechanics courses AE 560 Fracture Mechanics Laboratory and AE 522 Dynamic Response of Materials, educating about 300 graduate students at Illinois in wave propagation and fracture mechanics.

Lambros has been included on the List of Teachers Ranked Excellent almost every semester he has taught graduate experimental mechanics and mechanics of materials courses.

He has served as AE's Associate Head for the graduate program since 2011, and in this capacity has advised more than 80 master's degree non-thesis students. Most recently, he helped develop AE's online graduate program to provide off-campus students with courses toward earning a non-thesis master's degree in aerospace engineering.

Lambros currently directs the Army Research Office-sponsored $6.25 million Multidisciplinary University Research Initiative program from 2009 to 2015, and directed the Air Force-sponsored Midwest Structural Sciences Center from 2010 to 2013, educating 25 graduate students and 15 undergraduates in experimental mechanics and mechanics of materials.

He has also been a strong supporter of undergraduate education in experimental mechanics, having taught more than 1,500 undergrads in his 20-year career. The UI student chapter of the American Institute of Aeronautics and Astronautics selected Lambros as the 2005 Teacher of the Year.

High School Students Get a Taste of AE

Almost 130 high school students got a taste of AE during summer camps this year.

The AE department and the Illinois Space Grant Consortium host the Illinois Aerospace Institute Summer Camps. Attendance has grown considerably since the program's beginnings in the early 1990s, when about 30 campers participated in a one-week camp. This year, the institute hosted two week-long camps, each attracting 40 students.

Organizer Brian Woodard, an AE camper himself in the mid-90s, said 2014 participants came from all over the world: Japan, India, Europe, China, Malaysia, Brazil, Puerto Rico, Canada, Guyana, as well as from the Midwest, California and the East Coast in the United States. These camps, offering 12 hours of instruction each day over five days, are highly selective in choosing students to participate.

A focused list of aerospace topics were covered, including an introduction to aeronautics/astronautics; model rocket/model glider design; aerospace materials and structures; flight mechanics; aerodynamics; orbits; navigation; rocket propulsion; aeronautics design and astronautics design.

Laboratory activities included introductions to flight simulation, the wind tunnel, rocket propulsion and fluid dynamics. Students built model rockets and gliders, and also took a field trip to the Institute of Aviation at nearby Willard Airport. There, they learned about jet aircraft, navigation and flight controls and took a flight in a small, four-seat airplane.

AE graduate students led most of the camp programs. "Graduate students relate well to the high school students," Woodard said.

In addition to the departmental camps, AE also participated in Girls' Adventures in Mathematics, Engineering, and Science (G.A.M.E.S.) and in a 4-H camp experience.

This year AE hosted 30 G.A.M.E.S. campers for a weeklong program and 19 4-Hers for a three-day experience. The College of Engineering and Women in Engineering sponsor G.A.M.E.S., which brought up to 200 high school girls to campus for activities in computer science, bioengineering, chemical engineering, electrical engineering, civil engineering and mechanical engineering departments, as well as in AE. The 4-H camp is part of the College of ACES Illinois Summer Academies extension program. Department of Aerospace Engineering

High schoolers participating in AE's 2014 summer camps.

AE Gains Composite, Nanosatellite Instructional Labs with Talbot Renovation

A $3.2 million project for renovating the Talbot Laboratory building will include developing state-of-the-art instructional composite manufacturing and nanosatellite laboratories in AE.

To be constructed in the building's basement, "the proposed instructional composite manufacturing facility builds on our expertise in the area of composite manufacturing, and aims at creating a truly unique educational facility that would have no equal at any university in the country," said Philippe Geubelle, AE Department Head and Bliss Professor in Engineering.

The nanosatellite facility will be a rarity as well. "The proposed lab facility, to be located in a very visible area on the third floor of Talbot, will bring our nanosatellite program at the level of the only other nationally recognized educational facility (Nanosat Operation Verification and Assessment or NOVA at the University of Utah)," according to Geubelle.

Construction requires the removal of the Mechanical Testing Facility 3-million-lb. press that starts from the building's basement and rises three floors. The resulting open area on each floor will be filled in to create space for laboratories and instructional areas for AE and the Department of Nuclear, Plasma, and Radiological Engineering (NPRE), also housed in Talbot. The renovation was one of four College of Engineering at Illinois projects picked for the University of Illinois Urbana Campus Facilities Matching Funds Program. The campus, the College of Engineering, AE, and NPRE will share the project's costs.

AE Prof. Scott R. White, Willett Professor in the College of Engineering at Illinois and leader of the Autonomous Materials Systems Group, maintains the new laboratory will make AE at Illinois "the national leader in composite facilities for research and education."

"This will be a world-class, 21st century composites laboratory that allows our students to tap the full creative spectrum: from computer-aided design to 3D prototype to final production parts," White said. "Additive manufacturing will play a significant role in this new laboratory and echoes what many envision for the future manufacturing shop floor. We will have greatly expanded capabilities in composites manufacturing under a one-stop facility including the traditional autoclave and filament winding techniques, but also more scalable and cost-effective processes like vacuum-assisted resin transfer molding.

Every AE undergraduate student will utilize this new facility in either their senior design course, special topic courses, professional design competitions, undergraduate research, or materials testing and behavior laboratories. "Typically, the Composites Manufacturing Laboratory touches 100+ students outside the AE department each year. That number is expected to significantly increase given the extraordinary plans for the new facility under development," White said.

An artist's conception of the new nanosatellite laboratory

The nanosatellite laboratory also will enhance the students' educational experiences.

"This lab will provide students with unparalleled hands-on engineering experience," said Erik Kroeker, graduate teaching assistant for AE Prof. Victoria Coverstone, who directs AE's nanosatellite program.

"Students in a variety of courses will be able to use the hardware lab to design, build, and test real flight hardware for upcoming missions. Students in a separate set of courses will utilize the mission control center to learn about mission design and mission operations by engaging in both simulated and live mission satellite operation," Kroeker said. "Both halves of the new lab will expose students to the kind of hands-on experience that one would only expect to find in industry, providing a unique and engaging vehicle for learning about satellite design.

"The space center will consolidate many of the existing fabrication and testing facilities while simultaneously adding several new capabilities," Kroeker continued. "The lab will incorporate improved attitude determination and control testing equipment, an improved clean room, solar simulators, electronics fabrication and testing benches, and an environmental testing suite. Most notably, it will also add a dedicated mission control room for conducting mission operations of university satellites."

Coverstone maintains, "This will elevate the University of Illinois' to the top tier of university satellite designers. While a few universities have satellite labs, Illinois will distinguish itself by dedicating its facility to both

continued on next page

Talbot Renovation, *continued from previous page*

undergraduate and graduate education in addition to research.

"The bulk of the research in nanosatellites done at this university has been accomplished through courses like the Nanosatellite Design courses," said Coverstone "The university can be proud that it is not only creating some of the best nanosatellite hardware designs, but also that that work is being done entirely by its students. The satellites built in this new lab, or tracked in its mission control room, will be the labor of literally over a hundred students (mostly undergraduate) over a total of 13 years and counting."

AE Offers Online Master's Degree

The first offering this fall of an online Masters of Engineering in Aerospace Engineering degree at Illinois has attracted eight master's degree students, and two non-degree students.

Eight of the students hold bachelor's degrees from AE and the other two have degrees from the University of Virginia and the University of Washington. Several work in aerospace, including for companies such as Boeing, Raytheon and UTC Aerospace Systems, and the U.S. Air Force.

"The turnout has been much more than we expected and we are really happy with it," said Prof. John Lambros, AE Associate Head of Graduate Programs. "The main thing now is to keep that up."

AE's priority in offering the program online has been to provide the same experience and maintain the same quality as the on-campus MS degree study.

"This is not a new degree program," Lambros has said. "It's exactly the same as the existing master's degree with the same requirements and the same courses."

Applications for enrollment in the non-thesis online master's degree can be made online at aerospace.illinois.edu/graduate-programs/applying-ae. The AE Department invested in the new program as a viable option for qualified graduate students who cannot be on campus.

"We will be able to reach people who are otherwise really good students but who can't be here physically," Lambros said. "We see this online degree format as appealing both to recent graduates just starting their careers, and to those in established careers who desire an advanced degree."

Qualified online students must meet the same prerequisites and required backgrounds as on-campus students for admission to the online MS. A total of 32 credit hours are needed to complete the degree.

Where are the online AE students?

"We wanted to maintain the same application process so that the quality of the online students would be equal to on-campus students," Lambros said.

He added that "for students not wishing to pursue a complete online MS degree the option of taking a limited number of courses is also available through Illinois's continuing education program (engineering.illinois.edu/online/)."

All AE faculty who teach graduate courses will participate in teaching students enrolled in the online program. Lectures are taped, and are available on an interface panel that can include video of the instructor, audio of the instructor's interactions with on-campus students during the class, and slides and handwritten notes. The faculty member for each course decide independently the best way to interact with online students, including through email, teleconferencing, discussion boards, direct contact, etc.

Rolls-Royce Dedicates Concorde's Olympus Engine to AE

AE at Illinois gained a unique part of aeronautics history when representatives from Rolls-Royce visited September 4 to dedicate to the department one of the company's Olympus engines used on the supersonic Concorde airliner.

Mark Rhodes, Rolls-Royce Vice President of Engineering and Technology, announced the long-term equipment loan to an audience of students, faculty, administrators and company representatives in a ceremony in Talbot Laboratory, the engine's new home. "This particular engine had just been completely overhauled at the time of the Concorde's retirement," Rhodes said. "We think it can be useful here for generating interest in gas turbine engines, Rolls-Royce, and for educational and community outreach through the annual Engineering Open House."

In conjunction with the loan of the engine, Rolls Royce has donated to the University Library more than 30 books with detailed information about the Olympus engine and Rolls-Royce products and history.

"The Olympus is a two-shaft turbojet with afterburner for takeoff and transonic acceleration, and each Concorde had four," Rhodes told the audience. "The engine generates 32,000 pounds of thrust dry and 38,000 pounds of thrust with the afterburner operating. These engines provided the thrust which enabled the Concorde to make a typical London to New York crossing in a little less than 3 ½ hours as opposed to eight hours for a subsonic flight. By its 30th flight anniversary on March 2, 1999, Concorde had clocked up to 920,000 flight hours, with more than 600,000 supersonic, much more than all of the other supersonic aircraft in the Western world combined."

The dedication is one way the company hopes to grow its interaction with the University of Illinois, according to Rhodes.

"We have funded research here on supersonics and are currently funding the development of an integrated engine/thermal/electrical modeling capability," he said. "We are a customer of the NCSA (National Center for Supercomputing Applications), running advanced analyses on the world class computers here on campus. We regularly recruit top-notch talent here for our co-op, intern and graduate development programs, as well as standard full-time positions.

"In addition, we are a Corporate Partner of the Illinois Leadership Center and support making leadership development available to students who are willing to challenge themselves to be better leaders," Rhodes continued.

Andreas Cangellaris, Dean of the College of Engineering at Illinois, and Philippe Geubelle, AE Department Head and Bliss Professor in Engineering, both thanked Rhodes and Rolls-Royce for the Olympus. Geubelle took the opportunity to announce the creation of a new student organization, Illini Aerospace Outreach, formed to support AE departmental outreach activities and maintain and improve the Olympus display.

In addition to attending the dedication, Rolls-Royce representatives also visited the National Petascale Computing Facility and the Illinois Leadership Center in the Illini Union while they were on campus.

College of Engineering Dean Andreas Cangellaris, left, with Mark Rhodes, Rolls-Royce Vice President of Engineering and Technology.

Projects Outside the Classroom Allow AE Students to Put Their Knowledge to Work

Aerospace Engineering at Illinois puts great emphasis on hands-on extracurricular projects so students can see tangible results from the knowledge they have gained in the classroom. Every AE student is encouraged to participate in one or more of these activities, and in recent years, the number of opportunities available have grown considerably.

"Extracurricular projects are an essential component of the education and on-campus experience of our students," said Philippe Geubelle, AE Department Head and Bliss Professor in Engineering. "They provide a unique opportunity for the students to work in teams and to develop leadership and communication skills that are critical for a successful career in engineering. It is the Department's objective to see every AE student involved in at least one extracurricular project while he/she is on campus, and we want this involvement to start early, at the freshman level."

Projects AE students have pursued over the last several months give a sampling of the many activities the department offers and supports to enhance the students' educational experiences.

