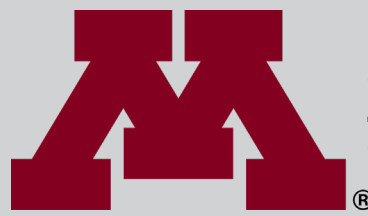


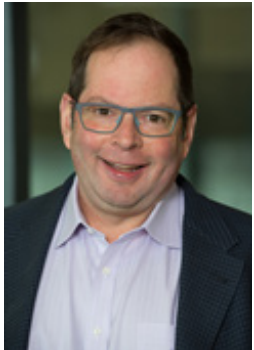
DEPARTMENT OF AEROSPACE ENGINEERING AND MECHANICS



COLLEGE OF
Science & Engineering

UNIVERSITY OF MINNESOTA

Department Update - Summer 2019



Dear Friends,

Minnesota summer is upon us, which provides faculty, staff and students opportunity not only for some relaxation, but also to catch up on research and projects, visit collaborators around the world, and create plans for future endeavors. It also provides opportunity to reflect on our accomplishments the past year.

To our graduating class of 2018, we are proud of you and look forward to hearing about your undertakings in the future. We hope that you continue to connect with the department wherever you may go. I have full confidence that our graduates will go on to great success in their careers, like the four alumni featured in the newsletter. Their stories are an inspiration to faculty and students alike.

Our faculty continue to be acknowledged for their work. Professor Richard James was the recipient of the prestigious Vannevar Bush Faculty Fellow, and Professor Peter Seiler was appointed as the next Russell J. Penrose Faculty Fellow. Professors Filippo Coletti and Joseph Nichols have been promoted to Associate Professor beginning in the fall. I congratulate all of them for these well-deserved honors.

The technology company Seagate made a second generous equipment donation to the Department, which will benefit AEM students in their labs, projects, and classes, as well as students in Physics and Electrical and Computer Engineering. Seagate has been a great supporter of AEM and the College of Science and Engineering, and we are grateful to all the people there who helped make these donations possible.

In the same vein, I would like to acknowledge all our alumni, donors, faculty, and friends. Your generosity is what creates opportunities for our students and faculty to be successful. Your gifts help fund undergraduate scholarships and graduate fellowships, and they also help support student projects such as the Rocket Team and the Minnesota Solar Vehicle Project. Thank you!

Perry Leo
Department Head



What's Inside...

2. Thank you Donors
3. Faculty Spotlight
4. Richard James' Vannevar Bush Fellowship
5. Seagate Donation
6. UMN AIAA Conference
7. Student Fellowships & Award
8. First Four-Seat Solar Car
9. Rocket Team
10. Congratulations Graduates!
11. Senior Exit Survey Results
12. Alumni News
15. In Memoriam



THANK YOU DONORS

The Department of Aerospace Engineering and Mechanics thanks the many generous alumni, faculty, companies, and friends listed below for their donations and commitments to support the department and our students. We are so grateful.

From the Development Office:

In the throes of summer heat, the AEM department is already planning for the next school year just around the corner. We are preparing to welcome new and returning students, many of whom are scholarship and fellowship recipients thanks to the donations of our generous alumni and friends.

We are so grateful for the many ways our alumni support AEM: volunteering, funding student scholarships and fellowships, and donating financial resources to enhance the academic program and specific projects. With your support, we will continue to attract the best and brightest students and retain the most amazing faculty to maintain the excellence of the Aerospace Engineering and Mechanics program.

When you get a letter or a call from the college or one of our students asking for your support, please consider doing so. These gifts are instrumental to the departments. If you have questions or need assistance in making a gift, please contact Kathy Peters-Martell, AEM External Relations Officer, at kpeters@umn.edu or 612-626-8282.



Kathy Peters-Martell
Sr. Development Officer
College of Science and Engineering

Individual Donors

Anil Bajaj
David Anderson
Pierre Beynet
Daniel Baseman
Vibhor Bageshwar
Stephanie & Matthew J. Thomasson
Daniel Van Lith
Paul Freeman
Heming Chen
Ahmet Ozdemir
Michele & David Hughes
John Clemens
Clinton Eckstrom
Kenneth Ewald
Roger Engdahl
Thomas Douma

Harwood & Helen Hegna
Sanjay Garg
Janet Fransen
Alford Hanson
Ronald & Maryanne Gibson
John Girard
J. James & Carol Flaten
Brenda & Mark Haven
Charles Lee
Gene Jorgensen
Gregory & Nancy Johnson
Gerald LeBeau
Michael Jackson
James & Jeanne Licari
James Malone
Gregory Ohrt
Donald & Judy Monson
Thomas Madison

Darren Mason
Cecilia Ortiz Duenas & Christopher Teeuwen
Ajit Roy
David Roberts
Rodney & Patricia Reeve
David & Joyce Quam
Michael Paleen
Peter & Patricia Torvik
David & Donna Sippel
Eric Snustad
William Spetch
Jong Shin
Chien Heng Wu
Dona & Louis Wagner
James & Lois Urnes
Debra Wegner
Anita Westberg

Corporate and Foundation Gifts

3M
Adventium Labs
BAE Systems
Clifton B. & Anne Stuart Batchelder Foundation
Benevity Community Impact Fund
Boeing
Delta Airlines
GE
Honeywell
IBM
Intel YourCause LLC

This listing includes all donation to the AEM department received January 1 - June 30, 2019. For information on giving or alumni involvement, please visit our web page cse.umn.edu/aem/give, or contact Kathy Peters-Martell at kpeters@umn.edu or 612-626-8282 in the College of Science and Engineering Dean's Office.

