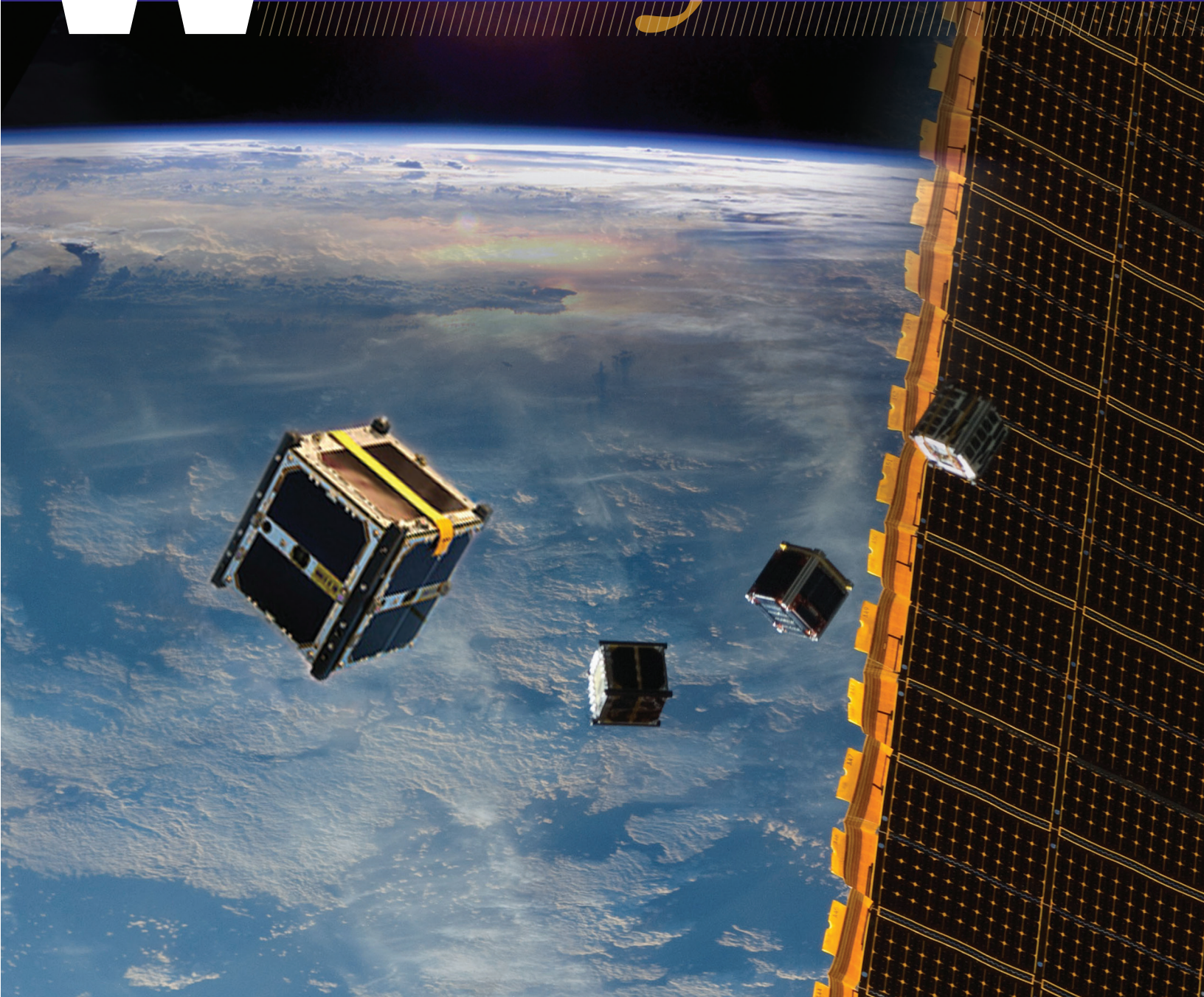


# W HIGH *f* LIGHT



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DEPARTMENT OF AERONAUTICS & ASTRONAUTICS  
UNIVERSITY of WASHINGTON

SPRING 2016





## MESSAGE FROM THE CHAIR



**DR. ANTHONY WAAS**, BOEING-EGTVEDT CHAIR

It has been an exciting and eventful year in the William E. Boeing Department of Aeronautics & Astronautics. Since joining the department in January 2015, I have been impressed by the excellence and enthusiasm of the students, the dedication of the faculty and staff, and the support of our alumni and industry partners. I am proud to be at the helm of such a dynamic department.

*"This department can become world-renowned with our faculty, students and staff building on its already strong foundations in space sciences and aeronautical engineering. Collaboration with our alumni, industry partners, donors and friends will be critical to our success."*

Many faculty research groups in A&A are engaging with leading aerospace industries, such as Boeing, Blue Origin, Raytheon, Lockheed Martin and Northrop-Grumman. We have seen a renewed interest in additive manufacturing, big data, autonomous vehicles, small satellites and space propulsion. These research areas benefit from our existing strengths in controls, plasma science, aerostructures, airplane design and fluid dynamics. We were fortunate to attract two rising stars in Aerospace Engineer-

ing. Dr. Behçet Açıkmış - who was an associate professor from the University of Texas at Austin - specializes in autonomous systems with applications to atmospheric and space flight vehicles. Dr. Marco Salviato, an expert in lightweight materials, joined us from Northwestern University where he was a research assistant professor. We are also excited to announce the arrival of Dr. Owen Williams, who will be joining the department this year. Dr. Williams is an expert in hypersonic turbulence and comes to us from the University of Maryland after obtaining his PhD from Princeton.

In the past, we have recognized student scholarship and fellowship recipients and our generous donors at our spring banquet. As we move forward, we are beginning a new tradition with a Student Research and Awards Reception, where students can present posters of their research to our alumni and friends, and we can celebrate their achievements. We are also developing a new series of alumni events to provide networking opportunities and highlight alumni accomplishments. These include: quarterly breakfasts, hosted receptions, a Distinguished Seminar Series and an annual Alumni Luncheon. These events are typically announced via email and posted on our website event calendar. If you are not receiving invitations, please contact our department; [contact@aa.washington.edu](mailto:contact@aa.washington.edu)

Many of our new department initiatives are informed by the expert advice and wisdom of an external Visiting Committee. This group consists of several of our own alumni who are industry leaders, alongside distinguished faculty members from our peer aerospace departments and other leaders in aerospace engineering whose interests are closely related to those in the department. We are preparing for growth by investing in academic excellence and developing relationships that produce cutting-edge solutions for our industry partners. I welcome your feedback and invite you to join us as mentors, student project sponsors, guest lecturers and supporters in this exciting journey into the future of aerospace engineering! ■

### CHAIR'S DISTINGUISHED SEMINAR SERIES 2015-16

**DR. DAVID HYLAND, TEXAS A&M**  
*"Power Star - Harvesting the Sun's Energy in Space" (11/12/2015)*

**DR. ERIKA WAGNER, BLUE ORIGIN**  
*"Vehicles, Engines, & Opportunities for Sub-Orbital Research" (12/01/2015)*

**DR. SERGIO PELLEGRINO, CALTECH**  
*"Ultralight Deployable Structures for Space-Based Solar Power" (02/23/2016)*

**DR. KARTHIK DURAISAMY, U-MICH**  
*"A Paradigm for Data-Informed Modeling of Multi-Scale Problems" (03/08/2016)*

**DR. DAVID STEIGMANN, UC BERKELEY**  
*"Effects of Fiber Bending & Twisting Resistance on the Mechanics of Fiber-reinforced Solids" (03/31/2016)*

**DR. MARCO PAVONE, STANFORD**  
*"Sampling-Based Techniques for Planning and Control of Autonomous Spacecraft and Space Robots" (05/05/2016)*

[www.aa.washington.edu/ChairSeminar](http://www.aa.washington.edu/ChairSeminar)

# NEW FACULTY



**Dr. Behçet Açıkmeye**  
*Associate Professor*  
Control Theory  
Convex Optimization  
Autonomous Aerospace Vehicles  
Markov Processes



**Dr. Raymond Golingo**  
*Research Assistant Professor*  
Plasma Physics  
Fusion Thrusters  
Advanced Diagnostics  
Compact Fusion Energy