NASA Robotic Mining Competition

With design changes that emphasized a systems engineering approach, the Illinois Robotics in Space (IRIS) team had their best year ever in the 2014 NASA Robotic Mining Competition. Formerly known as NASA Lunabotics, the competition held in May at NASA's Kennedy Space Center encourages forward thinking in future design concepts for autonomous mining robots.

Robot for the NASA Robotic Mining Competition

Robots are required to navigate around obstacles and uneven simulated Martian terrain, reach the mining area, collect at least 10 kilograms of regolith, and return to the starting area to dump the regolith in a designated bin. Judging is based on the amount of regolith collected, and how well the design minimizes power and data transfers between the robot and Mission control. Teams are evaluated on a systems engineering paper, an educational outreach report, and competition in on-site mining.

IRIS team with their robot.

Competing annually since 2009, IRIS made changes this year to optimize the robot's efficiency, and garnered third place for the Systems Engineering Paper. "The Mechanical Team proposed a simple design that aimed to minimize necessary machining and to facilitate the integration process," according to Aerospace Engineering at Illinois junior Adana Pappas, IRIS president and the project's manager. The design combined collection, storage and dumping all in one bin.

"This design was ideal because it allowed (the IRIS robot) to continue moving while collecting regolith, thus maximizing efficiency in the allotted 10 minutes," Pappas said. "Additionally, it minimized moving parts of the robot so troubleshooting, wiring and supplying power were somewhat simplified."

The 11-member team built the robot using machines in the Engineering Student Projects Laboratory (ESPL), the Digital Computer Laboratory (DCL) and the Ford Rapid Prototyping Laboratory. Pappas said team members also used the AE Machine Shop for repairs and machining.

RASC-AL

An Illinois team employed several unique concepts in designing an in-space lunar outpost as part of the 2014 Revolutionary Aerospace Systems Concepts Academic Linkage (RASC-AL) competition.

University groups were challenged with designing a habitat and support system augmenting NASA's Orion spacecraft to house a four-person team for a 30-day orbit between the Earth and the Moon. The National

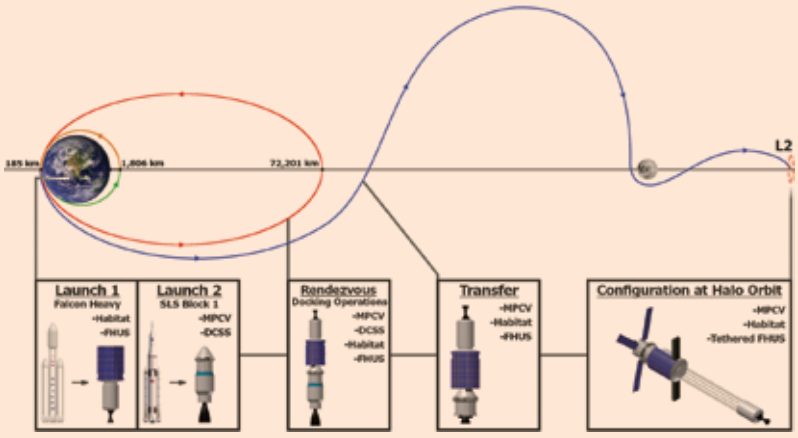
Institute of Aerospace, a non-profit research and graduate education institute near the NASA Langley Research Center in Hampton, Virginia, sponsored the annual RASC-AL competition, held in Florida in mid-June. The competition was intended as a test-bed mission to test technologies in preparation for longer manned missions.

Aerospace Engineering at Illinois undergraduate Christopher Lorenz said the Illinois team concentrated on these aspects to set their design apart:

- The team provided for 3-D printing of spare parts, to replace any originals that might malfunction or become damaged.
- The team planned for a unique orbital trajectory that used the full capacities of the Orion capsule. The Orion has been designed for deep space missions, so it is overpowered for the shorter-distance, intermediate orbit required of the competition. Because of that, Lorenz said, his team could increase the mass that the habitat could carry, allowing for more scientific equipment, better accommodations for the astronauts and better safety precautions.
- The design called for the habitat to be tethered to the upper stage of the rocket, then spun up to create artificial gravity for reasons including helping the astronauts to retain muscle mass during the prolonged stay in space. "The artificial gravity was included to allow for the testing of the technology that might be used on future, even longer duration missions to deep space, such as a manned Mars mission, where these technologies would be crucial," Lorenz explained.

The total cost was estimated at $3.2 billion, with a launch planned for the year 2021. AE Prof. Vicki Coverstone advised the 10-member team. Lorenz won an individual award as best undergraduate presenter.

"The feedback we got from the judges was very positive," Lorenz said. "They mentioned that they enjoyed the completeness of our design and didn't have any large problems with our architecture."



RASC-AL team's orbit design

RASC-AL team visiting the Kennedy Space Center

SpaceOps

An Illinois team got double duty out of a manned mission to Mars project when team members presented the plan at the American Institute of Aeronautics and Astronautics SpaceOps conference in May.

Recent AE graduate Braven Leung and undergraduate Christopher Lorenz represented the team at the SpaceOps 2014 13th International Conference on Space Operations held in Pasadena, California. Hosted by the National Aeronautics and Space Administration Jet Propulsion Laboratory, the conference was intended to bring together the space operations community to address state-of-the-art operations principles, methods, and tools.

On behalf of the nine-member team, Leung and Lorenz contributed an oral and poster presentation of the NERIO-I (Nuclear Explorations for Realizing Interplanetary Objectives I) project that won the Illinois Space Society (ISS) team 3rd place in 2013 at the RASC-AL (Revolutionary Aerospace Systems Concepts—Academic Linkage) competition.

In that competition, students were challenged with human factor considerations in crafting a mission for four crew members to stay a minimum of 30 days on Mar's surface. The ISS team concentrated on designs for better space suits, radiation shielding, and a biomass chamber in the award-winning concept.

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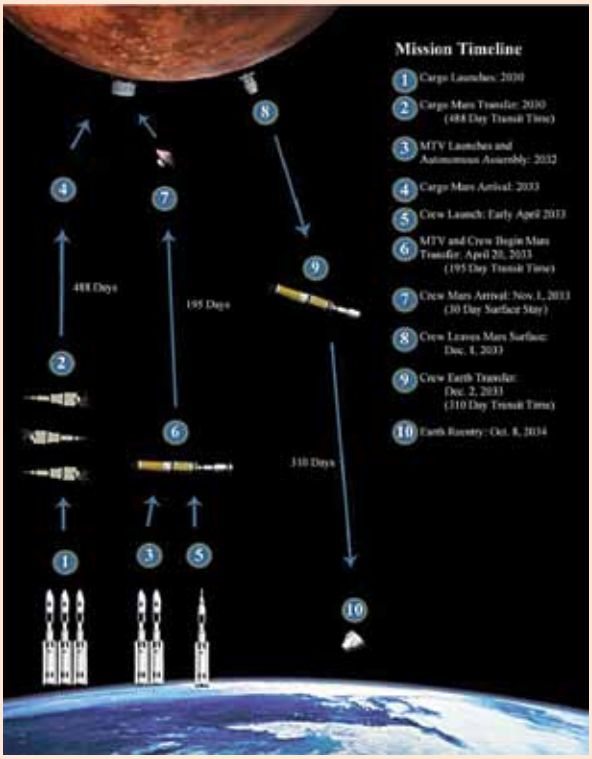
Braven Leung and Christopher Lorenz at SpaceOps

The revamped project presented in May included greater financial details than the original plan, as well as a more thorough aspect of adapting and using existing technology.

America's Cup of Rocket Science

While the best soccer players converged in Brazil this past summer for the World Cup, competitors from 44 teams around the world, including AE at Illinois, vied for international supremacy in the Global Trajectory Optimization Competition, dubbed the "America's Cup of Rocket Science."



NERIO-I project at SpaceOps

The biennial event challenged the best aerospace engineers and mathematicians in the world to solve a "nearly impossible" problem in interplanetary trajectory design. Participants were given a hypothetical "mother ship" with three probes. The mother ship could launch the probes at any time. But each had six years to visit as many of the known 16,000+ asteroids between Mars and Jupiter, stay 30 days at each, and return to the mother ship. The total allotted time between launch to landing would be 12 years. Each team got a point for every asteroid visited, but the probe was required to return to the mother ship to count. The Illinois contingent visited 25.

Led by Prof. Vicki Coverstone and post-doc Alex Ghosh, the Illinois students teamed with members of NASA's Goddard Space Flight Center and scientists and engineers from ai solutions, a contractor for Goddard. Access to Blue Waters, one of the most powerful supercomputers in the world and the fastest on a university campus, greatly enhanced the Illinois team's participation in the contest. To demonstrate Blue Waters power, in the course of about two hours, students ran calculations that would have taken six months of computing on a desktop computer.

Blue Waters reserves a chunk of time for educational purposes, and the team was allocated 26,000 node hours for the GTOC competition project. At one point during the calculations, 58 percent of the submitted jobs on Blue Waters came from the team.

The Illinois team also had the advantage of working with Dr. Jacob Englander at Goddard. Having earned his PhD in AE in 2012, Englander participated in the school's first foray into GTOC in 2009. While at Illinois, Englander developed for NASA the Evolutionary Mission Trajectory Generator, the first fully automated tool giving mission planners a preliminary set of detailed directions for steering a spacecraft to hard-to-reach interplanetary destinations such as Mercury, Jupiter, Saturn, and most comets and asteroids.

Working on the "America's Cup of Rocket Science"

"I was excited to see the enthusiasm of the students being able to work with professionals, and see the relevancy of what they have learned in class," Coverstone said. "They got a perspective on how it's done in the real world and transferred book knowledge into practical knowledge. Some techniques will lead to conference and journal papers."

NASA Rocket Launch Competition

An Illinois team gained exposure to a wide range of engineering applications—CAD modelling, project design and management, workshop and hands-on building, and technical knowledge of rocket design and flight—when they took part in the national NASA Student Launch over the summer.

The months-long competition, which culminated in rocket launches in May at the Bonneville Salt Flats in Salt Lake City, Utah, focused on designing, constructing and flying technologies to support NASA's Space Launch Systems (SLS) mission. Research results will be used in future design and development of SLS and other projects.

Each team launched a rocket with a custom-built recovery system and three payloads. Competitors were evaluated based on a series of technical design reviews, the results from the rocket's flight, including altitude, educational engagement activities in home communities, team-built websites, and a final written report.

"This year's program was especially challenging due to the requirement to include three payloads with the rocket, as well as a much more limited schedule due to NASA conflicts," said AE undergraduate Jason Allen, Systems Lead for the Illinois team.

The three payloads on the Illinois rocket were:

- A liquid sloshing experiment, designed to determine the effects of microgravity on fluid mixing during flight
- A hazard detection camera and image processing computer
- A payload fairing on the rocket's nosecone to examine how the nosecone operated mechanically and expose the camera during flight. Unfortunately, for safety reasons, the nosecone was not deployed during the final flight.

The 11-member team used a Wildman rocketry Intimidator kit, which produced a 5-inch diameter rocket that was just over 8 feet long. The rocket was launched on an Aerotech L1390 motor, and the final design weighed about 40 pounds.

Illinois students in Salt Lake City at the NASA Rocket Launch Competition.

"It was challenging, engaging work that was also lots of fun," Allen said. "It was rewarding for all involved."

Regional Great Midwest High Altitude Rocket Competition

An Illinois team composed of all freshmen earned the highest score in the 2014 Regional Great Midwest High Altitude Rocket Competition.

Thirteen teams—four from the University of Illinois at Urbana-Champaign and others from Iowa, Ohio, Minnesota and Wisconsin—took part in the competition held in April in North Branch, Minnesota. Student teams competed to design a one-stage, high-powered rocket that would accurately achieve an apogee of 3,000 feet and be recovered safely and in flyable condition, to predict and characterize flight performance by more than one method. The competition included design analysis, oral presentation, and assessment of data results, scored by professional engineers from both academia and industry.

Emerging with an altitude of 3,107 feet was Student Space Systems (SSS), composed of team leader David Degenhardt, Courtney Reid and Florin Ghinet, all of AE, Mathew Halm of Computer Science, and Leigh Honzatko, an undeclared major in the College of Engineering.

"What set our group apart was our development of a radio communications system that transmitted live altitude data to a ground station," Degenhardt said. "Several other groups at the competition had

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attempted to create similar systems, but none of them were successful. We would have been in that group, too, if it weren't for an 11th-hour breakthrough on the part of our programmer, Mathew Halm."

The team's work was not all smooth sailing.

