

# AeroGRAM

A newsletter for alumni & friends of the School of Aeronautics & Astronautics

Covering the 2013-2014 academic year



**Purdue astronaut  
alumni returned to  
Purdue for reunion**

*See page 3 for story*

# in this issue...

Letter from the AAE Head . . . . .	2
Astronauts returned to Purdue for reunion . . . . .	3
Lieutenant Commander Daniel J. Radocaj Wins Young Alumni Award . . . . .	4
Tamaira E. Ross BSAAE'96, MSAAE'98 . . . . .	4
2014 Distinguished Engineering Alumni/Alumnae . . . . .	5
Welcome New Faculty 2014-2015 . .	6
New Cybersecurity Center in Purdue Research Park . . . . .	6
Purdue Alumnus Astronaut Dr. David A. Wolf . . . . .	7
News About You. . . . .	8
Curtiss-Wright Cadette Programs. .	11
Purdue Alumnus Publishes New Book . . . . .	11
Development Updates . . . . .	12
Purdue Day of Giving 2014 . . . . .	13
X-20 Dyna-Soar space vehicle . . .	14
Steering Advisory Council . . . . .	15
Changes to AAE Academic Advising . . . . .	15
Industrial Advisory Committee . . .	16
William E. Boeing Distinguished Lecture 2013 . . . . .	17
Former Head Visits School . . . . .	17
Boeing and Boilermakers . . . . .	18
Space Day 2013 . . . . .	19
AAE Graduate Research Symposium 2014. . . . .	20
Outstanding Aerospace Engineer Awards 2013 . . . . .	22
Faculty News . . . . .	26
AAE 450 Moon Colony Proposal: Project Artemis . . . . .	27
Astrobiology Front Cover . . . . .	28
Excellence in Research Awards . . .	29
Purdue Researchers Working with the U.S. Missile Defense Agency. . . . .	29
Apollo 11 astronaut Dr. Buzz Aldrin on Purdue campus. . . . .	30
Faculty Research . . . . .	31
Dennis Tito Visits Purdue Inspiration Mars Mission. . . . .	32
Purdue Led Team Breaks Speed Record . . . . .	34
Congratulations to the Graduates . .	38
Student Awards . . . . .	40
AAE Student Design Project Chosen as Finalist for International Inspiration Mars Design Contest 2014 . . . . .	43
Keep in Touch . . . . .	44

**On the Cover:**  
*Astronaut Charlie Walker meets with AAE students at a reception for the astronaut alumni reunion.*

## Letter from the AAE Head - Tom I-P. Shih



The 2013-2014 academic year has been an exciting one for Purdue University, our College of Engineering, and the School of Aeronautics and Astronautics (AAE). It is a pleasure and a privilege

to share with you some of those events and accomplishments in this AeroGram. In January 2014, President Mitch Daniels launched Purdue's four Big Moves: affordability and accessibility, transformative education, STEM leadership, and world-changing research. These Big Moves are shaping how Purdue is moving forward with engineering at the forefront. In engineering, Dean Leah Jamieson has led an initiative to hire 107 "net" new faculty members in engineering by 2018 to ensure unparalleled excellence and impact on discovery, learning, and engagement. AAE is delighted to announce the addition of four new faculty members. Dr. Carolin Frueh (pronounced Free) from Texas A&M will join as an assistant professor, and Dr. Sergey Macheret from Lockheed Martin Aeronautics Company's Advanced Development Programs (Skunk Works) will join as a full professor. We also welcome Mr. Dan Dumbacher, former Deputy Associate Administrator of NASA's Human Exploration and Operations Mission Directorate as a Professor of Practice. Purdue alumnus and astronaut, Dr. David Wolf, joined our school as a Visiting Professor in January 2014. We also congratulate Dr. Wolf who received an honorary doctorate from Purdue at the May 2014 commencement. To provide better advising to our students, we welcome our second academic advisor, Taylor Weast.

Some of the major events during this past year include the Zucrow Labs Alumni Reunion in early September, where Zucrow alumni met with faculty and students, and worked with Steve Heister and faculty in Zucrow Labs to further advance the work at Zucrow. At the Outstanding Aerospace Engineer Award Banquet on September 13, 2013, we honored five outstanding AAE alumni whose distinguished accomplishments also honor us. The William E. Boeing Distinguished Lecture took place on October 1, 2013 with Lt. General C.D. Moore II, Commander of the Air Force Life Cycle Management Center, as the keynote speaker. On Oct. 18, 2013, a model of the Boeing X-20 Dyna-Soar space vehicle - a gift from Boeing - was unveiled by Dean Leah Jamieson, Phantom Works President Darryl Davis, BRT Chief Engineer Mark Burgess, and BRT Senior Manager Matt Symmonds. Purdue Space Day, held on October 26, 2013 with General Roy D. Bridges as the VIP astronaut, reached over 650 elementary and middle school students. On February 21, 2014, AAE alumni Andrea Chavez and Jim Miller were honored with our college's Distinguished Engineering Alumni award. In April 2014, President Daniels organized an astronaut reunion to engage our students and faculty. During this past year, we also welcomed a number of high-profile visitors to our school, including Dr. Buzz Aldrin, Mr. Dennis Tito, former AAE head Dr. Bruce A. Reese, Dr. Ron Kerber, and Dr. James Raisbeck as well as members of our distinguished Industrial

Advisory Council and Steering Advisory Council.

On awards, Associate Prof. Timothée Pourpoint was granted tenure; Prof. Karen Marais won a National Science Foundation CAREER Award; and Prof. Mike Sangid won a Young Investigator Award from the Office of Naval Research and a Young Professional Development Award from the Minerals, Metals, and Materials Society. Professors Haifeng Wang and Nicole Key also won young investigator awards from professional societies. In teaching, Professors Bill Crossley and Steve Heister were inducted into Purdue's "Great Book of Teachers;" Prof. Karen Marais won AAE's Elmer Bruhn Teaching Award; Prof. Mike Grant won AAE's W.A. Gustafson Award for Outstanding Teaching; and Prof. Kathleen Howell won Purdue's Charles B. Murphy Outstanding Undergraduate Teaching Award. In research, Prof. Alina Alexeenko won AAE's C.T. Sun Excellence in Research Award, and Professors Wayne Chen, Bill Crossley, Karen Marais, Barrett Caldwell, and Bob Lucht won Purdue's Seed for Success Award. Also, Professor Tim Fisher won a Purdue-led multi-university AFRL Center of Excellence for Integrated Thermal Management of Aerospace Vehicles with Steve Heister and Tom Shih as co-PIs. Our students and our alumni also won numerous awards which are highlighted in this AeroGram.

In partings, we bid farewell and expressed our deep-felt thanks to Prof. Marc Williams who retired in June 2014. We are extremely grateful for his many years of dedicated service to Purdue as an outstanding educator, tireless mentor to our students, and as AAE's Associate Head for our undergraduate program. Prof. Bill Anderson has taken over as Associate Head of our undergraduate program since Spring 2014. We also bid farewell and expressed our deepest thanks to Ann Broughton who retired in August 2014 for her outstanding work in managing the communication of our school including the writing/editing of our AeroGram and leading our incredibly successful outreach program, Purdue Space Day.

Mark your calendars for November 7 as we will honor our Outstanding Aerospace Engineers at the 16th annual awards dinner and ceremony. We welcome you back to campus so that we might show you up-close the educational opportunities that your support provides our students. Your visit also gives us the chance to say thank you for your support and, more importantly, connects you with our students so that you too can know why we make educating Purdue Aeronautical and Astronautical Engineers our life's work. We strive to make the Purdue education live up to the standards that you remember so well and remind you that we cannot do so without your support. Thanks again for your part in making times at Purdue so exciting. Hail Purdue!

Tom I-P. Shih  
Professor and Head

# Astronauts returned to Purdue for reunion



**Gene Cernan and Professor Skip Grandt**



**Scott Tingle with Nicoletta Fala being photo bombed by Jackie Stephan and Kathryn Johnson**



**Gene Cernan with AAE grad students Jeff Stuart and Ashwati Das**



**Gene Cernan with Mrs. Voss and Mark Brown with students**



**(L-R) Scott Tingle, Mark Brown, Charlie Walker, Gary Payton, Purdue President Mitch Daniels, Loren Shriver, Eugene Cernan, Andrew Feustel**

Purdue University hosted a group of its NASA astronaut alumni on April 10-12, 2014 for a reunion that culminated with a public forum, "A Conversation with Our Astronauts," in the Elliott Hall of Music. Purdue has 23 graduates who went on to become astronauts, including the late Neil Armstrong, the first man to walk on the moon, and Eugene Cernan, the most recent person to walk on the moon.

While the astronauts were on campus, they met with students and faculty and took part in educational outreach with local schools. They were also introduced at halftime of the spring football scrimmage on April 12 in Ross-Ade Stadium. The astronauts who took part in the public forum included **Gene Cernan, Mark Brown, Andrew Feustel, Gary Payton, Loren Shriver, Scott Tingle** and **Charles Walker**. Additionally **Gregory Harbaugh** and **David Wolf** (not pictured) also made an appearance on campus.

Eugene Cernan was recognized at a reception at Purdue's Mackey Arena for donating an Apollo 17 Lunar Roving Vehicle mapbook to Purdue. Cernan donated his personal papers to the Barron Hilton Flight and Space Exploration Archives in January 2009. The maps are mounted in a custom-made book and are accompanied by several contextual documents and photographs. The maps provided the crew with bearings and ranges to each investigation site on the lunar surface during more than 22 hours of exploration. In addition to being home to the largest collection of Amelia Earhart papers in the world, the archives include the papers of engineers, aviators, aviation professionals, scholars and alumni astronauts including Neil A. Armstrong and Cernan, Jerry Ross, the late Janice Voss and Roy Bridges Jr.

For highlights of Purdue's space-related research and historic NASA milestones, go to <http://www.purdue.edu/newsroom/releases/2014/Q2/purdue-has-legacy-of-space-research,-nasa-milestones.html>.

More information about the astronauts and Purdue in space is available at <http://www.purdue.edu/space/>



**Gene Cernan with Dr. & Mrs. James Voss, parents of the late Janice Voss**

# Lieutenant Commander Daniel J. Radocaj BSAAE'00, MSAE'01 Wins Young Alumni Award



Lieutenant Commander Daniel J. Radocaj, United States Navy, BSAAE '00, MSAE '01 has been named as a recipient of the *2013 Purdue Engineering Alumni Young Alum Award* by the Purdue Engineering Alumni Association. His extraordinary accomplishments for a young alumnus have been recognized by his commitment to Purdue while advancing his military career.

**Professor Steven Collicott** was Dan's advisor for his master's degree, and he accepted the award at the Post-Game Homecoming Event on Saturday, September 28, 2013 on Dan's behalf.

In March 2012, the Navy honored LCDR Radocaj as Test Pilot of the Year. "Radocaj led a team of 25 engineers, technicians and aircraft maintainers to plan the first aircraft launch from an electromagnetic catapult. After flying the historic first launch in an F/A-18E, he coordinated with multiple organizations to open the envelope to a wide range of aircraft, identifying several previously unknown compatibility issues."

In addition to serving as the Project Officer leading the testing program of this revolutionary launch system, he also flew and took on management responsibilities during two tours of duty in the fleet. He was nominated for the Purdue Engineering Alumni Association's Young Engineering Alumnus Award for both his Navy and Marine commendations and his eagerness to return to Purdue to strengthen both the AAE curriculum and the extra-curricular educational opportunities for AAE students.



PURDUE  
UNIVERSITY



**Tamaira E.  
Ross BSAAE'96,  
MSAAE'98**

Alumna Tamaira E. Ross was recognized for her engineering and aerospace expertise when she was inducted as a Boeing Technical Fellow on January 2, 2014. As Boeing Technical Fellow, Tamaira is recognized as a company and industry expert in vehicle design, rapid prototyping, and test & integration.

Tamaira is an aircraft and spacecraft design engineer at Boeing Defense, Space & Security in Seattle, WA. She is responsible for the complete vehicle design for multiple development programs which, in addition to concept and design, includes prototype build, testing of flight hardware, performance estimates, and integration & test plans. She also works the cost estimates and program schedule. To relate it to students in Aero, Tamaira usually tells them that her job is like their senior design class – on a daily basis. She has also worked on many different projects in Commercial Airplanes, Defense, Space & Security, and Phantom Works.

Tamaira graduated from Purdue with a BSAAE in 1996 and a MSAAE in 1998. She received a Master's degree in Mechanical Engineering from the University of Washington in 2002 and a Technology Management MBA in 2008 also from the University of Washington.

She has been recognized numerous times in her career, including being named as the 2011 Puget Sound Engineering Council Industry Engineer of the Year and by the Purdue Alumni Association in July/August 2010 as 40 alums under the age of 40. Additionally, to highlight and honor Tamaira, a short video of her accomplishments under the title of "*Idea Maker*" has been shown at each home football and basketball game.



**Bob Sattler receiving his OAE award in 2012 from Head of School Dr. Tom Shih**

## Robert I. Sattler BSAE'48; OAE'12 - Obituary

The School of Aeronautics and Astronautics was saddened to hear of the death of distinguished alumnus Bob Sattler - June 14, 1926 - October 5, 2013.

Bob was honored by the school in 2012 with the Outstanding Aerospace Engineer Award and the following is taken from his biography.

Bob Sattler enlisted in the Navy V-12 program in 1944. The Navy sent Bob to DePauw University then transferred him to Purdue. Bob was discharged from the Navy in 1946 and finished his degrees at Purdue. Bob graduated from Purdue University in 1948 with bachelors' degrees in Aeronautical Engineering and Naval Science and Tactics. Bob has been a Registered Professional Engineer since 1952.

While at Purdue, Bob lettered in Baseball. One of the most memorable games was Purdue vs. Michigan. Bob pitched a one-hitter. He had no-hit laurels in his grasp with two out in the ninth inning when Jack Weisenburger singled for the Wolverines' lone hit of the afternoon. Bob struck out the next batter to end the game. Bob sat in the locker room waiting for coach Ray Schalk. When he got there he said, "Bob after this I want you to throw the ball as fast as you can at least three times during the game." Coach Schalk was one of the finest men I have ever known. He taught me Baseball. Bob also received 5 athletic awards. 2 baseball, 2 basketball and 1 football.

Memorable moments - first day in Professor Bruhn's class - he gave us all a test in airplane design (we all flunked). "It appears that you all require additional education in aeronautical engineering."

Bob had spent the past 60+ years in the Machine Tool Industry. During his time as President of LaSalle Machine Tool and ROBOGATE Machine Systems, he was instrumental in the design and production of TMS "Total Manufacturing Systems" and Body Assembly and Welding Systems worldwide. His time in the Navy, education from Purdue and experiences throughout his career have earned him several patents and awards. In 1997 the [National Machine Tool Builders Association] honored him with the "Living Legend" designation award. Thank you to the Navy V-12 program and the education I received at Purdue...Purdue provided the "Backbone" of education, making a successful life in Machine Tool Industry a reality.

## Dr. James D. Raisbeck BSAE'61; DEA'79; OAE'99; HDR'05

AAE Alumnus Dr. James D. Raisbeck was back on the Purdue campus to take part in the Symposium, "*Leading the Future of Aviation*," held by the College of Technology October 16 and 17, 2013. The Symposium was held as part of the 50th anniversary of the College.

The following week, Leah Jamieson, the John A. Edwardson Dean of Engineering, Dr. Stephen Heister, The Raisbeck Engineering Distinguished Professorship for Engineering and Technology Integration, Head of the School of Aeronautics and Astronautics Dr. Tom Shih, and Director of Development Rita Baines, represented Purdue University at the thirty-second Annual Museum of Flight Pathfinder Awards on October 26, 2013 in Seattle, WA. The awards honor pioneering achievements in flying, education, operations, manufacturing, and an at-large category. During this visit, they were given a tour of the new Raisbeck Aviation High School.

A 1961 graduate of the School of Aeronautics and Astronautics, James D. Raisbeck is CEO of Raisbeck Engineering Inc. and its subsidiary Raisbeck Commercial Air Group Inc. He has distinguished himself in aviation by combining a keen engineering ingenuity with a spirit of entrepreneurship that is unique in the modern-day aerospace industry. The two companies focus on integrating advanced technology into existing aircraft in ways that increase their productivity and profitability.

Raisbeck serves on the boards of the Museum of Flight, the Seattle Opera, Pacific Northwest Ballet, Seattle Symphony Orchestra, and The Seattle Arts Fund as well as on several corporate boards. Seattle's Hope Heart Institute honored Raisbeck and his wife, Sherry, an artist and former special education teacher, with its "Wings of Hope" 2003 annual award for their leadership in philanthropy. The Raisbeck's were selected as the 2007 Seattle-King County First Citizens for their generous support of local arts, education and medical research organizations.

Dr. Raisbeck has been honored many times for his professional accomplishments and philanthropy, and Purdue has honored him with a Distinguished Engineer Award in 1979, an Outstanding Engineer Award in 1999, and an Honorary Doctorate Degree in 2005. He was made Fellow of American Institute of Aeronautics and Astronautics (AIAA)

in 2013.

***The Raisbeck Engineering Distinguished Professorship for Engineering and Technology Integration*** -

Prof. Alten "Skip" Grandt was named as distinguished professor in 2000 and Prof. Stephen Heister named in 2010.

During a visit in May 2014, Raisbeck also met up with Professor Emeritus George Palmer. This visit gave them an opportunity to talk over old times when Raisbeck worked for George as a Research Assistant.



**(L-R) Dr. Stephen Heister, Dr. James Raisbeck, Dr. John Sullivan and Dr. Tom Shih**



**James and George talk over old times at ASL.**

## 2014 Distinguished Engineering Alumni/Alumnae

The Distinguished Engineering Alumni/ Alumnae Award is presented to men and women who have distinguished themselves in any field in ways that reflect favorably on Purdue University, the engineering profession, or society in general.

For those who have been engaged in engineering work, their record of accomplishments should indicate a high potential for future growth into positions of increasing responsibility. The College of Engineering has over 85,000 living alumni. The distinction of DEA has been bestowed upon 499 of these outstanding individuals.

The School of Aeronautics and Astronautics is proud to honor two AAE alumni who received the College of Engineering Distinguished Alumni Award 2014.



**Andrea M. Chavez**  
BSAAE'88

Director, National Defense Operations and Planning, Ball Aerospace & Technologies Corporation

*In recognition of her continuing technical and managerial leadership accomplishments at Ball Aerospace and Technologies Corporation and her previous contributions to NASA, as evidenced by numerous awards and significant professional responsibilities*



**Jim Miller**  
BSAAE'86

Vice President of Worldwide Operations, Google Inc.

*For exemplifying sustained lifelong learning and global impact as a Purdue engineer, for service to Purdue, and for sustained leadership in engineering-intensive industries*

## The School of Aeronautics and Astronautics Welcomes New Faculty 2014-2015

The School of Aeronautics and Astronautics is pleased to welcome **Dr. Carolin Frueh** as an assistant professor, and **Dr. Sergey Macheret** as a full professor.



**Dr. Carolin Frueh** (pronounced Free) obtained her bachelor's and master's degrees at the Karlsruhe Institute of Technology in Germany and her Ph.D. in 2011 at the University of Bern, Switzerland. Her thesis was on the identification of space debris objects, including observational as well as theoretical work. Software implementations stemming from her work are currently operationally used at the ESA (European Space Agency) SSA telescope network in the real time, and post data processing and orbit propagation. Following her Ph.D., she continued her research as a Postdoctoral Fellow with the Air Force Research Laboratory and as an Assistant Research Professor at the University of New Mexico, both in Albuquerque, through most of 2013. At the end of 2013, she joined Texas A&M University's Department of Aerospace Engineering as a TEES Assistant Research Scientist. She is the recipient of the Scholarship Award of the Federal Republic of Germany (2001 and 2003), the Swiss Study Foundation (2009), the US National Research Council (2011).