**Dr. Carl Knowlen**  
*Research Associate Professor*  
Energy Conversion  
Combustion Physics  
Hypervelocity Propulsion



**Dr. Christopher Lum**  
*Research Assistant Professor*  
Autonomous Systems  
Flight Operations  
Multi-Agent Mission Planning



**Dr. Marco Salviato**  
*Assistant Professor*  
Composite Aerospace Structures  
Nano Composites

## HIGHLIGHT 2016

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Tony Waas

Dalton Waldock

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### GO GREEN:

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### WRITE TO THE EDITOR:

[highflight@aa.washington.edu](mailto:highflight@aa.washington.edu)

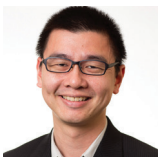
*Have news you would like to share in the next issue?*  
**WE WANT TO HEAR FROM YOU!**

# DEPARTMENT NEWS

## NEW STAFF



**Victor Aque**  
Academic & Administrative  
Services Coordinator



**Stanley Choi**  
Academic Advisor,  
Undergraduate Programs



**Dr. Christopher Hansen**  
Research Scientist



**Dr. Justin Little**  
Research Scientist



**Dr. Leah Panganiban**  
Academic Advisor,  
Graduate Programs



**Steven Pearson**  
Budget/Fiscal Analyst



**Julie Taylor**  
Budget/Fiscal Analyst



**Dr. Tobin Webber**  
Research Scientist



LEFT: Prof. Breidenthal (second from left) at the National Central University, Taiwan; CENTER: Scenic Sweden; RIGHT: Prof. Hermanson (second from right) and colleagues at KTH, Sweden

## FACULTY SABBATICALS

**Prof. Jim Hermanson** spent eight months in residence at the Royal Institute of Technology (KTH) in Stockholm, Sweden, collaborating with Prof. Gustav Amberg in the numerical modeling of near-critical droplet behavior in turbulent flow, and with Prof. Nicholas Apazidis in an experimental study of the interaction of shock waves with two-dimensional liquid droplets.

During his winter quarter sabbatical, **Prof. Bob Breidenthal** visited his former student **Shenqyang Shy (MS 86 PhD 90)** at the National Central University in Taiwan. He also spent time at the Federal University of Rio de Janeiro with colleagues planning experiments in their new icing tunnel, the first in the southern hemisphere. His travels further took him around the Southwest and to the Grand Canyon, where he was working on an erosion problem.

**Prof. Dana Dabiri** spent his sabbatical at UW, collaborating with Professor Jim Riley in the Mechanical Engineering Department towards understanding large eddy simulation (LES) modeling and developing methodologies for studying LES models using experimental data.

## 2015 RETIREMENTS

**Research Prof. Richard Milroy** joined the department's Redmond Plasma Physics Laboratory as a research scientist in 1998 and became a research professor in 2009. Milroy worked closely with plasma science students and supervised the PhD work of several. He also served as the deputy director of the A&A Plasma Science & Innovation Center.

**Marlo Anderson**, manager of undergraduate programs, retired after 35 years at the UW (28 spent in the A&A Department). Marlo helped grow the bachelor's degree program and shepherded hundreds of undergraduate students toward graduation.

For 15 years, **David Erickson**, budget/fiscal analyst lead, administered submission of grants and contracts, served as the AERB building coordinator and managed payroll for the department.

Research scientists **George Andexler**, **Rorm Arestun**, **Alan Glasser** and **George Marklin** retired after a combined 62 years in A&A. Drs. Andexler and Arestun worked with Prof. John Slough in the Plasma Dynamics Lab, and Drs. Glasser and Marklin worked with Professor Thomas Jarboe in the Plasma Science & Innovation Center.

## FACULTY PROMOTIONS

**Prof. Kristi Morgansen** was promoted to full professor and was appointed as the department's associate chair for academics.

**Prof. Uri Shumlak**, who serves as president of the University Fusion Association, was promoted to associate chair for research.

**Prof. Eli Livne** has been appointed as the director of the Aerospace Engineering Research Laboratories (AER Labs).

## STAFF PROMOTIONS

Congratulations to **Ed Connery**, who was promoted to the position of director of academic services. Ed was the 2015 recipient of the UW Graduate School Distinguished Graduate Advisor Award.

**Wanda Frederick**, long-time graduate advisor and assistant director of academic services, is now the part-time community relations and communications specialist. She works closely with **Gaia Borgias Brown**, the department's external relations officer. Wanda recently celebrated her 20th anniversary in the department.

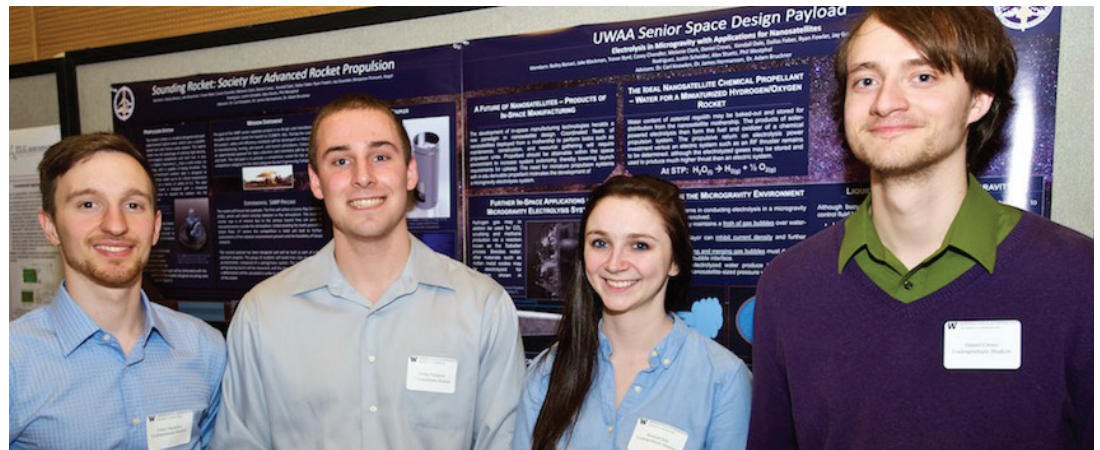
# ACADEMICS



## ASSOCIATE CHAIR FOR ACADEMICS, **DR. KRISTI MORGANSEN**

During the past year, the educational programs in A&A have grown at all levels and we have been engaged in development of a variety of new offerings. To address this growth and recent transitions among staff, academic services now has four positions: director of academic services, graduate advisor, undergraduate advisor, and academic and administrative services coordinator. Our junior and senior classes have grown in size to more than 140 students, and our graduate student population is well over 200. Our student facilities for design projects are being upgraded to accommodate increasing research and multi-disciplinary opportunities. All of these enhancements will add to an even greater academic experience for our students. ■

### THANK YOU CAPSTONE SPONSORS:



PICTURED: (L-R) Seniors Casey Chandler, Phillip Westphal, Kendall Dale and Daniel Crews. Photo credit: Kerry Dahlen.

### **UNDERGRADUATE: INDUSTRY-SPONSORED SENIOR CAPSTONE PROGRAM**

In order to accommodate the increasing numbers of students in our undergraduate program, and to provide opportunities to work directly on interdisciplinary aerospace industry design problems, A&A has helped to launch the UW College of Engineering Industry-Sponsored Senior Capstone Program this year. This program supplements the existing large team flight and space projects with small group projects formed of 3-6 students. Students complete a rigorous design and build project focusing specifically on the skills and knowledge unique to the field of aerospace engineering. Project work runs through winter and spring quarters (January through mid-June). The achievements and products of the senior capstone program will be exhibited during a final presentation day on June 6, 2016.

### **UNDERGRADUATE: MINOR**

Starting in winter quarter 2016, UW A&A established a minor in Aeronautics & Astronautics available at the undergraduate level. The aim of this new program is to provide focused knowledge of aerospace design goals, constraints, criteria, analysis and synthesis for non-majors interested in multidisciplinary careers in aerospace-related industry. The minor is composed of nine courses (six required and three elective): statics, dynamics, thermodynamics, mechanics of materials, orbital and space flight mechanics, atmospheric flight mechanics and three elective upper-division courses.