Professor Peter Seiler Honored with Russell J. Penrose Faculty Fellow

The Department of Aerospace Engineering and Mechanics has appointed Peter Seiler as the next Russell J. Penrose Faculty Fellow.

Seiler has been with the University of Minnesota for 11 years. He started as a Senior Research Associate and was promoted to Associate Professor in 2016. His research focuses on advanced control techniques for wind turbines, unmanned aircraft, and hard disk drives. He works on developing tools to analyze the effect of model uncertainty and nonlinearities on system performance. Seiler is also applying his research to make wind energy more reliable and reduce the cost of wind energy.



The Russell J. Penrose Faculty Fellow, established on Oct. 9, 1990, is a generous gift supported by University of Minnesota alumnus, Russell J. Penrose. The fellowship is awarded to “obtain and retain distinguished faculty who are outstanding in their teaching and research capabilities.” It is also a financial resource in recognition of successful research and outstanding contributions to the field and the department.

Seiler intends to use the Penrose Faculty Fellowship to continue his current research as well as pursue a new area in robustness issues associated with data-driven (machine-learning) control methods. Prof. Seiler said, “I’d like to acknowledge everyone in the department. They’ve been supportive from the beginning of my career and I’ve had many valuable interactions. It’s truly been a privilege to be a faculty member in AEM.”

Professor Filippo Coletti Promoted to Associate Professor

Filippo Coletti received his B.S. in Mechanical Engineering from the University of Perugia in Perugia, Italy in 2003. He earned his Masters of Science in 2005 and his Ph.D. in Aerospace Engineering from the University of Stuttgart in Germany and the von Karman Institute in Belgium in 2010. His research focuses on turbulence, particle laden-flows, and respiratory and cardiovascular flows. He worked as an Assistant Professor from 2014-2018 and became a McKnight Land-Grant Professor in 2018.

Professor Joseph Nichols Promoted to Associate Professor

Joseph Nichols earned his B.S. in Computer Science and another in Computer Engineering in 1999. He received his M.S. in Mechanical Engineering from the University of Washington in 2001 and his Ph.D. in Mechanical Engineering in 2005. Professor Nichols' research spans different areas such as aeroacoustics, hydrodynamic stability analysis, large eddy simulation, and turbulent reacting flows. He has been an Assistant Professor at the University of Minnesota since 2013.



The Department of Aerospace Engineering & Mechanics has launched a new website!
Visit cse.umn.edu/aem/ for more information.

Professor Richard James Receives Vannevar Bush Faculty Fellowship

Richard D. James, a University of Minnesota Distinguished McKnight University Professor in the Department of Aerospace Engineering and Mechanics, is one of only 10 scientists and engineers nationwide to be selected to receive a 2019 Vannevar Bush Faculty Fellowship from the U.S. Department of Defense—the agency’s most prestigious single-investigator award.

The Vannevar Bush Faculty Fellowship provides \$3 million over 5 years to advance transformative, university-based fundamental research.



The fellowship will support James’ research on the discovery of materials using advanced mathematical concepts, with a focus on phase transformations in crystals.

“I am truly honored to receive this award,” James said. “Our work is at the intersection of mathematics, materials science and mechanics, and, above all, this is recognition

for highly interdisciplinary research. It will allow us to explore the possible existence of materials, such as a shape-memory ceramic, a crystal that undergoes light-induced phase transformation, and a ideally soft magnetic material, that are considered sufficiently unlikely as to be outside the realm of ordinary funded research.”

A sub award of the project will go to James’ collaborator Professor Bharat Jalan, an associate professor in the Department of Chemical Engineering and Materials Science. Jalan pioneered the synthesis of thin films of advanced materials by hybrid molecular beam epitaxy. The James-Jalan team is designed to translate theoretical predictions into unprecedented materials without delay.

“Professor James is a pioneer in the science and engineering of functional materials, and we are extremely proud of the richly-deserved recognition and support he is receiving as a Vannevar Bush Faculty Fellow,” said University of Minnesota College of Science and Engineering Dean Mos Kaveh.

“As a college of science and engineering we take great pride in our culture of multidisciplinary research and education across sciences, mathematics, and engineering. The partnership between Professors James of aerospace engineering and mechanics and Jalan of the chemical engineering and materials science is a great example of such a collaboration.”

Sir John Ball, a mathematics professor at Heriot Watt in the United Kingdom, said, “As a longstanding mathematical collaborator of Professor James, I have always been struck by his unswerving belief in the power of mathematics to describe materials. It is this belief that enabled him and his research group to find alloys with special compositions allowing unusual microstructure geometry that has resulted in amazing properties to form the backdrop for this very well-deserved award.”

In addition to his research, James has received the Theodore von Karman Prize from SIAM, the William Prager Medal from the Society of Engineering Science, the Warner Koiter medal from ASME, the Brown Engineering Alumni Medal, the George Taylor Research Award and an Alexander von Humboldt Senior Research Award.