**Dr. Sergey Macheret** received his M.S. and Ph.D. degrees from Moscow Institute of Physics and Technology and Kurchatov Institute of Atomic Energy, respectively. Since moving to the US in 1991, he worked at the Ohio State University (1991-1994) and Princeton University (1994-2006).

Since 2006, Dr. Macheret has been with Lockheed Martin Aeronautics Company's Advanced Development Programs (Skunk Works), where he is the leader of a team engaged in a number of both government-sponsored and company-funded research and development projects on aerospace applications of weakly ionized plasmas. Dr. Macheret has made contributions to the theory of nonequilibrium physical and chemical processes in high-enthalpy flows, to highly efficient generation of nonequilibrium plasmas, and to aerospace applications of plasmas and magnetohydrodynamics. Dr. Macheret is an author or co-author of over 160 journal and conference papers, 10 patents, and 2 books. In the last decade, he gave dozens of invited presentations and lectures and chaired AIAA conferences and sessions.



**AAE alumnus John Walsh BSAAE'82;  
OAE'2012 - President Sypris Electronics**

### Dedicates New Cybersecurity Center in Purdue Research Park

**Purdue AAE alumnus John Walsh** and other officials from Sypris Electronics LLC were at Purdue on October 10, 2013 to dedicate a new research and development center in the Herman and Heddy Kurz Purdue Technology Center.

The location will enhance collaboration for ongoing research between the company and Purdue University's Center for Education and Research in Information Assurance and Security (CERIAS).

The Purdue Research Park has the largest university-affiliated business incubation program in the country.

The park's four Indiana sites are in West Lafayette, Indianapolis, Merrillville and New Albany. The nearly 200 companies located in the park network employ about 4,000 people.



## Boilermaker and the Purdue flag **travel the world**



**AAE alumnus Blaine Curtis BSAE'68** began his trek up Kilimanjaro in Tanzania on September 12, 2013. He followed the Shira route which enters from the west and circles the mountain around the northern side (to the left in the picture below) which faces Kenya. In addition to the rest of his luggage, Blaine also managed to pack a Purdue flag which is being proudly displayed in the photo.

He reached the summit, Uhuru Peak- elevation 19,340 feet, from the eastern approach on September 19. Blaine followed up this trek on a safari through the Serengeti, Olduvai Gorge, Ngorongoro Crater and Tarangire National Parks.

The Purdue Flag, now seen on its 3rd continent, being held off the South Atlantic Ocean on the Antarctica Peninsula by Blaine and fellow Boilermaker, Jeff Price (BS Management, 2009) whom Blaine met on board the *National Geographic Explorer*. The Adelle penguins are nesting along the rocks behind them. (The cone is there to keep people 5 meters from the penguins).

## Purdue Alumnus Astronaut **Dr. David A. Wolf**

The School of Aeronautics and Astronautics is privileged to welcome **Dr. David Wolf** to our school as a Visiting Professor.

Dr. Wolf joined the school at the start of the Spring Semester 2014 and he is collaborating with **Professor Steven Collicott** to teach the orbital section of our unique hands-on project class, AAE418 "Zero-gravity Flight Experiment."

Dr. Wolf's great experiences not only with on-orbit operations, but also in the planning and management of such activities by other astronauts, makes him a remarkably valuable addition to AAE418. He is leading a student team in defining and

documenting on-orbit operations for 'Fluids Education,' a student designed space station experiment. He is also guiding the students in producing effective astronaut training materials for the experiment program.

Dr. David Wolf was also awarded an Honorary Doctorate Degree during the Spring Commencement Ceremonies on May 18th.

Our school welcomes Dr. Wolf's experience and expertise in enhancing the education of our students, and we look forward to this unique collaboration with a Purdue alumnus astronaut.



## Class Notes

### 1940's

**Joseph P. Minton** (BSAE'49) and **Nancy (Fettig) Minton** (S'48), Sterling, VA, for the last three years have organized a food drive that has benefited many families in Loudoun County, VA. The drive has resulted in over three tons of nonperishable foods and nearly \$16,000 in donations.

### 1950's

**Dr. Albert J. Fleig** (BSES'58), Bethesda MD, retired from NASA 22 years ago, then worked for NASA for 5 years as a research Professor, and continues to work for NASA as a contractor through his own company. His work involves work on creating geophysical data sets from remote sensing data and he is currently working on the Ozone Mapping and Profiler Suite (OMPS) flying on the Suomi National Polar Orbiting Partnership (NPP).

**Jerry Glancy** (BSAE'57), Wichita, KS, Retired from The Boeing Company, July.

### 1995

**Tom Leech** (BSAE'59), San Diego, CA, was one of three individuals honored as Garrett High School's Distinguished Alumni for 2013. The ceremonies were conducted during halftime of a Railroaders football game.

**William Sanderman** (BSAE'55), Colorado Springs, CO, has retired.

### 1960's

**Blaine Curtis** (BSAAE'68), Laguna Beach, CA, has taken the Purdue flag on his travels. (see article on page 7).

**Thomas Graham** (BSE Sci'63), Costa Mesa, CA. Consultant with Graham Consulting LLC.

**Ronald Hera** (BSAAE'67), Avon, IN, has authored two books *Bethlehem's Brothers* and *Jerusalem's Brothers*. Both are available at Amazon.com

## AEROGRAM PUBLICATION

Please contact us at [aae-alumni@ecn.purdue.edu](mailto:aae-alumni@ecn.purdue.edu) so that we can add you to our electronic mailing list. You can be assured that this mailing list is private and will not be released to a third party. Thank you for helping us think Green.

**John Newbold** (BSAE'61), Retired in 1997 from Aerospace Corporation. He is a member, Northridge Hospital Foundation (Chair 2009-2010), Member California Hospital Association Board 2009-2010.

**Dr. David H. Quick** (BSAE'61), Indianapolis, IN, Rolls-Royce Retired and Lt. Col, USAF Retired.

**Leonard Srnka** (BSAAE'68), Bellaire, TX, retired from ExxonMobil as chief research geoscientist after 34 years of service and is now professor of practice at UCSD Scripps Institution of Oceanography IGPP, in La Jolla, CA.

**Clifton Trice** (BSAE'68), Saint Charles, MO, is Program Manager-Commercial Support for The Boeing Company, St. Louis, MO.

### 1970's

**Edward Bielski** (BSAAE'74), accepted the position of Corporate Controller with SOS International, Reston, VA. SOSi provides linguist and logistic support for CONUS and OCONUS locations for both the US Government and foreign customers.

**Michael J. Corso** (BSAAE'71), Fort Myers, FL, was selected for inclusion in the 2013 Florida Super Lawyers magazine. This is his seventh consecutive year being named to the Florida Super Lawyers magazine. Corso was also named to Florida Trend Magazine's Tenth Annual Legal Elite, which recognizes and honors the top two percent of all Florida lawyers. Corso is the chair of the firm's Tort and Insurance Litigation Division. Corso also serves on the AAE Industrial Advisory Committee.

**Joseph Jaap** (BSAAE'74, MS'74), Cincinnati, OH, has worked over 13 years to secure the conning tower and other equipment from the nuclear-powered submarine USS Cincinnati to serve as the focal point of the USS Cincinnati — Cold War Memorial. The sub was decommissioned in 1996 after nearly 20 years of Cold War service in all the oceans of the world. He serves as project coordinator of the private, nonprofit group.

**Dr. Robert E. Kielb** (BSAE'71), 2012 Affiliate Professor, Royal Institute of Technology, Stockholm, Sweden, Renewed.

**Bruce Willis** (BSAAE'79), Huntsville, AL, is an Engineer with The Boeing Company, he is currently supporting Boeing's development of the Space Launch System (SLS) core stage in the Loads & Dynamics group.

**Robert Wirt** (BSAAE'77), Leonardtown, MD, is a Principal at Booze Allen Hamilton - Acquisition/Program Management/Test & Evaluation. He had a 28 Year Navy Career as a Naval Aviator (A-7s and FA-18) and retired March 2005 as Captain. Among other achievements he received the Distinguished Graduate USNTPS Class 86 (1984), 10 Years as a Test Pilot, Head of Integrated Test Team for Developmental Test of the FA-18EF Super Hornet (95-99), Test Pilot of the Year (86), Program Manager - Precision Strike Weapons (99-03), CNO Strategic Studies Group (03-04). Presidential Helicopter Replacement Program 04-09 (AgustaWestlandBell and Lockheed Martin).

### 1980's

**Jerry A. Brown** (BSAAE'88), is Eastern Region Sales Manager, for Seves, USA.

**Andrea Chavez** (BSAAE'88), Broomfield, CO, was promoted to the position of director of operations and planning for National Defense at Ball Aerospace & Technologies Corporation. Andrea also serves on the school's Industrial Advisory Board.

**David J. Forrest** (BSAAE'88), Houston, TX is an Aerospace Systems Engineer at NASA, Johnson Space Center, Houston, TX.

**Michael Longmeyer** (BSAAE'89, MS AAE'91), Maryland Heights, MO, joined Armstrong Teasdale's Intellectual Property Practice Group in St. Louis. His patent prosecution practice encompasses all aspects of intellectual property law, including patent preparations, validity and infringement options, patentability, and patent landscape analyses.

**Brent Marriott** (BSAAE'81), Senior Product Support Engineer, Honeywell Aerospace, Aircraft Wheels and Brakes, South bend, IN.

**Christian D. Newton** (BSAAE'81), Senior Manager, Southwest Airlines, is a two-time recipient of Southwest Airlines President's Award, Southwest Airlines Pilots Association Meritorious Service Award. He completed 25 years at Southwest Airlines and has worked as Captain, Check Airman, and Senior Manager NextGen/Airspace.

**William R. Noble** (BSAAE'80), Beavercreek, OH, retired after 33 years as a civilian aerospace engineer for the USAF. He was the design loads engineer for the C-17 and F-22 and the lead structures engineer for the B-2 and T-6. He plans to spend more time with his family, keeping active in the National DeSoto Club, and continue to perform solo handbell benefit concerts at his church.



**We have been delighted with the response to the Online Update Alumni Records page on the Aeronautics and Astronautics website. The web page to update your records can be found at:**



**<https://engineering.purdue.edu/AE/Alumni/Update/AlumniRecords>**

## 1990's

**Eka B. Danuwirana** (MS'95), volunteered at a college fair in Jakarta, Indonesia. He had the opportunity to speak with more than 100 high school students about attending Purdue.

**Brett Hoffstadt** (BSAAE'93), San Antonio, TX, is an Enterprise Entrepreneurship Architect at Boeing Defense, Space & Security.

**Commander Russ Pesut** (BSAAE'93), Dayton, OH, retired from active military service in the US Navy on Sept. 17. Commander Pesut led nearly 300 sailors in the maintenance and operations of more than 6,000 mishap-free flight hours over six continents. Over 35,000 passengers and two million pounds of cargo were safely transported during his tenure supporting operations.

## 2000's

**Austin B. Butler** (BSAAE'09), St. Augustine, FL, is a P-3C Orion Pilot with the United States Navy with Patrol Squadron 26.

**Alvin Chan** (BSAAE'10), is a Manufacturing Engineer with The Boeing Company. Everett, WA.

**Prakash Dikshit** (MS'09), is a Senior Consultant/Airport Planning, Landrum & Brown, San Francisco, CA.

**Shariff d'Souza** (MS'97), London, U.K. is Vice President for Credit Suisse.

**Bradley Ferris** (BSAAE'08), Long Beach, CA, is a Mechanical System Design and Analysis Engineer with The Boeing Company, C-17 Program.

**Alex Fleck** (BSAAE'02), Leonardtown, MD, was awarded the Naval Air Systems Command's 2013 Propulsion & Power Fliedner Award for outstanding contributions upholding the highest traditions of the United States Naval Service.

**Joseph Gangestad** (MS'08; Ph.D.'10), publishes new book 'Good Grad! A Practical Guide to Graduate School in the Sciences & Engineering' ISBN-10: 0988972603, ISBN-13: 978-0988972605 (See article on page 11).

**Brendan M. Houlton** (BSAAE'05), Pottsdown, PA, Lead Deployment Engineer - Space Situational Awareness, Analytical Graphics.

**Brent Joray** (BSAAE'96), Burleson, TX, Senior Structural Analyst, D3 Technologies, Hurst, TX.

**Andrew Krieger** (BSAAE'07), is a Mechanical Design & Analysis Engineer with The Boeing Company, Brook Park, OH. He is currently working on NASA's Space Launch System (SLS) program on payload fairings and adapters.

**Julim Lee** (BSAAE'07), is an Engineer with the Jet Propulsion Laboratory in Navigation and Mission Design Section.

**Tony Lighthill** (BSAAE'92), Sub-Section Manager, Thermal Management, Unison Industries, Beavercreek, OH.

**Timothy Maes** (BSAAE'10), Livonia, MI, is a Mechanical Engineer working with the Ford Motor Company in Transmission/Driveline Engineering. He is in Ford's 32-month leadership rotational program.

**Paul Moonjelly** (MSAAE'08), Columbus, IN, Technical Specialist - Systems Engineering & Controls, Cummins Inc., graduated MIT System Design and Management Graduate Certificate Program in September 2012.

**Joseph Moore** (MSAAE'10), Kirkland, WA, is Lead Field Service Engineer for GE Aviation, Boeing Everett Delivery Center.

**Matt Sharkey** (BSAAE'09), is a Reliability Engineer with Swakelok Company, Solon, OH.

**Dr. Oleg Sindiy** (Ph.D.'10), was part of a NASA team that successfully beamed a high-definition video from the International Space Station to Earth using a new optical laser communications instrument. He is



Deputy Mission Manager on the Optical Payload for Lasercomm Science (OPALS) project at NASA's Jet Propulsion Laboratory. He is also in charge of training and certifying the operations team, preparing operational procedures, and deploying the workstation tools required for operations at the OPALS control center. Oleg is also on the spacecraft design team for the Europa Clipper mission concept.

ations team, preparing operational procedures, and deploying the workstation tools required for operations at the OPALS control center. Oleg is also on the spacecraft design team for the Europa Clipper mission concept.

**Phillip Wagenbach** (BSAAE'07), Santa Maria, is a Captain with the United States Air Force.

**Brandon White** (BSAAE'08), is a Technical Project Manager with GE Aviation, Cincinnati, OH.

## Births

**Kimberly (Chalmers) and Doug Hicks** (BSAAE'06; MS Eng. Ed.'13) welcomed Jonathan Douglas Hicks on January 22, 2014. He weighs 8 lb 15.9 oz. and is 19.5 in long.

**Rebecca (Kacvinsky) Alferink** (BSAAE'03), Madison, AL, and husband, Robert, celebrated the birth of their second son, Matthew Harrison on Feb. 18, 2013.

**Matthew** (MSAAE'06; Ph.D.'09) and **Jill Churchfield** welcomed their third child Sulien Cypress Māhealani in early June, 2014.

**Julim Lee** (BSAAE'07), welcomed Baby Boilermaker in May 2013.

**Robert MacDermott** (BSAAE'05), welcomed Henry William MacDermott on December 17, 2013.

**Cindy Mahler** (BSAAE'98), welcomed son Jake Riley Mahler May 8, 2013 weighing 6 lb. 10 oz. and measuring 19 in.

**Paul Moonjelly** (MSAAE'08), Columbus, IN, and his wife welcomed Catherine Mariette Paul on September 12, 2012.

**Cody** (MS'10) and **Lori Short** welcomed Branson Wayne Short on August 28, 2013. He joins big brothers Jackson and Grayson.

**Brian and Anne (Anderson) Ventre** (BSAAE'04; MS'06), Nathaniel was born June 1 at 1:51 PM. He was and 9 lbs. 10z. and 22 inches long.

**Professor Li Qiao** and her husband celebrated the birth of their second child Emily Gu on March 14, 2014. She weighed 7 lbs 3 oz. and was 21 inches.

**Professor Sally Bane** and her husband Thomas celebrated the birth of their son Nathaniel Raymond Bane on July 9, 2014. He weighed 6 lbs. 9 oz.

## Marriages

**Joseph Moore** (MSAAE'10), was married to Jennifer (Lilly) Moore of Opelika, AL on June 29, 2013 in Auburn, AL.

**Michael Schlabach** (BSAAE'94, MS AAE'98) and Gina (Kocher) Schlabach (T'05), Sterling, VA, married on May 18, 2013 in Falls Church, VA.

**Breanne Wooten** (BSAAE'07), celebrated her marriage to Daniel Sutton on September 14, 2013.



## Purdue Astronaut Jerry Ross inducted into the U.S. Astronaut Hall of Fame 2014

Purdue astronaut alumni Jerry Ross was inducted into the U.S. Astronaut Hall of Fame on May 3, 2014 joining the ranks of well-known space explorers such as Alan Shepard, John Glenn, John Young, Neil Armstrong and Sally Ride.

Past inductees were part of the Mercury, Gemini, Apollo, Skylab and Space Shuttle programs. The total number of members in the Hall of Fame is now 87.

Ross was the first to break the world record for being the first human launched into space seven times. He flew as a mission specialist for six of his record-holding seven flights to space and logged 1,393 hours in space, including 58 hours, 18 minutes during nine spacewalks.

Throughout his career, Ross received 15 NASA medals and was awarded the American Astronautical Society's Victor A. Prather Award for his numerous spacewalking achievements. From 2003 until his retirement from NASA in January 2012, Ross served as chief of the Vehicle Integration Test Office at Johnson Space Center. "Spacewalker: My Journey in Space and Faith as NASA's Record-Setting Frequent Flyer" is Ross' recently published autobiography.

## In Memoriam

### 1940's

**Paul T. Homsher** (BSAE'45, OAE'99), Chesterfield, MO, Oct. 24, 2013.

**Vernon L. Arne** (BSAE'47), Ogden, UT, Jul. 13, 2013.

**Sam E. Rose** (BSAE'47), Indian Wells, CA, Jul. 1, 2013.

**Richard J. Andersen** (BSAE'48), Eugene, OR, Jan. 15, 2013.

**Louis Philip Brady** (BSAE'48), Sandwich, IL, Apr. 24, 2013.

**Walter Davis Croker** (BSAE'48), Ballwin, MO, Mar. 13, 2013.

**Robert P. Harvey** (BSAE'48), San Diego, CA, Mar. 26, 2013.

**Collins M. McKelvey** (BSAE'48), Clearwater, FL, Nov. 2, 2013.

**Franklin Michaels** (BSAE'48, MS AE'49), Sewickley, PA, Sept. 21, 2013.

**Robert I. Sattler** (BSAE'48), Grosse Pointe Shores, MI, Oct. 5, 2013.

(see article on page 5)

**Edwin E. Hanson** (BSAE'49), Peoria, IL, Jun. 15, 2013.

**Dan McKinnon** (BSAE'49), Santa Barbara, CA, Aug. 5, 2013.

**Joan (Pask) Mikelson** (S'49), Sun City West, AZ, Mar. 4, 2013.

She is survived by her husband, Dwane (BSAE'49).

**Roger W. Walker** (BSAE'49), Fayetteville, GA, Mar. 3, 2013.

He is survived by his wife, Julie.

**Linda L. (Ficklin) Weber** (BSAE'45), Champaign, IL, February 4, 2014 (See article on page 11)

### 1950's

**Sally (Reed) Dunton** (BSAE'50), Saint Michaels, MD, Mar. 4, 2013.

She is survived by her husband, William (BSAE'50).

**George L. Mager** (BSAE'50), Amarillo, TX, Apr. 1, 2013.

**John T. Marshall Jr.** (BSAE'50), Leominster, MA, Oct. 14, 2013.

**Dean Den Uyl** (BSAE'50), Saint Charles, IL, Jun. 9, 2013.

**Kenneth F. Wright** (BSAE'50), Lake Barrington, IL, Oct. 7.

He is survived by his wife, Donna (HHS'49).