### **GRADUATE: FIRST MASTER OF AEROSPACE ENGINEERING GRADUATES**

The first cohort of the evening Master of Aerospace Engineering (MAE) degree will graduate in June. Thirty MAE students will be finishing the part-time degree program after completing a three-year curriculum. Because this is a professional degree program, many of these students simultaneously held full-time jobs. Congratulations to all of the soon-to-be MAE graduates!

# NEW FACULTY SPOTLIGHT



## ASSOCIATE PROFESSOR DR. BEHÇET AÇIKMEŞE

One of the main pillars of Dr. Açıkmeye's research is to promote the use of optimization in robotics and autonomy. Using optimization enables performance, robustness, and has the capacity to expand a vehicle's operational envelope to its physical limits.

A recent application for real-time, onboard optimization has been in the realm of planetary Powered Descent Guidance (PDG). PDG is the last phase of a planetary landing, and it uses a rocket engine to slow the vehicle and safely land at a designated site. Traditional methods for computing vehicle trajectories and their corresponding control sequences relied on Apollo-era polynomial curve fitting techniques. While computationally inexpensive, these meth-

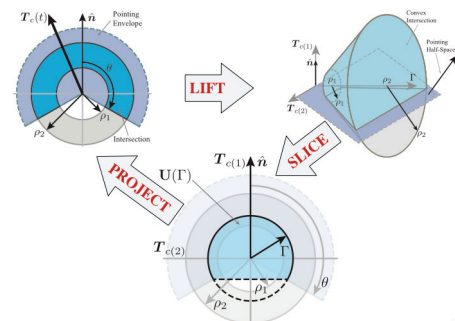
ods do not consider vehicle constraints or optimality – sometimes resulting in infeasible “flight” trajectories. Instead, the Autonomous Controls Lab has developed both the theoretical and algorithmic techniques that enable us to solve trajectory optimization on-board and in real-time.

Convex programming approaches are readily applicable to real, strenuous and safety critical engineering problems due to their global optimality, polynomial time convergence and guaranteed constraint satisfaction if a solution exists. However, most real-world engineering problems, including PDG trajectory optimization, are not inherently convex. The theory of lossless control convexification was initially developed by Dr. Açıkmeye while working at the Jet Propulsion Laboratories (JPL) and advanced later in his academic career. Using this breakthrough theory, Dr. Açıkmeye has shown that a large class of constrained optimal control problems, including PDG trajectory optimization, can be solved losslessly in the realm of convex programming.

The Autonomous Controls Lab also developed algorithmic techniques that allow convex programming to be used reliably on-board embedded systems. Recent work enabled the group to develop auto-generated, custom solvers tailored to a given problem class. These auto-generated solvers take advantage of a known problem structure to increase performance, reduce memory requirements, and make the code

more verifiable. The latter point has proven its significance by helping the group break into an industry that has traditionally been slow to adopt new technologies.

These advances culminated in the summer of 2013 when both the theory of lossless convexification and the custom solvers were put to the test onboard Masten's Xombie rocket.

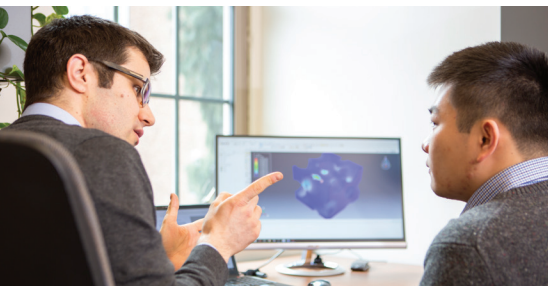


In a collaborative effort between JPL, Masten Space Systems and Dr. Açıkmeye, the descending rocket was commanded to land at a different landing site without warning. The landing vehicle computed a fuel-optimal divert trajectory from an altitude of 364m to its new landing target 800m away (video available at: <https://youtu.be/PzHaWc5n70A>). To put this into perspective, the largest divert performed by Masten from the same altitude on the same rocket without optimization was 300m – optimization allowed the lander to travel almost three times farther. The successful landing of the Xombie rocket in the Mojave Desert demonstrated that both lossless convexification and custom convex programming solvers have an important role to play in the future of the aerospace industry specifically in the area of autonomous aerospace vehicles. ■

**Dr. Behçet Açıkmeye** | After receiving his doctorate in Aerospace Engineering from Purdue University in 2002, Professor Behçet Açıkmeye joined NASA Jet Propulsion Laboratory. As a technologist and senior member of the technical staff, Prof. Açıkmeye developed guidance and control (G&C) and estimation algorithms for formation-flying spacecraft and distributed networked systems. This theoretical insight led to a leap in the G&C technology that has now made planetary pinpoint landing feasible. He was a member of NASA's Mars Science Laboratory G&C team, where he developed and delivered algorithms used in the “fly-away phase” of the successful Curiosity rover landing in August 2012. He also developed Reaction Control System algorithms for NASA's SMAP (Soil Moisture Active Passive) mission, which was launched in 2014. At the UW, Prof. Açıkmeye's research will focus on convex optimization and its engineering applications; guidance, navigation, and control of autonomous vehicles; and model predictive control.



MASTEN Xombie rocket. Photo credit: NASA



PICTURED: (L-R) Prof. Salviato and student Yao Qiao. Photo credit: Dennis Wise

## ASSISTANT PROFESSOR **DR. MARCO SALVIATO**

As never before, modern aerospace engineering is experiencing an increasing demand for the reduction of carbon dioxide emissions and fuel consumption as well as the need to reduce manufacturing and design costs. These requisites have paved the way for the development of materials with unprecedented properties for safer, lighter and more durable aerospace structures.

In one of his recent research projects, Dr. Salviato is investigating the potential application of graphene to enhance the properties of composite materials used in aerospace engineering. Graphene is used in the form of a two-dimensional, atomic-scale, honey-comb lattice in which one atom forms each vertex. About  $3.5 \times 10^{-10}$  m thick, a graphene sheet is endowed with extraordinary properties. It is about 100 times stronger than the strongest steel, it conducts heat and electricity efficiently

and is nearly transparent. One of the objectives of the project is to investigate how to exploit these extraordinary properties in aerospace structures. Leveraging on the properties of graphene, Dr. Salviato envisions the possibility to further reduce the weight of the next generation aeronautical components and increase their capacity to absorb impact loadings. Further, Dr. Salviato intends to exploit the outstanding electrical and thermal conductivity of graphene to develop materials with defrosting capabilities, and which offer better protection in case of lightning strikes. Graphene can also be used to develop materials which act as sensors and are able to provide information about the state of damage of the structure during service life.

One of the challenges of the project is understanding the best way to disperse graphene in the composite material system and how the resulting distribution will affect the final properties of the composite. Toward this end, the material design is tightly integrated with the development of advanced computational models. These models are designed to capture the interactions of the constituents (e.g. graphene sheet, fiber tows, polymer matrix) at the various length scales, from the nanoscale of graphene to the meter scale of an aerospace structure. Thanks to this multi-scale framework, the models can be used to understand the optimal amount of graphene and how its dispersion and the manufacturing properties affect the structural properties. ■

*Dr. Marco Salviato received his PhD degree in Mechanical Engineering from University of Padova (Italy) in 2013. His doctoral research focused on the formulation of multi-scale computational models and the experimental characterization of the mechanical behavior of polymer nanocomposites. Before joining the University of Washington in 2015 as an assistant professor, Dr. Salviato worked in the Department of Civil and Environmental Engineering at Northwestern University first as a postdoctoral fellow, and later as a research assistant professor. Currently, he leads the Laboratory for Multi-scale Analysis of Materials and Structures in the William E. Boeing Department of Aeronautics and Astronautics. His research focuses on the development of materials with unprecedented mechanical and functional properties and the formulation of computational models to assist the design of the next-generation aerospace structures.*

## FACULTY AWARDS & RECOGNITION

**PROFESSORS BEHÇET AÇIKMEŞE, ANSHU NARANG-SIDDARTH** and **JK YANG** were all selected to receive National Science Foundation Faculty Early CAREER Development Awards. These five-year, \$500,000 awards provide funding for their cutting-edge research programs. Professor Narang-Siddarth also published the book: *Nonlinear Time Scale Systems in Standard and Non-standard Forms*, Society for Industrial and Applied Mathematics (SIAM), Cambridge University Press.