The Vannevar Bush Fellowship supports out-of-the-box ideas where researcher creativity intersects with the unknown. The fellowship supports top-tier researchers at U.S. universities whose high-risk, high-payoff work is of strategic importance to the Department of Defense. Dr. Bindu Nair, deputy director for Basic Research in the Office of the Under Secretary of Defense for Research and Engineering said, “The Vannevar Bush Faculty Fellowship reflects the department’s commitment to support paradigm-shifting research that explores the unknown, engages outstanding scientists and engineers on these challenges, and helps to define and transform our research agendas of the future.”

Charitable Donation from Seagate

The AEM Department has received another generous donation of equipment from the technology company, Seagate. This donation was distributed to the departments of Aerospace Engineering & Mechanics, Electrical and Computer Engineering, and Physics & Astronomy.

Seagate has a close partnership with the University of Minnesota; it has funded numerous research projects with the university and many graduates are hired at Seagate. With more than 100 UMN graduates hired at Seagate within the last eight years, and over 400 current employees holding degrees from the university, the school provides Seagate with the largest number of hires from any institution in the world.

The Department recognizes and thanks Mark Dubé, Jim Fisher, and the team at Seagate for their efforts and diligence. Professor Peter Seiler and scientist Kale Hedstrom were also instrumental in organizing and arranging all the pieces of this operation. These individuals made the donation process possible, and the Department offers them much gratitude and appreciation.

Of the equipment received, one of the two Dini Group DNV7F2A development systems and two Huius Multi FPGA Prototyping LX330 boards went to the physics department. Multiple other units went to the Electrical and Computer Engineering department.

Professor Kurt Wick said the physics department is hoping to use the Multi FPGA prototyping board and FPGA logic prototyping system in the MXP (Methods of Experimental Physics) course. The class has about 60 physics students annually who learn basic digital logic concepts and Verilog programming to familiarize them with analog-to-digital conversion and computer interfacing to the physics department for their experimental physics class.

The Aerospace Engineering Small Satellite Laboratory will receive multiple units as well. While this helps roughly 30 students in both AEM and Physics, it will particularly affect the CubeSat project. The Epsec thermal shock chamber will be used for thermal testing of satellite components. The Nikon profile projector will be used for circuit board inspection, and the Fluke and Bendix multimeters, the Lecroy oscilloscope and the HP counter will be used as general purpose lab equipment.

The HP 35670A signal analyzer will be used for the vibrations experiments in the Aerospace Engineering Aeromechanics Laboratory, AEM 4602W. As AEM's main undergraduate lab class, between 70 and 80 students handle the equipment each year. The Polytec vibrometers will be used by the department of Aerospace Engineering for structural system analysis and other departmental research.

The Department is grateful for Seagate's generosity and thoughtfulness. Generous gifts such as these are instrumental in supporting students, faculty, and academic programs and help shape the future for everyone in Aerospace Engineering & Mechanics.



University of Minnesota Hosts 2019 AIAA Region V Student Paper Conference

The American Institute of Aeronautics and Astronautics 2019 Region V Student Conference was held in April at the University of Minnesota in Akerman Hall. The event was an outstanding success, bringing together students from six different universities across the Midwest.

In total, 53 students participated in the conference, including five students from the University of Minnesota. Additionally, AIAA student officers from the University of Minnesota helped with planning and administrative aspects of the conference. Participating Universities included: the University of Minnesota, University of Colorado Boulder, Air Force Academy, Missouri University of Science and Technology, and St. Louis University.

Hosted annually by different Region V chapters, the objective of the conference is to provide students with an opportunity to present their research and technical papers in competition, with the goal of preparing students for a future in aerospace engineering.

In addition to research competitions, this year's conference also included an AEM open house, presentations on the department's various research and teaching labs, and a tour of Honeywell's facilities.

University of Minnesota undergraduate students Robert Halverson and Sophia Vedvik, and University of Minnesota graduate student, Kail Laughlin, competed in the team division at the conference. The trio presented a proposal called the "Advanced Horizons" mission, which is a follow-up to NASA's New Horizons Mission. The team worked together to design a spacecraft capable of exploring the surface geography and makeup of Pluto.

The winners of the 2019 Region-V Student Conference undergraduate division were Reese Fairchild and Matthew Green from the United Air Force Academy, and the winner of the master's division was Kevin Farmer of St. Louis University.



UMN Team Presenting at AIAA Conference

Valerie Lesser, Christopher Percy, Vishranth Siva, and Colin Sullivan from the University of Colorado at Boulder claimed first place for the team division. AIAA awarded the winning team \$500 and a trip to the AIAA SciTech Forum in January 2019.

This event would not have been possible without the sponsors who donated generous gifts and support. The department would like to thank the companies who sponsored the event: AIAA Foundation Advancing Aerospace, Honeywell, Lockheed Martin, and Northrop Grumman.

Special thanks is also given to the conference's Committee Chair Members, Kristen Gerzina, chair of the AIAA Twin Cities Section; Professor Yohannes Ketema, faculty advisor for the UMN AIAA Student Branch; Tiger Rost, President of the UMN AIAA Student Branch; Robert Halverson, Treasurer of the UMN AIAA Student Branch; Barret McCann, AIAA Region V Deputy Director- Education; Rachel Dowdy, Student and Regional Communities Coordinator; as well as all of the conference judges: Paul Gross, UMN Alumnus, Northrop Grumman employee; Kristen Gerzina, AIAA Region V's Deputy Director of Finance, Northrop Grumman employee; David Myren, Aero Systems Engineering employee; Kevin Mikkelsen, Aero Systems Engineering employee; and Dan Dumbacher, Executive Director of AIAA.