**Patrick C. Carroll** (BSAE'51), Centennial, CO, Feb. 2013.

**William S. Covington** (BSAE'51), West Lafayette, IN, May 15, 2013.

He is survived by his wife, Phyllis (S'50).

**William B. Spargur** (BSAE'51), Santa Barbara, CA, Jul. 12, 2013.

He is survived by his wife, Kathleen.

**Robert H. Andresen** (BSAE'52), Fort Lauderdale, FL, Jul. 13, 2013.

**C. William Stephens** (BSAE'53), Seymour, TN, Sept. 2013.

**Lee E. Ross** (BSAE'55), Bellevue, WA, May 21, 2013.

**R. Gerald Steffey, Sr.** (BSAE'55), Exmore, VA, Dec. 23, 2013.

**Robert A. Wilson** (BSAE'55), Murrieta, CA, Feb. 22, 2013.

**Godofredo D. Cirineo** (MSAE'56), New Castle, WA, Nov. 14, 2012.

**Dr. Paul S. Lykoudis** (Ph.D.'56 ME), Professor and Associate Head

(see article on page 30)

**Don W. Doak** (BSAE'58), Bernalillo, NM, Apr. 16, 2013. He is survived by his wife, Nancy.

**H. Michael Gray** (BSAE'58), Los Angeles, CA, Apr. 30, 2013.

**William F. Laird** (BSAE'58), Waldron, IN, Oct. 29, he is survived by his wife, Faith.

**Philip R. Marshall** (BSAE'58), Beaver Creek, OH, May 19, 2013.

**James F. Ritchey** (BSAE'59, MSAE'61), Noblesville, IN, Jan. 28, 2013.

He is survived by his wife, Nancy.

### 1960's

**William P. DeMichieli** (BSAE'61), Englewood, FL, Jan. 1, 2013.

**James E. Randall** (BSAE'61), Albuquerque, NM, Aug. 25, 2013.

**Grant V. Welland** (BSAE'63), MS S'65, PhD S'66), Saint Louis, MO, Aug. 1, 2013.

**Russell P. Kuhn** (BSAE'64), Visalia, CA, Aug. 6, 2013.

**Robert R. Klopp** (BSAE'65), Lake City, Fla, March 2, 2014.

His wife Judith A. Klopp passed on August 11, 2013

**Norbert A. Olzmann** (BSAE'66), Rochester, MI, Oct. 28, 2013.

**James M. Dornan** (BSAAE'69), Alpharetta, GA, Aug. 16.

He is survived by his wife, Nancy (HHS'69).

**Robert A. Metz** (BSAAE'69), Baroda, MI, Nov. 30, 2012.

### 1970's

**Craig S. Golart** (MSAAE'70), Tampa, FL, Mar. 16, 2013.

**Gary W. DeBaun** (BSAAE'72), Crawfordsville, IN, Jan. 7, 2013.

**Bruce C. Gessley** (BSAAE'71), San Antonio, TX, May 27, 2013.

### 1980's

**Robert Sherman** (BSAAE'88), Dakota, MN, Sept. 2, 2013.

# Curtiss-Wright Cadette Programs

## Purdue February 1943

The Purdue Curtis-Wright Cadette program lost one of their alumnae on February 4, 2014 with the passing of **Linda L. (Ficklin) Weber**.

During WWII, the urgent military demand for ten's of thousands of airplanes presented industry with a tremendous engineering and production task. Although most U.S. aircraft companies expanded their facilities with new large plants built by the government, finding the necessary engineering staff became a critical problem.

The Curtiss-Wright Airplane Corporation decided to train 700 to 1000 young women in their engineering departments for technical positions traditionally held by men. The training was to be conducted at their three main plants in Buffalo, NY, Columbus, OH, and Louisville, KY.



**George Palmer, Senior Aero Student (Professor Emeritus), teaching aerodynamics to the Class of 1944 Cadettes at Purdue**

Purdue was invited to participate in what became known as the Curtiss-Wright Cadette Training Program. Purdue started programs between 1943 and 1945. 100 young women cadettes arrived at Purdue on February 12, 1943 to start the first program. The program consisted of two 22-week long terms and was very heavy in drafting materials processing and testing.

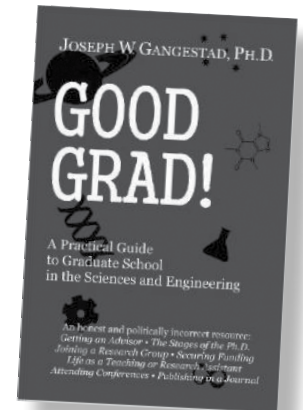


**Sixth row, fourth from the left; Curtiss-Wright Cadette Linda Lou (Ficklin) Weber at the 50th reunion of the Curtiss-Wright Cadettes in Columbus, OH October 17th, 1994**



**Linda L. (Ficklin) Weber Second row, 4th from the left, at the Third Class of Cadettes at Purdue University October 1944 through March 1945**

## Purdue Alumnus Publishes New Book



**Joseph Gangestad MSAE '08; Ph.D.'10** has published a new book 'Good Grad! A Practical Guide to Graduate School in the Sciences & Engineering' The book is a practical guide for current and future grad students trying to unravel the mysteries of the master's degree and Ph.D.

A graduate student in the sciences and engineering has to attend conferences, write journal articles, navigate collaborations, negotiate for lab equipment, mediate between squabbling lab mates, indulge eccentric professors, teach undergraduates, and secure funding every semester. None of which is covered in an undergraduate setting.

Gangestad sent a copy to his advisor **Professor Jim Longuski** and gratefully acknowledged Longuski's guidance and pearls of wisdom during his time at Purdue. In particular, Gangestad appreciated the time that Longuski took to shape his grad students into fully rounded professionals.

Gangestad is the author of several scholarly journal articles in the fields of aerospace engineering and astrodynamics and has authored the articles on "Celestial Mechanics" and "Orbital Motion" for the *McGraw-Hill Encyclopedia of Science and Technology*. A native of Boston, Massachusetts, he received his bachelor's degree in Astrophysics from Williams College, a liberal arts college in western Massachusetts, and later a master's degree and Ph.D. in Aeronautical and Astronautical

## EVER GRATEFUL – EVER TRUE

Your financial support leaves a lasting impact on Purdue and the School of Aeronautics and Astronautics. These gifts help us to achieve our mission in preparing students to be leaders in the aerospace field and they signify your loyalty and belief in the university and the School of Aeronautics & Astronautics, its traditions and the power of a Purdue education to impact the world.

Our school continues to move forward. Students choosing aerospace engineering are outstanding and our faculty are committed to excellence in the classroom and laboratories. We want to continue to be the global leader in aerospace engineering and with your continued support, we will maintain that role.

You can have an impact with your participation with the school and by contributing to the future success of the school.

Our annual Donor Honor Roll covers the period July 1, 2013 – June 30, 2014 and lists our alumni, friends and corporate donors who have given generously of their financial resources to support the School of Aeronautics and Astronautics. Thank you for your support. The Donor Honor Roll is published on the Alumni page of the School Web site at <https://engineering.purdue.edu/AAE/AboutUs/Giving/honorroll>.

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& ASTRONAUTICS

### Dear Alumni and Friends,

As always, the first thing that I would like to say is Thank YOU! We have had an incredible year thanks to your generosity and engagement. The support for our student scholarships has continued to grow and aligns very well with President Daniels' Purdue Moves initiative. This range of initiatives introduced by Daniels will broaden Purdue's global impact and will enhance educational opportunities for our students. Another one of the strategic growth goals that will move us forward is upgrading our facilities to meet the needs of today's students.

Many of you have already chosen to support the expansion and renovation of the Zucrow labs. We are well on our way of having that ground breaking ceremony to begin that building process. With your incredible help, we have been able to engage many new and first-time donors, which is vital to meeting our long-range plans. Our first ever Day of Giving (p. 13) was largely responsible for finding many of those donors and resulted in gifts that were in the range of \$10 to over \$1 million. We truly value each of these donations and want to make this a foundation for further growth for our school. Amy Noah, our Vice President of Development said it quite well, "The value of a Purdue degree continues to rise, and, at all levels of giving, the Purdue family has responded enthusiastically and generously to make an already premier university even better."

Our school has very exciting plans on the horizon, and we look forward to sharing those plans with each of you as we meet with you. Having the ability to meet with you and talk to you about your experiences continues to be a highlight of my job here at AAE. I look forward to working with you and finding ways of further engagement with your school. I would challenge each of you to think about this question: How do you see your relationship expanding with the School of Aeronautics and Astronautics? Again, my sincere thanks to all of you for everything that you do to make us an even better institution.

Boiler Up!

*Rita Baines*



Rita Baines  
Director of Development  
(765) 494-9124  
rbaines@purdue.edu

## The David L. Filmer, Ph.D. and Christiane E. Keck, Ph.D. Endowment

AAE adjunct Professor of Aeronautics & Astronautics Dr. David L. Filmer and his wife Dr. Christiane E. Keck have created an endowment to benefit Purdue University faculty members working in the area of Astrodynamics and Space Applications

The primary purpose of this fund is to provide funds to be used for tenure-track and tenured faculty working in the area of Astrodynamics and Space Applications beyond Earth Orbit and will be awarded on a rotating basis starting with the most senior member of the faculty.



## The Ronald L. and Kathleen M. Kerber Engineering Scholarship

Dr. Ronald L. Kerber (BSAE'65; DEA'88; OAE'99) and his wife Kathleen M. Kerber recognize the value of education and Purdue was in their thoughts for future graduates when they established *The Ronald L. and Kathleen M.*

*Kerber Engineering Scholarship* in their philanthropic estate planning. Few gifts and endowments make as significant an impact as the gift of education, and the Kerber's intention is that in the future, their scholarship would support full tuition costs for at least one sophomore student. One aspect that is very important to the Kerber's is that the student should originate from a farming background. The Kerbers had a farming background and owns several thousand acres of farmland both near Purdue and in other areas.

Dr. Ronald L. Kerber is an experienced executive with a successful record of leading and growing domestic and global businesses. His leadership responsibilities have included innovation, product development, cost reduction, and profitability in diverse, global organizations. His background includes a variety of entrepreneurial and pro bono activities as president of SBDC, a small consulting firm; Partner and Co-founder of Dominion Development Company; visiting professor at The Darden School at the University of Virginia; and member of the Department of Defense Science Board.

During ten years as Executive Vice President and Chief Technology Officer at Whirlpool, Dr. Kerber had line responsibility for global product development and procurement, along with P&L responsibility for three worldwide businesses: microwave ovens, air conditioners, and compressors. Kerber also served as Vice President of Advanced Technology and Business Development at McDonnell Douglas, as Deputy Under Secretary of Defense for Research and Advanced Technology, and as a program manager at the Defense Advanced Research Projects Agency (DARPA) in the Department of Defense. His fields of specialty were in the areas of engineering management, new product development, procurement management, and laser physics.

In addition to his B.S. degree from Purdue in 1965, Dr. Kerber received his M.S. and Ph.D. degrees in engineering science from the California Institute of Technology. Before beginning his business career, Dr. Kerber was a professor of electrical and mechanical engineering and associate dean of graduate studies and research at Michigan State University. He has published more than 60 technical articles, co-authored the book *Strategic Product Creation*, and is a recipient of the Secretary of Defense Medal for Outstanding Public Service, the Michigan State University Teacher Scholar Award, the Purdue University Distinguished Engineering Alumni Award in 1988, and the Outstanding Aerospace Engineer Award in 1999. He was a NASA Fellow at the California Institute of Technology.

## Purdue Day of Giving 2014

Purdue University received \$7.5 million from 6,500 donations during its first Day of Giving on April 30. The Purdue Day of Giving was a 24-hour, online and social media event that focused on student affordability and accessibility, among other areas. The day's theme was "*Opportunity Granted.*"

Gifts ranged from \$10 to more than \$1 million. Donors included long-time benefactors along with students, staff and recent graduates new to philanthropy. The online event drew contributors from 15 countries – including China, Australia and Uzbekistan – and all 50 states. Some donors honored family members or favorite professors with their gifts.

"We at Purdue are truly grateful to all of our students, parents, faculty and staff, alumni, and friends who made

our first Day of Giving such a success," said Amy Noah, Vice President for Development. "The Boilermaker family came together in a powerful way, and their gifts will help Purdue pursue extraordinary opportunities for innovation, achievement and growth while keeping an affordable education within reach of our students."

More than \$454,000 in donations to the President's Student Affordability and Accessibility Fund received a dollar-for-dollar match, accounting for more than \$908,000 of the total. The fund provides scholarships for Indiana students in need of financial support.

**It's not too late to donate.**  
**More information on donating to Purdue can be found at**  
**[www.purduedayofgiving.com](http://www.purduedayofgiving.com)**

The photo gallery of the day's events can be found here: <http://purdue.photoshelter.com/gallery/Day-of-Giving/G0000Pg5tpsMxdOg>

YouTube: [http://youtu.be/u\\_ty7-NL9MQ](http://youtu.be/u_ty7-NL9MQ)



# X-20 Dyna-Soar space vehicle

The model of the Boeing X-20 Dyna-Soar space vehicle was lifted into position in the Herman & Heddy Kurz atrium of the Neil Armstrong Hall of Engineering on January 10, 2014. The mock-up of the X-20 was unveiled at a ceremony on October 18, 2013 when Dean Leah Jamieson welcomed senior representatives from The Boeing Company to Purdue which included Darryl W. Davis, BSAAE'78; OAE'08; DEA'10, President, Phantom Works, Boeing Defense, Space and Security and a member of the school's Steering Advisory Council and Engineering, and Operations & Technology Chief Engineer Mark Burgess, BSAAE'78, MSAA'79, MSIA'82, OAE'10; DEA'13. Senior Manger Research and Technology, Matt Symonds, spoke on the background of how the project came about, and its timeline.

On June 16, 1958, Boeing and the Martin Co. were selected to compete for the space plane, then designated the Dyna-Soar for Dynamic Soaring. Boeing would build the manned space glider and Martin would provide the booster rocket.

On March 15, 1962, four U.S. Air Force test pilots and two NASA pilots were assigned to the Dyna-Soar program. One of the NASA pilots was Purdue AAE alumnus Neil A. Armstrong.

The Dyna-Soar design contract was awarded to Boeing on Nov. 9, 1959, and designated the X-20 on June 19, 1962. It was designed to be a 35.5-foot piloted reusable space vehicle, had a sharply swept delta 20.4-foot-span wing and a graphite and zirconia composite nose cap and used three retractable struts for landing.

Eleven manned flights were to be launched from Cape Canaveral Fla., starting in November 1964. Dyna-Soar's first orbital flight was tentatively scheduled for early 1965 once a series of unmanned orbital flight tests were successfully completed.

The X-20 reached the mockup stage. \$410 million had been spent on its development, and a team of astronauts was training to fly it. However, the U.S. government canceled the program on December 10, 1963, because Dyna-Soar had no viable military mission and was too expensive for a research vehicle. Congress diverted the X-20 funding to the Manned Orbiting Laboratory, which used McDonnell-built Gemini capsules. The partially completed X-20 prototype and the mockup were scrapped, as well as initial tooling set up for a production line for 10 space planes. Although it never flew, the X-20 Dyna Soar helped pioneer the way for the Space Shuttle.



**(L-R) Mark Burgess, Engineering, Operations & Technology Chief Engineer; Darryl Davis, President, Phantom Works; Leah Jamieson, Purdue Dean of Engineering; Senior Manger Research and Technology, Matt Symonds; Dr. Tom Shih, Professor and Head, School of Aeronautics and Astronautics and Dr. John Sullivan, Director, Purdue Center for Advanced Manufacturing**



**AAE students assisted at the unveiling of the X-20 with the Boeing Research and Technology team included: Becky Cutting, Daniel Goldberg, Kyle Schwinn, Sean Walsh, Alix Crandell, Shawn Olsavsky, Tim Madzey, Joseph Lorenzetti and Devon Marion**

## Steering Advisory Council 2013-2014

The Steering Advisory Council (SAC) advises and helps AAE in exploring and creating major opportunities in the aerospace arena that are timely and important at the national level, where Purdue's AAE can take a leadership role.

The current members of the SAC are shown below. We sincerely appreciate the efforts of the members of the SAC to take time from their busy schedules to assist us in our programs, and look forward to working with them in the future.



### **Natalie W. Crawford**

Senior Fellow • RAND Corporation

### **Darryl W. Davis (BSAAE'78)**

President • Phantom Works • Boeing Integrated Defense Systems

### **C. Douglas Ebersole (BSAAE'82)**

Director of Engineering • Joint Strike Fighter Program Office

### **William H. Gerstenmaier (BSAAE'77)**

Associate Administrator • Human Exploration and Operations • NASA

### **Thomas L. Maxwell (BSAAE'69)**

General Manager • Military Systems and Design Integration

• GE Aircraft Engines

### **Alton D. Romig, Jr.**

Vice President and General Manager • Skunk Works • Lockheed Martin Aeronautics Company

### **Munir Sindir**

Director of Engineering Technical Disciplines • Aerojet Rocketdyne

### **Dr. Robert L. Strickler (BS'60, MS'62, Ph.D.ME'68)**

Private Consultant; Retired Vice President / General Manager for Space and Missile Systems • Energy and Environmental Systems • TRW

### **Matt Szolwinski (BSAAE'93, MSAAE'95, Ph.D.'98)**

Manager • GENx Systems Engineering • GE Aviation

### **Tom Vice (BS'86)**

Corporate VP and President • Northrop Grumman Aerospace Systems

• Northrop Grumman Corporation

### **Dennis Warner (BS'73, MSME'76)**

President and CEO • Rolls-Royce North American Inc. • Aero Engine Control, North America

### **Sigmar Wittig**

Professor • Karlsruhe Institute of Technology, Member of the Board of Presidents • the Technical University System of the State of Niederachse — Association of Universities of Hannover, Braunschweig, and Clausthal



## Changes to AAE Academic Advising

**Professor Bill Anderson** was appointed Associate Head for Undergraduate Education following **Professor Marc Williams'** retirement from Purdue on June 3rd.

**Taylor Weast**, AAE's new academic advisor joined the School on June 2, 2014. Taylor graduated in May 2014 from the Higher Education and Student Affairs master's program at Indiana University. She held a graduate assistantship as an Academic Advisor for two years before her graduation and received her bachelor's degree from IU in December 2011 in General Studies.

The mission of undergraduate advising at Purdue University is to partner with students, faculty, staff, departments, and administration to empower students to develop and implement an individualized plan for academic success, personal and career development, while integrating learning and enrichment within the University and community, as well as assisting students in understanding the nature, purpose, and value of higher education. Students are welcome to send an email, or schedule an appointment using the online form: <https://appointments.pnhs.purdue.edu/>

The addition of Taylor to the existing team of Gina Covarrubias, Senior Academic Advisor, and Lisa Crain, Undergraduate Program Coordinator brings a new level of service to prospective and current AAE undergraduates.



**Prof. Bill Anderson**



**Taylor Weast**

*Thank You!*

# Industrial Advisory Committee 2013-2014

The Industrial Advisory Council (IAC) serves an important role in the School of Aeronautics & Astronautics. The success of our programs depends on strong support from industry and the Industrial Advisory Council serves as a link between industry and the university. The IAC meets twice a year in the fall and spring and reviews a large variety of topics related to our current operations and future goals.

The current members of the IAC are shown below. We sincerely appreciate the efforts of the members of the IAC to take time from their busy schedules to assist us in our programs, and look forward to working with them in the future.