"What we had hoped would be a quick launch prep instead turned into a grinding, 6-hour ordeal after failing a series of ejection charge tests," Degenhardt said. "In order to ensure that our parachutes would deploy successfully during flight, we had to make sure that we used the right amount of gunpowder to eject the parachutes from the rocket. Due to an unnoticed pressure leak in the nosecone, this testing took up most of our day.

"However, once we completed our testing, we were ready to fly. We had a picture-perfect launch, and our telemetry system performed beautifully."

In all, the competition was a great experience. "I would like to say how proud I am of the team for pulling this off," Degenhardt said. "If you can believe it, our entire team was composed of freshman. We put in a lot of hours and a few sleepless nights to get the rocket ready for competition."

In following up the competition, SSS now is constructing Project III, the group's first completely custom designed rocket. SSS plans for the rocket to fly higher than 10,000 feet and break the sound barrier.

Mars Flyby Competition

A team of Illinois students took third place among 10 finalists chosen to design a manned-mission flyby of the planet Mars this year. Members of the 18-person team, Illini Mars Mission for the Opportunity to Revitalize The American Legacy (IMMORTAL), presented the team's work in August during the 17th Annual International Mars Society Convention in League City, Texas. IMMORTAL garnered a trophy and a $3,000 prize for third place.

Student SpaceGrant Systems (SSS) members

The contest required competitors to design a safe, inexpensive, and simple two-person flyby of Mars for the year 2018. The relatively quick timeline was determined to make use of an advantageous alignment of the planets. Co-team leaders Braven Leung, a 2014 AE bachelor's degree graduate, and Christopher Lorenz, an AE undergraduate, said the short timeline and focus on cost efficiency triggered IMMORTAL's design using existing technology.

"Our novel idea is in the way the architecture comes together, and how the different pieces work together" to sustain human passengers, Lorenz said. "It's really difficult to send enough mass to support two people in space for that long."

IMMORTAL's plan called for launches of two rockets. The first would be a Space X Falcon Heavy rocket that would consist of a Dragon capsule to carry the crew into space, a Cygnus habitat in which the crew would spend most of the 501-day journey, and a service module to hold the crew's life support systems. These payloads would be significantly less mass than the Falcon Heavy's maximum capacity, so the team projected the rocket would have enough propellant left over to help perform part of the trans-Mars injection burn.

Since no one existing vehicle currently can carry enough mass to support humans on such a long journey, IMMORTAL's plans called for a second launch shortly after the first. A Delta IV Heavy rocket would be launched, carrying a Delta Cryogenic Second State propulsion module that would dock with the

Materials used for the Regional Great Midwest High Altitude Rocket Competition

Dragon-Cygnus assembly in Low Earth Orbit. The Falcon Heavy Upper Stage would then ignite, sending the assembly into an elliptical orbit around Earth. That stage would be discarded and the Delta Cryogenic Second Stage would burn to send the spacecraft out of Earth's orbit on to Mars.

The Delta stage would then be discarded, and the Dragon capsule would detach from the Cygnus module. The Dragon capsule would then spin 180 degrees and dock with the Cygnus so the crew could move over from Dragon to Cygnus for the rest of the journey.

Within 224 days, the Dragon-Cygnus vehicle would reach Mars and perform the flyby at an altitude of 100 kilometers, bringing the crew close enough to observe the planet and its moons in detail. The orbital energy of Mars would then effectively boomerang the spacecraft around for the return trip. The remaining 271 days would be spent traveling back to Earth, with the crew moving from the Cygnus to the Dragon module for re-entry.

Using NASA's Project Cost Estimating Capability framework, the team set the budget at $1,493 million.

The IMMORTAL members first heard of the competition in November, and decided to pursue it in January. They worked with Steven D'Urso, AE Lecturer and Aerospace Systems Engineering Program Coordinator, as their faculty sponsor.

CubeSat

Students at Illinois have been building CubeSats, miniaturized satellites for space research, since 2001. AE and the Department of Electrical and Computer Engineering manage an interdisciplinary engineering design class built around the CubeSat program. The class is run as a systems engineering project, with proposals, design reviews, demonstrations, and final presentations and documentation.

Currently, about 20 students are working in the CubeSat program on the Lower Atmospheric and Ionospheric Coupling Experiment (LAICE), said Alexander Ghosh, the project's manager.

The LAICE mission has two goals:

- To demonstrate a unique magnetic torqueing altitude control system that constrains the satellite in a fixed altitude
- To demonstrate and acquire in situ measurements of neutral and ion density properties in the altitude region from 150 to 325 kilometers; and to remotely sense wave parameters between 90 and 100 kilometers as the waves move upward from the lower atmosphere into the ionosphere

IMMORTAL Team members in the Mars Flyby Competition

The LAICE project hopes to reveal new information about the neutral ion coupling processes in the 150 to 325 kilometer atmospheric region. The phenomenon has led to ionospheric instabilities that disrupt communication and global positioning system (GPS) signals.

"Students who work with the CubeSat program get significant hands-on experience with space hardware and testing, which is highly desired by employers," Ghosh said. "Many of our students have continued on to positions at NASA, Boeing, Northrop Grumman, Lockheed Martin and SpaceX based on their time with the CubeSat program. We help teach students lots of practical engineering skills (such as technical writing, test development, hardware design, CAD, Electronics design), and there is even an associated educational course ENG491CU1 that students can take to get more formal training in satellite systems."

Student Aircraft Builders Glider Project

The Student Sustainability Committee at Illinois awarded almost $53,000 this year to Student Aircraft Builders (SAB), providing a big boost to the multi-departmental group of undergraduates who are building a composite, alternative energy glider.

"The grant is a tremendous opportunity for Student Aircraft Builders," said SAB President and AE undergraduate Andrew Putch. "It will allow us to continue providing a valuable learning experience for all

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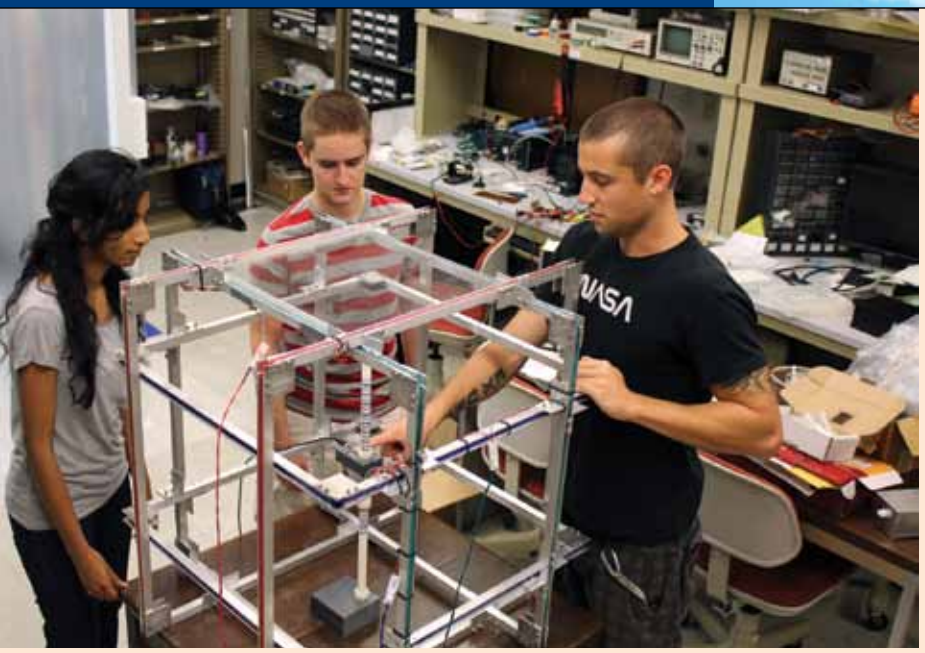


Patrick Haddox, right, explains technology in the CubeSat Laboratory to students Akshita Kakarlapudi and David Greer.

students on campus interested in aviation. We want to show the world what students are really capable of and this grant is a big leap in that direction."

"With the additional funding, we will be able to support even more students and their continued ideas," Putch continued. SAB counts as many as 150 members.

SAB teaches students from all across campus to work as a team in successfully constructing a flyable airplane. Working on projects since January 2013 in a hangar at Willard Airport, SAB members have gained resources and experience and are ready to move forward with the group's goal: fostering advancements in aviation by expanding student experience in sustainable energy technology and principles.

Alex Ghosh in the CubeSat clean room.

SAB is in the process of designing a quarter-scale, composite, alternative energy glider. The project is intended to teach students skills to design a plane as well as the basics for composite airframe construction. This is important because composite airframes, like the one found on Boeing's 787 Dreamliner, are at the forefront of the aerospace industry.

With knowledge of composite aircraft construction, SAB plans to build a Burt Rutan Long EZ. Aerospace engineer Burt Rutan is famous for his groundbreaking airplane designs. The Long EZ was specifically designed for fuel-efficient long-range flight by using composites and a canard in the airplane.

"The current plan is to expand past just working with sheet metal into composite airframe construction," said Erik Lopez, previous SAB President and also an AE student. "This will allow us to not just follow our industry but aid in surpassing it. Most of all, this (sustainability) grant plays perfectly into our long-term plan of eventually being able to design and build our very own airplane."

SAB has been working on the construction of a Zenith STOL CH-750 manned aircraft that can seat two people. Members are building the engine to power the plane, and, with students from the Computer Science Department, are creating an Active Instructions program to alter the order in which the Zenith

Student Aircraft Builders members working on a project

instructions are followed, to use resources more efficiently.

Design/ Build/Fly

The 25-30 members of the AIAA Design/ Build/Fly team at Illinois over the past year designed an aircraft that had to lift a series of payloads and ferry them around a predetermined course. Design work began in September and by December, a working prototype was flown. After more refinement, a production model was built during February and March. The final aircraft, weighing only 3 pounds, was designed to carry a 2-pound payload.

"We use Computer Aided Design (CAD) software extensively throughout the year to create a digital model of the aircraft that can be used to analysis instead of building an actual test model," said member Tom Blassick. "In addition, the digital report that is required by AIAA stresses presentation of both the design, as well as the methodology as to why various parameters were chosen.

"DBF offers a unique experience to experiment with the concepts learned in lecture on a small scale and see first-hand the effects of engineering decisions with near immediate feedback."

Operating on the Illinois campus since 1996, DBF specializes in developing radio-controlled aircraft to compete in the AIAA/Cessna/Raytheon-sponsored annual student Design/Build/Fly competition.

BP Ultimate Field Trip Challenge

The bright idea of recirculating natural gas flaring from oil drill sites to power oil rigs won a group of Illinois students a spot to compete in the National Finals of BP's 2014 Ultimate Field Trip Challenge. The 2014 challenge asked students to identify an innovative solution that would significantly reduce energy consumption and could be implemented by 2025, with the potential to be deployed at scale across the energy industry.

Team Orange Energy—the Illinois team of undergraduates Kevin Kim, Thomas Bernhardt and Grant Klobuchar—devised a solution that would make use of otherwise wasted energy.

"We planned to take gas that would ordinarily be flared into the atmosphere and run it through a steam reformation process, turning it into a quality methane fuel source. This fuel would then be used in a combustion engine to power the rig," said Klobuchar.

"We began working on the project in late October," Bernhardt continued. "Once we had an idea we spent most of our time building on the idea, making a business plan. The last few weeks were when we began to put all the information we gathered into a presentation; we finalized our plan and worked on our speaking, making sure the presentation was balanced."

The team members were glad for the experience. "We learned how to work on a team," Kim said. "We learned how to think more completely, how to take an idea from inception to delivery. We needed to make sure that our solution would not only be new and innovative but also economically feasible and able to be put into use within a few years by a company."

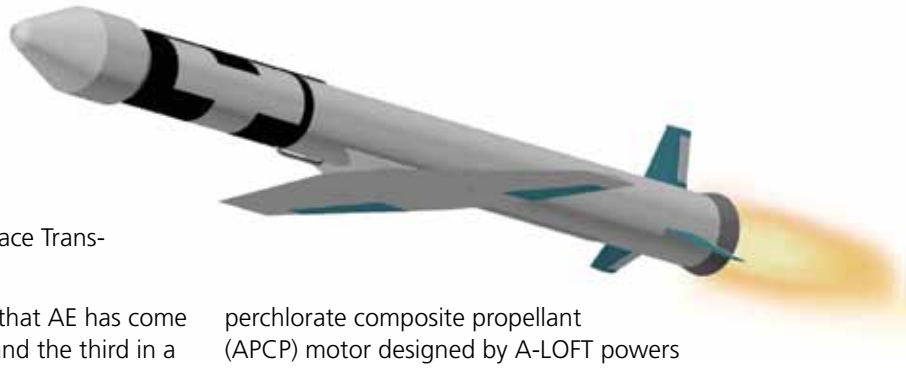
Formula SAE

Many AE students also help in Formula SAE at Illinois, one of the nation's best in designing, building and racing formula-style cars every academic year.