**PROFESSORS ROBERT BREIDENTHAL, KRISTI MORGANSEN** and **URI SHUMLAK** were named Associate Fellows of the AIAA.

**PROFESSOR JIM HERMANSON** received a three-year Fulbright Award to work at the Center of Applied Space Technology and Microgravity at the University of Bremen in Germany. Hermanson will work there with Dipl.-Eng. Christian Eigenbrod, head of Aerospace Combustion Engineering, on a study of combustion behavior of oxygen droplets under cryogenic conditions.

**PROFESSOR KEITH HOLSAPPLE** was given the 2016 Meteoritical Society Barringer Medal.

**PROFESSOR ELI LIVNE** was named a Fellow of the AIAA. He was also appointed director of AER Labs at UW in 2015.

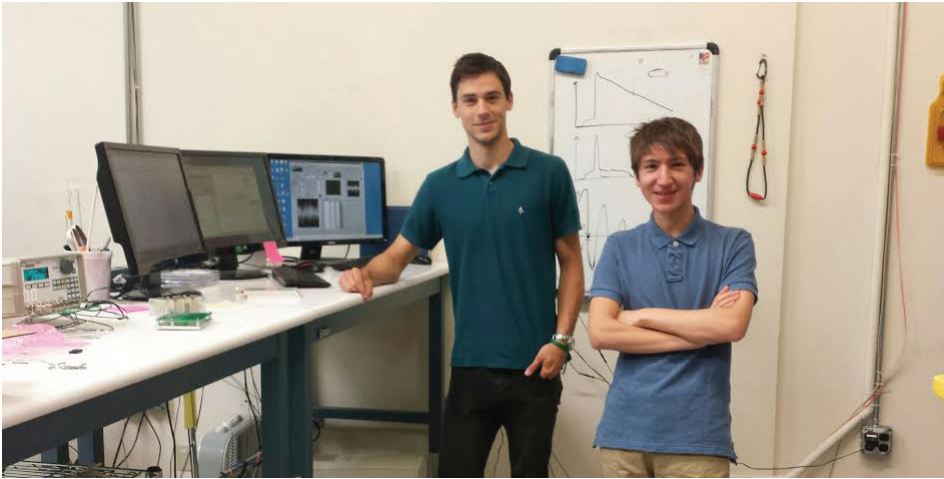
**PROFESSOR MEHRAN MESBAHI** was named as an IEEE Fellow. Mesbahi also serves as executive director of the Washington State Joint Center for Aerospace Technology Innovation (JCATI).

**PROFESSOR & ASSOCIATE CHAIR FOR ACADEMICS KRISTI MORGANSEN** was selected as one of 20 UW faculty to participate in a Leadership Development Program, for those who have the potential to be the "next generation of faculty leaders at the UW." She was also chosen as AIAA Pacific Northwest Section Educator of the Year 2013-2014.

**PROFESSOR & ASSOCIATE CHAIR FOR RESEARCH URI SHUMLAK** received a \$4.8M award from the Department of Energy Advanced Research Projects Agency - Energy (ARPA-E) for his research project, "Development of a Compact Fusion Device based on the Flow Z-Pinch."

**PROFESSOR & CHAIR ANTHONY WAAS** received the 2016 AIAA Structures, Structural Dynamics and Materials Award, which was presented to him at the 2016 AIAA Sci-Tech Conference in San Diego, California.

# STUDENT NEWS



ABOVE: (L-R) PhD Student Jordan Neuhoff and intern Dalton Waldock

## INTERNSHIP

### HIGH SCHOOL SENIOR TAKES ON PLASMA SCIENCE

Dalton Waldock, a senior from Briarcliff Manor High School in New York, spent last summer working in Professor John Slough's Plasma Dynamics Laboratory. Dalton was taking part in a College Science Research Class which began in his sophomore year. Dalton worked with his mentor, A&A graduate student Jordan Neuhoff, to measure the energy of plasma emitted from a pre-ionizer. This experiment has real-world implications for space travel by potentially enabling a space probe to reach its destination efficiently and have enough fuel to return to Earth.

Dalton's paper, titled "Spectroscopic Measurements Versus Langmuir Probe Analyses of RF Plasma," was entered in a number of regional and national science competitions. He was selected as a semi-finalist in the 2016 Intel International Science Talent Search. Special thanks to Professor Slough and Jordan Neuhoff for giving Dalton this unique opportunity, and helping him to prepare for his college career. UW A&A is his number one college choice!

## STUDY ABROAD

### MASTER'S STUDENT VISITS JAPANESE RESEARCH LAB

Last year, UW A&A master's student Nathaniel Guy spent six months as a visiting researcher in Sendai, Japan, working in the Space Robotics Lab in Tohoku University. There, he did intensive work on lunar rover



Nathaniel Guy performing an outdoor field test of the micro-rover.

development as a member of the Hakuto Lunar XPRIZE Team, a small group of engineers working on building a micro-rover and operating it remotely on the Moon. In particular, Nat worked on overhauling the control system for the rover's wheels, introducing fault-tolerant logic into the rover and making ground station software to allow the team to control and monitor the rover remotely. The team has already performed several field tests making use of Nat's work, and the final version of their hardware is planned to be launched in 2017.

Tohoku University's Department of Aerospace Engineering is looking for undergrad and graduate students interested in learning about various aspects of rover and nanosatellite development while studying abroad. No Japanese language skills necessary! Contact: UW Professor Fumio Ohuchi (ohuchi@u.washington.edu).



ABOVE: Michael Dodd (far right, rear) with Nobel Laureate Sir Harold Kroto (far right, front)

## REPRESENTATION

### PHD ATTENDS NOBEL LAUREATE MEETING IN GERMANY

Last summer, A&A doctoral student Michael Dodd represented the United States at the 65th Lindau Nobel Laureate Meeting in Germany. Michael was selected from over 20,000 candidates in a three-stage international competition. The meeting brought together 650 young scientists, representing 88 countries and 64 Nobel Laureates from the fields of Chemistry, Physics and Physiology/Medicine. Michael had the opportunity to spend five days attending numerous lectures, panel discussions and meetings, where he had in-depth exchanges with Nobel Laureates. Michael would like to thank the National Science Foundation for sponsoring his trip.

## DEPARTMENT RESEARCH & NETWORKING EVENTS

Our department is now hosting an annual Student Research & Awards Reception (held during winter quarter) where the latest undergraduate and graduate research is shared with our honored guests including alumni, friends, donors and partners. We have also kicked-off a quarterly student/alumni breakfast series to build mentorship and networking opportunities.



PICTURED: Senior Benjamin Pennant. Photo credit: Kerry Dahlen

# CAREER CENTER @ ENGINEERING

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**INTERNSHIP PROGRAM**  
engrice@uw.edu  
206-685-1789



# STUDENT CLUBS



ABOVE: AIAA DBF Team. RIGHT: DBF students work on their aircraft.

## AIAA DESIGN, BUILD, FLY

The AIAA Design/Build/Fly Team (DBF) at the University of Washington is a student-run project intended to involve students in designing, building and flying an aircraft in a national challenge. This project gives students a chance to obtain hands-on experience while applying the skills they are learning in the classroom to a real-life problem.

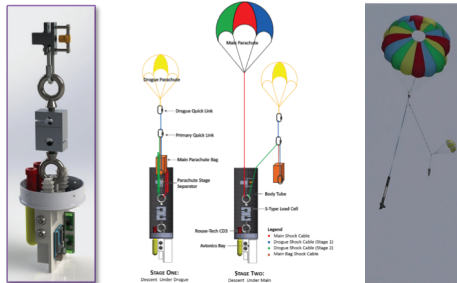
While there are many other student-run projects at the UW, DBF is one of the few that is judged on a paper presentation as well as the final product. This process teaches students about the importance of creating a thoughtful, functional, demonstratable design.