**Mr. Frank H. Bauer (BSAAE'79, MSAAE'80)**

Vice President for Strategic Programs • Emergent Space Technologies

**Mr. Bradley D. Belcher (BSAAE'82)**

Research & Technology Program Executive • Research & Technology Strategy • Rolls-Royce Corporation

**Dr. Paul M. Bevilaqua (MSAAE'68, Ph.D.'73)**

Professor • Department of Mechanical and Aerospace Engineering • University of Miami

**Douglas L. Bowers (BSAAE'72)**

Director, Propulsion Directorate • AFRL/RZ • United States Air Force Research Laboratory (Retired)  
U.S. Department of Defense Liaison for Purdue

**Col. (Ret.) Mark N. Brown (BSAAE'73)**

Aerospace Consultant • Mark Brown Consulting, LLC

**Ms. Andrea M. Chavez (BS'88)**

Director of Operations and Planning for National Defense; Ball Aerospace & Technologies Corp.

**Mr. Michael J. Corso (BS'71)**

Department Chair • Tort and Insurance Litigation Department • Henderson, Franklin, Starnes & Holt, P.A.

**Mr. Darryl W. Davis (BS'78)**

President • Phantom Works • Boeing Integrated Defense Systems

**Mr. Daniel F. Devitt (BS'75)**

Sr. Director of Engineering & Certification • American Eurocopter

**Mr. Michael P. Dreessen (BS'83)**

Vice President, Engineering • Ducommun-Milltec

**Mr. John P. Gleiter (BSAE'60)**

Adjunct Professor • California State University, Northridge, CA  
Adjunct Professor • National University, Los Angeles, CA  
Adjunct Professor • Woodbury University, Burbank, CA

**Dr. Markus B. Heinemann (BSAAE'92, MSAAE'94, Ph.D.'97)**

Technology Manager • Aerospace, Alcoa, Inc • Alcoa Technical Center

**Mr. Andrew H. Kasowski (BS'72)**

Retired Vice President • Engineering Product Development • Cessna Aircraft Company

**Dr. Andrew M. King (MSME'84, Ph.D.'88)**

Director, S & IS Mission Assurance • Boeing Defense, Space and Security • The Boeing Company

**Stephen S. Kress**

Group Technical Staff, Integrated and Programs • Lockheed Martin Missiles, and Fire Control • Lockheed Martin Corporation

**Ms. Mary Kriebel (BS'85)**

Propulsion Systems Manager • Northrop Grumman Corp.

**Mr. Thomas L. Maxwell (BSAE'69)**

Retired General Manager • Military Systems and Design Integration • GE Aircraft Engines

**Mr. David K. McGrath (BS'83, MS'84)**

Director, Systems Engineer • Tactical Propulsion and Controls • ATK Elkton Operations

**Mr. James R. Miller (BSAAE'86)**

Vice President • Worldwide Operations • Google, Inc.

**Mr. Gary E. Mitchell (BS'60)**

Retired - Vice President • Boeing Integrated Defense System

**Mr. Gary E. Payton (MSAAE'72)**

Distinguished Visiting Professor in the Erdle Chair in Engineering Sciences; U.S. Air Force Academy

Retired Deputy Under Secretary for Space • U.S. Air Force

**Ms. Erika J. Pearson (BSAAE'93)**

Business Director/Deputy VP Asia Pacific & India Sales • Boeing Commercial Airplanes

**Mr. James P. Renna (BS'86)**

Vice President, Engineering Safety, Test and Evaluation • Sikorsky Aircraft Corporation

**Dr. Richard Byram Rivir (BSAE'60)**

Chief Scientist, Propulsion Directorate • United States Air Force, US Department of Defense Liaison for Purdue

**Mr. Charles Robert Saff (BS'71)**

Retired, Boeing Technical Fellow—Structures • Boeing Research and Technology

**Mr. Randal E. Secor (BS'76)**

Director • Deputy IPT Lead • MAMS UAS • Northrop Grumman Corporation

**Dr. Robert L. Strickler (BS'60, MS'62, Ph.D.ME '68)**

Private Consultant; Retired Vice President / General Manager for Space and Missile Systems • Energy and Environmental Systems • TRW

**Mr. William "Ted" Torgerson (BS'83)**

Director — Program Manager • Phantom Works • Boeing Company

**Mr. John J. Walsh (BS'82)**

President • Sypris Electronics LLC

**Mr. Glenn Weissinger (BSAAE'77) (MSIA'78)**

Retired Vice President — Strategic Planning • Lockheed Martin Aeronautics

*Thank You!*





# William E. Boeing Distinguished Lecture 2013

The 2013 *William E. Boeing Distinguished Lecture* was presented by Lieutenant General C.D. Moore II, Commander, Air Force Life Cycle Management Center, Wright Patterson Air Force Base, Dayton, OH on October 1, 2013. His talk was entitled "**Preserving aerospace combat advantages in a fiscally constrained environment.**"

The William E. Boeing Distinguished Lecture Series, named in honor of the Boeing Co.'s founder, is administered by the College of Engineering's School of Aeronautics and Astronautics. Started in 1999, the series features an internationally known speaker from the aerospace or air transportation industries.

As commander of the Air Force Life Cycle Management Center at Wright-Patterson Air Force Base in Dayton, Ohio, Lt. Gen. Moore is responsible for total life-cycle management covering all aircraft, engines, munitions and electronic systems.

Lt. Gen. Moore graduated from the U.S. Air Force Academy and, as a Guggenheim Fellow, earned a master's degree in aeronautical engineering at Columbia University before entering flight school in 1981. He served as a T-38 instructor pilot, an operational F-15 pilot and as an experimental test pilot. He also served as commander of the first F-22 squadron as well as a group commander at Eglin AFB, materiel wing director of the F-16 System Program Office, materiel wing commander of the F-22 System Program Office, and vice commander of the Aeronautical Systems Center.

His staff assignments include director of special programs in the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, and deputy director of the Global Power Directorate in the Office of the Assistant Secretary of the Air Force for Acquisition, and deputy program executive officer of the F-35 Joint Program Office.



Lt. Gen. Moore served as chief of air operations, Multi-National Forces-Iraq in 2004, and he is a command pilot with more than 3,000 flight hours in 30 types of aircraft.

Before assuming his current position, he was vice commander, Air Force Materiel Command.

## Former Head Visits School of Aeronautics and Astronautics

The School of Aeronautics and Astronautics was delighted to receive a visit from former head Dr. Bruce A. Reese on September 6, 2013. Dr. Reese received a BSME from the University of New Mexico in 1944 and then served in the U.S. Navy from 1944 -1946. He earned a master's degree in 1948 and a Ph.D. in 1953 both in Mechanical Engineering from Purdue. He joined the aero school as an assistant professor in 1949 and was promoted to associate professor in 1955 and full professor in 1958.

Dr. Reese taught a course in jet propulsion and assisted Dr. Maurice Zucrow with several research projects. When Dr. Zucrow left the aero school for a full-time position with ME, Dr. Reese accompanied him. When Dr. Zucrow retired in 1966, Dr. Reese was appointed director of the Thermal Sciences and Propulsion Center - now known as Zucrow labs, at Purdue. He later rejoined the School of Aeronautics and Astronautics in 1973, and served as head until his retirement in 1979. He then served as Chief Scientist, Arnold Engineering Development Center (AEDC), one of the world's largest and most advanced aerodynamics test facilities. Dr. Reese was accompanied by his grandson, Walker Reese, who is an aero/astro student at Georgia Tech.

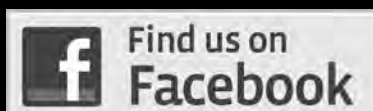


(L-R) Dr. Tom Shih, Dr. Bruce Reese, Walker Reese, Dr. Wayne Chen



Dr. Bruce Reese with Linda Flack

## Find us on Facebook



The School of Aeronautics and Astronautics enjoys utilizing Facebook, and we now have over 1600 people who follow us.

You do not need to join Facebook to view the page, just follow the link on the AAE web page <https://engineering.purdue.edu/AAE>.

We aim to keep alumni, faculty, students, staff and friends of AAE up-to-date on all relevant events!

# AAE Expands its Master's Programs

The School of Aeronautics and Astronautics (AAE) is pleased to announce an expanded option for earning an M.S. degree. Effective Fall 2014, AAE is offering, through Purdue's Engineering Professional Education, a terminal professional M.S. degree, called M.S. in Engineering with concentration in Aeronautics and Astronautics with Management. The target audience is aeronautical and astronautical engineers with significant work experience who are interested in deepening their knowledge within their engineering disciplines and in furthering their professional skills and competencies. The program is also open to students who intend to learn business skills in addition to the traditional core training in engineering. It is expected that students attracted to this program will be on a career path of technical and engineering leadership.

This program is designed to be completed in one calendar year. For students intending to take the one-year engineering practice option, the program can be extended into two years. The course requirements are 6-7 core AAE and Math courses and 3-4 management courses. To learn more, visit:

<https://engineering.purdue.edu/EngineeringManagement/programs>

Additionally, AAE offers Master of Science in Aeronautics and Astronautics (MSAA) with or without thesis on-campus and online. The online version is typically offered without thesis and offers working professional engineers a convenient way to earn an advanced degree via the flexibility of distance learning classes. Currently, AAE has 112 students working towards their MSAA via distance education.

To learn more about AAE's MSAA online program, please visit:

<https://engineering.purdue.edu/ProEd>



(L-R) Dr. Tom Shih, Head of School of Aeronautics and Astronautics, Boeing representatives: Stu Voboril, Director, Special Pursuits Cell (SPC) Jerad Hayes, Senior Manager Proprietary Programs, Keith Etling, Senior Manager Advanced Technologies, Boeing Phantom Works, Dr. John Sullivan

## Boeing and Boilermakers

Engineers from Boeing Phantom Works took advantage of a unique opportunity in February 2014 to exchange ideas with students from the School of Aeronautics and Astronautics. They spent a day touring the Boeing-sponsored projects in the laboratories of the Neil Armstrong Hall of Engineering.

For decades, Purdue University and The Boeing Company have enjoyed a fruitful relationship leading to the realization

of research laboratories, faculty initiatives and well-prepared employees for The Boeing Company. Specifically, the School of Aeronautics and Astronautics has benefited from resources, such as the Boeing Wind Tunnel, Ludwig Tube and the McDonnell Douglas Composite Materials Laboratory. Purdue established the *William E. Boeing Distinguished Lecture Series* which is administered through the School of Aeronautics and Astronautics, to express our gratitude and to honor the memory of its founder. The lecture series features an internationally-known speaker from the aerospace or air transportation industry.

The students involved in the program in February presented their work to the Phantom Works team members. They were building an unmanned air vehicle designed for agricultural surveillance, designed to image a 60-acre field in less than 45 minutes.

The three strategies of Phantom Works are Engage, Innovate and Prototype, and the Phantom Works team saw that the students are already doing that in the classrooms. They also witnessed how Purdue students currently learn additive manufacturing technology, specifically 3D printing. Phantom Works Director of Special Pursuit Cells, Stuart Voboril, believes the training undergraduate students at Purdue receive very closely mirrors the engineering industry, better preparing them to enter the work force required to take Boeing through the next 100 years.

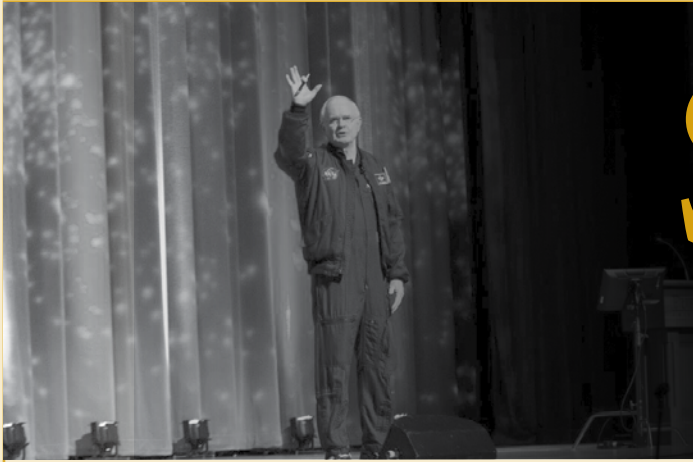
The visit to Purdue concluded with a presentation by the Phantom Works team members to a packed classroom. The discussion was titled Prototyping to Win, and gave the future engineers a behind-the-scenes look at how the advanced manufacturing techniques they are learning in college are applied to rapid prototyping in the engineering industry. After the presentation, several Boilermaker engineering students enthusiastically lined up to converse with the Phantom Works team members.



The Phantom Works team meets AAE students

PURDUE

# SPACE DAY



The 18th annual Purdue Space Day (PSD) took place October 26th with guest VIP astronaut **Dr. Roy D. Bridges Jr. MSAE'66, DEA'98, OAE'99, HDR'01.**

Dr. Bridges gave a presentation the evening before the event in the Class of 1950 Lecture Hall and then kick-started Space Day on Saturday morning in the Elliott Hall of Music.

The theme for 2013 was a tribute to Mars Exploration, each of the 21 groups were named for scientists, explorers, and missions to Mars. The quote was "*In Curiosity Lies Opportunity.*"

Organized by university students and hosted by the School of Aeronautics and Astronautics with support from the Indiana Space Grant Consortium, PSD is the largest educational STEM outreach program at Purdue. Since its inception in 1996, over 2,300 Purdue students have volunteered their efforts to run the event and over 7,100 school students have taken part.

PSD coordinator **Ann Broughton** completed her 14th and final Space Day before she returns to her native United Kingdom. Under her leadership, the program has grown from accommodating 270 to 650 grade school students and from 65 to 248 Purdue student volunteers from 58 majors. AAE and PSD alumni and their spouses Breanne (Wooten) and Dan Sutton, and Brian and Ann Ventre returned to help out with the event. Breanne presented Ann with a quilt made out of Space Day crew t-shirts from each of the years she was coordinator.



**Astronaut Dr. Roy Bridges with the PSD Executive Board and Director of INSG Dr. Barrett Caldwell**



**Brian Ventre, Ann Broughton and Breanne Sutton**



**Astronaut Dr. Bridges with the PSD Crew**

# 2013

# AAE Graduate Research Symposium 2014



The first annual AAE Graduate Research Symposium was held on April 10, 2014 in the Stewart Center. The goal of this event is to showcase AAE's latest research and to give our school's industry and government partners the first opportunity to meet and recruit our outstanding M.S. and Ph.D. students who are graduating. At this symposium, all 28 of our Ph.D. students who will graduate in 2014 presented talks (see below). Also, a portion of our 100 M.S. students who will graduate in 2014 presented posters of their research. Attendees at this symposium included those from Aerospace Alcoa Inc., ATK Elktion Operations, Boeing Research and Technology, GE Aviation, Lockheed Martin Aeronautics, Lockheed Martin Skunkworks, Northrop Grumman Corp., Rolls-Royce Corp., and AIR Force Research Lab.

## Aerodynamics

### Ph.D.

Kurt Aikens

Advisor: Professor Greg Blaisdell

**High-Fidelity Large Eddy Simulation for Supersonic Jet Noise Prediction**

Chien - Shing Lee

Advisor: Professor Tom Shih

**Time-Accurate Conjugate CFD Analysis of a Jet-Impingement Configuration with Sudden Changes in Heating and Cooling Loads**

Andrew Weaver

Advisor: Professor Alina Alexeenko

**Assessment of High-Fidelity Collision Models in the Direct Simulation Monte Carlo Method**

### M.S.

Samantha Alberts

Advisor: Professor Steven Collicott

**Feasibility Analysis of Large Length-Scale Thermocapillary Flow Experiment**

Mounia Belmouss

Advisor: Professor Sally Bane

**Development and Characterization of Flow Control Actuators Based on Spark Discharge Plasmas**

Di Huang

Advisor: Professor Alina Alexeenko

**Understanding and Optimizing MPCVD Synthesis of Carbon Nanopetals**

Yashas Keshav

Advisor: Professor Tom Shih

**Unsteady Forces on a Spherical Particle Accelerating or Decelerating in an Initially Stagnant Fluid**

Lalit Rajendran

Advisor: Professor John Sullivan

**Skin Friction Measurement in the Trailing Edge Separation Region of a Wing-Body Junction**

Zachary Stratton

Advisor: Professor Tom Shih

**Effects of Cross Flow in an Internal-Cooling Channel with Ribs on Film Cooling of a Flat Plate Through Compound-Angle Holes**

Nikhil Varma

Advisor: Professor Alina Alexeenko

**Fluid Dynamics of Vacuum Freeze Drying**

## Aerospace Systems

### Ph.D.

Kristopher Ezra

Advisor: Professor Dan DeLaurentis

**Comparative Solution Methods for the Integrated Problem of Sensors, Weapons, and Targets**

Donald Fry

Advisor: Professor Dan DeLaurentis

**Cost, Performance, and Networked Information Sharing in a Ballistic Missile Defense System**

Cesare Guariniello

Advisor: Professor Dan DeLaurentis

**Integrated Analysis of Functional and Developmental Interdependencies: Quantify and Trade-off Ilities for (Space) System-of-Systems Design, Architecture, and Evolution**

Ali Khalid

Advisor: Professor Dan DeLaurentis

**A System-of-Systems Perspective for Information Fusion Systems**

Kartavya Neema

Advisor: Professor Dan DeLaurentis

**Robust, Distributed Sensor Management and Target Tracking using Large Scale Sensor Network**

Payuna Uday

Advisor: Professor Karen Marais

**Resilience-based System Importance Measures for System-of-Systems**

### M.S.

Thomas Antony

Advisor: Professor Mike Grant

**Rapid Trajectory Optimization using Indirect Methods on Parallel Computing Architectures**

Timothy Dannenhoffer

Advisor: Professor Dan DeLaurentis

**A Mixed Discrete-Continuous Surrogate Model for End to End Ballistic Missile Defense Systems**

Timothy Harris

Advisor: Professor Dan DeLaurentis

**Integrating Allied Sensors in an Evolving BMDs SoS Architecture Model**

Peter Klintstiver

Advisor: Professor Dan DeLaurentis

**Multiple Objective Interceptor Shot Selection within Time Constrained Bounds**

Tiffany Le

Advisor: Professor Karen Marais

**Investigating Performance Trade-offs of Unimpeded Taxiways for Efficient Arrival Taxi Routing and Environmental Benefits**

Kshitij Mall

Advisor: Professor Mike Grant

**High Mass Mars Exploration using Slender Entry Vehicles**

Jessica Rivas

Advisor: Professor Karen Marais

**Modeling Preventive Maintenance in Complex Systems**

Harish Saranathan

Advisor: Professor Mike Grant

**Modeling Shape Change of Slender Hypersonic Vehicles due to Ablation**

Mughilan Thiru Ramasamy

Advisor: Professor M. Grant

**Prediction of Optimal Trajectory States of Hypersonic Re-entry Vehicle using System Id**

Haogong Wei

Advisor: Professor M. Grant

**Real-Time Trajectory Optimization with Lag and Uncertainty**

## Astrodynamics and Space Applications

### Ph.D.

Amanda Haapala

Advisor: Professor Kathleen Howell

**Spacecraft Trajectory Design in the Spatial Circular Restricted Three-Body Problem**

Masaki Kakoi

Advisor: Professor Kathleen Howell

**Access to a Destination Object from Earth-Moon Libration Point Orbits: Manifold and Direct Options**

Blake Rogers

Advisor: Professor Jim Longuski

**Establishing Cycler Trajectories Between Earth and Mars**

Rashmi Shah

Advisor: Professor Jim Garrison

**Remote Sensing of Ocean Surface Using Signals of Opportunity**

Jeffrey Stuart

Advisor: Professor Kathleen Howell

**Design of End-to-End Trojan Asteroid Rendezvous Tours Incorporating Potential Scientific Value**

## **M.S.**

Ashwati Das  
Advisor: Professor Kathleen Howell  
**Design and Control of Solar Sail Enabled Spiral Trajectories in the Earth Moon System**

## **Dynamics & Controls**

### **Ph.D.**

Jian Wei  
Advisor: Professor Inseok Hwang  
**Design and Evaluation of Design and Evaluation of Sector Design Algorithm for Terminal Airspace**

### **M.S.**

Sangjun Lee  
Advisor: Professor Inseok Hwang  
**Real-time RSSI-based Indoor Navigation for Autonomous Flight**