Nicholas Morse

John and Jane Dunning Copper Fellowship



Nicholas Morse received his Bachelor's of Science in Aerospace Engineering, and Mechanics in 2018. He is now working with Professor Krishnan Mahesh on simulations of fluid flows around maneuvering marine vehicles using novel computational methods developed by Mahesh's group.

Ali Fakhreddine

John and Jane Dunning Copper Fellowship



Ali Fakhreddine received his bachelor's degree in Mechanical Engineering in the spring of 2018. His research focuses on Computational Fluid Dynamics and Multiphase Flows. He is currently working on cavitation with Professor Krishnan Mahesh, which he describes as "the formation of vapor bubbles or clouds in a liquid due to a significant drop in pressure in one or more regions of the flow." Fakhreddine intends to "simulate cavitation by adding compressibility effects to an existing incompressible flow code instead of solving the full Navier-Stokes equations."

Thomas Gross

John and Jane Dunning Copper Fellowship



Thomas Gross received his bachelor's degree in Mechanical Engineering in 2016. He joined the Aerospace Engineering and Mechanics department at the University of Minnesota in 2018 to pursue his Ph.D. in computational high temperature gas dynamics. He is currently working alongside Professor Schwartzentruber to develop molecular-level chemistry models for non-equilibrium gas physics relevant to hypersonic flight.

AEM Graduate Student, Manash Chakraborty, Wins Travel Award



Manash Chakraborty, a graduate student and research assistant in the AEM department, won a travel award at the Midwest Workshop on Control and Game Theory on April 28th. The MWCGT is a major event in the Midwest that brings together students, researchers, and practitioners in control and game theory. The event was hosted by Washington University in St. Louis, Missouri.

Chakraborty's poster titled "Conic Controller Synthesis with Gain-Scheduled Internal Models for Robust Trajectory Tracking," is based on his doctoral work with Professor Ryan Caverly.

The poster displayed a controller synthesis method using Conic Sector Theorem and Internal Model Principle. This creates a robust controller with excellent tracking performance. Chakraborty presented a visual

depiction of the proposed synthesis method and showed how it can be implemented in a gain-scheduled fashion.

First Four-Seat Solar Car

The University of Minnesota Solar Vehicle Project designed and built the first four-seat solar powered vehicle, called Freya 1, which is expected to compete at the 2019 World Solar Challenge in Australia next fall.

The University of Minnesota Solar Vehicle Project was founded in 1990, and the organization has since competed 13 solar-powered vehicles in over 30 solar challenges internationally. The group, comprising of AEM, ECE, and ME students, has been very successful, holding the world record for the most wins at the Formula Sun Grand Prix making it the #1 Cruiser Class Solar Team in America.

Freya 1 will be the student group's first four-seat vehicle. This innovation will push solar car technology towards the consumer market.

The process of building a solar vehicle car requires an extensive amount of time and effort. Students must first build many molds using tooling foam that shapes the carbon fiber shell. Then, the molds are taken to a Delta Airline Composite Shop to create the shell. Once the shell is put together, a carbon fiber chassis is installed to make the solar car stay together. Students add the car's suspension, steering, wheels, electronics, doors, solar array, and other additional components the car needs, all of which are designed from scratch. Students also have to put aside a considerable amount of time to make a lithium ion battery pack that is safe and reliable and also an electric motor that will be able to drive the solar car up to 70 mph and over 30,000km across the Australian Outback.



The Solar Vehicle Project Team has raced in more than 30 solar challenges and has travelled to four different countries.

Rickey Sipila, the director of operations for the University of Minnesota Solar Vehicle Project, said that: "The experience has been amazing and it has given me so much real-world experience. I am confident that once I graduate and go into the workforce, I will be prepared."

The UMN Solar Vehicle Project is funded through the College of Science and Engineering and departments such as Electrical and Computer Engineering, Aerospace Engineering and Mechanics, and Mechanical Engineering. Generous donations from individual and corporate sponsors are also key to the project. To support the UMN Solar Vehicle Project, you can contribute to its fundraiser, "Adopt-A-Cell," which all proceeds go towards funding Freya 1.

University of Minnesota Rocket Team Conducts Successful Flight

The University of Minnesota's Rocket Team is celebrating a successful year, having competed at IREC and winning first place in their category. Out of the nine teams that participated in the 30,000 ft. Student Researched and Developed (SRAF) solid motor category, only three teams had a successful launch.

IREC is an annual competition where student teams attach a 4kg payload to a rocket that must reach a specific altitude. The categories for the competition are commercial off-the-shelf motor, SRAD solid, and SRAD hybrid/liquid. Each propulsion category is also split into 10,000 feet or 30,000 feet.

The competition started with a poster presentation day, followed by the first launch day. The Minnesota team reached an altitude of 27,800 feet and the rocket only suffered minor damage, making it the most successful IREC for the team in years.



The Minnesota team's rocket had a 6 inch diameter and was 13.3 feet tall. Students created the rocket out of carbon fiber, and fiberglass for RF transparency. Students also developed a propellant formulation, from which the motor was able to produce almost 1000lbs of thrust for 8 seconds.