Illini Motorsports 2014 competition entry has been designed using points analysis coupled lap simulation and a renewed focus on reliability. Key design changes include a new aerodynamics package featuring custom airfoils, a reduction in wheel base and an introduction of a dry sump lubrication system.

Members of the Design/Build/Fly team flying a remote controlled plane.

Tradition of Success: AE at Illinois Teams Take First, Second in AIAA Space Design Contest



Continuing what's become a tradition of success, Aerospace Engineering at Illinois teams have taken first and second place in the American Institute of Aeronautics and Astronautics (AIAA) Foundation Undergraduate Team Space Transportation Design Contest.

This makes the fourth year in a row that AE has come in first in the national competition, and the third in a row AE teams have taken the top two places.

The course instructor, Prof. David Carroll, commented, "The tradition of success of the Illinois teams can be largely attributed to my predecessor instructors who created a superb course structure to follow, and the teaching assistants who interact so diligently with the students every year. And, of course, the students themselves earn the awards because they pour their heart and soul into creating their designs while incorporating our critiques (sometimes brutal with lots of red ink!) throughout the two-semester course."

The 2013-14 competition asked teams to develop an Air-Launched Vehicle capable of delivering 5,000 pounds of payload to Low Earth Orbit (LEO). The orbital vehicle needed to be launched from an existing military or commercial aircraft or a credible modification thereof. Launch altitude, velocity, and attitude, as well as the number of stages and propulsion system for each stage of the launch vehicle, were to be selected in an initial trade study with justification given for the selected design.

A-Loft Team

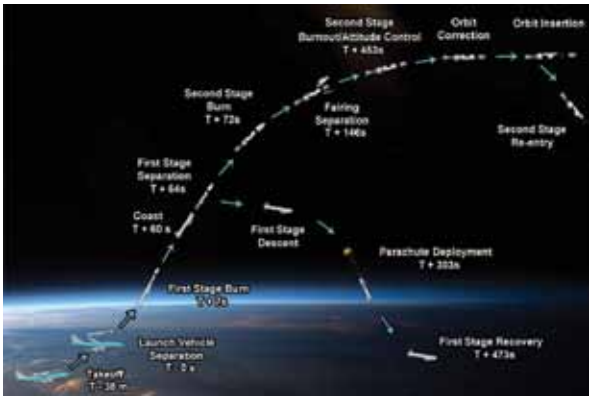
The first-place A-LOFT Team, with AE undergraduate Dayne Rogers of Rockford, Illinois, as Lead Systems Engineer, designed the Mako Launch System. "The Mako vehicle, named for the shortfin mako shark, consists of a two-stage rocket mounted atop a modified Boeing 747-400F carrier aircraft," according to A-LOFT's proposal. "A solid ammonium perchlorate composite propellant (APCP) motor designed by A-LOFT powers the winged first stage, which is designed for oceanic recovery and reuse. Cryogenic liquid hydrogen (LH2) and liquid oxygen (LOX) fuel the Vinci engine on the expendable second stage, which performs payload orbit insertion prior to re-entry. With design, development, integration, test, and evaluation from 2015 to 2019, the Mako vehicle can fly payloads through at least 2039 at $44 million per flight."

Said Rogers, "Our design approach was to meet the mission requirements with a vehicle that was reasonable to develop, manufacture, and fly, with as many technologically and economically feasible design elements as possible."

In addition to Rogers, A-LOFT Team members were:

- Jason Allen of Arlington Heights, Illinois, Structural Engineer

Members of the A-Loft team



A-Loft's design plan

- Jobin Kokkat of Chatham, Illinois, Propulsion Engineer
- Julia Liu of Mounds View, Minnesota, Orbital and Trajectory Engineer
- Timothy Lanham of Wood River, Illinois, Power and Thermal Engineer
- Stanley Chan of Solon, Ohio, Control and Communications System Engineer
- Tucker Gritton of Moline, Illinois, Air Vehicle and Ground Base Engineer
- Clayton Summers of Mount Carmel, Illinois, a freshman, joined the team in the Spring semester as part of AE 199S, and assisted with producing orbital and propulsion system models

Aether Team

The second-place Aether Team also designed a two-stage vehicle to deliver the payload, said Rosemary Chapple of Fults, Illinois, Lead Systems Engineer for Aether. The team's plan was for a large delta-winged vehicle to be mounted on a Boeing 747-8F, and to detach from the plane using a glide maneuver. "Unique to our design, a turborocket, air-breathing engine can carry the launch vehicle to approximately 100,000 feet, after which the first stage autonomously flies back to Earth," Chapple said. "For a final launch cost of $30 million the Aether Air Launch Vehicle uses safety, autonomy, and recoverability to remain economic.

"After the completion of this senior design project our team members have continued to contribute to aerospace applications by working for major companies like Boeing, NASA, and SpaceX, or remained at the university as students in the doctoral, masters, and undergraduate aerospace programs," Chapple continued.

Other Aether Team members were:

- Matt Dempsey, Orland Park, Illinois, Propulsion Engineer
- Kailey Draves, Woodstock, Illinois, Orbital Trajectory Engineer
- Brian Duckmann, Des Plaines, Illinois, Guidance, Navigation & Controls Engineer
- Lorena Jaimes, Oakwood Hills, Illinois, Launch Vehicle and Ground Operations Engineer
- Javier Puig Navarro, Urbana, Illinois, Structural Engineer
- Je Won Hong, Seongnam, South Korea, Power and Thermal Engineer

Competition Rationale and Requirements

Air-launched orbital vehicles continue to hold promise because of their reduced launch cost and improved access to space. Pegasus, built by Orbital Sciences Corporation, is currently the only orbital air-launched system in operation. Other air-launched orbital systems, such as Stratolaunch and the Defense Advanced Research Projects Agency-sponsored ALASA program, are in development. Similar systems were also the subject of Horizontal Launch Study that DARPA and the National Aeronautics and Space Administration published in 2011.

Teams competing were asked to demonstrate advantages of their air-launched system over ground/sea-based systems with comparable payload capability in terms of launch vehicle size, launch flexibility, launch site requirements, cost, operability, etc. Design teams also needed to identify and address any risks and challenges unique to the proposed system.

The design solution was required to focus on the orbital vehicle and interface with the carrier aircraft, as well as propulsion systems, propellant tanks and feed lines, control systems, primary structure, thermal control systems, power systems, and vehicle health monitoring systems.

Members of the Aether team

Aerospace Engineering Honors Outstanding Students

Department Head Philippe Geubelle with Jeremy G. Morton

Brendon M. Leeker with Adjunct Prof. David L. Carroll

Undergraduate Program Coordinator Laura Gerhold with Brian J. Gardas

Min-Yee Deng with Associate Prof. Timothy Bretl

Department Head Philippe Geubelle with David R. Brandyberry

Undergraduate Program Coordinator Laura Gerhold with Sarah C. Barrett

AE recognized several of the Department's undergraduate and graduate students in Spring 2014 with awards for their scholastic achievement and other contributions.

AIAA Scholastic Achievement Award, to the senior graduating in May 2014 with the highest class GPA—**Jeremy G. Morton, Bull Valley, IL**

H.S. Stillwell Memorial Award, to students showing outstanding scholastic achievement and contributions in extracurricular activities—**Brian J. Gardas, Chicago, IL, and Brendon M. Leeker, Eureka, MO**

The H.S. Stillwell Memorial Award was established in honor of Professor H.S. (Shel) Stillwell. At the age of 27, Professor Stillwell founded the Department of Aeronautical Engineering at the University of Illinois in 1944. He served as department head at Illinois for 32 years. A graduate of the University of Minnesota, he served as Head of the Aeronautical Engineering Department at the University of Kansas prior to coming to Illinois. Professor Stillwell was influential in the design of the first ramjet-powered missile and was highly respected for his contributions to aerospace engineering education.

Stillwell Problem-Solving Scholarship, to a junior-level student majoring in aerospace engineering who exhibits exemplary problem-solving skills—**Min-Yee Deng, Cleveland, OH**

This scholarship was set up by a generous alumnus as a tribute to H.S. Stillwell and the role he played as a mentor to students.

Robert W. McCloy Memorial Award, to a junior or first-semester senior student in recognition of outstanding academic performance—**David R. Brandyberry, Mahomet, IL, and David S. Knourek, Mokena, IL**

Professor McCloy was the first faculty member hired in the new Department of Aeronautical Engineering. He was known for his research and teaching in propulsion and for his pioneering work in jet propulsion.

Dale Margerum Memorial Award, to the AE undergraduate who exemplifies outstanding leadership qualities by participation in departmental extracurricular activities—**Sarah C. Barrett, Orland Park, IL**

Dale Margerum was a 1979 graduate who died in an accident the summer after graduation. He was very involved in extracurricular activities.

Jo Ann Haynes Platt & Daniel Wall Platt Memorial Award, to the AE sophomore, junior or senior female undergraduate James Scholar and/or Chancellor's Scholar studying aerospace engineering—**Melanie A. Ciancio, Villa Park, IL**

Lee H. Sentman III Scholarship, presented annually to an Aerospace undergraduate student based on academic achievement—**Jacob N. Denton, St. Elmo, IL**

AE Boeing Scholarships, one-year awards for an incoming freshman based on outstanding academic performance—**Margaret O. Smith, Downers Grove, IL**

Illinois Space Grant Scholarships, awarded by the NASA Illinois Space Grant Consortium to entering and continuing undergraduate students based on academic performance—**Min-Yee Deng, Cleveland, OH, and Braven C. Leung, Glenview, IL**

Roger A. Strehlow Memorial Award, to a graduate student in recognition of outstanding research accomplishment—**Phillip J. Ansell, York, PA; Mohith Manjunath, Bangalore, India; and Ravi Kumar Tumkur Revannasiddaiah, Framingham, MA**

The award is presented annually to honor Professor Strehlow, who joined the aero faculty in 1961. His background was in chemistry, and he was an acknowledged expert in the field of detonations and explosions. He also made significant contributions toward the understanding of the structure, stability, and extinction of laminar premixed flames. He was an early advocate of microgravity combustion research and successfully characterized the extinction and flammability states of flames under microgravity conditions. Professor Strehlow was the first AIAA Fellow in the Department of Aerospace Engineering.

Faculty Outstanding Graduate Award, in recognition of outstanding contributions to the Department's teaching and/or research missions—**Owen T. Kingstedt, Plymouth, MN**

Undergraduate Program Coordinator Laura Gerhold and Jacob N. Denton

Program Coordinator Laura Gerhold and Melanie A. Ciancio

Braven C. Leung, Undergraduate Program Coordinator Laura Gerhold and Mee-Yee Deng

Phillip J. Ansell and Department Head Philippe Geubelle

Prof. John Lambros with Owen T. Kingstedt

Prof. Tamer Basar (ECE) with Abhishek Gupta and Gupta's wife, Priyanka Aggarwal

Assistant Prof. Soon-Jo Chung with Saptarshi Bandyopadhyay

Andrew B. McKenzie, Prof. John Lambros, and Robyn L. Macdonald

From left, Berangere Doll, Asha-Dee N. Celestine, Prof. John Lambros, and Bindu B. Jagannatha

More photos can be viewed on the Aerospace Engineering Facebook Page.

Kenneth Lee Herrick Memorial Award, presented annually to a graduate student in recognition of outstanding research and academic performance—**Abhishek Gupta, Patna, India**

AE Alumni Advisory Board Fellowship, presented annually to a graduate student in recognition of outstanding research, academic performance, and research accomplishments—**Saptarshi Bandyopadhyay, Mumbai, India**

AE Block Grant Fellowships, provided by the University of Illinois Graduate College Block Grant program to provide flexible fellowship funding. AE uses the funds exclusively to improve the diversity of AE's graduate program—**Bindu B. Jagannatha, Bangalore, India; Berangere Doll, La Colle-sur-Loup, France; and Asha-Dee N. Celestine, San Fernando, CA**

Illinois Space Grant Fellowship, presented to entering and continuing graduate students by the NASA Illinois Space Grant Consortium and based on academic and research performance

H.S. Stillwell Fellowships, presented annually based on merit to income graduate students—**Robyn L. Macdonald of Urbana, IL; Andrew B. McKenzie, Irvine, CA; Xichen Shi, Shanghai, People's Republic of China; and Eliot J. Wycoff, Urbana, IL**

Students who joined Aerospace Engineering at Illinois in Fall 2014 made up the largest number of incoming undergraduates in 10 years.