Joseph Tuttle  
Advisor: Professor Art Frazho  
**Feedback Controlling Systems with Nonholonomic Constraints**

## **Propulsion**

### **Ph.D.**

Jacob Dennis  
Advisor: Professor Steve Son & Professor Tim Pourpoint  
**Investigations of Condensed and Early Stage Gas Phase Hypergolic Reactions**

Chris Fugger  
Advisor: Professor Bill Anderson  
**Turbulent Mixing Characteristics of a Reacting Transverse Fuel Jet Injected into an Acoustically Oscillating High Pressure and High Temperature Vitiated Crossflow**

Mark Pfeil  
Advisor: Professor Steve Son & Professor Steve Heister  
**Solid Amine Boranes as Hypergolic and Energetic Additives to Hybrid Rocket Fuels**

David Reese  
Advisor: Professor Steve Son & Professor Steve Heister  
**A Novel Nitrate Ester for Next-Generation Solid Propellants**

Mario Roa  
Advisor: Professor Bob Lucht  
**Investigation of a Reacting Jet Injected into a Vitiated Cross Flow at Gas Turbine Operating Conditions**

Matthew Wierman  
Advisor: Professor Bill Anderson  
**Development of Combustion Response Functions in a Subscale High Pressure Transverse Combustor**

Jian Xu  
Advisor: Professor Li Qiao  
**Droplet Breakup of Micro- and Nano-Dispersed Carbon-in-Water Colloidal Suspensions under Intense Radiation**

## **M.S.**

Prashanth Bangalore Venkatesh  
Advisor: Professor Sally Bane  
**High-Pressure Combustion and Deflagration-to-Detonation Transition in Ethylene/Nitrous Oxide Mixtures**

James D'Entremont  
Advisor: Professor Sally Bane  
**Control of Combustion Instability Using Plasma Discharges**

Jason Gabl  
Advisor: Professor Tim Pourpoint  
**Portable, On-Demand, Solid State Hydrogen Generation Systems**

Sarah Hester  
Advisor: Professor Bill Anderson  
**The study of ORSC Rocket Engines Utilizing Single Element Gaseous Combustors**

Ravichandra R. Jagannath  
Advisor: Professor Sally Bane  
**Wave Rotor Combustion Turbine and Its Potential Application**

Devin Kees  
Advisor: Professor Tim Pourpoint  
**The Design and Test of a 900 lbf Hybrid Rocket**

Evan Maynard  
Advisor: Professor Bill Anderson  
**Efficient Experimental Design and Development of Injector Mixing Theories for Performance Prediction**

William Murray  
Advisor: Professor Nicole Key  
**Experimental Investigation of Forced Response Condition in a Multistage Compressor**

Joe Neal  
Advisor: Professor Steve Heister  
**A Process for Performing Constituent System Sensitivity Analysis: Effect of Interceptor and Sensor Performance**

Kevin Shipley  
Advisor: Professor Bill Anderson  
**Multi-Injector Modeling of Transverse Combustion Instability Experiments**

## **Structures and Materials**

### **Ph.D.**

Benjamin Bratschi  
Advisor: Professor C.T. Sun  
**Failure Load Predictions of Highly Constrained Specimens Using Cohesive Zone Models**

Jeeyeon Hahn  
Advisor: Professor Skip Grandt  
**Analysis on the Interaction of Two Parallel Surface Cracks**

Yousung Han  
Advisor: Professor Vikas Tomar  
**Ab Initio Analysis of the Influence of Helium Point Defects and Radiation Damage on Strength of SiC and Tungsten Grain Boundaries**

Hongsuk Lee  
Advisor: Professor Vikas Tomar  
**Understanding the Influence of Grain Boundary Thickness Variation on the Mechanical Strength of a Nickel Added Tungsten Grain Boundary**

James Manimala  
Advisor: Professor C.T. Sun  
**Acoustic Metamaterials with Oscillator Microstructures: Recent Advances and Device Implications**

### **M.S.**

John Black  
Advisor: Professor Wayne Chen  
**Dynamic Triaxial Compression Experiments on Borosilicate and Soda-lime Glass**

Benjamin Claus  
Advisor: Professor Wayne Chen  
**Characteristics of Fibrous Tissue at High Rates of Loading**

Benjamin Denos  
Advisor: Professor Byron Pipes  
**Characterization of Discontinuous Fiber Composite Microstructure Using CT Scan Image Analysis**

Javier Esquivel  
Advisor: Professor Mike Sangid  
**Strain Mapping of Heterogeneous Deformations Using Digital Image Correlation**

Brittany Essink  
Advisor: Professor Wayne Chen  
**Blast Mitigation in Porous Rocks**

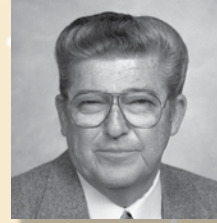
Zherui Guo  
Advisor: Professor Wayne Chen  
**Transverse Mechanical Response of High-Performance Ballistic Fibers**

Jianzhou Sun  
Advisor: Professor Wayne Chen  
**Dynamic Failure of Spectra 130d & 100d Single Fibers Under Biaxial Shear/Tension**

Yuankai Wang  
Advisor: Professor C.T. Sun  
**Insufficiency of the Stress Intensity Factor in Failure Prediction of Brittle Materials**



URSA MINOR



**G. Porter Bridwell**  
Center Director  
NASA's Marshall Space Flight Center  
(Retired)



**Jeffrey D. Deckelbaum**  
Vice President  
Boeing Defense, Space & Security



**Edward A. Morris**  
Vice President  
National Center for Defense  
Manufacturing (NCDMM)



**George M. Palmer**  
Professor Emeritus  
School of Aeronautics and  
Astronautics, Purdue University



**Jeffrey M. Tyrcha**  
Vice President  
Business Development &  
Marketing, Adacel Systems, Inc.

2013

# Outstanding Aerospace Engineer Awards

The Purdue University designation Outstanding Aerospace Engineer recognizes the professional contributions of graduates from the School of Aeronautics and Astronautics and thanks them for the recognition that their success brings to Purdue and the School.

The School was delighted to honor five graduates of AAE with the designation Outstanding Aerospace Engineer Award on September 13, 2013. Criteria for the Award state that recipients must have demonstrated excellence in industry, academia, governmental service, or other endeavors that reflect the value of an aerospace engineering degree.

## *Congratulations to our 2013 Outstanding Aerospace Engineers*



**OAE 2013 honoree George Palmer receives a standing ovation at the award ceremonies**



Bottom Row (L-R) **Porter Bridwell, Edward Morris, George Palmer, Jeff Tyrcha, Jeffrey Deckelbaum** Top Row (L-R) **Dr. Tom Shih, Michael Corso, John Rich, Jamie Renna, Bud Mitchell, Anthony Thornton, Glenn Weissinger, Tom McKane, Ken Miller, Dr. Robert Strickler, Ted Torgerson, David McGrath, Tom Maxwell, Robert Flemming, Brad Belcher, Stephen Kress, Frank Bauer, Gary Payton**



**Student Masters of Ceremonies Kathryn Johnson and Cory Back**



**Bill and Anastasia Uhrig with George Palmer**



**Professor Emeritus: (L-R) John Drake, Terry Weisshaar, George Palmer and Gus Gustafson**



# PURDUE

UNIVERSITY



16TH ANNUAL

## Outstanding Aerospace Engineer Awards

THE FACULTY OF THE SCHOOL OF AERONAUTICS AND ASTRONAUTICS

**Invites you to attend**

**The Awards Dinner and Ceremony  
to honor the recipients of the  
2014 Outstanding Aerospace Engineer Awards**

**Friday, November 7, 2014**

RECEPTION AT 6:00PM  
DINNER AT 7:00PM

**Four Points By Sheraton**

1600 CUMBERLAND AVENUE  
WEST LAFAYETTE, IN 47906

Adult Meal \$40

Student Meal \$30

Seating is limited. Reservations must be received by October 24, 2014.

If you would like to attend, you can sign up online

**<https://eng.purdue.edu/jump/9f077a>**

Then mail in your check with the total amount  
due or complete and mail the form opposite.



RECIPIENTS OF THE

## 2014 Outstanding Aerospace Engineer Awards

C. Douglas Ebersole BSAAE'82

Amy S. Hess BSAAE'89

Rakesh K. Kapania Ph.D.'85

Paul E. Petty BSAE'53

Tamaira E. Ross BSAAE'96; MSAAE'98

John D. Schmisser BSAAE'97

Jeffery A. Schroeder BSAAE'84; MSAAE'90

Panagiotis Tsiotras Ph.D.'93

J. William Uhrig Jr. BSAAE'82

16TH ANNUAL

## Outstanding Aerospace Engineer Awards Friday November 7, 2014

If you plan to attend,  
please complete and  
mail this form along with  
a check for the total  
amount due to:

**Purdue University**  
Attn: OAE  
School of Aeronautics  
and Astronautics  
701 W. Stadium Avenue  
West Lafayette, IN  
47907-2045

Make checks payable to:  
**Purdue Foundation**

Sorry no phone  
reservations accepted.  
Email Rita Baines  
rlbaines@prf.org

Seating is limited.

Reservations must  
be made by  
October 24, 2014.

\_\_\_\_ ADULTS @ \$40 each

\_\_\_\_ STUDENTS @ \$30 each

I would like to sponsor \_\_\_\_ students @ \$30 each

Name \_\_\_\_\_

Guest Name \_\_\_\_\_

Degree/Year \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_

E-Mail \_\_\_\_\_

Vegetarian or special meal request – please specify \_\_\_\_\_

### AAE Faculty Roster

#### Aerodynamics

- A. Alexeenko**  
Associate Professor; Ph.D., Penn State, 2003
- S. Bane**  
Assistant Professor; Ph.D., California Institute of Technology, 2010
- G. A. Blaisdell**  
Professor; Ph.D., Stanford, 1991
- S. H. Collicott**  
Professor; Ph.D., Stanford, 1991
- S. P. Schneider**  
Professor; Ph.D., California Institute of Technology, 1989
- T. Shih**  
Professor and AAE Head; Ph.D., Michigan, 1981
- J. P. Sullivan**  
Professor; Sc.D., Massachusetts Institute of Technology, 1973
- M. H. Williams**  
Professor and Associate Head; Ph.D., Princeton, 1975
- D. Wolf**  
Visiting Professor; Ph.D., Purdue, 2014

#### Aerospace Systems

- D. Andrisani**  
Associate Professor; Ph.D., SUNY at Buffalo, 1979
- W. A. Crossley**  
Professor; Ph.D., Arizona State, 1995
- D. DeLaurentis**  
Associate Professor; Ph.D., Georgia Institute of Technology, 1998
- M. Grant**  
Assistant Professor; Ph.D., Georgia Institute of Technology, 2012
- I. Hwang**  
Associate Professor; Ph.D., Stanford, 2004
- K. Marais**  
Assistant Professor; Ph.D., Massachusetts Institute of Technology, 2005
- J. P. Sullivan**  
Professor; Sc.D., Massachusetts Institute of Technology, 1973
- D. Sun**  
Assistant Professor; Ph.D., UC Berkeley, 2008

#### Astrodynamics and Space Applications

- J. L. Garrison**  
Associate Professor; Ph.D., University of Colorado at Boulder, 1997
- M. Grant**  
Assistant Professor; Ph.D., Georgia Institute of Technology, 2012
- K. C. Howell**  
Hsu Lo Professor of Aeronautical and Astronautical Engineering; Ph.D., Stanford, 1983
- J. M. Longuski**  
Professor, Ph.D., Michigan, 1979

#### Dynamics and Control

- D. Andrisani**  
Associate Professor; Ph.D., SUNY at Buffalo, 1979

- M. J. Corless**  
Professor; Ph.D., UC Berkeley, 1984
- D. DeLaurentis**  
Associate Professor; Ph.D., Georgia Institute of Technology, 1998
- A. E. Frazho**  
Professor; Ph.D., Michigan, 1977, Control Systems
- M. Grant**  
Assistant Professor; Ph.D., Georgia Institute of Technology, 2012
- I. Hwang**  
Associate Professor; Ph.D., Stanford, 2004
- D. Sun**  
Assistant Professor; Ph.D., UC Berkeley, 2008

#### Propulsion

- W. Anderson**  
Professor; Ph.D., Pennsylvania State, 1996
- S. D. Heister**  
Raisbeck Engineering Distinguished Professor for Engineering and Technology Integration; Ph.D., UCLA, 1988
- T. Pourpoint**  
Associate Professor; Ph.D., Purdue, 2005
- L. Qiao**  
Associate Professor; Ph.D., Michigan, 2007
- H. Wang**  
Assistant Professor; Ph.D., Cornell University, 2010

#### Structures & Materials

- W. Chen**  
Professor; Ph.D., California Institute of Technology, 1995
- W. A. Crossley**  
Professor; Ph.D., Arizona State, 1995
- J. F. Doyle**  
Professor; Ph.D., UIUC, 1977
- A. F. Grandt**  
Former Raisbeck Engineering Distinguished Professor for Engineering and Technology Integration; Ph.D., UIUC, 1971
- R. B. Pipes**  
John L. Bray Distinguished Professor of Engineering; Ph.D., University of Texas, 1972
- M. Sangid**  
Assistant Professor; Ph.D., UIUC, 2010
- C.T. Sun**  
Neil A. Armstrong Distinguished Professor; Ph.D., Northwestern, 1967
- V. Tomar**  
Associate Professor; Ph.D., Georgia Institute of Technology, 2005
- W. Yu**  
Associate Professor; Ph.D., Georgia Tech, 2002

### Faculty Emeritus

- J. Drake** - Professor Emeritus
- W. Gustafson** - Professor Emeritus
- C. Kentzer** - Professor Emeritus
- M. C. Jischke** - President Emeritus
- F. Marshall** - Professor Emeritus
- C. Merkle** - Professor Emeritus, Reilly Professor of Engineering
- G. Palmer** - Professor Emeritus
- T. A. Weisshaar** - Professor Emeritus

### Adjunct Professor

#### Aerodynamics

- A. S. Lyrantzis**  
Adjunct Professor; Ph.D., Cornell, 1988

#### Astrodynamics and Space Applications

- D. Filmer**  
Adjunct Professor; Ph.D., Wisconsin, 1961
- B. Marchand**  
Adjunct Associate Professor; Ph.D., Purdue, 2007

#### Dynamics and Control

- D. Filmer**  
Adjunct Professor; Ph.D., Wisconsin, 1961

#### Propulsion

- J. J. Rusek**  
Adjunct Assistant Professor; Ph.D., Case Western Reserve, 1983
- K. Yerkes**  
Adjunct Professor; Ph.D., University of Dayton, 1994

### Faculty by Courtesy

#### Aerospace Systems

- B. S. Caldwell** (By Courtesy)  
Professor of Industrial Engineering; Ph.D., UC Davis, 1990
- S. Landry**  
Associate Professor; Ph.D., Georgia Tech, 2004

#### Astrodynamics and Space Applications

- H. J. Melosh** (By Courtesy)  
Distinguished Professor EAS/Physics; Ph.D., California Institute of Technology, 1972
- D. Minton** (By Courtesy), Assistant Professor; Ph.D., University of Arizona, 2009

#### Propulsion

- T. Fisher**  
James G. Dwyer Professor of Mechanical Engineering; Ph.D., Cornell, 1998
- J. P. Gore** (By Courtesy)  
Vincent P. Reilly Professor of Mechanical Engineering; Ph.D., Pennsylvania State, 1986
- N. Key** (By Courtesy)  
Assistant Professor of Mechanical Engineering; Ph.D., Purdue, 2007
- R. Lucht** (By Courtesy)  
Ralph and Bettye Bailey Professor of Combustion in Mechanical Engineering; Ph.D., Purdue, 1981
- S. Son** (By Courtesy)  
Associate Professor of Mechanical Engineering; Ph.D., UIUC, 1993

#### Structures & Materials

- P. Imbrie** (By Courtesy)  
Associate Professor; Ph.D., Texas A & M, 2000

## AAE 450 Moon Colony Proposal:

# Project Artemis

Purdue students in **Prof. James Longuski's** AAE 450 class presented their Senior Design *Moon Colony Proposal – Project Artemis* to NASA Associate Administrator Bill Gerstenmaier, and other top NASA managers.

The report and presentation is the culmination of an intensive spacecraft design course, AAE 450, undertaken by seniors during a single semester. The students perform a feasibility study for a specific mission goal, subject to certain constraints.

The goal of **Project Artemis** is to minimize the cost of establishing three human colonies on the Moon that, in a safe and timely manner, will ultimately enable a one-way-to-Mars mission. The colonies will be located at the Shackleton crater, the far side of the Moon, and at an entrance to a lunar lava tube. The colonists will live on the Moon for  $4 \frac{2}{7}$  years, which is equal to the two-synodic

period of the cyclor vehicle that will be used during the one-way-to-Mars mission. The first colony on Mars will consist of eight people who will not see another human until the second colony arrives, bringing the Mars colony up to 16 people. Colony cohesiveness and stability should improve as the size of the colony increases. The team was particularly interested in observing crew health (both mental and physical) while they live on the moon because little is known about how human physiology will fare on extended space missions.

Following the presentation to the NASA administrators, Prof. James Longuski received very positive feedback from Bill Gerstenmaier and Purdue President Mitch Daniels.

The team members comprised: Andrew Cox, Parth Shah, Andrew James, Nick LaPiana, Cameron Horton, Ian Bennett, Eric Menke, Alana Tice, Spenser

Guerin, Matt McDougall, Sadie Holbert, Ryan Allen, Ben Fishman, Alexis Turner, Taylor Schultz, Seung Soo Lee, Jessica Callinan, Hani Kim, Krista Garrett, Alex Van Anderlecht, Jose Miguel Blanco Iglesias, Michael Creech, Thomas Rich, Andrew Powis, Michael Bilyeu, Vince Purdy, Walter Schostak, Trevor Satornino, Divinaa Burder, Joe Avellano, Bryan Foster, Finu Lukose, Sean Snoke, Eric Flores, Andrew Emans, Erik Slettehaug, Arika Armstrong, Saagar Unadkat, Scott Sylvester.

The team gratefully acknowledges the following for help and assistance: Prof. James Longuski, Mr. Frank Laipert, Prof. David Filmer, Prof. Stephen Heister, Prof. Kathleen Howell, Mr. Dayton L. Jones, Prof. Karen Marais, Prof. David Minton, Mr. Sarag Saika, Mr. John Steinmeyer, Prof. Boris Yendler, Mr. Jeffrey Stuart, Mr. James Waldie, Multi-Body Dynamics Research Group.



## PURDUE FACULTY AWARDS 2013-2014

### The Elmer F. Bruhn Teaching Award 2014



Congratulations to **Professor Karen Marais** who has been selected to receive our school's prestigious Elmer F. Bruhn Award for 2014. By receiving

this award, Professor Marais will be our school's nominee for our college's 2015 Potter Teaching Award.

The Bruhn teaching award is presented annually to an Outstanding Teacher in the Purdue University School of Aeronautics and Astronautics. The selection is through a vote by AAE's sophomores, juniors, and seniors for excellence in teaching and made possible by the interest and generosity of friends and alumni of the school. The top five candidates for the Bruhn Award were: **Prof. Karen Marais, Prof. Greg Blaisdell, Prof. Kathleen Howell, Prof. Mike Sangid, Prof. Mike Grant**

Congratulations to all for this recognition of their dedication to teaching and their efforts to provide the best possible education for our students.

### The C.T. Sun School of Aeronautics and Astronautics Excellence in Research Award 2013



Congratulations to **Professor Alina Alexeenko** who is the recipient of the 2013 C.T. Sun School of Aeronautics and Astronautics Excellence in Research Award.

Presented annually, this prestigious award is conferred to an individual or a team of faculty members in the Purdue University School of Aeronautics & Astronautics to recognize high quality contributions in science and engineering.

