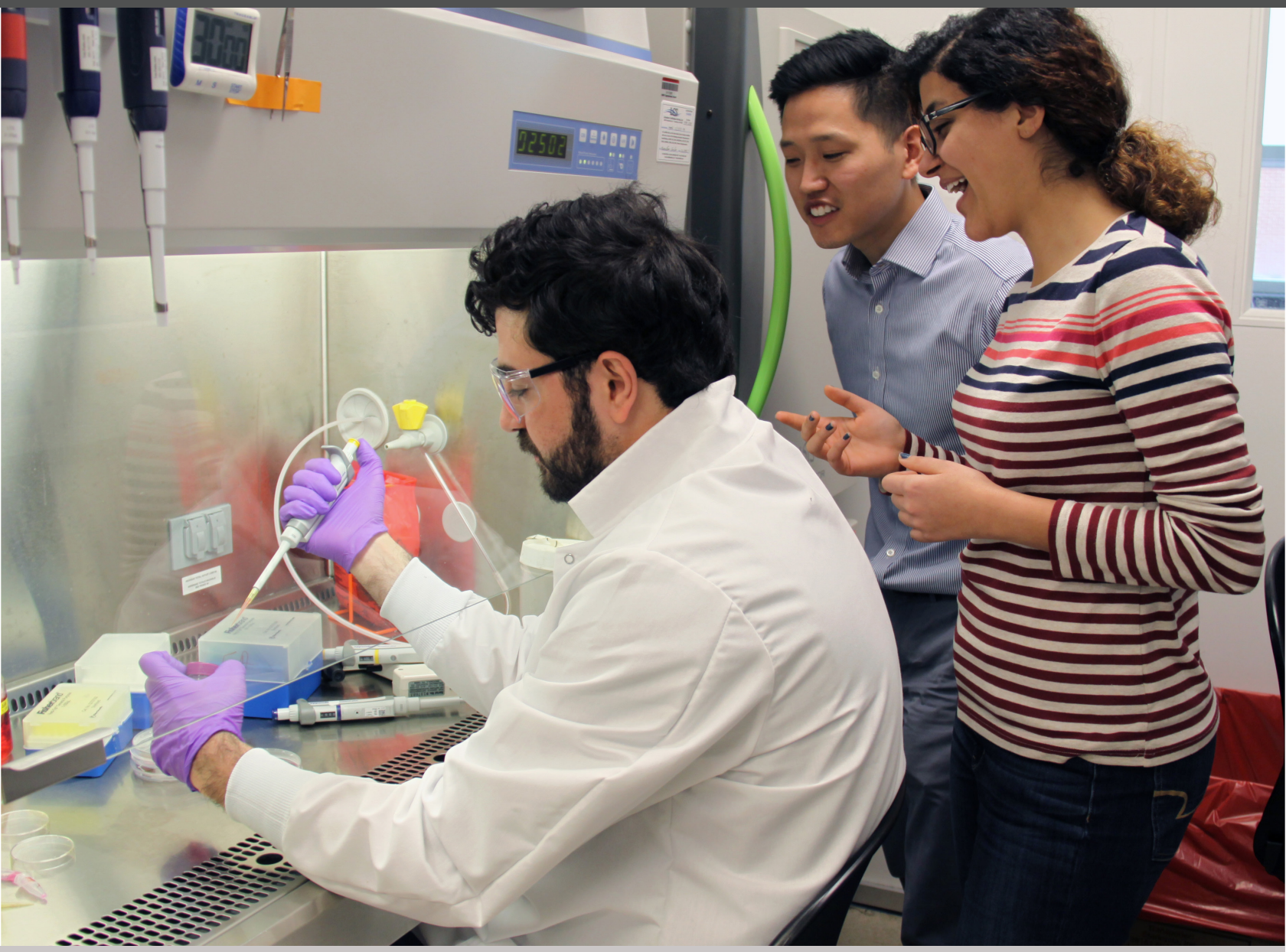
THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

2018

EXCHANGE

ALUMNI NEWS Department of Mechanical and Aerospace Engineering



MESSAGE FROM THE CHAIR

Cultivating success, building leaders

This year in the Department of Mechanical and Aerospace Engineering, our students and faculty have expanded their research efforts to create solutions aimed at meeting the needs of a society more reliant on technology than ever before.

Experiential learning continues to be a priority across the department. As a snapshot, our students have the opportunity to work in the machine shops, investigate smart mobility projects, conduct experiments at the Nuclear Reactor Lab and undertake research with unmanned aerial vehicles.

Our expertise in engineering for health and wellness continues to grow. Funded by the National Institutes for Health, our faculty aim among other things to establish a fundamental understanding of blood vessel permeability, which could ultimately improve ways to limit excessive blood vessel growth during disease progression (page 18).