While the payload for the rocket not recovered, the team was pleased that the parafoil seemed to open.

Apart from IREC, the team also created a high altitude rocket. While they did not use this rocket for the competition, it managed to reach an altitude of 44,900 feet and a speed of Mach 3.3, which is the new club record.



Congratulations Graduates!



BAEM recipients:

Nasser Al-Rasbi	Alexander Eakins	Luke Hubbard	Loretta Onchiri	Zachary Simons
Yaqub Ali	Amanda Epstein	Ryan Ichinose	Athanasios Pantazides	Jermaine Smith
Daniel Anderson	Zi Min Er	Richard Immanuel	Garrett Peloquin	Kory Soukup
Jeremy Anderson	Kevin Falcetano	Maxwell Jetzer	David Pfeifer	Noah Storm
Ali Bakri	Samuel Feltis	Ryan Jones	Jack Popa	James Tait
Clayton Beck	Evan Fuller	Garrett Kluz-Wisniewski	Anand Pradhan	Ryan Thomas
Ryan Beczkiewicz	Joseph Gallagher	Joel Krieger	Lincoln Priebe	Daniel Toth
Jessie Bergerson	Alessio Gardi	Cody Laakkonen	Joseph Prom	Abigail Valero
Matthew Blenis	Nathan Gassie	Luke Lammers	Syed Raza	Ryan Vandaalwyk
Ryan Bowers	Mitchell George	Robert Licari	Clark Reiter	Riandro Vogt
Nathaniel Bracken	Joseph Geronime	Vincent Lim	Hamidreza Rezaei	Steven Weese
Benjamin Brix	Syed Anas Ghazanfar	Sophia Litkewitsch	Tiger Rost	Elaina Weingartner
Matthew Chookiatsirichai	Jeng Yi Gwi	Stephen Marker	Ricardo Saborio	Austin Wersonske
Henry Clark	Robert Hartman	Torin McCabe	Henri Sanness Salmon	Jacob Woeltjen
Keegan Clay	Christopher Havlik	Brian Miller	Taylor Scowcroft	Kevin Wollner
Emily Daniel	Riley Hillstrom	Jame Moua	Sean Shen	Curtis Zicker
Dan Dao	John Houliston	Nicholas Nagorski	Caleb Sigfrid	

AEM Masters and PhD recipients:

Steve Alwin	Peng Mun Siew	Leonardo Le
Saurav Aryan	Huaijin Yao	Yixuan Li
Lucia Baker	Ross Chaudhry	Prakash Shrestha
Caleb Carlson	Fan Feng	
John Reinert	Sidharth G S	
Joel Runnels	Nathaniel Hildebrand	
Lauren Schlenker	Wyatt Horne	
Min Shi	Jacob Keller	

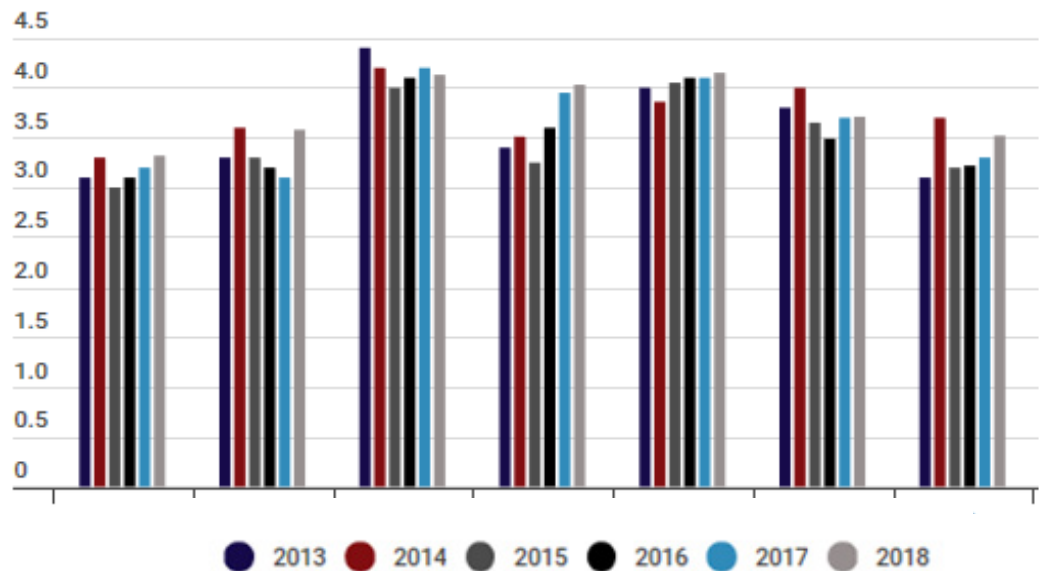
Congratulations to this year's BAEM, MS, and PhD graduates on all of their accomplishments!

Senior Exit Survey Results

Each year, graduating seniors complete a 30-question survey evaluating the AEM program. The survey touches on their experiences both as lower division and upper division students as well as their perceived quality of education, advising, and learning environment. Questions are ranked from 1 to 5, with 5 as the best score. The scores shown below indicate that students are learning the academic material, and that their preparation to use engineering tools has been steadily increasing in recent years. We suspect this is due to student participation in Senior Design courses, in which students often must know how to use computer aided design programs in order to succeed in their projects. Moreover, with the implementation of freshman courses like “Introduction to CubeSats,” students are exposed to these engineering tools very early in the undergraduate program.