The final outcome will be a remote controlled flight vehicle that can be flown in a competitive event. The flight vehicle is judged at the AIAA national competition based on both a paper and a flight competitive challenge. This entry will be the 11th entry by a UW DBF team. Our goal will be to present a competitive design, a quality paper and a continuing tradition that builds, from year to year, on the success of previous teams.

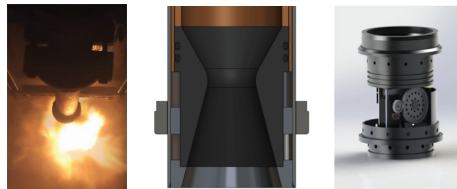
**Faculty Advisor:** Prof. Christopher Lum

## SOCIETY FOR ADVANCED ROCKET PROPULSION

The A&A students got off to an early start organizing their extracurricular SARP (Society for Advanced Rocket Propulsion) team for designing and building a sounding rocket for the 5-mile launch challenge at this year's Intercollegiate Rocket Engineering Competition in Green River, UT. As evidence of the high interest in rocketry, over 50 undergraduate students throughout the UW



Recovery coupler with load cell, recovery operational sequence, and recovery chute in action.



Subscale test firing December 2015 for validating new nozzle design. New N2O valve concept.

College of Engineering are participating this year. Based on feedback from student observers of the UW Project Management Program last year, SARP has restructured the team to facilitate integration of subsystem designs and overall program management. This has resulted in a professional level organization led by A&A seniors. The students have generated a high level of enthusiasm, demonstrated by the SARP U-SEED crowd funding drive in November 2015, which successfully raised \$15K for their project.

Unbeknownst to the SARP team, the A&A Department had been working in the background to make SARP their flagship senior capstone space design project this year. Upon receiving the news, the seniors on the project were ecstatic! Moving the senior participation from extracurricular to part of their regular course load immediately doubled their available time and significantly enhanced their subsequent design and analysis efforts. Furthermore, several

industry sponsors have made donations for payload design and fabrication which enabled very challenging concepts to be considered. This has led to an increasing membership in the SARP program. With A&A backing for a launch berth, the payload team is designing a zero-g experiment to be flight tested on the SARP rocket in June and then launched on the Blue Origin New Shepard rocket this summer.

**Faculty Advisor:** Prof. Carl Knowlen

## AIAA STUDENT CHAPTER

The UW AIAA student chapter has focused on establishing a welcoming, professional, and inclusive student culture in the department. Each year they coordinate a professional development series with industry attendees. This year they welcomed guests from Boeing, Blue Origin, TLG Aerospace, TerraPower and AeroTEC. Representatives from these companies came to Guggenheim Hall to offer advice on resumes and suggest strategies for transition into the professional field.

The UW AIAA Student Chapter has also bolstered internal department connections by hosting a quarterly department happy hour that encourages faculty, staff, graduate and undergraduate students to mingle in a relaxed setting. In spring, the chapter supports an aerospace mentorship program that pairs prospective freshman and sophomore engineers with juniors and seniors currently in the program to offer advice about academics and life at UW.

The UW AIAA student officers are grateful to be located in one of the major aerospace hubs in the world, and are further grateful to work with an administrator that values and supports the student experience at UW.

**Faculty Advisor:** Prof. Adam Bruckner

# INDUSTRY PARTNERSHIPS & RESEARCH



ABOVE: (L-R) Dave Dickson and Belur Shivashankara, both from Boeing, at the 2016 CCAM Aerospace Forum. Photo credit: Matt Hagen.

## CCAM: COLLABORATIVE CENTER FOR ADVANCED MANUFACTURING

Manufacturing technology will continue to advance with the increased use of automation, additive processes, connectivity, sensors and data generation. These fundamental changes will provide many opportunities and challenges for researchers, designers, and engineers.

In January 2016, the University of Washington led an industry forum to rethink material waste in aerospace, and propose a framework for future manufacturing methodologies. The Collaborative Center for Advanced Manufacturing (CCAM) was created to help foster discussion and support innovation between UW researchers, industry and other external parties.

For more information about the CCAM forum or workshop series, visit: [www.engr.washington.edu/facresearch/ccam](http://www.engr.washington.edu/facresearch/ccam)

## UW/BOEING: CONTROLS COLLABORATION

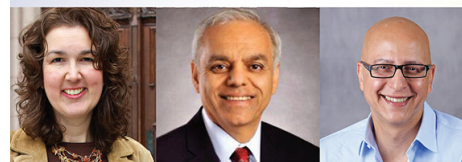
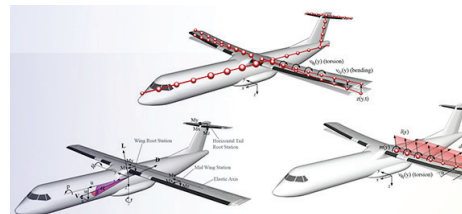
We are very pleased to announce the establishment of a new research collaboration between our department and The Boeing Company in the area of high-performance fly-by-wire flight control technology.

Flight control involves a wide array of issues surrounding the design and implementa-

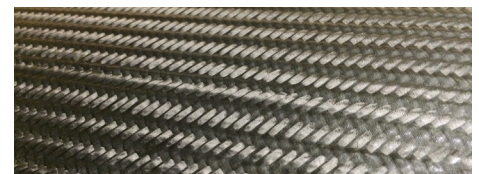
tion of control laws for aircraft longitudinal and lateral dynamics during distinct flight envelopes. As Boeing moves towards the development of highly efficient airplanes, flight controls have been pushed towards more optimized control system architectures and designs. This push in turn has direct implications for the product development design cycle and comprehensive system-wide optimization and integration.

Facilitated by advances in optimization-based techniques for control system design and the availability of analysis and synthesis approaches for nonlinear control, the UW research team has proposed the initiation of a long term relationship between the controls group at the William E. Boeing Department of Aeronautics and Astronautics and the Flight Controls group at Boeing.

The project is led by Professors Mehran Mesbahi and Kristi Morgansen at UW, and Dr. Kioumars Najmabadi at Boeing.



From left to right: Prof. Morgansen, Dr. Najmabadi, Prof. Mesbahi



## UW/BOEING: STRUCTURES COLLABORATION

Structures technology development relies on the prediction of deformation response and progressive failure modeling of advanced composite structures. With the increasing utilization of automated manufacturing of composite airplane structures, certification by virtual analysis plays an increasing role. For this purpose, accurate physics based damage and failure modeling using advanced computational tools is a must. Members of the UW A&A composite structures team (Professors Tony Waas, Kuen Lin, Marco Salviato, JK Yang and Eli Livne) are bringing significant and novel expertise to industry in new and continued collaborations with Boeing.

This effort is led by Drs. Mostafa Rassaian, Sal Liguore, Brian Justusson and Joe Schaeffer at Boeing.

The establishment of these two collaborations would not be possible without the vision and continuous support of **Todd Zarfos**, Vice President of Engineering for Washington Design Center, and **Kourosh Hadi**, Director of Airplane Product Development (both at Boeing BCA) and **Steven Precup** of Boeing R & T.

# JCATI AWARDEES

**PI: DR. CHRISTOPHER LUM**  
**CO-PI: DR. JURIS VAGNERS**

*"Specialization, Testing and Integration of NextGen Technologies on Unmanned Aerial Systems"*

**PARTNERS:** Advanced Navigation and Positioning Corporation / Hood Technology Corporation / Insitu / Sagetech

**PI: DR. KRISTI MORGANSEN**  
**CO-PI: DR. UNSIK LEE**

*"High Power SEP for Autonomous Spacecraft Operations"*

**PARTNER:** Aerojet Rocketdyne

**PI: DR. ANSHU NARANG-SIDDARTH**

*"Continuation Based Trim and Stability Analysis for Airworthiness Certification of Transport Category Airplanes"*

**PARTNERS:** Safran Engineering Services / NASA Langley Research Center

**PI: DR. JINKYU 'JK' YANG**  
**CO-PIs: DR. KUEN LIN & DR. ANTHONY WAAS**

*"Design and Fabrication of Composite Wing Structures Using Non-conventional C-ply Technology"*

**PARTNERS:** Toray Composites (America) / Think Composites / Chomarat

[WWW.JCATI.ORG](http://WWW.JCATI.ORG)

## FACULTY

### IN THE NEWS

#### WORKING ON WAYS TO FLY SAFER

**Tim Gruver, Contributing Writer, UW Daily**

Photo Credit: Abhishek Sugam

Flying may be the safest way to travel, but the number of aircraft accidents and risky landings over the past decade have provided more challenges. The National Science Foundation awarded a \$500,000 grant over a five-year period to Anshu Narang-Siddarth, a UW assistant professor in the department of aeronautics and astronautics, to study methods to safely land aircraft under adverse conditions.