Faculty in our Nuclear Engineering Program are using their expertise to equip students of various STEM majors with foundational knowledge of nuclear engineering systems, through the minor in nuclear engineering (page 6).

Developing tomorrow's leaders is high on the department's agenda. With nine doctoral graduates placed into tenure-track faculty positions over the past year and others in technical leadership positions in industry and government, our alumni are making a global impact across all three sectors: academia, industry and government.

As you read this year's *Exchange*, you will see how solutions have driven our motivation for research and innovation. From record-setting rockets to research at the intersection of health and engineering, improving society is at the heart of what we do.

Vish Subramaniam

Professor and Chair
Department of Mechanical and Aerospace Engineering
The Ohio State University

Cover: graduate student Ehsan Akbari (left), Assistant Professor Jonathan Song and graduate student Melika Shahhosseini in the lab

Experiential education

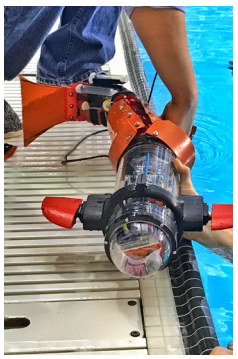
Equipping students with technical knowledge and interpersonal and professional skills

Today's graduating students are expected to be experienced in designing, building and prototyping. By enhancing our course offerings and capstone projects, we aim to further prepare our undergraduates to be at the forefront of the global engineering workforce.

Experiential learning drives success

Experiential learning involves applying classroom knowledge to practical projects. This allows students to directly engage with concepts by experience. Comprehensive manufacturing shops and student laboratories offer modern spaces for students to build prototypes and work with hardware and software. From using traditional machining techniques to leveraging our on-site 3D printing technologies, students learn how to take their ideas from paper to reality.

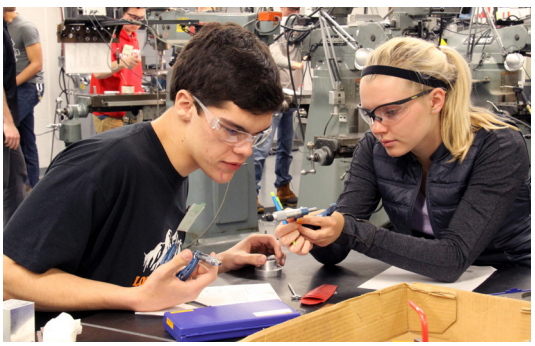
Interactive classes and student-designed and -built capstone projects provide opportunities to gain experiences in solving complex, interdisciplinary problems. Our goal is for students to graduate with not only technical knowledge, but also the interpersonal and professional skills needed to succeed in today's engineering field. Specialized coursework and capstone projects in each major—mechanical engineering and aerospace engineering—prepare students for transitioning to the workforce or entering graduate studies.



Infrastructure for experiential learning

Quality laboratory, classroom and work area space are essential to successful experiential learning. Employers have provided positive feedback on graduates' skills in emerging technology areas, testifying to the initiative's far-reaching impact.

Plans are set to expand current initiatives and extend laboratory support for student learning to broader curricula segments. Laboratory maintenance of the increased equipment base, electronic instrumentation and computer hardware and software support remains a continuing need.



Experiential Education Endowment

Benevolent donors have allowed the department to invest significantly to enhance infrastructure for student development, while supporting growing numbers of undergraduates. Will you join us as we prepare the next generation of engineers ready to tackle society's challenges?

Contact **Laura Doll** (doll.79@osu.edu) for information about supporting this endeavor, or **Blaine Lily** (email@osu.edu) to learn more about experiential education initiatives.

The generosity of alumni and corporate supporters made development and implementation of the department's current experiential learning initiatives possible, including acquisition of the needed infrastructure.

Four-peat! Ohio State wins national EcoCAR 3 competition

The Ohio State University won first place in the final year of EcoCAR 3, an Advanced Vehicle Technology Competition, sponsored by the U.S. Department of Energy and General Motors Co. This is the fourth consecutive win for the Buckeyes.

EcoCAR 3 is a four-year collegiate automotive engineering competition that challenges 16 North American universities to redesign a 2016 Chevrolet Camaro to further reduce its environmental impact while maintaining the iconic Camaro performance and safety.

> "our overall our team philosophy focused on building students instead of building a car"
>
> **SHAWN MIDLAM-MOHLER**
> *faculty advisor*

In addition to the coveted first place trophy and bragging rights, the Buckeyes will also take home $33,000 to further support the university's advanced vehicle technology program.

"This year the students excelled at both the pre-competition deliverable, the oral report and the presentations," said Ohio State team faculty advisor **Shawn Midlam-Mohler**. "Our students are able to build a great car, but they're also able to communicate in both written and oral communication—the thought process, the design, the validation—all of that effort that goes into building a car."