AE students also recently have garnered awards from several other organizations.

Bronze Tablet Awards, recognizing high academic achievement and awarded to the top 3 percent of undergraduate students across the U of I campus. The names of this select group of students are inscribed on bronze tablets displayed on the first floor of the Main Library—**Jeremy G. Morton, Bull Valley, IL**

College of Engineering Stanley H. Pierce Award; Engineering Council Knights of St. Patrick; Ernst & Young Innovation Award; Class of 1941 Memorial Scholarship—**Akash A. Shah, Mumbai, India**

College of Engineering William R. Schowalter Award—**Bentic J. Sebastian, Dubai, United Arab Emirates**

College of Engineering William L. and Elizabeth A. Ackerman Scholarship—**Daniel N. Noboa Hidalgo, Morton Grove, IL**

College of Engineering Boeing Engineering Diversity Scholarship—**Alberto Davila, Jr., Crest Hill, IL; Martin Meraz, Chicago, IL; Michael S. Miller, Forsyth, IL; and Guillermo Perez, Jr., Chicago, IL**

College of Engineering Boeing National Action Council for Minorities in Engineering (NACME) Scholarship—**Michael L. Espinal, Itasca, IL**

College of Engineering Schlader Memorial Scholarship in Engineering—**Katherine A. McDonald, Plainfield, IL**

Knights of Dabrowski Crusade for Education Scholarship—**Robert M. Cachro, Lake Zurich, IL**

2013-14 Computational Science and Engineering Undergraduate Award—**Christian J. Howard, Crystal Lake, IL**

College of Engineering Support for Under-Represented Groups in Engineering (SURGE) Fellowships—**Rebecca Foust, Columbia, MD, and Christopher A. Herrera, North Bergen, NJ**

University of Illinois Beckman Institute Graduate Fellowship—**Michael T. Odarczenko, Arlington Heights, IL**

University of Illinois Graduate College Fellowship—**Christopher A. Herrera, North Bergen, NJ**

Achievement Rewards for College Scientists (ARCS) Foundation Graduate Fellowship—**Michael R. Dorothy, Creston, IA**

National Aeronautical Space Administration (NASA) Space Technology Research Fellowship—Daniel J. Morgan, Lafayette, IN

National Science Foundation (NSF) Graduate Research Fellowship—**Andy D. Borum, High Point, NC**

NSF Integrative Graduate Education and Research Traineeship (IGERT) Program—**HongAn Mary Nguyen, Wyoming, MI**

National Society of Hispanic Professional Engineers (SHPE) Research Competition, 2nd Place—**Joseph F. Gonzalez, Chicago, IL**

2013 Eisenhower Graduate Fellowship—**Gustavo Eidji Camarinha Fujiwara, Sau Paulo, Brazil**

Beeson Wins Brundage Scholarship

AE graduate student Ryne Beeson is a 2014 winner of the Avery Brundage Scholarship, awarded university-wide for excellence in academics and athletics.

The scholarships are awarded to students who engage in athletics for personal development, not as a professional career track. They also must be working toward bachelor's, master's or doctoral degrees, and must be in the upper 25 percent of their undergraduate class or in good academic standing in their graduate program.

Beeson participated in Division I cross country and track his freshman and sophomore years at Eastern Illinois University in Charleston, Illinois, and his senior year and first year of graduate school at Illinois. He also helped establish Illinois' cross country and track club teams.

As a graduate student advised by AE Prof. Vicki Coverstone, Beeson is researching new ways to improve the design process for optimal spacecraft trajectories, specifically for sensitive dynamical, 3 and 4-body problems.

Beeson also won the 2014-15 Mavis Future Faculty Fellowship and the 2014 John Mather Nobel Scholar Award.

Fujiwara Wins "Love of Learning Award"

AE graduate student Gustavo Eidji Camarinha Fujiwara has won the "Love of Learning Award" from the Honor Society of Phi Kappa Phi, the nation's oldest and most selective honor society for all academic disciplines.

Fujiwara is advised by AE Research Prof. Michael B. Bragg.

Shah Chosen as Knight of St. Pat; Receives Pierce Award

Recent AE graduate Akash Shah was inducted as a 2014 Knight of St. Patrick in the College of Engineering, and won the College's 2014 Stanley H. Pierce Award for developing empathetic student-faculty cooperation.

The native of Mumbai, India, was furthermore included on *Aviation Week* Twenty20s list, based on his all-round participation on campus and contributions made to the aerospace and defense industry.

Having earned bachelor's degrees in AE and computer science, and recently employed with Microsoft, Shah was noted for his performance in the classroom, his leadership in service activities, and his mentoring of international students in AE.

In addition to his rigorous coursework, including a minor in the Hoeft Technology and Management Program, Shah took a leadership role in a variety of activities, including Engineering Council, the Illinois Space Society (ISS), the Dean's Student Advisory Committee (DSAC) and the NASA University Student Launch Initiative (USLI).

As an executive board member for the Illinois Space Society, Shah helped nurture student collaborations on several technical projects, allowing for expanded research opportunities for students. He has also hosted student-led information sessions to encourage students to make suggestions, leading to several renovations within the department.

As president of DSAC, Shah helped form Undergraduate Advisory Boards to represent each of the 12 departments within the College and helped organize an undergraduate research workshop that attracted 400 students.

His involvement in USLI included working with the Technology Entrepreneur Center to fund the team's travel for its final rocket launch at Marshall Space Flight Center in Huntsville, Ala. As team leader for this year's project, he is working to develop three scientific payloads on-board a high-powered rocket as part of the Space Launch System research program.

Sebastian Wins College's Schowalter Award

Winner of Engineering at Illinois' William R. Schowalter Award, AE undergraduate Bentic Sebastian has a mission to "inspire other younger students to get involved and follow their passion."

Sebastian, who will complete his degree in May 2015, has served as the director of the Aerospace Undergraduate Advisory Board (AEUAB) and as treasurer of the Illinois Robotics in Space (IRIS). It has been through his student blog posts for *International Student and Scholar Services,* however that he has most connected with students.

Sebastian's blogs share the international student experience with topics that he was curious about as a freshman. He has written about Thanksgiving, Midwest winters, career fairs, making good conversations, the Freshman 15, and how to use technology effectively to enhance student performance.

Sebastian also has a passion for music, which he has pursued at the university by joining the acca-pella team *Illini Awaaz.* He has been a member for a year, singing as a baritone for the team.

"Most students think that it is impossible to follow their interests during college," Sebastian said. "I hope to show that it's possible, even necessary, to pursue them for the most wholesome university experience."

Sebastian has been involved in the Senior Design Mentorship Program (AE 199 SD). The program allows selected freshmen to serve on the AE Senior Design Team, contributing to the projects through three tasks. Last year, he helped modify the grading rubrics for the course to serve the interests of both the freshmen and seniors.

Sebastian is interested in control systems, specifically AE applications like drones and quadcopters. He hopes to use his skills in the future to lead technical teams to build robust vehicles, by "inspiring team members to think of the big picture as motivation for their current tasks."

Gonzalez Takes Second in National SHPE Research Presentation

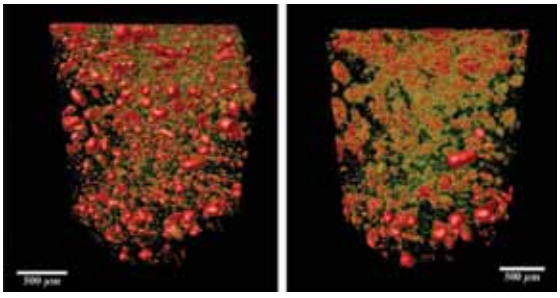
AE graduate student Joseph Gonzalez took second place for research presented at the National Conference of the Society of Hispanic Professional Engineers (SHPE).

Gonzalez competed in Fall 2013 among 125 finalists from across the country invited to present papers on research ranging from biomedical studies to physics to aerospace engineering.

"Three Dimensional Studies in Li-ion Composite Battery Electrodes," illustrated Gonzalez's work in using x-ray tomography to visualize microstructural evolution of an anodic Tin-based electrode before and after lithiation, using a custom designed Li-ion battery cell.

"Through ex situ imaging of the composite electrode after different stages of electrochemical testing, I developed particle expansion measurements and observed different failure mechanisms," Gonzalez said. "I tied my results into understanding the microstructural challenges and improvements that can be made to develop higher capacity batteries for the future, leading to longer battery life."

Gonzalez is pursuing a PhD under the direction of AE at Illinois Prof. John Lambros.



Research graphic from graduate student Joseph Gonzalez's work with AE Prof. John Lambros

AE Students Use GPS to Improve Wind Farm Efficiency

Knowing which way the wind blows is critical in achieving efficiency in energy-producing wind farms. A team of AE undergraduates arrived upon novel means to maximize wind power by using Global Positioning System technology.

"Because existing methods are very expensive and can be complex to set up, we wanted to demonstrate the capabilities of applying GPS to remote sensing to obtain a more cost-efficient solution for wind profile determination," said team member Derek Chen.

Chen teamed with AE undergraduate Dan Jia, and the students gained direction from AE Assistant Prof. Grace Gao and her postdoctoral research assistant, Liang Heng. Chen and Jia's work, "Distributed Array of GPS Receivers for 3D Wind Profile Determination in Wind Farms," garnered the best presentation of the session award in Fall 2013 in Nashville, Tennessee, at the ION GNSS+ conference, the largest conference in the field of GPS/GNSS.

Explaining their concept, Chen said, "Through the use of precise positioning and relative wind speed sensors, we were able to create a scalable airspeed sensor. Our system was based on first tying a wind sensor with an aerodynamic shell that allows the sensor to constantly point into the wind, to a weather balloon. Afterwards the balloon will lift the sensor to wind turbine height. Through the movements of the balloon, calculated by GPS, as well as the measurements of the wind sensor, we were able to determine an accurate wind profile of the area."

The team had built a prototype sensor and tested the system on a local wind farm in Paxton, Illinois. The prototype proved the system's effectiveness, Chen said.

AE Assistant Prof. Grace Gao, middle, with students working on GPS research

IN MEMORIAM

Steven Nagel, Astronaut, Long-time AE Supporter

Nagel

Retired Col. Steven R. Nagel, a veteran of four Space Shuttle flights and a loyal AE alumnus, died Thursday, August 21, 2014, after a long battle with cancer. He was 67.

Nagel was dedicated in his support of the Department, and greatly inspired AE's students and faculty. In addition to serving on the AE Alumni Board for many years, he journeyed to the University of Illinois often to present talks about his career, his 723 hours in space including his Space Shuttle missions, and future directions of the National Aeronautics and Space Administration (NASA). Most recently he was well received by an overflow audience on the Urbana campus in October, when he spoke of his experiences in space and helped introduce fellow astronaut and AE alumnus Michael Hopkins, who chatted live from his location aboard the International Space Station.

In addition to many recognitions from NASA and other organizations, Nagel in 1992 was presented the Alumni Achievement Award, the highest honor the University of Illinois bestows upon its graduates. He also received the 1988 AE Distinguished Alumnus Award, and the 1993 College of Engineering at Illinois Alumni Award for Distinguished Service.

"Steve really loved to interact with students," said AE Department Head Philippe Geubelle. "Last fall, when I asked him to serve as emcee for the event with Mike Hopkins, Steve immediately agreed to rearrange his schedule, drive up from Columbia, Missouri, to Champaign, and share his experience as a NASA astronaut. His presence made the event a real success.

"I had the chance to attend a few of his presentations over the years: the way he connected to the students was truly remarkable," Geubelle continued. "As a long-time member of the AE Alumni Board, he gave valuable input on our curriculum and the educational activities of the Department. This is a sad day for AE: we lost a remarkable alumnus and a very loyal friend."

A native of Canton, Ill., Nagel earned his bachelor's degree from AE in 1969 and was commissioned the same year through the University of Illinois Air Force Reserve Officer Training Corps (AFROTC).

He served the NASA astronaut program from 1979-2011. Nagel had the unique distinction of participating in four space flights aboard four different space shuttles— as mission specialist for STS-51G aboard Discovery in 1985; as pilot for STS-61A aboard Challenger also in 1985; as commander of STS-37 aboard Atlantis in 1991; and as commander of STS-55 aboard Columbia in 1993.

Following the explosion of the Challenger space shuttle in 1986, Nagel represented the Astronaut Office in efforts to develop a crew escape system. According to Space.com, Nagel said, "This was my best time at NASA, actually. Nothing I ever did was more fulfilling than that two years, to be honest, even flying. This was better, because everybody was so focused on getting the shuttle flying again."