### W.A. Gustafson Award for Outstanding Teaching



Congratulations to **Professor Michael Grant** who is the winner of the prestigious 2013 W.A. Gustafson Award for Outstanding Teaching.

The following five faculty members were also nominated and received the next five highest votes: **Professors Mike Sangid, Alina**

### Alexeenko, Karen Marais, Sally Bane, and Jim Longuski.

The recipient of this award is selected by the juniors and seniors of the AAE student body. It is made possible by the interest and generosity of friends and alumni of the school.

### 2014 Outstanding Undergraduate Murphy Teaching Award



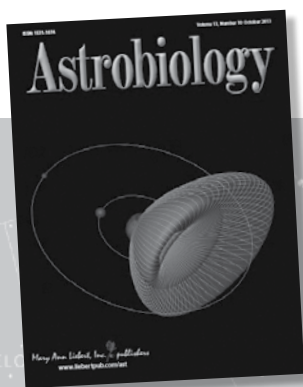
**Professor Kathleen Howell**, the Hsu Lo Distinguished Professor of Aeronautical and Astronautical Engineering, was named a recipient of the 2014 Outstanding Undergraduate Teaching Award in Memory of Charles B. Murphy.

Charles B. Murphy was a history professor at Purdue from 1927 to 1970 and Howell is one of five out of Purdue's approx. 1,800 professors to receive this prestigious award. This award is Purdue's highest honor to recognize exceptional teaching at the undergraduate level by a faculty member. Professor Howell was informed of this honor on Monday, March 24 via a surprise visit from the provost's office while she was teaching AAE 440.

Prof. Howell has been a member of the faculty at Purdue since 1982. She received her B.S. in Aerospace Engineering from Iowa State University in 1973. Her M.S. (1977) and Ph.D. (1983) degrees in Aeronautical and Astronautical Sciences are from the Department of Aeronautics and Astronautics in the School of Engineering at Stanford University.

She maintains an active research program that includes spacecraft trajectory design and optimization to support active and planned missions within the Earth-Moon region as well as interplanetary science and exploration scenarios. Her investigations also include maneuver strategies for transfers and on-orbit operations.

Prof. Howell teaches both undergraduate and graduate courses at Purdue and has been recognized with numerous national and local awards for excellence as an engineering educator.



## Astrobiology Front Cover

### Paper written by Purdue Professors and Grad Students Makes Front Cover

A paper authored by **Prof. Kathleen Howell, Prof. Jay Melosh, graduate students Loic Chappaz, and Mar Vaquero** was highlighted on the cover of

the October, 2013 issue of *Astrobiology*.

The paper Chappaz et al. (p 963) analyzes the possibility that samples from Phobos and Deimos may contain material ejected from the surface of Mars by large impacts.

The cover image illustrates computed trajectories of ejecta from an impact on Mars that could transport material from the surface of Mars to its moons. The impact occurred at (0°, 0°), and the trajectories shown in red and blue represent two sample curtains of ejecta for particles launched at 3.8 and 4.2 km/s, respectively. The inner and outer gold circles represent Phobos' and Deimos' orbit, respectively.

The sizes of the two spheres that represent the moons are exaggerated a hundred times.

Image credit: L. Chappaz.



# Excellence in Research Awards 2013

Nearly 200 Purdue faculty and staff attended an award dinner on November 18, 2013 to celebrate the accomplishments and contributions of Purdue's research community.

Among the honorees were faculty members who had received college or school awards for outstanding research in 2013, along with *Seed for Success* honorees — principal investigators and co-investigators garnering awards of \$1 million or more per grant.

The Seed for Success award was established in 2003 and each recipient receives a bronze acorn in which their name is engraved. Among the 163 principal investigators and co-investigators working on one of the 60 Seed for Success projects, 46 investigators earned their bronze acorn award in recognition of their contribution in acquiring a \$1 million dollar or more award for the first time.

Three Seeds for Success awards went to faculty members and faculty by courtesy who were principal investigators or co-investigators from the School of Aeronautics and Astronautics.

Congratulations to:

**Prof. Wayne Chen** - U.S. Army Research Office, Multiscale Experiments and Computational Modelling of Transparent Ceramic and Glass Armors.

**Prof. Bill Crossley, Prof. Karen Marais, Chien-Tsung Lu** and **Mary Johnson**, Federal Aviation Administration, Partnership to Enhance General Aviation Safety, Accessibility, and Sustainability (PEGASAS)

**Prof. Barrett Caldwell** (by courtesy) - NASA, Indiana Space Grant Consortium Five Year Renewal Proposal for Activity Years 20-24.

Prof. Caldwell was selected as Member of **NASA's New Field Investigation to Enable Solar System Science and Exploration Team**. It is one of nine research teams in a new institute that will bring researchers together in a collaborative virtual setting to focus on questions concerning space science and human space exploration.

The teams participating in the Solar System Exploration Research Virtual Institute (SSERVI) will address scientific questions about the moon, near-Earth asteroids and the Martian moons Phobos and Deimos, in cooperation with international partners.

**University Research Awards July 2012 – June 2013**

**Prof. Robert Lucht** (by courtesy) was honored with a Research Award.



**Wayne Chen**



**Bill Crossley**



**Karen Marais**



**Barrett Caldwell**



**Bob Lucht**

## Purdue Researchers Working with the U.S. Missile Defense Agency



**Daniel DeLaurentis and Saurabh Bagchi**  
(Purdue University photo/Mark Simons)

Purdue University researchers are peering into the future to help the United States foil enemy missile attacks.

**Professor Daniel DeLaurentis** is working with the U.S. Missile Defense Agency to create software that makes it possible to pose various "what-if" questions; scenarios that explore plausible future missile advances in adversarial nations and the defensive capability of the United States. The research focuses on how to defend against attacks called "raids" in which many missiles would be launched against the United States.

DeLaurentis is leading the project with **Saurabh Bagchi**, a professor in Purdue's School of Electrical and Computer Engineering, and **Stephen D. Heister**, Purdue's Raisbeck Engineering Distinguished Professor for Engineering and Technology Integration, **Joseph Pekny**, a professor of chemical engineering, two research scientists and about a dozen doctoral students.

The project began in 2010 and is funded with a four-year, \$4.8 million grant from the MDA, which is part of the U.S. Department of Defense. The project is inherently interdisciplinary because it requires expertise in aerospace and computer engineering.



### Dr. Timothée Pourpoint Promotion

Dr. Timothée Pourpoint was awarded tenure and promoted to Associate Professor. He received his Ph.D. from Purdue University in 2005. Dr. Pourpoint's research interests are aerospace propulsion systems, rocket engine combustors, liquid propellant injection systems, hypergolic propellants, and high pressure and hydrogen storage systems.

## Dr. Paul S. Lykoudis 1926-2013



Dr. Paul S. Lykoudis, professor emeritus of Purdue University, passed away on October 13, 2013. Born in 1926, he received his Bachelor's degree in 1950 in Mechanical and Electrical Engineering from the National Technical University of Athens, Greece.

He came to Purdue on a Fulbright Scholarship and received his Master's degree in Mechanical Engineering in 1954 and his Doctorate in 1956. Dr. Lykoudis had specialized in the areas of heat transfer, thermodynamics, and fluid flow.

He started his academic career in January 1956 as an assistant professor of aeronautical engineering where he was assigned to teach aerodynamics courses. He also offered one of the first graduate courses in magneto-hydro-dynamics at any university. His research in this new and exciting field was widely recognized at the time, as indicated by his presence at national and international meetings. In 1957, Dr. Lykoudis developed a new course in astrophysics which was taught jointly with Dr. Hsu Lo.

Dr. Lykoudis became an associate professor in September 1958 and professor in September 1960. By 1963, in the Aerospace Sciences Laboratory, experimental research was under way on magneto-fluid-mechanics using liquid mercury as a working fluid. This project was developed by Dr. Lykoudis and his graduate students with support of the National Science Foundation. This research produced a number of Ph.D. dissertations during the following years.

He was named Associate Head on January 1, 1972. He was the Director of the Aerospace Sciences Laboratory from 1968 to 1973 and an associate fellow of the American Institute of Aeronautics and Astronautics.

He was named head of the School of Nuclear Engineering in 1973 and retired in 1992. During his retirement years he completed a full translation of Homer's *Odyssey* into Modern Greek in a way which showed the close connection between the ancient and the modern languages. The first rhapsody "Rhapsody A – Athena advises Telemachus" was published in October 1999 by the Hestia Publishing Company of Athens and was acclaimed by critics.

## Apollo 11 astronaut Dr. Buzz Aldrin on Purdue campus

Dr. Buzz Aldrin was on the Purdue campus on October 16, 2013 to meet with AAE Professor James M. Longuski and his grad students. He has referenced their work in his new book - "Mission to Mars: My Vision for Space Exploration."

During his time on campus, Aldrin gave a public presentation "An Evening with Buzz Aldrin," in which he discussed his unified space vision. Dr. Aldrin also gave insights into the 1969 Apollo 11 Moon landing and followed his talk with a book signing.

Aldrin has long been an advocate for future space exploration and in his latest book he says that he believes that humans could arrive and settle on Mars between the time-period 2035-2040.

Contained within his new book, on page 35 Dr. Aldrin references work done over the years by Professor James M. Longuski and his students. Also, on page 195, Buzz Aldrin writes "I have long admired and worked with James Longuski, professor of aeronautics and astronautics at Purdue University. Along



Top front row (L-R) Dr. Tom Shih, Dr. Buzz Aldrin and Prof. Jim Longuski  
Back Row (L-R) Blake Rogers, Peter Edelman, Sarag Saika, Kaela Martin, Kyle Hughes, Frank Laipert

*with his colleagues, we have forged ways to launch a substantial large vehicle that would provide radiation shielding and spacious quarters in order to guarantee the safety and comfort of outbound-to-Mars and inbound-to-Earth astronaut crews."*



Buzz greets fellow Apollo 11 astronaut Neil Armstrong on his arrival at Armstrong Hall

Aldrin has referenced work of AAE alumni Dr. Damon F. Landau who is now with NASA's Jet Propulsion Laboratory. Dr. Landau's slides have also been used at conferences and venues on his book signing tour. During his tour of conferences and book signings, Aldrin also discussed figures and movies developed by AAE doctoral student Blake Rogers.

## FACULTY RESEARCH

### Project aims to mass-produce 'nanopetals' for sensors, batteries

AAE Professor Alina Alexeenko is part of a research team from Purdue who are developing a method to mass-produce a new type of nanomaterial for advanced sensors and batteries. The underlying technology was developed by a research group led by **Prof. Timothy Fisher**, (AAE by Courtesy) the James G. Dwyer Professor in Mechanical Engineering. It consists of vertical nanostructures resembling tiny rose petals made of a material called graphene, which is a single-atom-thick film of carbon. Research findings indicate the material shows promise as a sensor for detecting glucose in the saliva or tears and for "supercapacitors" that could make possible fast-charging, high-performance batteries.

These color-enhanced scanning electron microscope images show nanosheets resembling tiny rose petals. The nanosheets are key components of a new type of biosensor that can detect minute concentrations of glucose in saliva, tears and urine. The technology might eventually help to eliminate or reduce the frequency of using pinpricks for diabetes testing.

The research is funded with a \$1.5 million grant from the National Science Foundation. It focuses on creating a nanomanufacturing method that is "scalable," or capable of mass production at low cost.

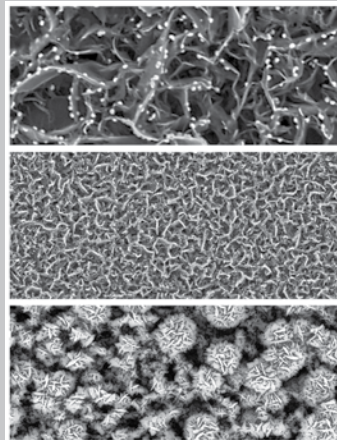
### Science is harnessing shock waves to create new materials

A team of researchers at Purdue is part of a national effort to develop new materials having super strength and other properties by using shock waves similar to those generated by meteorites striking the Earth.

The team will perform experiments using equipment in the university's Maurice J. Zucrow Laboratories and the Robert L. and Terry L. Bowen Laboratory for Large-Scale Civil Engineering Research. The Purdue team is led by **Prof. Steven Son** (AAE by Courtesy), a professor of mechanical engineering, and **Prof. Wayne Chen**, a professor of aeronautics and astronautics and materials engineering and associate head for Graduate Education.

A meteorite impacting the Earth generates high pressures and temperatures. The researchers are striving to replicate these conditions to create materials able to withstand extreme temperatures and possessing superior strength and unique electromagnetic properties.

The research is funded by the National Nuclear Security Administration (NNSA) through a new center led by the University of Notre Dame and also includes collaborators from Indiana University. The Center for Shock Wave-processing of Advanced Reactive Materials (C-SWARM) is funded with \$1.6 million annually for five years.



(Purdue University photo/Jeff Goecker)



Alina Alexeenko



Timothy Fisher



Wayne Chen



Steven Son

## AAE DISTANCE GRADUATE EDUCATION

### Distance Education Faculty Award 2014

#### Professor James Longuski



Congratulations to Prof. Jim Longuski who has been named as the winner for the 2014 award recognizing his excellence as a distance instructor. Each year Engineering

Professional Education recognizes the outstanding contributions of faculty to the distance education program through Purdue's annual Distance Teaching Award. The winner of the award is determined by distance students who nominate faculty and support those nominations through comments and evaluations.

The School of Aeronautics and Astronautics offers online master's - level engineering courses designed for working professional engineers providing an opportunity to earn non-thesis online MSAE degrees via distance learning.

The distance courses from Purdue's School of Aeronautics and Astronautics are administered by engineering Professional Education.

One of the more unique features specific to Purdue is that distance students take the same courses as on-campus students. The non-thesis degree for distance students is the same degree as for on-campus students.

More details of available classes can be found at the EPE web site. <https://engineering.purdue.edu/AAE/Academics/Grad/DistanceGradEd>.

The Engineering Professional Education website can be found here: <https://engineering.purdue.edu/ProE>

## Dennis Tito Visits Purdue Inspiration Mars Mission

In February 2013, Dennis Tito created the *Inspiration Mars Foundation* and announced his intention to privately finance a mission to send a two-person American crew – a man and a woman – to fly by Mars, with a target launch date in 2018. The Inspiration Mars mission was inspired by a rare 501-day free-return opportunity that was discovered in 1998 by **Professor James Longuski** and his then student **Moonish Patel**. Tito holds a Bachelor of Science in Astronautics and Aeronautics from New York University, 1962 and a Master of Science in Engineering Science from Rensselaer Polytechnic Institute. He was a former scientist at NASA's Jet Propulsion Laboratory, where he helped to plan and monitor the Mariner 4 and 9 missions to Mars.

In 2001, Tito spent nearly eight days in orbit as a crew member of the International Space Station on a visiting mission to the ISS, and he is widely known as the first privately funded space tourist.

On July 31, 2014 Tito and two colleagues, John Carrico (of Applied Defense Solutions, Inc.,) and Michel Loucks (of Space Exploration Engineering Co.) began a collaborative design effort for the Inspiration Mars mission with Longuski's research group and he came to visit Purdue on August 2, 2013. Prof. Longuski and two of his doctoral students, **Kyle Hughes** and **Peter Edelman**, have been working on studying the uniqueness of the Inspiration Mars 2018 opportunity as well as potential backup trajectories to give the mission a second chance if the 2018 launch date is missed. A portion of this work by Kyle Hughes focused on searching for opportunities that fly by Venus on the way to Mars, and then return to Earth (i.e. an Earth-Mars free-return trajectory with an intermediate Venus flyby). By using the Venus flyby on the way to Mars, the group was working with an entirely different set of trajectories, and their hope was that they could find one (with properties similar to the Inspiration Mars trajectory) soon after the 2018 opportunity. After an extensive search, the group found a few suitable trajectories with launch dates in 2021 that could be used as backups for Inspiration Mars.

Michel Loucks contacted Prof. Longuski in Feb. 2014 with the news that one of the trajectories that Longuski's



*This image came from a reproduction of the team's trajectory in STK and was provided by Mike Loucks. The House Science Committee discussed this trajectory on February 27th 2014.*

research group found (as part of their work with Dennis Tito) led to the development of a new mission to fly by Venus and Mars and was recently proposed in a U.S. House of Representatives Science Committee hearing (officially called the Committee on Science, Space, and Technology) on February 27, 2014. This mission would be a government funded mission as opposed to the privately funded Inspiration Mars mission, and would be launched in November of 2021 with a 580 day total flight time to Mars and back.



*(L-R) John Carrico (Applied Defense Solutions, Inc.), Michel Loucks (Space Exploration Engineering Co.), Kyle Hughes (Prof. Longuski's Ph.D. student), Dennis Tito (Wilshire Associates Inc.), Peter Edelman (Prof. Longuski's Ph.D. student), Professor James Longuski.*



## IMPACT - Instruction Matters: Purdue Academic Course Transformation

AAE faculty **Dr. Alina Alexeenko** and **Dr. Wenbin Yu** were selected as IMPACT Faculty Fellows to participate in the Spring 2014 cohort of IMPACT.

Instruction Matters: Purdue Academic Course Transformation also known as IMPACT is a program that works to redesign key foundational courses to create more interaction between the instructors and the students. The mission is to improve student competency and confidence through redesign of courses by using research findings on sound student-centered teaching and learning.

IMPACT targets classes that serve as key introductory courses, especially those with high enrollments. IMPACT fellows are provided with a fellowship and learn about course redesign options by working with a team of instructional, technology, and assessment specialists.

The program, which also is partnering with the Discovery Learning Research Center, targets ten courses each semester and will be of value to faculty, students, the Purdue campus and to academic units.

Dr. Alexeenko redesigned AAE 333 Fluid Mechanics and Dr. Yu redesigned AAE 204 Aerospace Structures and Materials.



**Alina Alexeenko**



**Wenbin Yu**

## The Book of Great Teachers 2013-2014

**Professor Bill Crossley** and **Professor Stephen Heister**, Raisbeck Engineering Distinguished Professor for Engineering and Technology Integration and Director, Maurice J. Zucrow Laboratories, were selected by their peers to be inducted into The Great Book of Teachers.

The Book of Great Teachers is a permanent display in the west foyer of the Purdue Memorial Union. It was dedicated on April 23, 1999.

The book bears the names of 316 faculty members, past and present, who have devoted their lives to excellence in teaching and scholarship. They were chosen by their students and their peers as Purdue's finest educators. The induction process takes place once every five years.

Past AAE faculty who have received this honor include:

- Professor Elmer F. Bruhn
- Professor Steven H. Collicott
- Professor Emeritus W.A. Gustafson
- Professor Kathleen C. Howell
- Professor Severino L. Koh
- Professor James M. Longuski
- Professor Paul S. Lykoudis
- Professor C.T. Sun
- Professor Henry T. Yang



**Bill Crossley**



**Stephen Heister**

## Faculty Investigator Awards 2013-2014

The School of Aeronautics and Astronautics is pleased to congratulate four faculty members who have been awarded a significant New Investigator or Young Professional Development Awards during the 2013 - 2014 academic year.

**Associate Professor Karen Marais** was awarded a National Science Foundation CAREER Award.



**Karen Marais**

**Assistant Professor Michael D. Sangid** was awarded the Young Professional Development Award from The Minerals, Metals & Materials Society (TMS), Structural Materials Division (SMD), and the Young Investigator Program Award from the Office of Naval Research.



**Michael Sangid**

The International Journal of Fatigue has featured a paper by **Professor Michael Sangid**. The paper, entitled "*The physics of fatigue crack initiation*," was Number 1 in the Most Downloaded Articles on the site over the late summer to early fall 2013 period. In this paper, Professor Sangid discusses the critical role of the material's microstructure in determining fatigue crack initiation, providing an updated review of the field along with discussion on the current and future direction of research in this area. This paper appears in a special issue of the journal, "Fatigue and Microstructure: A special issue on recent advances."