"But our overall our team philosophy focused on building students instead of building a car."

Ohio State's team was in first place going into the competition and earned 895 out of 1,000 overall points.

Ohio State's crew won 18 awards, including the NSF Diversity, Inclusion and Equity Award, the NSF Outstanding Advisor Award (Midlam-Mohler) and the first place NSF Innovation Award.

Individual team members also earned awards, including electrical team lead Kerri Loyd who received the General Motors Rookie in Engineering Award.

One feature that set apart the Buckeyes' vehicle from their competitors is its electrically heated catalyst that reduced startup emissions by 85 percent.

"We actually had fuel economy that was 20 percent higher than our next competitor in that area," said team lead and engineering manager **Brandon Bishop**.

West Virginia University and the University of Alabama took second and third place in the competition, respectively.

In addition to sweeping all four years of EcoCAR 3, in 2014 the Buckeyes also captured top honors in the final year of the EcoCAR 2: Plugging In To The Future competition.

The Ohio State EcoCAR sponsors include Parker-Hannifin, Cooper Tires, Clean Fuels Ohio, Transportation Research Center, TE Connectivity, Johnson Controls, Parker, Tremec, Ford, Honda, 3dparts.com and Modern Driveline.

The EcoCAR 3 competition is sponsored by the U.S. Department of Energy and General Motors. Additional sponsors include MathWorks; National Science Foundation; California Air Resources Board; NXP; AVL Powertrain Engineering; the Bosch Group; ETAS; PACCAR; dSpace, Inc.; Snap-on Tools; Siemens PLM Software; GKN Driveline; Transportation Research Center; HORIBA; DENSO; Champlain Cable; Woodward; Proterra; Ricardo; Mentor Automotive; New Eagle; Gage Products; Tesa Tape; Vector CANtech, Inc.; Delphi Foundation; EcoMotors; Electric Power Research Institute, Inc.; A123 Systems; Flextronics; and Samsung, SDI.

contributions by Allison Mellor, Ohio State EcoCAR team co-communications manager

Buckeye rocketeers soar to first place at international competition

Ohio State's Buckeye Space Launch Initiative team soared to first place at the Spaceport America Cup, taking home a trophy as a repeat champion.

The competition took place June 19-23 at the Spaceport America headquarters in New Mexico, where over 120 teams from around the world came together for the largest annual intercollegiate rocket engineering conference and competition. The event allows multistage rockets and all chemical propulsion types—solid, liquid and hybrid. Teams are graded on how close their rockets are to reaching specified altitudes, as well as through a Technical Report and Flight Readiness Report.

Team members with department machine shop staff, who supported the projects.

Ohio State's rocket targeted for an altitude of 10,000 feet took first place in the Student Researched and Designed category when it flew to 10,080 feet over the desert. The rocket, dubbed "I-O," was propelled by a solid motor and carried a payload of nine pounds.

Ohio State's 40 team members in attendance also competed in the 30,000-foot category and launched a two-stage exhibition rocket aimed at reaching 100,000 feet.

"O-H," the 30,000-foot rocket, which achieved a first-place finish in 2017, reached an altitude of 27,500 feet before its unplanned descent.

The team's program manager, **Nic Flesher**, described what happened. "The flight was straight and stable, but, shortly after liftoff, the onboard avionics lost power and thus the ejection charges for the parachutes never went off."

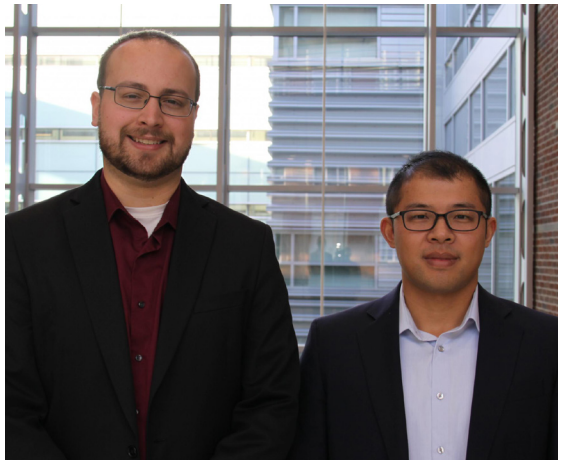
The 100,000-foot rocket was a demonstration launch in preparation for competition next year. Using two stages it successfully reached an apogee of 23,000 feet.

The interdisciplinary team is composed of undergraduate students, a majority from the Department of Mechanical and Aerospace Engineering.