Narang-Siddarth will serve as the project's principal investigator and will work with two faculty advisers from Green River Community College, and one or more graduate research assistants from the UW, along with students from Green River's two-year aviation degree program.

One of the project's primary objectives is to identify and reduce surface control failure involving devices such as an aircraft's wing tips, rudder, or tail. It intends to replace these heavy devices with automated backup technology within a plane's engines, thereby reducing aircraft weight and increasing overall aircraft maneuverability.

"It can be that you actually have a failure on the control surfaces, or it could be some inappropriate crew action," Narang-Siddarth said. "Usually, these events happen in a short amount of time. So they are highly stressful situations."

George Comollo, an aviation instructor of 16 years with 5,700 hours of flight experience, believes the project will help build a better training program for Green River and train more effective pilots to prepare them for the airline industry.

Since June 2015, Green River college currently has five Federal Aviation Adminis-

tration approved flight simulators manufactured by flight simulator technology companies Redbird and Precision Flight Controls, three of which are full-motion simulators featuring onboard computer graphics by Lockheed Martin and X-Plane. The largest plane that students train in is a twin-engine Beechcraft Super King Air 350. According to Comollo, the program focuses on helping its students develop outstanding flying skills, which includes handling in-flight emergencies.

"What we basically work on doing is taking the theory out of the class and putting it into action in the flight simulators," Comollo said. "It's great to do well in class, but flying is a motor skill as well."

Narang-Siddarth believes the project could lead to better fuel efficiency for commercial jetliners. For Airbus, reducing one foot of tail height could mean saving two tons of fuel annually. It could also mean greater capabilities for unmanned aerial vehicles.

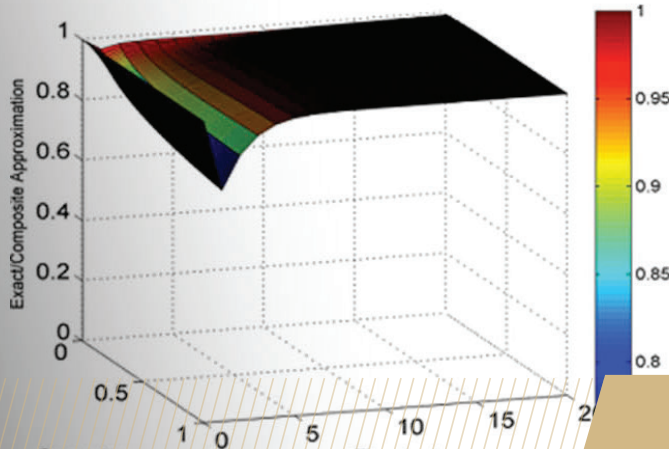
"Any time you're going to make a command, you're going to think that command is going to influence [you] four seconds, five seconds down the road," Narang-Siddarth said. "We [control engineers] don't take advantage of everything around us because we make decisions based on [current time models]. They make decisions on a current time level, whereas [pilots] think way ahead."

Additionally, the project may have potential medical applications for people with lower-extremity paralysis, but Narang-Siddarth believes it is too early to say either way.

"There are some folks who strongly believe it can happen and those who believe it cannot," Narang-Siddarth said. "I believe it can be done. There has been proof of concept. It is now a matter of doing the mathematical formulation."

The project will begin March 1, and is tentatively scheduled through Feb. 28, 2021.

Contact: Prof. Narang-Siddarth  
anshu@aa.washington.edu, (206) 543-6679



# ALUMNI SPOTLIGHT

## DISTINGUISHED ALUMNUS

GREGORY C. JOHNSON, BS 77  
(CAPTAIN, US NAVY, RET.)



Photo credit: NASA

After graduating from the UW, alumnus Gregory Johnson attended the Naval Aviation Officer Candidate Program, went on to graduate from the US Air Force Test Pilot School and later served as maintenance department head in an operational A-6 squadron at the Naval Air Station at Whidbey Island, Washington. In 1990, he accepted a position as an aerospace engineer and research pilot with NASA's Johnson Space Center Aircraft Operations, and in 1998 was selected to become an astronaut. Johnson was the pilot for the final space shuttle mission, STS-125, to the Hubble Space Telescope in 2009. The mission was accomplished in 12 days, 21 hours, 37 minutes and 09 seconds, traveling 5,276,000 miles in 197 Earth orbits.

Johnson's presentation at the 2015 A&A Spring banquet was inspirational. His recounting of lessons learned from the Space Shuttle Columbia accident offered key insights that can be broadly applied to engineering professions across the board.

We were delighted to honor Capt. Gregory C. Johnson as the 2015 A&A Distinguished Alumnus in recognition of his distinguished career and service to our country

Johnson is currently a management astronaut assigned as the Acting Chief, Aircraft Operations Division which manages 25 aircraft of five different types. During his illustrious career, Johnson has received many awards and honors, including the NASA James A. Korkowski Excellence in Achievement Award; Carrier Airwing Fourteen and Fifteen Top Ten Tailhook Pilot; three Navy Meritorious Service Medals; three Navy and Marine Corps Commendation Medals; the Armed Forces Expeditionary Medal; and the Humanitarian Service Medal.

## NOTABLE ALUMNUS

DENNIS MUILENBURG, MS 90, A&A  
DISTINGUISHED ALUMNUS 2010



After 30 years of service, Dennis Muilenburg was named as the CEO of Boeing. Muilenburg began his career there as an intern in 1985. He spent the first 15 years

at Boeing in the Puget Sound area and held a progression of key engineering and management positions in support of the defense and commercial airplanes businesses.

Muilenburg was successively promoted to be the director of Weapon Systems for the Joint Strike Fighter, VP Programs & Engineering, Air Traffic Management, VP and general manager, Boeing Combat Systems division and VP Global Services and Support. In 2009, Muilenburg was named as the CEO of Defense, Space & Security for Boeing. Under his leadership, the division won key contracts, including the US Air Force Tanker program.

In 2013, Muilenburg became Boeing's president, vice chairman and chief operating officer sharing in the day-to-day oversight of the company's business operations and global relationships. Two years later, Muilenburg was elected as Boeing's CEO and this March, he was named as chairman of the board.

Muilenburg also serves on the board of directors for the US - China Business Council, the Congressional Medal of Honor Foundation and FIRST (For Inspiration and Recognition of Science & Technology). He is an Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA) and a Fellow of the Royal Aeronautical Society

## YOUNG ALUMNUS

EMMETT LALISH, BS 05, MS 07 PHD 09



Emmett Lalish is from the tiny town of Nordland, Washington on the Olympic Peninsula. He attended Chimacum School until he was 16 when he entered the Running Start program. Running Start

allows students to attend some community colleges and universities, while simultaneously earning high school and college credit. Due to unforeseen circumstances, Emmett ended up leaving his high school but continued forward, earning a GED and ultimately receiving an Associate of Science degree in Engineering from Olympic College in Bremerton. From there, he transferred directly into our department as a junior.

Emmett was well prepared for undergraduate studies in Aeronautics & Astronautics.

Within two years, he earned his Bachelor's Degree, graduating on the Dean's List. Emmett held a summer internship at Blue Origin after graduating and then returned to UW A&A to pursue a Master's Degree in controls, working with Professor Kristi Morgansen's lab and earned his PhD in 2009, writing a dissertation on "Distributed Reactive Collision Avoidance," which was designed as a method of guaranteed safety for automating air traffic control. Emmett accomplished all of this by the age of 24!