**Assistant Professor Haifeng Wang** was awarded the Doctoral New Investigator Award from the American Chemical Society Petroleum Research Fund.



**Haifeng Wang**

**Professor Nicole Key** (by courtesy) receives the Dilip R. Ballal Early Career Award from the ASME International Gas Turbine Institute.



**Nicole Key**

*These awards are the nation's most competitive and prestigious honor for a young faculty member.*

## Professional Recognition of Faculty Members

Congratulations to three faculty members who have received recognition by Professional Organizations



**Prof. Alina Alexeenko**

American Institute of Aeronautics and Astronautics (AIAA) Associate Fellow



**Prof. Robert Lucht**

(By Courtesy) American Institute of Aeronautics and Astronautics (AIAA) Fellow



**Prof. Wenbin Yu**

American Society of Mechanical Engineers (ASME) Fellow



## NASA Deputy Assoc. Administrator, Mr. Dan Dumbacher joins the School of Aeronautics and Astronautics

The School of Aeronautics and Astronautics welcomes Mr. Dan Dumbacher, Deputy Associate Administrator of NASA's Human Exploration and Operations Mission Directorate on August 1, 2014 as a Professor of Practice.

Mr. Dumbacher will teach courses in systems and systems of systems. He will also work with Professors Bill Crossley and Abhijit Deshmukh, and other leaders in our College of Engineering in the systems area to develop the Purdue Systems Initiative.

Mr. Dumbacher comes to Purdue from the Exploration Systems Development Division, for the Human Exploration and Operations Mission Directorate at NASA Headquarters where he was Deputy Associate Administrator. In that capacity, he provided leadership and management for the directorate with a special focus as the Program Director for Exploration Systems Development encompassing Space Launch System, Orion, and Ground Systems Development and Operations (GSDO) development and integration efforts. He led a team of over 5000 people across all NASA Centers and Industry.

Mr. Dumbacher joined NASA in 1979. During his career, he has received numerous awards and honors. In 2007, he was awarded the Presidential Rank Award for Meritorious Executives — the highest honor for career federal employees. In 2003, he received the Outstanding Mechanical Engineer award from Purdue University. He received the NASA Exceptional Achievement Medal in 2002 for exceptional accomplishments related to NASA's Space Launch Initiative Program, and in 1997 for his work on the DC-XA Project. In 1996, he was honored with a Marshall Director's Commendation for accomplishing two flight tests within 26 hours in the DC-XA Project flight test series.

Mr. Dumbacher earned a bachelor's degree in mechanical engineering from Purdue University in 1981 and a master's in business administration from the University of Alabama in Huntsville in 1984. He has completed the Senior Managers in Government study program at Harvard University. Mr. Dumbacher has authored several papers on liquid propulsion technologies, space transportation systems development, and systems engineering.

We look forward to Mr. Dumbacher's vast experience and expertise in enhancing the education of our students in the systems area, and to welcome him to our school.

## Morpheus Hot Fire Test

Purdue students successfully tested a 4000 lb thrust rocket combustor on May 13 at the High Pressure Lab.

The combustor is a test unit built to demonstrate technologies for a lunar lander, and was developed according to NASA requirements by AAE students during the Propulsion Design, Build, Test class taught by **Professor Bill Anderson**. The combustor uses liquid oxygen and liquid methane propellants, and must be throttled over a 4:1 thrust range.

Mike Bedard, a Ph.D. student in AAE, led the testing and the buildup of a methane liquefaction system. Mike was assisted by AAE students: Alix Crandell, Jacob Ediger, Daniel Goldberg, Logan Kamperschroer, Daniel Kerstiens, Austin Link, Jenna Schreiner.

Video footage from the test attempt in the link:

<https://www.youtube.com/watch?v=m2xytZDvMDM>



## NASA Reduced Gravity Student Flight Opportunities Program

### Prof. Steven Collicott's AAE418

"Zero-Gravity Flight Experiments" class submitted an original research proposal to NASA in October, 2013. It was announced on December 18, 2013 that they were selected by NASA's Reduced Gravity Education Flight Program as one of the best proposals submitted this year.

NASA flew the student-built experiment and five of the students in weightlessness, or zero-gravity, on board a research aircraft in June, 2014. The student team, led by AAE senior Peter Geldermans, built their experiment during the spring 2014 semester.

The team's proposal is "*Flow Boiling Bubble Detachment Behavior on Enhanced Heat Transfer Surface Geometries in Microgravity.*" Their experiment investigates the impact of some of the textured surfaces developed recently for enhancing boiling heat transfer on Earth, but in short-duration low-gravity. Boiling and condensation are necessary for creating phase-change heat transfer loops and are poorly understood, and hence, rarely used yet, in spaceflight. The students' data from this rapid experiment program is expected to uncover new phenomena which will then stimulate the detailed experiments necessary to turn the textured surface boiling enhancement technology into useful spaceflight thermal control systems.

The team of AAE undergraduate students comprises of:

**Daniel Bravo**  
**Jessica Callinan**  
**Ronak Dave**  
**Peter Geldermans** - Team Leader  
**Carter Grove**  
**Jonathan Hughes**  
**Eric Jones**  
**Margaret Kleindl**  
**Nathan Koerschner**  
**Timothy Machin**  
**Brent Mathis**  
**Nicholas McGregor**

The School of Aeronautics and Astronautics has been involved in the NASA Reduced Gravity Student Flight Opportunity program since fall 1996. Prof. Collicott specializes in research and engineering on low gravity fluids topics and he advised the first few teams of students. Collicott then created an upper-level undergraduate course for students to design zero-gravity flight experiments specifically for the NASA program which then became part of the curriculum. In all, it is a team-based, hands-on multidisciplinary experience.

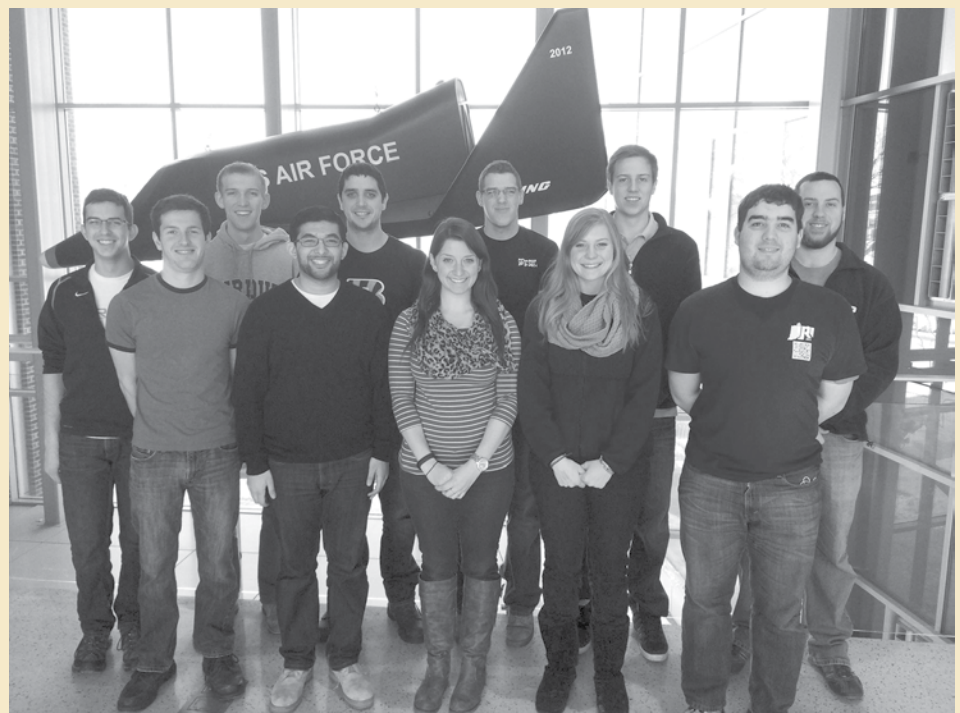
The selection process is very competitive and teams of undergraduate students from all over the country send in proposals for experiments to be performed in a reduced-gravity environment.

The team that flew in June 2014 was AAE's seventeenth year in a row with at least one student team winning a flight spot with NASA for their original zero-gravity science or spaceflight technology experiment.

*"I am pleased to have this team of very capable young engineers and researchers carry on the type of team-based, open-ended real-world engineering education efforts which the previous students have benefited richly from."*



Periods of weightlessness lasting about 25 seconds during downward "parabola" give students scant time to ready their experiments for the next parabola. The plane varies the steepness of its maneuvers, and this varying steepness produces different degrees of weightless. Most of the maneuvers reproduce the weightlessness experienced by space shuttle astronauts flying in orbit around Earth, but a few of the maneuvers reproduce the gravity on Mars and the moon.



Back Row (L-R) **Nathan Koerschner**, **Peter Geldermans**, **Carter Grove**, **Tim Machin**, **Nicholas McGregor**, **Brent Mathis** Front Row (L-R) **Jonathan Hughes**, **Ronak Dave**, **Jessica Callinan**, **Margaret Kleindl**, **Daniel Bravo** Not pictured - Eric Jones

## Professor Emeritus Winthrop (Gus) Gustafson inducted into the Purdue Co-Op Hall of Fame

Professor Emeritus Winthrop A. (Gus) Gustafson was among six people who were inducted into the 2013 Co-Op Hall of Fame on September 27, 2013. Professor Gustafson was Co-Op Coordinator for the School of Aeronautics and Astronautics for 14 years (1984-1998).

Gus came to Purdue fall 1960 after working for the Lockheed Aircraft Corporation's Missiles and Space Division as an associate research scientist in the areas of aerodynamics and high-speed gas dynamics. He received a BSAE in 1950, an MSAE in 1954, and a Ph.D. in 1956, all from the University of Illinois.

In addition to teaching in the aerodynamics area, he also taught the spacecraft section of the senior design course for approx. 10 years. Professor Gustafson served two terms as interim head and was named associate head by Dr. Yang on March 28, 1980. He continued in that role with Professors



*Sally and Gus with Linda Flack*

Grandt and Sullivan through 1995.

He played a key administrative role within the School and also performed the duties of undergraduate counselor and co-op coordinator. All undergraduate students during this period benefitted directly from the dedicated concern and attention to detail. He also had a major influence on the graduate programs as he was responsible for teaching assistant and graduate student office assignments during much of this period.

Professor Gustafson won the E.F. Bruhn Teaching Award twice in 1980 and 1998, and was presented with the Dean M. Beverly Stone Award by the Omicron Delta Kappa National

Leadership Honor Society in 1997.

He retired from his position as associate head and professor at Purdue University in June 1998 and received the Sagamore of the Wabash Award from Indiana Governor Frank O'Bannon in August 1998.

The Purdue University Book of Great Teachers was dedicated in April 1999 and Professor Gustafson was selected as a former faculty member to be honored.

The W.A. Gustafson Teaching Award was established by the School of Aeronautics and Astronautics in 1997 to honor Professor Gustafson's distinguished career of teaching and service to the school.



*Sally and Gus Gustafson with Prof. Skip Grandt and Prof. Marc Williams*



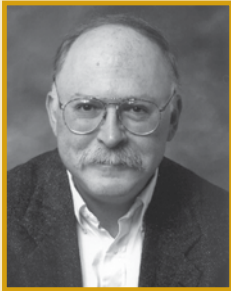
## Purdue Team led by Prof. John Sullivan Breaks Speed Record

AAE Professor John Sullivan led a team of students to break two land-speed records on August 28, 2013 at the Bub Motorcycle Speed Trials at the Bonneville Salt Flats, UT using 150-kilogram (330-pound) electric motorcycle.

The team of 15 students designed and built the electronic 200-pound aerodynamic motorcycle and used a state-of-the-art water-cooled prototype motor. They also used the ASL wind tunnel to test their streamlined design.

*(L-R) Clayton Smith (AAE 2006), Drew Westrick (EE 2014), Professor John Sullivan, Grant Chapman (ME 2014), Sean Kleinschmidt (ME 2013)*

## Professor Marc Williams Retires from the School of Aeronautics and Astronautics



Prof. Marc Williams retired from the School of Aeronautics and Astronautics in June 2014. He received a Bachelor of Science from the University of Pittsburgh, Aeronautical Engineering, Magna Cum Laude, 1969, a

Masters from Princeton University, Aerospace & Mechanical Sciences, in 1971, and his Ph.D. from Princeton in 1974.

He remained on the research staff at Princeton until joining Purdue in the school's aerodynamics group as an assistant professor in 1981. He was promoted to associate professor in 1984 and to professor in 1990.

Following the retirement of Prof. 'Gus' Gustafson, Prof. Williams was promoted to Associate Head on July 1 1998. In this capacity, he continued Prof. Gustafson's earlier responsibilities for undergraduate counseling, co-op coordination, and scheduling. During Prof. Williams's tenure as associate head for undergraduate education, he introduced the *Plan of Study* (POS) which is unique to our school. The POS helps AAE undergraduates plan their BSAAE program and ensures that AAE students cover each of the areas that are required in order to graduate. In addition to his other responsibilities, Prof. Williams was the ABET Coordinator for the College of Engineering 2005-2014. His interests include Aerodynamics and Computational fluid Mechanics. Prof. Williams won the prestigious W.A Gustafson Teaching Award in 2004.

## Professor James Longuski Latest Book



Prof. James Longuski has published his latest book, "*Optimal Control with Aerospace Applications*." The book is co-written with Jose J. Guzman, Orbital Sciences Corp. Chantilly, VA, and John E. Prussing, University of Illinois at Urbana-Champaign, Urbana, IL.

In this book, it is noted that Optimal Control Theory has become such an important field in aerospace engineering that no graduate student or practicing engineer can afford to be without a working knowledge of it. The book does assume that the reader has the usual background of undergraduate engineering, science, or mathematics program with calculus, differential equations, and numerical integration.

The goal of this book is to provide the reader with sufficient knowledge so that he or she may read the literature and also apply the theory to find optimal solutions in practice.

An extensive annotated bibliography lists the references the authors found most useful, with a second bibliography listing numerous papers and reports that demonstrate the vast range of related aerospace applications.

Michael D. Griffin, Ph.D. NASA Administrator 2005-2009 and author (with James R. French) of *Space Vehicle Design*, was quoted in the book as follows: "*Optimal Control with Aerospace Applications* fills a huge void between Derek Lawden's dated but classic 1963 text, *Optimal Trajectories for Space Navigation* and the exhaustive, and exhausting, treatment in *Applied Optimal Control* by Bryson and Ho. Modern in its approach and in its treatment of applications, this thorough but very accessible text is destined to become an instant classic."

Curious Quotations in Appendix D lets the reader know that many great minds and renowned authors have expressed their own concerns, often in humble and humorous ways, about the vast challenges that the calculus of variations and optimal control present.

## New Staff Welcomed

*The School is delighted to welcome new staff members.*

**Jennifer Merzdorf** joined the school on July 7, and as Communications Administrator, Jennifer's duties include the editorship of the *AeroGram* newsletter and other communication publications for the School.

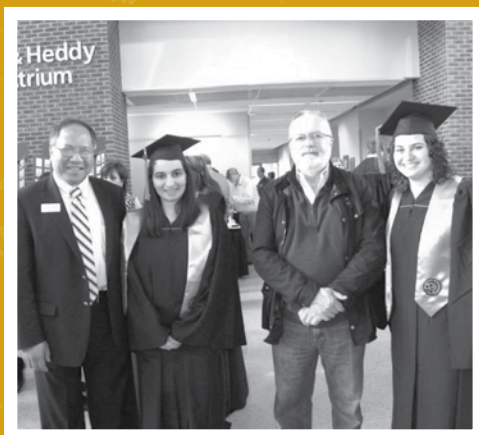
**Anna Bowers** – Secretary IV also started with the school on July 7 and will be at the front desk. Anna will be the first point of contact for visitors to the school and as always, we look forward to alumni coming back to visit.

*We welcome them to the school and wish them well in their new endeavors.*

# AAE



# Congratulations to Our Graduates 2013-2014



## Ph.D. degrees

### AUGUST 2013

Jimmy Chiu  
Niat Rahman  
Escribano Vaquero

### DECEMBER 2013

Ahmed E. Abdulhafez  
Shao-Huan Cheng  
Ming Gang  
Christopher D. Geisel  
Jonathan E. Goodsell  
Alinda K. Mashiku  
Bhisham N. Sharma

### MAY 2014

Oscar Garibaldi  
Seung Yeob Han  
Matthew Kube-McDowell  
Chien-Shing Lee  
James Manimala  
David Reese  
Mario Roa  
Blake Rogers  
Rashmi Shah  
Steven Shark  
Isaac Tetzloff  
Andrew Thompson  
Jian Wei  
Jian Xu

## August 2013

### B.S.

Thomas F. Binetruy  
James A. Destino  
Brian D. Foss  
Muhamad Shahrizen  
Jamal  
Aniket M. Patel  
Maitry S. Patel  
Joshua R. Wolf

### M.S.

Catherine G. Berdanier  
Jordan M. Forness  
Galen K. Harden  
Shourya Jain  
Cheol Hyeon Kwon  
Adam J. Loesch  
Jesus O. Mares  
Cem Pekardan  
Niat M. Rahman  
Sang-Hyun Shin  
Nicholas A. Smith  
Nissa K. Smith  
Brandon C. Terry  
Alexander J. Troiani  
Mizuki Wada  
Heather K. Wiest  
Rozaine S.  
Wijkularatne

## December 2013

### B.S.

Melissa C. Brindise  
Andrea E. Burkhardt  
Cody J. Carey  
Mark C. Danielson  
Victor E. Gandarillas  
Joseph T. Graham  
Bryan A. Haring  
Michael E. Hartel  
Eric A. Imhoff  
Roshan N. Jobanputra  
Scott M. Johnson  
Trevor D. Johnson  
Eric B. Jones  
Ravin Joshi  
Shyngys Karimov  
Seth A. Kreissler  
Junhyung Lee  
Robert J. Lundeen  
Christian M. Lysholm  
Nuraziz Maikhiyev  
Bhuvi S. Nirudhoddi  
Shawn A. Olsavsky  
Akash B. Patel  
Ruchir S. Patel  
Patrick J. Resler  
Christopher A.  
Riemer

Kaitie M. Schoenfeldt  
Matthew C. Selling  
Hang Sheng  
Abubakar Sial  
Michael J. Sparapany  
Samuel W. Stoess  
Sydney J. Taylor  
Hao Wang  
Jack J. Welter  
Austen T. Wildberger  
Kyle D. Zimmerle

### M.S.

Andrew D. Abney  
Adeel Ahmed  
Joshua E. Altchuler  
Ryan D. Bennett  
Robles A.R. Castillejo  
Lucas Cayzac  
Jung Hoon Choijung  
Matthew J. Durbin  
Nathaniel J. Forton  
Nicholas L. Gurtowski  
Kirsten Hughes  
Madhur Aravind  
Khadabadi  
Sathyanarayanan S.  
Krishna  
Julia J. Krupansky  
Shankars S. Kulumani  
Logan J. Larson  
Daniel E. Lejeune  
Boon Him Lim  
Kshitij Mall  
Bruno L.A. Marchessou  
Ankur Mour  
Chinnamani S.  
Muthukannan  
Kamwana N. Mwara  
Jeeongmoon Park  
Devon D. Parkos  
Priyank Pradeep  
Aaron M. Rosen  
Subahhish Sasmal  
Selcuk S. Sindir  
Nandiganahlilijay J. Suraj

## May 2014

### B.S.

Ryan A. Allen  
Arika S. Armstrong  
Joseph P. Avellano  
James F. Behmer  
Ian G. Bennett  
Geoffrey V. Bianchini  
Michael B. Bilyeu  
Nityeshranjan  
Bohidar  
Divinaa Burder  
Jessica C. Callinan