He served many other support roles for the shuttles' early flights and, upon retirement from the Air Force in 1995, was deputy director for operations development for the Safety Reliability and Quality Assurance Office at the Johnson Space Center in Houston.

Nagel retired from the Air Force in February 1995. He retired from the Astronaut Office on March 1, 1995, to assume the full-time position of deputy director for operations development, Safety, Reliability, and Quality Assurance Office, Johnson Space Center, Houston, Texas. In September 1996, Nagel transferred to the Aircraft Operations Division where he performed duties as a research pilot, chief of aviation safety and deputy division chief. He retired from NASA on May 31, 2011.

His career shifted to academics when he became an instructor in the Mechanical and Aerospace Engineering Department at the University of Missouri in 2011.

Nagel is survived by his wife, Linda, and two daughters, Lauren and Whitney.

Harry Hilton, AE emeritus professor and former Department Head, became good friends with Nagel throughout his association with AE. "Steve was a tireless supporter of the UIUC Aerospace Engineering Department," Hilton said. "He was a frequent visitor and campus speaker who inspired AE students to be devoted to their profession."

Steve Nagel giving a presentation at the University of Illinois in April 2013

Mike Hopkins' Year-long Journey: From ISS to Illinois

In what has been an incredible journey over the span of the past year, AE alumnus and astronaut Michael Hopkins grew closer in his connection with the University of Illinois at Urbana-Champaign through his travels to the International Space Station.

Having launched into space on Sept. 25, 2013, Hopkins thrilled a capacity-filled room of students, faculty and university personnel in October when he engaged with them in a live chat via satellite. He fielded questions from several lucky AE students, then set the crowd cheering when he did a flip in zero gravity to end the chat.

While aboard ISS, Hopkins orbited Earth for more than 2,500 times and participated in two space walks. Throughout his journey, he celebrated his Illinois roots, tweeting updates from the address @Astrolllini.

Upon returning to Earth, Hopkins thought it fitting to give his Post Mission Presentation on the Urbana campus, capping that off with the 2014 Commencement Address in which he urged new University of Illinois graduates to define their own success. The stirring speech was recognized as one of the year's six best graduation addresses (chicagotribune.com/news/local/breaking/chi-astronaut-sky-high-on-list-of-best-graduation-speakers-20140801-story.html).

Hopkins earned his bachelor's in 1991 in AE while also captaining the Illini football team. He was commissioned as a second lieutenant in the United States Air Force in 1992 and was the first of the 14-member NASA Astronaut Class from 2009 to enter space.

AE Alum and astronaut Mike Hopkins was proud to show the orange and blue during his 2014 Commencement Address.

Carruthers Receives Illinois' Highest Alumni Award

AE alumnus George R. Carruthers was honored with the University of Illinois' highest alumni award during Commencement, May 17, on the Urbana-Champaign campus.

The University of Illinois Alumni Achievement Award is presented to those alumni who have attained outstanding success and national or international distinction in their chosen profession or life's work, and whose accomplishments reflect admirably on, or bring honor to, their Alma Mater. Carruthers, BS 61, MS 62 Nuclear, Plasma, and Radiological Engineering, PhD 64 AE, performed groundbreaking work in far ultraviolet astronomy as a Naval Research Laboratory scientist. His rocket-borne telescope of ultraviolet star radiation brought long-sought proof that hydrogen atoms are converted to molecules in dust clouds in interstellar space and catalyze the birth of stars.

In February 2013, President Barack Obama honored Carruthers by presenting him the National Medal of Technology and Innovation at the White House. Carruthers was one of seven scientists nationwide to be recognized with the medal at that ceremony.

Influenced by the Space Race of the late 1950s and 1960s, Carruthers, a scientist at the Office of Naval Research Laboratory, performed groundbreaking work in far ultraviolet astronomy. His efforts led to a patent for pioneering instrumentation, an image convertor for detecting electromagnetic radiation, especially in short wave lengths. In 1970 he gained international attention when the photographs from his rocket-borne telescope of ultraviolet star radiation brought long-sought proof that hydrogen atoms are converted to molecules in dust clouds in interstellar space and catalyze the birth of stars. In 1972 his far ultraviolet camera spectrograph was sent to the moon with the Apollo 16 mission, allowing ONRL to take readings of and understand objects and elements in space that are unrecognizable to the naked eye. The camera, which remains on the moon, provided views of stars and solar systems millions of miles away.

Carruthers

AIAA Recognizes Muellner as Honorary Fellow

Muellner

The American Institute of Aeronautics and Astronautics has selected AE alumnus George K. Muellner as an Honorary Fellow, AIAA's highest distinction.

Muellner, BS 67, was cited "for a lifetime of seminal contributions to our Nation's defense with leadership in aerospace programs and education that will enhance our security for decades to come."

Muellner is Chairman of the Board for the Air Force Association. He is a Life Member of the AFA and has previously served as the Vice Chairman for Aerospace Education, a National Director and as a member of the Aerospace Education Council.

Muellner retired from the Boeing Company in February 2008 as president of Advanced Systems for the Integrated Defense Systems business unit. Prior to that he was senior vice president-general manager of Air Force Systems, responsible for all domestic and international Air Force programs. Prior to that, Muellner was president of Phantom Works, Boeing's advanced research and development unit.

Muellner served 31 years in the U.S. Air Force, retiring as a lieutenant general in 1998 from the position of principal deputy for the Office of the Assistant Secretary of the Air Force.

From 1993 to 1995, he served as director and program executive officer for the Joint Advanced Strike Technology program, now the Joint Strike Fighter program. He earlier served as mission area director for tactical, command, control and communications, and weapons programs. In 1992, he became deputy chief of staff for requirements for the Headquarters Air Combat Command at Langley Air Force Base. A highly decorated veteran, Muellner spent most of his career as a fighter pilot and fighter weapons instructor, test pilot and commander. He flew combat missions in Vietnam and commanded the Joint STARS deployment during Operation Desert Storm.

Muellner is a Fellow of the Society of Experimental Test Pilots, a Fellow of the Royal Aeronautical Society, and a Fellow and Past-President of the AIAA. He is also a trustee of the USAFA Falcon Foundation, a Senior Fellow of the Air Force Scientific Advisory Board and serves on the Board of Visitors of the College of Engineering at Illinois.

Muellner has received Distinguished Alumni Awards from both AE at Illinois and the College of Engineering, and serves on the AE at Illinois Alumni Board.

Alumnus Riley Selected as AIAA Fellow

Riley

The American Institute of Aeronautics and Astronautics has designated AE alumnus David R. Riley as an AIAA Fellow.

Riley, BS 77, has worked on high technology aerospace products ranging from front-line fighter aircraft to transport aircraft, and from VSTOL aircraft to winged spacecraft.

In 1977 Riley joined McDonnell Douglas, working on stability and control and flying qualities of the F-15 and F/A-18. In the mid-80s, he worked as a member of the X-29A flight test team at the NASA Dryden Flight Research Facility. He then returned to St. Louis and managed a research team developing new high angle of attack flying qualities criteria and performing innovative research in aircraft agility.

In the early 90s, Riley worked on the flight control development efforts of multiple programs including the C-17, A/F-X, AV-8B, T-45, and ASTOVL. He led the flight control development team for the McDonnell Douglas/Northrop Grumman/British Aerospace JAST program. As part of the McDonnell Douglas merger with Boeing in 1998, he led the Boeing JSF flight control development team. He later took over the management of a Phantom Works research group, refining technology for the X-40A and X-37 space planes, X-36, the Sonic Cruiser, and multiple classified programs.

Riley has served as program manager for several Air Force Research Laboratory programs including the Active Aeroelastic Wing Program and the Automated Aerial Refueling Program. Currently, he is the Integrated Vehicle Energy Technology (INVENT) program manager.

Riley has over 25 technical publications, and his honors and awards include an AE Department Distinguished Alumnus Award in 1995, and the Boeing Research and Technology 2008 Gold Team Award.

Deal, Leo, Merret and Whalen Selected for AE Alumni Awards

Aerospace Engineering alumni Stanley A. Deal, BS 86, and Donald J. Leo, BS 90, are winners of the 2014 Distinguished Alumnus Awards. Jason M. Merret, BS 99, MS 01, PhD 04, and Edward A. Whalen, BS 01, MS 03, PhD 07, are winners of the 2014 Outstanding Recent Alumni Awards.

The alumni were honored during the AE Awards Banquet on April 22, 2014.

Stanley A. Deal

Deal is senior vice president for Commercial Aviation Services at Boeing Commercial Airplanes in Everett, Washington. In this role, he leads Boeing's commercial airplane customer support and after-market products and services.

The organization provides customer support for airlines around the world and consists of five services businesses as well as several subsidiary companies, including Aviall, CDG and Jeppesen. Deal was named to this position in March 2014. More than 11,000 employees worldwide provide a wide range of services and 24/7 support, including material management, airplane conversions, upgrades and repairs, navigation and planning solutions, operational efficiency systems and flight and maintenance training. These capabilities are part of a comprehensive portfolio of services, support and solutions collectively known as the Boeing Edge.

Most recently, Deal was vice president and general manager of Supply Chain Management and Operations for Boeing Commercial Airplanes. Appointed to this position in August 2011, he was responsible for the overall leadership of Commercial Airplanes Supplier Management, Fabrication, Propulsion Systems and Quality.

Prior to that, Deal was vice president and general manager of the Boeing Commercial Airplanes Supplier Management organization. Named to this position in January 2010, he was responsible for the overall strategy, contracting, daily management and development of the Boeing Commercial Airplanes supply chain for all commercial airplane programs.

Deal served as vice president of Asia Pacific Sales for Boeing Commercial Airplanes, a position he assumed in November 2006. In that position, Deal was responsible for sales in Japan, Korea, Singapore, Australia, Thailand, New Zealand, Vietnam, Hawaii and other Pacific Island markets.

Deal also has served as vice president of Sales and Marketing Operations, Boeing Commercial Airplanes and, previously, helped launch Connexion by Boeing, in which he served as vice president of Global Network Sales. He led sales activities in the commercial airlines and executive services aviation markets worldwide.

Deal joined Boeing in 1986 and held various leadership positions within Boeing, including leading integrated product teams for propulsion systems and structures on the 717 program and serving as Japan Airlines program manager on the MD-11 program.

In addition to his Boeing career, Deal served as vice president and general manager for Fairchild Aerospace, for which he was responsible for many commercial airliner programs, including managing the supply chain and strategy. Under his leadership, Fairchild successfully developed and introduced a new airliner program and oversaw the certification and market introduction of the 328 jet aircraft.

In addition to his AE degree, Deal holds a Master of Business Administration from Pepperdine University.

Stanley A. Deal with Department Head Philippe Geubelle

Donald J. Leo with AE Prof. Larry Bergman

Donald J. Leo

Leo has been Dean of the University of Georgia at Athens (UGA) College of Engineering since July 1, 2013. The College was established in April 2012 to meet a need for more Georgia-trained engineers. The College was formed by merging the University's two engineering academic units, the Faculty of

Engineering and the Department of Biological and Agricultural Engineering, into a single engineering academic unit.

Previously, Leo was a professor of mechanical engineering and vice president and executive director of the National Capital Region operations of Virginia Tech. There he served as associate dean for research and graduate studies at the Virginia Tech College of Engineering. Leo successfully grew the research enterprise at Virginia Tech while creating partnerships with government and industry, underscoring the institution's land-grant mission of service to the state.

Department Head Philippe Geubelle with Jason M. Merret and Jason's father, James Merret, Jr.

As vice president and executive director of the National Capital Region operations of Virginia Tech, Leo integrated and coordinated the activities of Virginia Tech in the greater Washington, D.C., area. From 2007-2011, he served as associate dean for research and graduate studies for the Virginia Tech College of Engineering, which has approximately 8,000 students. As associate dean, he led Virginia Tech in its collaboration with the University of Virginia and the government of the Commonwealth of Virginia in the founding of the Commonwealth Center for Advanced Manufacturing.

From 2005-2007 and in conjunction with his position at Virginia Tech, Leo served as a program manager for the Defense Advanced Research Projects Agency (DARPA), a unit of the Department of Defense, For DARPA he created programs in the field of biologically inspired materials and systems and managed a portfolio of approximately $50 million in interdisciplinary research.

Leo joined the faculty of Virginia Tech in 1998. His research focuses on smart materials, and he has served as principal investigator on 50 research grants and contracts with approximately $12 million in extramural funding. He has authored or co-authored more than 200 research publications and recently founded the Biomolecular Materials and Systems Laboratory, which explores how biological materials and signaling processes can be used to develop engineering devices.