After graduation, Emmett joined Moiré Inc., a small, local company where he designed unmanned vehicles and their associated control systems for DARPA. While at Moiré, Emmett also built a 3D printer and began designing art and toys to print with it. (You can see some of Emmett's designs on his website: [www.thingiverse.com/emmett](http://www.thingiverse.com/emmett).) He was showing these designs at a local Maker Faire when he was approached by a manager at Microsoft who had recently formed a 3D printing team. This encounter led to a job offer from Microsoft, and a sudden change of career for Emmett.

Since 2013, Emmett has been working as a senior mechanical engineer at Microsoft, developing geometric algorithms for manifold meshes and is helping shape the 3D Manufacturing Format (3MF) as a new interchange medium for additive manufacturing. Emmett recently returned to A&A to present a seminar for our students on how additive manufacturing is changing how we design and build parts in a variety of industries—especially aerospace.

## ENTREPRENEUR ALUMNUS

JORIS POORT, MS 09



Founder & CEO Joris Poort is responsible for leading the management team at Rescale, a 2011 startup offering cloud-based software platforms and hardware infrastructure for companies performing complex scientific and engineering simulations.

"Aerospace engineering requires significant compute resources to perform massive scale structural, fluid dynamics, thermal, and electrical analyses. Rescale's customers

leverage the latest technology to analyze aerospace applications, ranging from complex turbine analyses to analyzing the structural integrity of wing designs to modelling propulsion flow." - rescale.com



This technology has piqued the interest of more than a few big-name investors. In July 2015, Rescale received \$6.4 Million in seed-round funding from a pool of investors that includes: Sir. Richard Branson (Virgin Galactic), Jeff Bezos (Amazon, Blue Origin) and Peter Thiel (Paypal). The majority of this funding will support sales growth and marketing.

Prior to founding Rescale, Joris worked as a consultant at McKinsey & Company on product development engagements in the high-tech sector. Joris began his career at Boeing, where he worked for four years as a structural and software engineer on the 787 program, optimizing the design of the tail and wings.

Joris holds an MBA with distinction from Harvard Business School, an MS in Aeronautics and Astronautics from the University of Washington, and a BS in Mechanical Engineering with a minor in Applied Mathematics magna cum laude from the University of Michigan.



Photo credit: [www.rescale.com](http://www.rescale.com)

## ALUMNI UPDATES

**Dale Jensen, PE (BS 56)** wrote to tell us about his company, JENTEC, which is developing a rocket engine and building the Gyrodrome®, an un-manned autogyro. Dale visited the University a few years back to

talk to A&A students about efficient rocket engines.

**Suzanna Darcy-Hennemann (BS 81; A&A Distinguished Alumna 1999)** was the 2015 Washington Seafair Queen! Suzanna recently retired from Boeing where she was chief pilot and Boeing's first woman test pilot. She now serves as a member of the A&A Visiting Committee.

**Alek Komarnitsky (BS 84)** hung up his Santa hat last year. For more than a decade, he ran, "Alek's Controllable Christmas Lights" on the web to raise awareness and funds for Celiac research. Alek also delighted us with beautiful photos from his extensive world travels.

**Tom Helgeson (BS 87)** is a senior manager for F-22 Training Systems at Boeing.

**Erik Christofferson (BS 88, MS 89)** was the 2014 A&A graduation keynote speaker. Erik is a member of the Collinear Group, which provides program management and systems integration for aerospace companies. Prior to joining Collinear Group, Erik was vice president of engineering for Raisbeck Engineering.

**Robert McIntosh (BS 89, MS 91)** is chief engineer, Weight Engineering at Boeing Commercial Airplanes Flight Sciences.

**Larry Fransson (BS 91)** is captain and lead pilot for Aero Air, flying medically configured Lear 31s for Airlift Northwest.

**Ki-Seuk Lee (BS 96, MS 98, MEngr 00)** wrote to wish us a happy Lunar New Year. Ki-Seuk is a principal researcher and director of the International Cooperation Center at the Korea Testing Laboratory (KTL). In addition, he travels the world to chair and convene professional meetings and forums such as Joint Regulatory Advisory Committee of the in the Asia-Pacific Economic Cooperation. Ki-Seuk hopes to visit Seattle and the UW this year with his wife and two sons.

**John Funk (BS 01)** is mechanical systems engineering lead for the US Navy, Naval Air Systems Command, where he works on the Navy's E-2C Hawkeye, E-2D Advanced Hawkeye, and C-2A Greyhound programs. John, who is married with two children, says he is fortunate to still get to play with airplanes every day.

Astronaut **Dominic (Tony) Antonelli (MS 02)** retired from NASA after 15 years. Dom-

inic flew on the Space Shuttle Discovery in 2009, and piloted the STS-132 Atlantis Shuttle to the International Space Station in 2010. During his NASA career, Dominic logged a total of 24 days, 3 hours, 57 minutes and 35 seconds in space!



ABOVE: Alumnus Dominic Antonelli (third from left) with NASA Astronauts. Photo credit: NASA

**Kyu Hwang (BS 02)** is program planning director at Vulcan Aerospace in Seattle. Kyu was the guest speaker at our recent Student/Alumni Breakfast.

**Sarah Musi (BS 04)** works for Boeing Commercial Airplanes in Product Development. She currently develops composite manufacturing processes for 777X, 787-9/10 and future airplane programs. Sarah is also an affiliate historian with the Boeing Historical Archives. She worked with Professor Adam Bruckner and alum **Jonathan Lee (BS 02, MS 04)** on a paper about the 1918 Boeing wind tunnel and its influence on the history of the department. The paper was presented by Professor Bruckner at the 2016 AIAA SciTech conference.

**Mazyar Amin (MS 06, PhD 10)** became an assistant professor of engineering technology at Miami University in Ohio. Prior to that he was a postdoctoral fellow and adjunct faculty member at Saint Louis University.

**Mario Manuel (BS 06)** attended graduate school at MIT, where he received his doctoral degree in Applied Plasma Physics and received the 2014 Marshall N. Rosenbluth Outstanding Doctoral Thesis Award. Mario is now an Einstein Postdoctoral Fellow at the University of Michigan in the Climate and Space Sciences and Engineering Department.

**Bhuvana Srinivasan (MS 06, PhD 10)** visited A&A last summer when she was in the Northwest to attend a conference. Bhuvana is now an assistant professor in the Department of Aerospace and Ocean Engineer-

# ALUMNI UPDATES

(CONTINUED)

ing at Virginia Tech. Bhuvana is married to alumnus **Colin Adams (BS 05, MS 09)** who received his PhD from the University of New Mexico. Colin is also an assistant professor in Aerospace and Ocean Engineering at Virginia Tech.

**Marleen (Martinez) Sundgaard (BS 06)**, senior systems integration and test engineer at Lockheed Martin Space Systems, was featured in season two of the PBS special, *MAKERS: Women in Space*.

**Manav Bhatia (PhD 07)** visited Seattle with his wife and two young sons last summer.

**David Schmitt (MS 07)** was selected to attend the US Air Force Test Pilot School last year. David is in the Fighter Pilot Category, 1st Fighter Wing.

**Ian Johnson (BS 08, MS 11, PhD 15)** is a lecturer in the Aerospace Engineering Department of Cal Poly San Luis Obispo.

**Cory McRae (BS 09)** is an instructor at the Navy Nuclear Power School in South Carolina.

**Brian Victor (MS 09, PhD 12)** accepted a position as a research scientist at General Atomics - Lawrence Livermore National Laboratory in California. He will be working on the D111-D Experiment.

**Daniel Zelazo (PhD 09)** made time to present a seminar in the A&A Department last December on his way to a conference in Los Angeles. Dan, who is an assistant professor of Aerospace Engineering at the Technion - Israel Institute of Technology, was hoping to find some snow in the mountains for skiing (a rarity in Israel).

**Isaac Statnekov (BS 10)** works at Space Exploration Technologies (SpaceX) as a lead analyst in the propulsion department where he has worked on regenerative cooling channels and structural, thermal, and fluids analysis in the development of a 3D printed rocket engine (Draco and SuperDraco thrusters) which will be used on the Dragon capsule as an escape engine for astronauts being ferried to the International Space Station.