Categories

1. Preparation to use engineering tools like CAD
2. Quality of AEM Advising
3. Knowledge of Aerodynamics
4. Knowledge of Aerospace Structures
5. Knowledge of Atmospheric Flight Mechanics
6. Quality of Design Experience
7. Quality of Lab Facilities



AEM Undergraduate Program Objectives

1. Consistent with the mission of the University of Minnesota, graduates of the BAEM program will be successfully employed in aerospace or other high technology industries.
2. Graduates admitted to graduate level studies in engineering and other professions will obtain an advanced degree.

Outcomes

Upon completion of the AEM degree students will have:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

Presidential Early Career Award for Scientists and Engineers

President Donald Trump announced the recipients of the Presidential Early Career Award for Scientists and Engineers (PECASE) on July 2.



AEM alumna, Kelly Stephani, was among the scientists and engineers chosen for this honor.

Stephani is currently an Assistant Professor in Mechanical Science and Engineering at the University of Illinois at Urbana-Champaign primarily researching fluid mechanics. She is also a Faculty Affiliate

for the department of Aerospace Engineering at UIUC. She earned her B.S. in Aerospace Engineering and Mechanics from the University of Minnesota in 2005, and she received her M.S. and Ph.D. in Aerospace Engineering from the University of Texas at Austin.

Professor Stephani's research interests are in hypersonics and high-temperature aerothermodynamics, surface chemistry and plasma-surface interactions, kinetic methods for non-equilibrium reacting flows, kinetic theory and transport processes, and fluid mechanics and thermal sciences. She is a member of the American Physical Society, an Associate Fellow of the AIAA, and was awarded the AFOSR Young Investigator Research Program Award in 2017.

From the press release, "The PECASE is the highest honor bestowed by the United States Government to outstanding scientists and engineers who are beginning their independent research careers and who show exceptional promise for leadership in science and technology."

"Established in 1996, the PECASE acknowledges the contributions scientists and engineers have made to the advancement of science, technology, education, and mathematics (STEM) education and to community service as demonstrated through scientific leadership, public

as demonstrated through scientific leadership, public education, and community outreach. The White House Office of Science and Technology Policy coordinates the PECASE with participating departments and agencies."

To learn more about Professor Stephani, visit z.umn.edu/4faa.

An Inspiration in Cybersecurity

Laura Lee, a University of Minnesota AEM Alumna, and now Executive Vice President of Rapid Prototyping at Circadence and award-winning cyber professional, traces the start of her successful career to her "Introduction to Aerospace Engineering" class at the University of Minnesota.

"I remember that we had to do a paper as the final project in that class and it was a lot of work. As I assembled the paper into its cover, I wrote "The End" in pencil on the inside back cover. I didn't expect anyone to see it – I was just glad that I finished this long (and at the time, challenging) review of a topic in Aerospace. When I got my paper back, the professor gave me an "A", wrote great comments, and then crossed out "the end" and wrote "The Beginning". That was 1984 and it stuck with me."

Her time at the University of Minnesota truly was the beginning as her career brought her to the Pentagon in D.C., to a remote military training camp in West Virginia, around the world supporting troops, and even in front of cameras on live television.

"The first part of my career was in Washington, DC, working at the Pentagon every day to help build the capabilities for Missile Defense (protecting our nation and allies against Ballistic Missile attacks). It was a lot of



Laura Lee

all-night sessions and very senior briefings both in the US and internationally. I was constantly challenged, not only technically, but also to be able to communicate at all levels of government. I think that my briefing to the State Department and members of the Russian Duma--their legislative body--was a moment that stands out. Perhaps it is the sheer terror of that kind of public speaking, or that my briefing charts were written in Russian or that it was the culmination of my work in Missile Defense that makes it memorable,”

The most memorable part of her career was leading a six-week intensive cyber defense course for the US Army and Navy teams. “We were sequestered in a remote area of West Virginia and worked non-stop for six weeks, implementing and testing the approach I had developed. Watching the teams grow technically was amazing and I actually cried at the final ceremony when we recognized the distinguished graduates and they presented me with a special gift. The US Cyber Mission Forces later adopted my cyber defense training strategy as their standard.”

“Cybersecurity is something that my company specialized in since the beginning of the Internet and it is an amazing field to be involved in. Since we had now developed and deployed a Missile Defense system, my initial foray into cyber was about protecting that. As my career in cyber, continued to evolve in the early 2000's, I focused more on cyber defense in general for the military.”

While working at Circadence, a market leader in next-generation cybersecurity readiness, Lee has been a part of many projects, one of the most important being Project Ares. Project Ares is a cybersecurity learning platform available to enterprises, government teams, and academic institutions where people can learn about critical security challenges.

Lee also finds herself volunteering to talk at schools to inspire younger generations to enter the cybersecurity field. “My favorite activity is talking to Middle School STEM classes or at “Girl’s and Boy’s Club” afterschool program. To them, I’m this really old person who explains the internet and gets them excited (they were born the same year as the iPhone so exciting them can be a challenge). We walk through a cyber-attack kill chain, play games that explain Hexa-decimal/Binary conversion

and how the Internet protocols work. I hope that I inspire at least one student to pursue a career in cybersecurity every time – who knows, maybe I do.”