Alex J. Cho  
 Richard T. Collins  
 Andrew D. Cox  
 Alexandra K. Crandell  
 Michael R. Creech  
 Mohammad F. Dar  
 Ronak K. Dave  
 Jacob L. Delponte  
 Ade R. Dillon  
 Dirk M. Dodge  
 Andrew J. Emans  
 Michelle A. Erbs  
 Nicoletta Fala  
 Benjamin R. Fishman  
 Edgar Flores  
 Eric A. Flores  
 Bryan A. Foster  
 Cameron J. Gantz  
 Krista L. Garrett  
 Carter E. Grove  
 Spenser C. Guerin  
 Zachary D. Harman  
 Ryan J. Harmeyer  
 Kristin M. Heustis  
 Michael C. Hofferth  
 Jonathan E. Hughes  
 Sara J. Jacobson  
 Andrew M. James  
 Drew M. Jendra  
 Hyun Woong Jo  
 Harshavardhan R. Joshi  
 Michael J. Kelley  
 Hani Kim  
 Michael P. King  
 Margaret M. Kleindl  
 Ryan A. Kobert  
 Nathan F. Koerschner  
 Abi C. Komanduru

Nicholas A. Lapiana  
 Sang-Won Lim  
 Stefan A. Lindorfer  
 Henry C. Lorenzen  
 Finu J. Lukose  
 Stephen M. Lutgring  
 Timothy I. Machin  
 Eric M. Maglio  
 Mark W. Mahuren  
 Sarah R. Marx  
 Brent J. Mathis  
 Matthew T. McDougall  
 Eric S. Menke  
 Jeanne C. Methel  
 Kyle R. Meyerholtz  
 Eric M. Nelson  
 Timothy J. Nye  
 Eugene Oh  
 Bennett K. Olson  
 Eric T. Ong  
 Pritesh J. Patel  
 Brandon J. Puccio  
 Vincent P. Purdy  
 Thomas C. Rich  
 Jean M. Ruggiero  
 Joseph D. Schaeffer  
 Jake D. Schafer  
 Taylor K. Schultz  
 Brandy M. Shaffer  
 Parth R. Shah  
 Erik B. Slettehaugh  
 Sean A. Snoke  
 Drew E. Sommer  
 Daniel A. St Pierre  
 Maxwell T. Stunkel  
 Kyle W. Svejcar  
 Scott J. Sylvester  
 Alana M. Tice

Julian M. Toumey  
 Alexis R. Turner  
 Saagar S. Unadkat  
 Alexandre G. Van  
 Anderlecht  
 Ido Waksman  
 Matthew R. Wilkerson  
 Allen A. Zhang  
 Daniel X. Zhou

**M.S.**

Samantha Alberts  
 Avinash Avinash  
 Natarajan  
 Michael Barton  
 Kevin Bonanne  
 Benjamin Claus  
 Ian Douglas  
 Britany Essink  
 David Fox  
 Troy Glendye  
 Alex Gonring  
 Timothy Harris  
 Daniel Heacock  
 Nipuna Jayakody  
 Devin Kees  
 Yashas Keshav  
 Megan Kinney  
 Tiffany Le  
 Huaizhi Lei  
 Justin Leung  
 Kejin Li  
 Austin Link  
 Mark Mendiola  
 Angela Mugenda  
 William Murray  
 Li Xing Pan  
 Peter Renslow  
 Jessica Rivas  
 Saverio Rotella  
 Harish Saranathan  
 Nandagopal  
 Sathyamoorthy  
 Benjamin  
 Schluckebier  
 Charles Schnake  
 Weixiao Shang  
 Kevin Shipley  
 Prakash Shrestha  
 Zachary Stratton  
 Jianzhuo Sun  
 Yichuan Sun  
 Megan Tadge  
 Maria Tolstykh  
 Todd Troup  
 Haogong Wei  
 Aaron Wong  
 Veronica Wu  
 Yuming Zou



***Congratulations to all of our graduates.***

# STUDENT *awards*

## **AAE General Scholarship**

Peter Geldermans, Robert Ilgenfritz, Ryan Kobert, Colleen Mahoney, Drew Sommer, Nicholas Spoentgen, Yiqing Ding, Shyngys Karimov

## **Andrew Kasowski Scholarship**

David Sotirovski

## **Arthur S. Remson Memorial Scholarship**

Spenser Guerin

## **The Bob and Elly Hostetler Scholarship in Aeronautics and Astronautics**

Samuel Ferdon

## **Boeing Undergraduate Scholarship**

Krista Garrett, My-Mustapha Lemcherfi, Christian Vuong, Parth Shah,

## **David L. Filmer Scholarship**

Ryan Kobert



*Pictured here with David and Linda Swain*

## **David O. and Linda Schimmel Swain Scholarship**

Jani Dominguez, Gibson Heckert, James Pierce

## **Future Purdue Scholarship**

Ade Dillon, Samuel Ferdon, Reese Johnson, Scott Schwenker

## **George & Patricia Palmer Scholarship**

Scott Schwenker, Dalan Talsma

## **Herbert F. Rogers Award**

Nicoletta Fala

## **The John Gleiter – Engineering Perseverance Scholarship**

James Geyer, Ahmed Khan, Joseph Riedle, Jacob Stepec, Christopher Treese, Alex Vanwye, Veronica Wiley, Samantha Sauers

## **John and Linda Hayhurst Scholarships in Aeronautics and Astronautics**

Ellis Sepkovich

## **John L. and Patricia R. Rich Scholarship for Aeronautical Engineering**

Andrew Cox, Roshan Jobanputra, Jeanne Methel, Shawn Olsavsky, Bennett Olson

## **Lynn Fellowship**

Tony Favalaro 2013-2014  
Chandra Prakash 2014-2015

## **John Zink Company Graduate Fellowship**

Huang Cheng

## **Magoon Excellence in Teaching Award**

Samantha Alberts, Alden Black, Michael Fruhnert, Christopher Potter, Saverio Rotella, Isaac Tetzloff, Veronica Wu

## **The Marc Christopher Weaver Memorial Scholarship**

Rebecca Pietrzycki, Jenna Schreiner, Amit Soni

## **NASA Aeronautics Scholarship**

Joseph Lorenzetti, Samuel Otto, Christian Vuong, Emily Zimovan, Keith Wittner

## **National Science Foundation**

*Award:* Jared Willits

*Honorable Mention:* David Kun,  
Andrew Strongrich, Nicholas Zarbo

## **Northrop Grumman Corporation Scholarship**

Saphal Adhikari, Scott Schwenker, Emine Atayurt

## **Orrin Arthur Austin Memorial Scholarship**

Timothy Machin

## **The Peter Mueller Memorial Scholarship for Aeronautics and Astronautics**

Emily Zimovan

## **Pratt and Whitney Rocketdyne Scholarship**

Melissa Brindise, Hakusho Chin

## **Purdue Forever Fellowships 2013**

Kurt Aikens, Jacob Dennis, Christopher Fugger, Nicholas Husen

## **Purdue Award for Teaching Academy Graduate Teaching Excellence**

Alden Black, Saverio Rotella

## **Purdue Outstanding Researcher Award**

Amanda Haapala

## **Purdue Outstanding Service Scholarship**

Kaela Martin

## **Society of Women Engineers Awards:**

Arika Armstrong

*Women in Engineering Program Award*

Sarah Marx

*Women in Engineering Program Award*

Emily Zimovan

*Rockwell Collins, Inc. Corporate Award*

## **Swenson Aeromodeler Scholarship**

Ade Dillon



## **AeroAssault Cricket Team Wins Silver Medal in the Indoor Cricket League**

The Nataraj Iyer Indoor Cricket League (NIICL) at Purdue University saw AeroAssault as the silver medalist for Spring 2014. 14 teams comprising a total of 200 students hailing from different nationalities contended for the trophy.

Front Row (L-R) **Kshitij Mall (Vice-Captain)**, **Venkatesh Saranathan**, **Satadru Roy (Captain)**, **Karan Bhise**. Rear Row (L-R) **Ravichandra Jagannath (Vice-Captain)**, **Shankar Menon**, **Sambit Palit**, **Faheem Dar**, **Apoorv Maheshwari**, **Tanmay Chobhe**



**U.S. Department of Justice Challenge**

- The team led by Prof. Wayne Chen and included Ben Claus, Matt Hudspeth and Niranjana Parab won the U.S. Department of Justice's first public competition challenge with its proposed concept for testing the viability of in-service body armor.

**Warren G. Koerner Scholarship**

Alexander Adduci, Saphal Adihikari, Arika Armstrong, Emine Atayurt, Liangchun Chen, Catherine Courchaine, Nicoletta Fala, Sebastian Francis, Victor Gandarillas, Nitish Jaiswal, Alexander Judson, Logan Kamperschroer, Lauren Kolkman, Mao Konishi, Nicholas LaPiana, Joseph Lorenzetti, Eric Maglio, Sarah Marx, Eric Monson, Bhuvu Nirudhoddi, Sean Nolan, Kathryn O'Connor, Andres Porro Carvalhar, Kevin Porter, Brandon Puccio, Bryan Ryder, Andrew Siefert, David Sotirovski, Michael Sparapany, Saagar Unadkat, Nicole Vaughn, Dominic Vitello, Christopher Vodney, Takaai Wakazono, Sean Walsh

**William & Sally Dunton Scholarship**

Ade Dillon

**Best Paper Other Awards 2013-2014**

Graduate student **Cheolhyeon Kwon's** paper "*Analytical Analysis of Cyber Attacks on Unmanned Aerial Systems*" C. Kwon and I. Hwang, was selected as a finalist in the Best Graduate Student Paper Competition at the 2013 AIAA Guidance, Navigation, and Control (GNC) Conference, Boston, MA August, 2013. The AIAA GNC conference is the largest AIAA Control conference in the nation.

Graduate student **James Goppert** received Best Paper Award for "*Model Checking of a Flapping-Wing Micro-Air-Vehicle Trajectory Tracking Controller Subject to Disturbances*" J. Goppert, J.C. Gallagher, I. Hwang, and E. Matson, presented in the International Conference on Robot Intelligence Technology and Applications 2013, Denver, CO December 18-20, 2013.

**Professor Inseok Hwang** is advisor to both James and Cheolhyeon.

Doctoral student **Ming Gan** won Second place in Best Poster award competition sponsored by NSF at ASME 2013 International Mechanical Engineering Congress & Exposition held in San Diego.

He was also one of 44 to be awarded a NSF fellowship (with success rate of ~5%) to attend the competition based on an essay competition. His application was highly ranked by reviewers.

Doctoral student **Sarag J. Saikia** received the 2nd Prize in the Outstanding Student Oral Presentation for his paper, "*Strategies For Mars Network Science Missions Via Innovative Aerocapture And EDL Architectures*" at the 10th International Planetary Probe Workshop (IPPW10) held in San Jose, CA, USA, June 17-21, 2013. The coauthors are: **Blake A. Rogers, James M. Longuski, Harish Saranathan, and Michael J. Grant.** Sarag is a Ph.D. candidate in the Advanced Astrodynamics Concepts research group under the supervision of Professor James M Longuski.

**Sarag J. Saikia** was awarded three competitive travel grants to attend conferences in 2014. NASA's Jet Propulsion

Laboratory awarded him a grant to attend "*Workshop on Venus Exploration Targets*" held at the Lunar and Planetary Institute, Houston, TX in May 2014.

An award to attend the 11th *International Planetary Probe Workshop* at the California Institute of Technology, Pasadena, CA in June 2014 and an award to present a paper at the *Asteroids, Comets, and Meteors (ACM) Conference* in Helsinki, Finland in June/July 2014.

**NASA Langley's University Design Challenge**

Congratulations to Prof. Bill Crossley's AAE 451 Team 5 who won second place in NASA Langley's University Design Challenge for aircraft design. The team members comprised: **YiWei Lee, Sara Jacobson, Timothy Nye** (First Lead), **Brandy Shaffer, Cameron Gantz, Collin Ramsey, Nicholas Crass, Daniel St. Pierre** (Second Lead), **Zachary Harman.**



(L-R) Dr. Tom Shih, Prof. Steven Son, Prof. Steven Collicott, Christopher Zaseck, Prof James Longuski, Kaela Martin, Prof. Nicole Key, Samantha Alberts, Prof. Tim Pourpoint, Jeanne Methel, Christopher Ward.

**2013-2014 AAE Research Symposium Series Winners**

**Best Presentation**

Christopher Ward - Advisor Prof. Steven Schneider  
*Crossflow Instability and Transition in a Mach-6 Quiet Tunnel*

**Second Place Presentation**

Christopher Zaseck - Advisor Prof. Tim Pourpoint and Prof. Steven Son  
*Development of High Performance Hybrid Rocket Fuels*

**Third Place Presentation**

Samantha Alberts - Advisor Prof. Steven Collicott  
*Large Length-Scale Thermo-capillary Flow Experiment Design*

**Best Abstract**

Kaela Martin - Advisor Prof. James Longuski  
*Reducing Velocity Pointing Errors for Spinning, Thrusting Spacecraft via Heuristic Thrust Profiles*

**Best Undergraduate Presentation**

Jeanne Methel - Advisor Prof. Nicole Key  
*Vane Wake Profile Characterization for the Purdue 3-Stage Research Compressor*

# STUDENT *awards*



## Winners of the ATK Thiokol Propulsion S.P.A.C.E Award

### Spring 2013 AAE 251 - Spacecraft Design Team 20 Dreamliner

Kartik Ancha  
Arash Habibi  
Santiago Ibarra  
Tianya Xu  
David McGrath - Director, Systems Engineer, Tactical Propulsion and Controls, ATK Elkton Operations.



### Spring 2013 AAE 251 - Aircraft Project Team 12 - Optimus Sidera

Alvaro Rangel Mendoza  
Ji Hoon Seo  
Reema Siddiqui  
David McGrath - Director, Systems Engineer, Tactical Propulsion and Controls, ATK Elkton Operations.



### Fall 2013 AAE 251 Team 11 Hwurd

Malcom Benion  
Daniel Ellinwood  
Narayan Iyer  
Nathan Johnson  
Rachel Lucas  
Sam Otto  
Anuj Shah  
Andrew Tidwell  
Professor Michael Grant and David McGrath,  
(BSAAE'83; MSAAE'84) Director, Systems Engineer,  
Tactical Propulsion and Controls, ATK Elkton Operations

## *Pie a President!!*

In conjunction with E-Week, Becky Cutting, SGT President was met with a pie in the face from AAE staff members Lisa Crain and Jenn LaGuire Feb 18th. \$1 donations for the pie in the face benefited Project Lead the Way.



## AAE Student Design Project Chosen as Finalist for International Inspiration Mars Design Contest 2014

**Team Kanau**, a joint venture headed by students at Purdue University and Keio University in Japan, was chosen as a finalist for the *International Inspiration Mars Student Design Contest* by the Mars Society in March 2014.

The requirement of the global student competition was to design a two-person Mars flyby mission for 2018 as cheaply, safely and simply as possible. The idea of a manned Mars flyby mission of the type proposed by Inspiration Mars was motivated by trajectory designs investigated by **Professor James Longuski** as well as alumni **Dr. Moonish Patel** and **Dr. Jon Sims**.

The team from Purdue contributed to the design of the launch system, spacecraft trajectory, aerocapture, power, and communications systems. They will be invited to present and defend their designs during a public event at the NASA Ames Research Center in August 2014 and will be joined by 6 team members from Japan. A panel of six judges chosen by the Mars Society, Inspiration Mars and NASA Ames will then select grand prize winners.

The team members from Purdue's School of Aeronautics and Astronautics are:

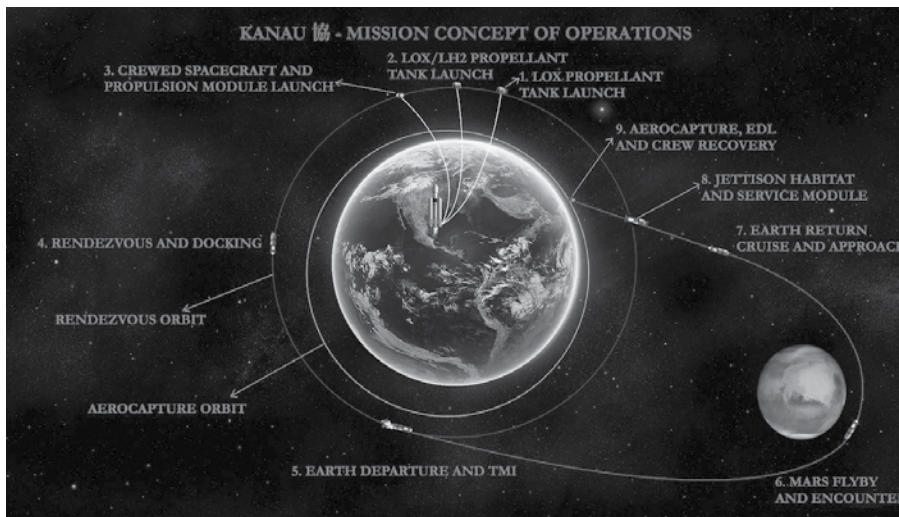
- **Professor Michael Grant**, Rapid Design of Systems Lab (RDSL), Systems, team co-advisor
- **Kshitij Mall**, graduate student in RDSL, Systems
- **Ashwati Das**, graduate student in Astrodynamics and Space Applications
- **Jeff Stuart**, graduate student in Astrodynamics and Space Applications
- **Max Fagin**, graduate student in RDSL, Systems, and Artisan Fabrication Lab (AFL)

Additional assistance from Purdue's School of Aeronautics and Astronautics was provided by:

- **Professor Bill Crossley**, Systems
- **Professor Stephen Heister**, Propulsion
- **Professor Kathleen Howell**, Astrodynamics and Space Applications
- **Professor Tom Shih**, Aerodynamics and Department Head
- **Marat Kulakhmetov**, graduate student in Propulsion
- **Jim D'Entremont**, graduate student in Propulsion
- **Rizwan Qureshi**, AAE alumnus, now at NASA Goddard Space Flight Center
- **Thomas Antony**, graduate student in RDSL, Systems

The Japanese team of **Shota Iino**, **Ayako Ono**, **Eriko Moriyama**, **Takuya Ohgi**, **Koki Tanaka**, **Yuri Aida**, and **Daichi Nakajima** worked on life support systems, spacecraft interior design and medical healthcare part of this mission for the team. The team co-advisor from Japan is **Professor Hiroyuki Miyajima**. **Nick Gillin**, a popular machinist from Art Center College of Design, Pasadena, California is a team member working on the animation video for this mission.

For further information, please visit:  
Team Kanau website - <https://sites.google.com/site/occupyplanet4/>  
Mars Society website - <http://www.marsociety.org/>



**Ashwati Das**



**Jeff Stuart**



**Kshitij Mall**



**Max Fagin**



**Michael Grant**

# AeroGRAM

**School of Aeronautics & Astronautics**  
Purdue University  
Neil Armstrong Hall of Engineering  
701 W. Stadium Ave.  
West Lafayette, IN 47907-2045

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## News About You

There are many ways for you to stay involved with our school. Please keep us posted on where you are and what you are doing using the Update Alumni Records page from our Alumni section of our web site at: <https://engineering.purdue.edu/AE/AboutUs/Alumni/Update/AlumniRecords>.

Alternatively, you can jot down personal news that you want to appear in the next edition of AeroGram or our E-newsletter the Aeroliner and either email it or send to the address below.

Our goal is to keep you abreast of the activities in the School of Aeronautics & Astronautics and across Purdue University. We hope that you find this information useful and relevant. We want to keep in touch with all our alumni and friends. Information provided by you is used to deliver up-to-date news and other information. We will not share your information with any other person or organization.

I can be contacted at the following email address: [rlbaines@prf.org](mailto:rlbaines@prf.org)  
Or by mail at:

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## AeroGRAM

A newsletter published for the alumni and friends of the School of Aeronautics & Astronautics

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