**Marzieh Nabi (PhD 12)** visited the department this summer. Marzieh is a research scientist and technical project lead at PARC in California. She is also an analyst in residence at HealthTech Capital, which is dedi-

cated to funding and mentoring new health tech start-up companies.

**Natalie (Rodriguez) Watson (BS 12)** has made several visits back to the UW as a representative of Millennium Space Systems in El Segundo, California, where she works as a spacecraft systems engineer. Thanks to Natalie for meeting with our students to discuss job opportunities at Millennium.

**Wei-Hsin Tien (PhD 13)** has joined the Mechanical Engineering Department of the National Taiwan University of Science and Technology as an assistant professor.

**Wenjing Liu Hinkleman (MS 14)** accepted a position as a mechanical design engineer at HAECO Americas. Wenjing is married to A&A alum **Kaifu Hinkleman (BS 08)**. Kaifu, who works at Boeing, is pursuing his MSAA in our department.

**Lt. Colonel Barrett McCann (PhD 14)** joined the US Air Force Academy in Colorado as an assistant professor.

## STUDENT/ALUMNI BREAKFAST SERIES

Our very first student/alumni breakfast was held in March 2016 for the UW A&A Controls group. We welcomed eight alumni from various stages in their careers to share insights & experiences with 25 senior-level and master's-level students. The breakfast was hugely rewarding for students and alumni alike. This will be a quarterly event, focusing on each of our core research areas.



ABOVE: Guests at the 2016 Student/Alumni Breakfast Series

Thank you to the following alumni for participating in the very first "Space & Autonomous Systems" Student/Alumni breakfast:

**Jeanne Suchodolski (MS 98)**

LLM Candidate (U. Nebraska) and Chief District Legal Officer (USCG)

**Kyu Hwang (BS 02)**

Director of Strategic Projects, Vulcan Aerospace

**Dan Klein (MS 05, PhD 08)**

Sr. Research Scientist, Institute for Disease Modeling

**Bryan Munro (BS 05)**

Aerospace Engineer, TLG Aerospace

**Annamarie Askren (BS 06)**

Launch Operations Lead for Crew Capsule, Blue Origin

**Vincent Ethier (BS 11)**

Lead Aerospace Systems & Test Engineer, Tethers Unlimited Inc.

**Jacob Erickson (BS 13)**

Product Development Engineer, Nortis Bio

**Neil Gompertz (BS 13)**

Assembly Integrations & Test Engineer, Spaceflight



## SCHOLARSHIPS, FELLOWSHIPS & AWARDS

*In 2015-2016, 33 A&A students were the recipients of department scholarships, fellowships and awards. An additional 13 students received national and international fellowships and recognition from organizations including the National Science Foundation, the US Air Force, the US Department of Energy, the UW Graduate School, and the UW College of Engineering.*

## FRIENDS OF THE DEPARTMENT

### EMERITUS FACULTY GIVES BACK



PICTURED (R-L): Prof. Vagners and Linda Christianson

Emeritus Professor Juris Vagners and his wife, Linda Christianson, recently established a new endowed fund to support faculty in the controls group. The Juris Vagners and Linda Christianson Faculty Fellowship will provide critical funding to support research activity and career development for controls faculty, with a particular focus on promoting the careers of female faculty.

Prof. Vagners was motivated to find a way to ensure recruitment and retention of excellent female faculty. Until 2002, there had been no women appointed to the faculty in A&A. Now, Professor Kristi Morgansen and Professor Anshu Narang-Siddarth sit on the faculty; both as members of the controls group.

"A dedicated endowment seemed the best approach to ensure this trend can continue," said Prof. Vagners.

Prof. Vagners joined the faculty in 1967. Before that time, control and autonomy were not a central part of the curriculum. Today, controls is one of the fundamental pillars of

aerospace engineering education and has launched students into exploring many other related fields.

The couple hopes to grow their endowment over time into a full professorship – there is currently only one departmental professorship. To those who have considered making a legacy gift, Prof. Vagners shares this:

*"Setting up a legacy gift while one is still alive yields wonderful results in that the donors see the benefits such gifts can provide. Expendable gifts are a nice way to support specific programs, but long-lasting effects can only be achieved via the legacy gift path."*

For more information on creating an endowment in A&A, please contact Katie Frisbie Buntten at [frisb@uw.edu](mailto:frisb@uw.edu) or 206.616.8310.

## IN MEMORIAM



**DALE MYERS (BS 43)** passed away in May 2015 at the age of 93. Dale had an illustrious career, most notably as undersecretary of the Department of Energy, and as NASA associate administrator with responsibility for the Apollo, Skylab, and Shuttle programs. Dale received the NASA and DOE Distinguished Service Awards, and was elected Fellow of the AIAA and member of the National Academy of Engineering. He was the 1982 A&A Distinguished Alumnus. The Dale and Marjorie Myers Scholarship was established by Dale and his wife, and continues to support outstanding undergraduate students.



**JOHN WESTERGAARD (BS 48)** passed away on May 30, 2015 at the age of 94. John worked for The Boeing Company for 42 years on a variety of programs, including the B-17, B-29, Bomarc, Minuteman, and Interim Upper Stage. Two of these years were in support of the US Air Force in Dayton, Ohio. John was a member of the Society of American Value Engineers and a certified value specialist in the Design-To-Cost program. In his retirement, John became interested in wind energy and served as a member of the American Wind Energy Association.



**WILLIAM E. BOEING**  
 DEPARTMENT OF AERONAUTICS & ASTRONAUTICS  
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**[highflight@aa.washington.edu](mailto:highflight@aa.washington.edu)**

The department held its annual Visiting  
 Committee meeting in November 2015,  
 with a new roster of esteemed members  
 that includes:

**Lars Q. Andersen**

Vice President, Advanced 777 Product Development  
 Boeing Commercial Airplanes

**Dana Andrews**

Chief Technology Officer  
 Spaceflight Industries (formerly Andrews Space, Ret.)

**Jason Andrews**

President  
 Spaceflight Industries

**Siva Banda, NAE**

Chief Scientist, Aerospace  
 Systems Directorate  
 Air Force Research Laboratory

**Paul Bevilaqua, NAE**

Chief Scientist  
 Lockheed Martin Skunk Works (Ret.)

**Suzanna Darcy-Hennemann**

Chief Pilot – Director, Flight Training  
 The Boeing Company (Ret.)

**Bonnie J. Dunbar**

MD Anderson Professor  
 Director of Aerospace Engineering  
 Dept. of Mechanical Engineering, University of Houston

**Peretz Friedmann**

Professor and Francois-Xavier Bagnoud Chair  
 Dept. of Aerospace Engineering  
 The University of Michigan

**Kourosch Hadi**

Director of Product Development  
 Boeing Commercial Airplanes

**Laura McGill**

Vice President of Engineering  
 Raytheon Missile Systems

**Rob Meyerson**

President  
 Blue Origin

**Roger Myers**

Executive Director, Redmond Operations  
 Aerojet Rocketdyne

**Elaine Oran, NAE**

Glenn L. Martin Institute Professor of Engineering  
 Dept. of Aerospace Engineering, University of Maryland

**Jaime Peraire**

Department Head  
 H.N. Slater Professor of Aeronautics and Astronautics  
 Department of Aeronautics and Astronautics  
 Massachusetts Institute of Technology

**Jerry Rising**

Chief Engineer for Flight Sciences  
 Lockheed Martin (Ret.)

**Alton Romig, NAE**

Executive Officer, NAE  
 Vice President, Advanced Development  
 Programs Engineering and Advanced Systems  
 Lockheed Martin (Ret.)

**Wei Shyy**

Executive Vice-President & Provost  
 Chair and Professor of Mechanical & Aero Engr.  
 Hong Kong University of Science and Technology

**S. Rao Varanasi**

Chief Engineer, In-Service Structures and Aging Fleet  
 The Boeing Company (Ret.)

**Vigor Yang, NAE**

Chair and William R. T. Oakes  
 Professor, School of Aerospace Engineering  
 Georgia Institute of Technology

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We are grateful for the guidance and expertise of this distinguished group of leaders in academia and industry. The Visiting Committee will meet annually to support the department and shape its future as an international leader in aerospace education.