Lee earned her Bachelor’s of Science in Aerospace Engineering and Mechanics from the University of Minnesota in 1984, a Master’s in Aerospace Engineering from Notre Dame in 1986, and a Juris Doctorate from George Mason School of Law in 1995.

Heather McDonald: Rocket Scientist

Written by Kermit Pattison

Heather McDonald makes sure that astronauts never again repeat the famous line, “Houston, we have a problem.”

McDonald, a career NASA employee, serves as the chief engineer of the International Space Station (ISS). She is the first female to hold the position in the 20-year history of the space station.

“I feel very lucky I have a job I love so much,” said McDonald (Aerospace Engineering and Mechanics ’92). “One of the things I love is how much I get to learn, grow, and expand my knowledge literally on a daily basis.”

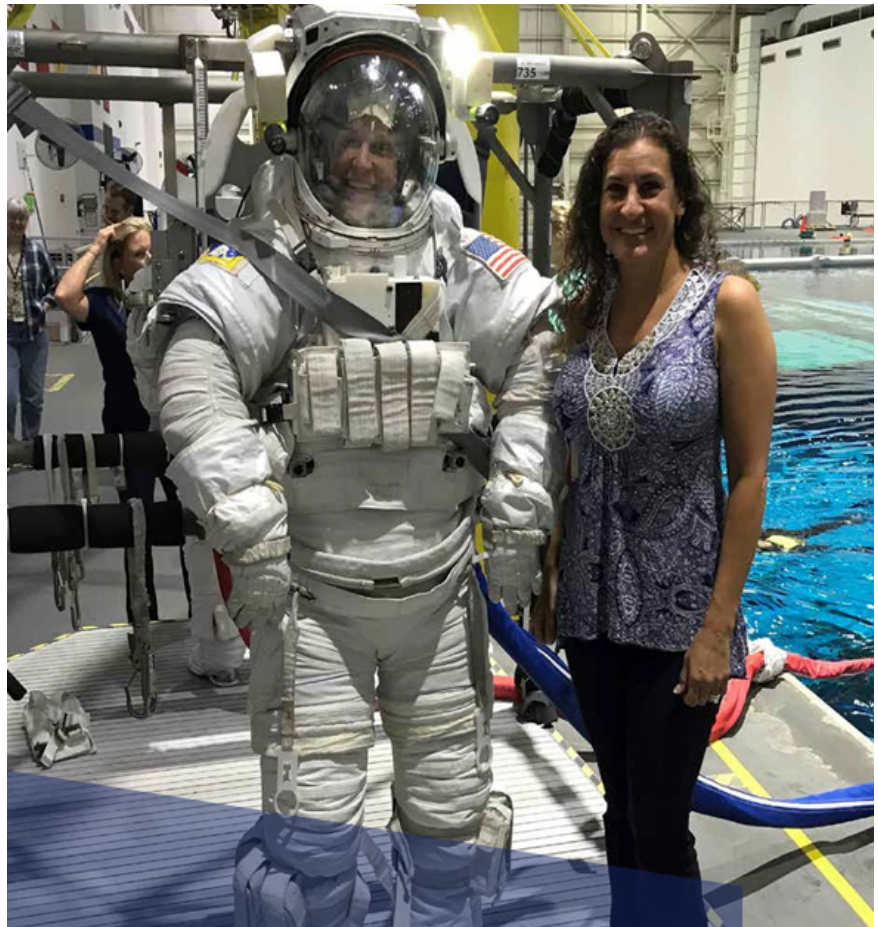
McDonald helps integrate the work of about 20 different engineering units within NASA from navigation to thermal control to avionics to keep the ISS orbiting the earth and accomplishing its science objectives. Her purview covers all space station engineering operations plus the fleet of vehicles that travel to and from it. Her job also entails coordinating with the Russian, Japanese, European, and Canadian space agencies, and private companies such as Elon Musk’s Space X.

“If something breaks on the ISS, Mission Control engages my team to help solve the problems,” she said. “Our job is also to assess activities and hardware in advance to ensure they don’t break.” McDonald traces her interest in aerospace to growing up near the Air National Guard base in Duluth. When the family heard the roar of military jets, they hurried outside or drove to the airport to watch F-4 and F-16 fighter planes practice takeoffs and landings.

She enrolled in the University of Minnesota–Duluth intending to major in math but shifted to aerospace engineering, transferred to the Twin Cities campus, and launched a career that led to space. She joined CSE’s co-operative program (in which students alternate semesters of academic work with fulltime employment) in 1989 and spent four quarters working at the Johnson Space Center in Houston.

McDonald has spent her entire career at the center (including 16 years of part-time work while raising three children). Some engineers thrive in narrow silos, but McDonald prefers working across disciplines and interacting with many departments—which is exactly what she does today. Her team ensures that every piece of hardware and software for the space station meets NASA requirements and “everything works together as an integrated system.”

“Growing up, I enjoyed looking at the night sky,” she said. “Never did I imagine the dreams born at the University of Minnesota would connect me so closely to the stars.”