Leo wrote the textbook, *Engineering Analysis of Smart Material Systems* (John Wiley and Sons, 2007), which is used at the senior undergraduate and graduate level at several colleges and universities. He created a course on active materials and smart structures that is based on his textbook and continues to be taught at Virginia Tech.

Leo is a Fellow of the American Society of Mechanical Engineers, a recipient of the Virginia Tech Dean's Award for Excellence in Research and in 2004 was named AE at Illinois Outstanding Recent Alumnus.

In addition to his AE at Illinois degree, he earned a master's degree and a doctoral degree in mechanical and aerospace engineering from the University of Buffalo. He earned his bachelor's degree in aeronautics and astronautics engineering from the University of Illinois at Urbana-Champaign.

Jason M. Merret

As a technical specialist for Gulfstream Aerospace Corp. in Savannah, Georgia, since 2004, Merret conducts preliminary analysis of future subsonic and supersonic business aircraft configurations, performs analysis including estimation and integration of aerodynamics, weights, stability and control, and propulsion into a basic multi-disciplinary optimization program, and assists in a number of wind tunnel planning and testing activities in subsonic, transonic, and supersonic wind tunnels.

Merret also teaches aerospace classes as an Adjunct Faculty member of Embry-Riddle Aeronautical University in Daytona Beach, Florida.

As a student, Merret worked with Emeritus Prof. Michael B. Bragg on high angle of attack reentry vehicle aerodynamics and Smart Icing Systems research in the area of flight mechanics and atmospheric disturbances for commuter aircraft. He also was a project leader for the American Institute of Aeronautics and Astronautics Design/Build/Fly Team in building a remote control unmanned aerial vehicle for the AIAA design contest.

Edward A. Whalen

Whalen is an Aerodynamics Engineer for Boeing Research & Technology in St. Louis, Missouri.

He joined the Flight Sciences Technology organization in Boeing in January 2008, becoming the focal for Active Flow Control applications supporting Boeing Commercial Airplanes that focus on AFC for high lift systems and a vertical tail. The latter project evolved from a Boeing internal R&D effort into a major Boeing-NASA collaborative effort with Whalen as Boeing Project Manager. The project involved four Boeing organizations (Boeing Commercial Airplanes, Boeing Defense Systems, Boeing Test & Evaluation, and Boeing Research and Technology) and a number of university suppliers. This work led to the successful demonstration of AFC on a full-scale 757 vertical tail in the NASA Ames 40′ by 80′ NFAC wind tunnel in October-November 2013. The accomplishments of this project recently were reported in *Aviation Week*.

Whalen also served as Program Manager and Capture Team Lead for a NASA SMAAART proposal to design a flight test AFC system for a 757 vertical tail as part of the 2014 ecoDemonstrator program. This contract is valued at approximately $3 million and was awarded in September. A follow-on contract is expected in October and will have a value around $12 million.

In 2011 Whalen became the manager for the Flight Sciences Technology project on Active Flow Control actuator development. He was awarded two patents for developments he made in AFC actuators. Also that year, he was selected for the Boeing "Engineering Career Partnership" program as an "Early Career Future Leader." He was one of only 100 engineers selected to the program Boeing-wide.

Boeing has selected Whalen to represent the company on the AIAA Fluid Dynamics Technical Committee. In that role, he proposed a student scholarship for short courses (continuing education) that the FDCT and the AIAA approved, and he is working to implement the scholarship process in 2014. He will also act as Deputy Chair for the 7th AIAA Flow Control conference, which will be at the new AIAA AVIATION 2014 conference in Atlanta.

From right, Department Head Philippe Geubelle with Edward A. Whalen; Edward's father, Edward Whalen; and the younger Edward's wife, Kelly Whalen

Whalen also was selected to represent Boeing on a panel discussing "industry perspectives on preparing a new generation of engineers" at the 2013 ASME International Design and Engineering Technical Conference in Portland, Oregon.

New AE at Illinois alumni, May 2014.

Aerospace Engineering Alum Develops Website for Young Adults with Cancer

Casperson

MIKE KOON, COLLEGE OF ENGINEERING AT ILLINOIS COMMUNICATIONS OFFICE

At the age of 24 and just two months after losing her mother to a brain cancer, Mallory Casperson again had to face the 'C' word, as she was diagnosed with Hodgkin's Lymphoma in February of 2011. She had completed her bachelor's degree in aerospace engineering at the University of Illinois and was coming off a stressful time where she had to balance her second year of graduate school in AE while serving as a part-time caregiver for her mother in suburban St. Louis.

"I was an engineer for over a decade and had defined my life by being an overachiever and an athletic person," Casperson recalled. "But all of a sudden I didn't have any of these outward cues because I took a summer off to finish my treatments and I couldn't do any of the things that I had previously used to define my whole world. The challenge of learning how to redefine myself with different expectations was a painful process."

Casperson underwent four months of chemo, completed that master's degree and enrolled as a PhD student in the same program. Even with her husband, Brett Jones, a fellow engineering student, by her side, she faced some unique challenges beyond her medical needs as a young cancer patient.

"When I was going through all of this, my husband and I realized there was a lack of resources on how to fit all of this new stuff into your day-to-day life," Casperson said. "I was a marathon runner and a graduate student. I was used to being very busy and active. During treatments, I could do neither of those. There was a whole process of how to establish what a day-to-day resemblance of a routine might be."

Now three years later and motivated by the need to provide resources and a sense of community to those finding themselves in similar situations, Casperson has launched a website, Lacuna Loft, to help young adults cope with all the "extra stuff" they are faced with as cancer patients, survivors, or caregivers.

Casperson chose the name because "lacuna" means hiatus and "loft" is an adaptable place of respite converted from another use.

"I wanted Lacuna Loft to be a place where one could come, learn how to take a break and exist in this stressful life, then either be able to move on or grow here," Casperson said.

Casperson notes that young adults are dealing with such events such as new careers, competitive graduate programs, new relationships or new families, challenges different from most who suddenly find themselves faced with overcoming cancer.

As a graduate student, Casperson studied structural mechanics, focusing on such topics as fatigue of materials at high temperatures and later computer simulation, intense subjects from one of the most respected programs in the world. She completed research with the Air Force Research Lab as well as with NASA's Marshall Space Flight Center.

"This is a very competitive environment and one that doesn't always lend itself to an awesome work-life balance," Casperson said. "That (work-life balance) was something I needed in facing all of these crises. Going through treatment was very isolating because my peers had never dealt with anything like this. They didn't know what to say or how to help out."

Fortunately for Casperson, she wasn't all study. She enjoyed the wide range of culture of Champaign-Urbana, which she calls, "a big city trapped in a little city's body." She joined many fellow engineering students in a salsa class, where she met her future husband.

A budding entrepreneur, Jones has been at Illinois for a decade and is completing his PhD in computer science this summer. His expertise has been instrumental in helping get Lacuna Loft off the ground. Initially he helped convert the couple's wedding website to a blog, where his wife could share their experiences.

"I found that I was skilled at blogging," Casperson said. "I learned what it meant to build a brand, and Lacuna Loft sprang out of these newly found capabilities."

Lacuna Loft has a number of contributors with a variety of experiences, some are long-term fighters, some are survivors, and one has a child with cancer. It covers a range of topics such as what to cook while having a queasy stomach, what to do for exercise, styling through chemo, whether it be hair loss or a changing body, and what products and essentials are helpful when starting chemotherapy treatments.

It offers care baskets for chemo patients, provides links to outside resources such as how to deal with infertility, and builds a network for those looking for mentors going through cancer as a young adult.

"The main thing that I hope Lacuna Loft is doing is communicating that while there are challenges and difficulties ahead, there are ways to navigate all of that," Casperson said. "I want Lacuna Loft to be this resource to help people feel less isolated and provide tools to deal with the day-to-day. Right now it's a very female-voiced site, but I'm working on getting some guys in the mix."

Although Casperson is new to brand-building and creating a business, she credits her Illinois engineering experience for "teaching her to be teachable." She is seeking sponsorships and endorsements (Carle Hospital has indicated they will link to Lacuna Loft on their resources page). She had a booth at the Working Women's Expo to test her pitch, noting that the word cancer especially startles people of this age group. Although her focus has been primarily on the Champaign-Urbana area and the state of Illinois, she hopes Lacuna Loft eventually becomes an international brand.

"There are a handful of very active voices in the young adult cancer community, but they are on the medical and advocacy side," Casperson said. "Lacuna Loft has had an overwhelming cry from people visiting the site who have said 'I don't where you've been all my life.' I'd like Lacuna Loft to be at the forefront of the day-to-day needs of this age group, because the issues are not just about what clinical trial to use or what chemo I should have. Navigating through hesitant peers and workplace environments, fears of financial difficulties and infertility, as well as learning to adapt and thrive in a slower pace of life are significant hurdles to overcome when facing cancer as a young adult.

Not surprisingly for someone her age, Casperson is finding many of her contributors through social media.

"I've found that people really like sharing their story, whether it's how to chat with their new boyfriend or how to present themselves in public now they that they are totally bald and their face is puffy," Casperson said. "Peers and work environment are huge because they constitute so much of a person's daily experience. Your peers are sometimes uncomfortable with hospitals. When one's not feeling well at home, it takes a special kind of friend to be invited into that situation. These connections are very crucial to keeping it together as a young adult who has so many other worries anyway."

"If Lacuna Loft was here when I was going through treatments, it would have made my life a whole lot easier," she concludes. "My hope is that if someone is in the same situation, through Lacuna Loft they have an easier time in making the transition into and hopefully make the transition out of this crisis as a young adult cancer survivor."

A Word From Alumni Board President Mark Crowley

Dear Fellow Alumni, Students, and Faculty:

It's a very exciting time for the Aerospace Engineering Department and our Alumni Advisory Board. As you may have heard we are experiencing increased enrollment, have four new faculty additions with more to come, and are starting the plans for new and enhanced facilities in Talbot Laboratory based on approval from the College for a $3.2M project! Having personally been involved with the board for a number of years, I have never seen so much positive activity all at once in the department.

The mission of our board is to "advance the standing, reputation, effectiveness, accomplishments, and leadership of the Department." This year we are seeing the fruits of the department and the board's persistent pursuit of the graduate Systems Engineering program now finally being offered as an on-line alternative to enhance the department's reach and exposure in industry. We are also continuing to try to increase industry involvement in course discussion with the inclusion of industry speakers in our undergraduate courses. We can always use more alumni involvement in this initiative; please let us know if you are willing to participate. The board and fellow alumni need to continue to support the department in these exciting times and into the future. Hope to see you on campus this fall!

Crowley

Regards,

Mark Crowley, BS 83
President, Advisory Board

Class News

Robert W. Farquhar, BS 59, and his colleagues have won permission from NASA to take control of the retired government satellite, International Sun-Earth Explorer 3 (ISEE-3) and attempt to change its orbit. Farquhar has a history with the satellite— in the late 1980s he devised a flight path that boomeranged the satellite repeatedly around Earth and the moon, then used lunar gravity to send it through the comet Giacobini-Zinner's plasma tail. From that point, the satellite— renamed International Cometary Explorer (ICE)— was set to orbit the sun for eternity.

AE alumni in November conducted a wind tunnel testing of a full-scale 757 vertical tail model equipped with active flow control technology. One aim of the test was to show that active flow control can enhance the performance of a vertical tail enough to enable future designers to reduce the size of the structure for a whole family of airplanes. Also, a smaller tail can help reduce an airplane's drag and weight, which could improve aerodynamic efficiency and fuel efficiency, respectively. Playing roles in the testing were **Edward A. Whalen, BS 01, MS 03, PhD 07; John B. Brandt, MS 05; Brian D. McGranahan, BS 01, MS 03; Douglas S. Lacy, BS 86;** and **Marc A. Spoor, BS 83 General Engineering.**

Aaron J. Trask, BS 98, MS 00, PhD 02, is an independent aerospace engineering consultant in Fairfax, Virginia. Before April 2014, Trask, who had received AE's Outstanding Recent Alumnus Award in 2011, had been Vice President of Leverage Dynamics. Trask. In January Trask attended the 24th AAS/AIAA Space Flight Mechanics Meeting in Santa Fe, New Mexico. **Jacob A. Englander, MS 08, PhD 13,** now at NASA Goddard Space Flight Center in Greenbelt, Maryland, presented a paper at the conference, which also was attended by **Ryne T. Beeson, BS 08, MS 10; AE Emeritus Profs. John Prussing** and **Bruce Conway,** and AE graduate student **Don Ellison.**

Michael Lembeck, BS 80, MS 81, PhD 91, became Vice President of Engineering at Logyx LLC in Houston in April. He manages engineering operations for a veteran-owned service-disabled small business related to systems engineering and integrations services, mission operations, health and biological sciences and information technologies.