*International Space Station chief engineer Heather McDonald (AEM '92) with an astronaut who was about to enter the Neutral Buoyancy Laboratory, a pool used for spacewalk training.
Photo by Chris Hansen*

NASA's Next Space Grant Project Manager



Chad Rowe, an AEM alum and Aerospace Engineer at NASA, is the next Space Grant Project Manager. “Space Grant is responsible for broadening the reach of the agency through the national network of 52 consortia in all 50 states and the District of Columbia and the Commonwealth of Puerto Rico. Responsibilities include the program and professional development of center based representatives across 10 regional NASA centers and Headquarters, and give oversight to project, solicitations and congressional directed budget.”

Chad began his career at NASA as a co-op in 1991. He began full time employment with NASA in 1994 in the Engineering Directorate as a Space Shuttle flight experiment engineer and later as an ISS guidance, navigation, and control system integration engineer. He transitioned into the ISS Program Office in 2002 as the Hardware/Software Integration Manager, and progressed in leadership positions within the ISS and Orion Programs.

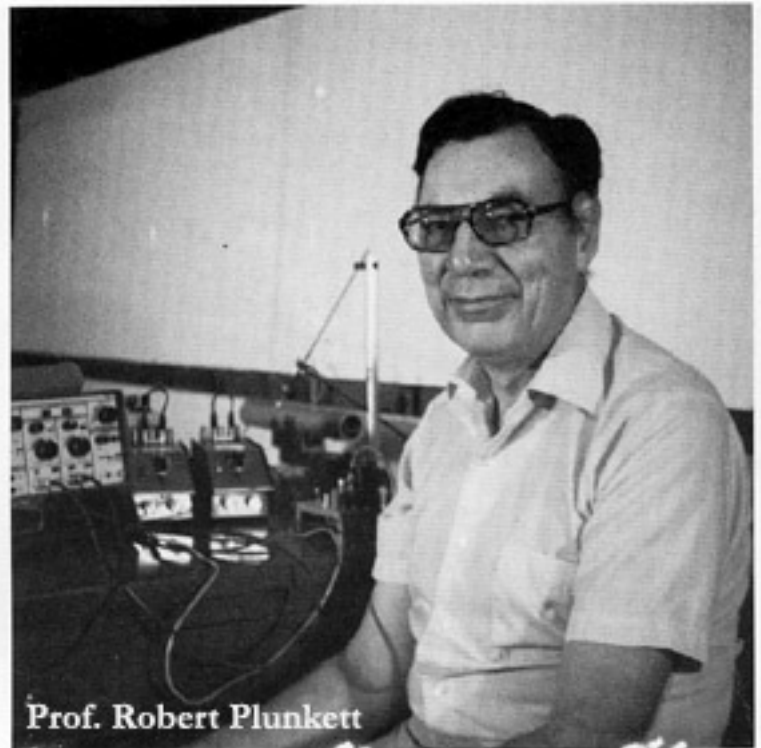


Thomas Madison

AEM Alumnus, Thomas Madison, has passed away. He graduated in 1959 with a Bachelor of Science degree in aeronautical engineering. Thomas Madison received the Outstanding Achievement Award from the University of Minnesota in 2010 and was a member of the AEM Professional Advisory Board (PAB).

Professor Emeritus Robert Plunkett

Professor Emeritus Robert Plunkett passed away in April shortly after celebrating his 100th birthday. Professor Plunkett was a member of the AEM faculty from 1960 until 1988. He was internationally known for his research in vibrations and his experimental measurements of mechanical behavior of materials. He was elected to the National Academy of Engineering in 1974. He was very active in the ASME where he held several national offices. Professor Plunkett originally came from New York City and attended MIT where he received all of his degrees. He served as an officer in the United States Army in Northwest Europe during World War II. Before joining the faculty at the University of Minnesota, Professor Plunkett was the resident expert on vibration at the General Electric Research Labs. As a faculty member at the University of Minnesota, he was active in teaching at both the graduate and undergraduate levels and supervised the research of numerous Master's and PhD students. After he retired he and his wife Katy moved to Austin, Texas, where he was living at the time he passed away. He is survived by three children Chris, Brian, and Peggy as well as several grandchildren.



Prof. Robert Plunkett

Aerospace Engineering and Mechanics
University of Minnesota
107 Akerman Hall
110 Union St SE
Minneapolis, MN 55455

Nonprofit Org.
U.S. Postage
PAID
Twin Cities, MN
Permit No. 90155

♻️ Printed on recycled and recyclable paper with 10 percent postconsumer waste material.

The University of Minnesota is an equal opportunity educator and employer.

Tel: 612-625-8000
Fax: 612-626-1558
aem-dept@umn.edu

PROFESSIONAL ADVISORY BOARD

The AEM Professional Advisory Board (PAB) met in April, 2019. The PAB meets annually with faculty and students to evaluate and discuss AEM programs and provide advice on educational and professional issues. The board consists of industry professionals from local and national industries. The PAB appreciated the thorough overview of the department and believes that this afforded the board a more detailed picture to base their recommendations on.

Comments from the Board:

- Mentorship of AEM students has improved, but more can be done for 1st and 2nd year students.
- The Board has noticed an increased visibility in student projects; this should continue to be an emphasis in AEM.
- Evaluate whether Senior Design projects could be done with other engineering departments for an interdisciplinary design project effort.
- The Board is impressed with the steps taken to increase diversity in the department.
- The Board commends the students for their effort on their thorough Student Advisory Board (SAB) report.