Donald G. Dodds, BS 84, has worked as executive vice president for business development for Orbital Tool Technologies since March 2014.

Jon P. Riley, BS 87, MS 89, joined the Board of Directors of the National Advanced Mobility Consortium in Ann Arbor, Michigan, in July. He has served in leadership capacities as Vice President of Digital Manufacturing and Executive Director for Design & Engineering Programs for the National Center for Manufacturing Sciences since 2009.

Jay F. Onken, BS 89, is Space Launch Systems Deputy Chief Engineer for NASA Marshall Space Flight Center in Huntsville, Alabama. Prior to April 2014, he directed Mission Operations at the Center.

Michael C. Scheller, BS 89, MBA 09 Business Administration, became Director of Engineering for Manual Systems at Hypertherm Inc. in June.

Alexandre Kosmala, MS 90, has been Executive Vice-President at Saltel Industries in Houston since May 2013. Saltel is a privately-owned French company started in 2004. It is the world leader in expandable steel packer technologies.

Erik L. Antonson, BS 97, MS 01, PhD 04, MD 09, is an assistant professor with co-appointments in Emergency Medicine and Space Medicine at Baylor College of Medicine in Houston, Texas.

Michael Breitenfeld, MS 98, PhD 14, is an engineer for HDF Technologies.

James E. Moes, BS 00, has been working as a project engineer at Avionics in Chicago since July 2013. Prior to that, he worked 4½ years for Northrop Grumman.

Gabriel F. Benavides, BS 01, MS 04, PhD 13, works for CU Aerospace in Champaign, Illinois.

Jared K. Hoover, BS 02, has worked as a reliability engineer at QEP Resources, Inc., in Denver since April. Prior to that he was a production engineer for Shell.

Dustin L. Ames, BS 05, MS 06, was promoted in August to project engineer at FedEx Express in Memphis. He has worked for the company since May 2009.

Miles Johnson, MS 07, PhD 13, is a senior scientist for Integrated Vehicle Systems.

Daniel V. Uhlig, MS 07, PhD 14, is engineer for Aurora Flight Sciences.

Tasia M. Bradley, BS 08, MS 13 *Human Resources & Industrial,* began work in January as an associate human resources manager for General Mills in Los Angeles.

Thomas Herges, BS 08, PhD 13, is an engineer for Sandia National Laboratory in New Mexico.

Colin E. Das, BS 09, MS 11, is an Engine Controls Engineer at John Deer in Cedar Falls, Iowa. With the company since August 2011, Das moved to his current position in August.

Michael Kevorkian, BS 09, is enrolled in the Industrial Engineering program at the University of Illinois-Chicago.

Tanil Ozkan, MS 09 *Mechanical Engineering,* PhD 14, is a postdoctoral research associate in the Department of Mechanical Science & Engineering at Illinois.

Sivakumar N. Yagnamurthy, MS 09, PhD 13, is an engineer for Intel Corporation.

Phillip J. Ansell, MS 10, PhD 13, is an assistant professor in Aerospace Engineering at Illinois.

Christian Davila, BS 10, is a systems engineer for Boeing.

William P. Flaherty, MS 10, PhD 13, has been an engineer/technologist for GE Aviation in West Chester, Ohio, since November 2013.

Brian A. Schmidt, BS 10, is Build Manager for Prototype Development Engines at Navistar Inc. in Melrose Park, Illinois. With the company since January 2012, Schmidt moved to his current position in May 2013.

Matthew R. Cillick, BS 11, MS 13, was promoted in July 2013 to Senior Associate Engineer at Caterpillar Inc. He has worked for the company since 2011.

Patrick Haddox, BS 11 *Engineering Mechanics,* MS 14, is a PhD student in Aerospace Engineering at Illinois.

Aditya Paranjape, PhD 2011, and AE postdoctoral research associate from 2011-13, is now a tenure-track Assistant Professor in the Department of Mechanical Engineering at McGill University in Montreal,

Canada. Paranjape had earned bachelor's and master's degrees in Aerospace Engineering from the Indian Institute of Technology Bombay in 2007 with an Institute Silver Medal. While a postdoc, he received the Kenneth Lee Herrick Memorial Award in 2011.

Paranjape specializes in flight dynamics, control, and aeroelasticity, and has research interests in the broader area of nonlinear dynamics and control. His primary contributions include the discovery of an analytical criterion for predicting the onset of spin in high-performance aircraft, the invention of a new PDE control theoretic framework called the dyadic perturbation observer (DPO), and the development of a new dihedral-based control technique for tailless flapping wing aircraft. His work on an autonomous perching maneuver (on a human hand) using a tailless articulated wing aircraft (US patent pending) received worldwide attention in 2012, including an appearance on Discovery Canada and news media coverage in Australia, Canada, United States and the United Kingdom. Both PDE and perching control papers were published in the IEEE Transactions on Robotics, a leading journal in the field.

Paranjape currently is working on the adaptation of the DPO framework for flight control applications, and on a first-principles study of flapping flight which seeks to explain the flapping wing kinematics seen in natural flyers and attempts to derive engineering principles based on a reduced-order analysis. At McGill, Paranjape currently teaches a 500-level course on Aircraft Performance and Stability and plans to offer an advanced course on applied flight control in 2015.

Ankeeth S. Ved, MS 11, MS 11 *Computer Science,* is a system performance senior engineer for Cummins Inc. in Columbus, Indiana. Ved, who has worked for Cummins since September 2011, moved to his current position in July.

Ryan D. Cook, BS 12, BS 12 *Electrical Engineering,* is a systems engineer at Raytheon in Tucson, Arizona and recently completed a master's degree in electrical and computer engineering at Georgia Tech.

Zachary A. Herman, BS 12, MS 14, is a systems engineer for Boeing.

Nicholas J. Johnson, BS 12, became a nuclear equipment operator for Exelon Nuclear in Davenport, Iowa, in March. He has worked for Exelon since April 2013.

Allen Kaitharath, BS 12 *General Engineering,* MS 13, is an engineer for Belcan Engineering.

Matt Po Chang Su, BS 12, has been working as a test engineer for Eclipse Combustion in Rockford, Illinois, since February. Prior to that, he was a junior mechanical engineer at EarthCam Inc. in Hackensack, New Jersey.

Curtis A. Woodruff, BS 12, MS 14, is an engineer at CU Aerospace in Champaign, Illinois.

Steven Chen, BS 13, is a software engineer for Echelon Consulting LLC.

Pon D. Chuchawat, BS 13, became a propulsion engineer at Boeing Satellite Systems in El Segundo, California, in August 2013. Prior to that, he worked as an attitude control systems engineer for NASA Goddard Space Flight Center in Greenbelt, Maryland.

Sarah J. Coady, BS 13, is a test engineer for Honeywell Aerospace in South Bend, Indiana, testing fuel and actuation products.

Pradipto Ghosh, PhD 13, is an engineer at Wolfram Research in Champaign, Illinois.

Akshita R. Kakarlapudi, BS 13, MS 14, is working for Boeing.

Evgeny Kharisov, PhD 13, works for Seagate Technology in Shakopee, Minnesota.

Marianne C. Monastero, MS 13, is working on a PhD at Rensselaer Polytechnic Institute.

Jeremy L. Moser, BS 13, began work in January as a structural engineer for Northrop Grumman Corporation.

Daniel J. Park, BS 13, has been working since January as a project engineer for UTC Aerospace Systems in Rockford, Illinois. Parks also operates his company, Airsoft Precision Dynamics in Roscoe, Illinois.

Daniel J. Regan, BS 13, has been a mission systems engineer for Ball Aerospace in Boulder, Colorado, since August 2013.

Ravi Kumar Tumkur Revanasiddaiah, PhD 13, works for MathWorks.

continued on next page

Elliot S. Schwartz, BS 13, has worked as a Systems Engineer for Raytheon in Tucson, Arizona, since June 2013.

Vivek Selvam, MS 13, works for MathWorks in Boston.

Brock D. Wiberg, MS 13, works at Sandia National Laboratory in Albuquerque, New Mexico.

Jason B. Allen, BS 14, is working as a structural and payload engineer for Boeing.

Sarah C. Barrett, BS 14, is a performance engineer for Rolls-Royce.

Christopher J. Bates, BS 14, is working for Ingersol Machine and Tool.

Asha-Dee N. Celestine, PhD 14, is an engineer for Schlumberger Research.

Weilong Ding, MS 14, is a software engineer for Rockwell Collins.

Gregory P. Doidge, BS 14, is a performance engineer for GE Aviation's Edison Program.

Corey G. Enderlin, BS 14, is earning a master's degree at Georgia Tech.

Rebecca Foust, MS 14, is a PhD student in Aerospace Engineering at Illinois.

Christian J. Howard, BS 14, is a systems engineer working in guidance, navigation and controls at Raytheon.

Ian Jessen, MS 14, is an engineer for Rockwell Collins.

Robert A. Kaminski, BS 14, began work as a systems engineer for Boeing in Seattle in August.

Brendon M. Leeker, BS 14, is an engineer for GE Aviation.

Peter A. Molnar, BS 14, is a systems engineer for UTC Aerospace.

Rishabh Narang, MS 14, is a combustion performance engineer for Cummins.

Eric K. Reisenbuckler, BS 14, is a structural analysis engineer for Boeing.

Dayne L. Rogers, BS 14, is a master's degree student at Illinois.

Shishir Sethiya, MS 14, is a software developer for Amazon.

Akash A. Shah, BS 14, BS 14 Computer Science, is a program manager for Microsoft.

Andrew D. Smith, BS 14, is an electric power generation engineer for UTC Aerospace System.

Steven H. Turner, BS 14, works for Lockheed.

Kaitlin R. Vahling, BS 14, works in mechanical development for Cummins Inc. in Seymour, Indiana.

Rick L. May, BS 77, died October 15, 2013, at the age of 58. May had worked for Boeing in St. Louis for 36 years.

IN MEMORIAM: Harold H. Meyer, BS 49, died January 19, 2014, at the age of 88. Meyer took a job with Lockheed after graduation and worked on the design of the "Connie" aircraft. But his true love was in flying and in January 1952 he was hired as a pilot for United Airlines, through which he met his wife, a stewardess. He retired from United in 1985. He continued as a pilot, meeting with a group of friends every Wednesday morning to fly. In 1993, he bought a Piper Arrow Turbo Charged Airplane and became active in the Colorado Pilots Association.

David E. Craig, BS 64, died January 28, 2014, in Sandy Springs, South Carolina, at the age of 81. A retired U.S. Air Force lieutenant colonel, Craig was a Vietnam veteran. While there, as a forward air controller, he received numerous military honors, including the Silver Star. After his 23-year career in the Air Force, he worked and then retired from Michelin. Craig had a lifelong love of flying, both as a private pilot and in the Air Force.

Matthew A. Medick, BS 48, died January 31, 2014 at the age of 87. Medick served from 1945 to 1961 in the U.S. Navy, earning the rank of lieutenant (junior grade), United States Naval Reserve. Upon graduating from Illinois, he worked as a mathematics graduate fellow at the University of Maryland then as an aeronautical engineer for the Naval Ordnance Laboratory. White completed his master's degree in mathematics at the New York University in 1950, then served as a lecturer in mathematics at Pace College in New York. He worked for IBM from 1951 to 1953, then was a mathematics lecturer at the City College of New York from 1953 to 1955. In 1955 he became a research associate in civil engineering and engineering mechanics at Columbia University in New York, then started his PhD in theoretical and applied mechanics at Columbia. While working on his doctorate Medick lectured in mathematics at Northeastern University, Boston, from 1957 to 1958, then was a senior staff specialist in the Research and Advancement Development Division of AVCO Corporation in Wilmington, Massachusetts. In 1962 he joined the mechanical engineering faculty of Michigan State University until his retirement in 1999. He was a member of the American Society of Mechanical Engineers, the Society of Engineering Science, the American Mathematical Society, the Mathematical Association of America, and the Society for Industrial and Applied Mathematics. He wrote several publications on wave propagation and vibrations, and consulted for Lawrence Radiation Laboratory in Livermore, California. His specialties were engineering mechanics, mechanical vibrations and shock waves, theory of waves and vibration and engineering science. He loved to mentor students and also loved the Michigan State Spartans football and basketball teams.

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