Research & Design Day April 19, 2019

Join us for an afternoon celebrating student research and design. Scott Laboratory hallways will be buzzing with excitement as undergraduate mechanical and aerospace engineering students showcase group projects from a variety of courses. Interactive demonstrations are a highlight of the annual event, which features collaborations with various industry and community partners. Contact: Assistant Professor Annie Abell, abell.9@osu.edu.

Four graduate students honored with Presidential Fellowships



Ehsan Akbari and Hoda Hatoum (top) received the fellowship in spring 2018. Logan Riley and Yu She (below) were recognized in autumn 2017.

Mechanical engineering PhD candidates **Ehsan Akbari**, **Hoda Hatoum**, **Logan Riley** and **Yu She** were each selected by The Ohio State University Graduate School as recipients of the distinguished Presidential Fellowship.

The most prestigious award given by the Graduate School, awardees are described as embodying the highest standards of scholarship in the full range of Ohio State's graduate programs. The esteemed designation will provide the students with full-time financial support for one year to allow them to complete their dissertations unimpeded by other duties.

Both Akbari's and Hatoum's research projects are at the intersection of engineering and medicine, specifically involving fluid mechanics and vascular health. Akbari, advised by **Jonathan Song**, is investigating the use of DNA-based nanostructures to study how blood vessel cells communicate with each other. Hatoum is studying the fluid mechanics of transcatheter heart valves and is advised by **Lakshmi Prasad Dasi** in the Department of Biomedical Engineering.

Advised by **Datta Gaitonde**, Riley will use his Presidential Fellowship to help hypersonic vehicles fly faster and further by exploring the unsteady operation of hypersonic vehicles.

She, advised by **Haijun Su**, is focusing his dissertation research on keeping humans safe when interacting with robots by designing a variable stiffness arm that can be used to assist human employees during manufacturing and industrial processes.

The Department of Mechanical and Aerospace Engineering has produced 16 Presidential Fellows over the past five years, evidencing the achievements and performance of faculty and graduate students.

Nuclear engineering minor

Includes hands-on learning and research opportunities

The department's Nuclear Engineering Program — ranked 12th in the nation in *U.S. News and World Report* 2018 edition of America's Best Graduate Schools — also offers an undergraduate minor in nuclear engineering.

"The nuclear engineering minor was a natural outgrowth of our graduate program," said Faculty Director of the Minor in Nuclear Engineering **Vaibhav Sinha**. "With the increasing demand by industry for students with general experience in nuclear engineering, we responded by developing this minor."

Additional value of the program lies in its hands-on learning aspect and research opportunities. "Students in many minor programs do not typically complete research or have the opportunity to do hands-on work," said Sinha. "Having that option available to students was important for us to include, and is available thanks to the research already being done by faculty."

Minor program students learn experientially by performing real-time simulations using the nuclear power plant simulator; executing experiments at the Nuclear Reactor Lab (**reactor.osu.edu**) to learn about various radiation detection and instrumentation techniques; and developing advanced knowledge in nuclear thermal hydraulics, radiation protection and shielding.

The minor is meant to complement a variety of majors from STEM fields and to provide students with the knowledge and skills for many entry-level positions in the nuclear industry. Sinha summarized the program's objectives. "The minor leverages the department's depth of knowledge to equip students with a foundational understanding of the field of nuclear engineering."

Honda-Ohio State partnership steers education and industry

In just its first year, Ohio State's Supermileage SAE student team developed and constructed a single-person vehicle with a fuel-efficiency of 96 mpg. The second year, it more than doubled to 256 mpg. Now, the teammates are brainstorming how to reach even greater efficiency.

Supermileage team members Connor Yarcheck (left, BS ME) and Jackie Karl-DeFrain talk with Honda's Dan Nagashima. Photo by Kevin Fitzsimons.

To drive that impressive progress, the students turn toward some experts: the team at Honda R&D Americas Inc. "Due to our team's focus on engine modifications this year, we have sought a second opinion from members of Honda's engine research department," said Supermileage team co-captain **Jackie Karl-DeFrain**, a mechanical engineering and Chinese double major.

The 18-member Supermileage team isn't Honda's first partnership with Ohio State, by far. "Honda and Ohio State have established a long and successful history of partnership and collaboration spanning almost 30 years," says Mike Wiseman, Honda's co-director of the Honda-Ohio State Partnership.

At Ohio State's Center for Automotive Research, the Supermileage team came to the attention of Honda engineers. "We noticed the extensive commitment the students had for motorsports, and the passion the students displayed for vehicles and powertrains was inspiring," says Dan Nagashima, a Honda R&D Americas principal engineer based in Raymond, Ohio.

Students grow their engineering design and project management skills by applying learned classroom theories in Supermileage, an engineering design competition organized by SAE International, an association of engineers and related technical experts in the aerospace, automotive and commercial vehicle industries.

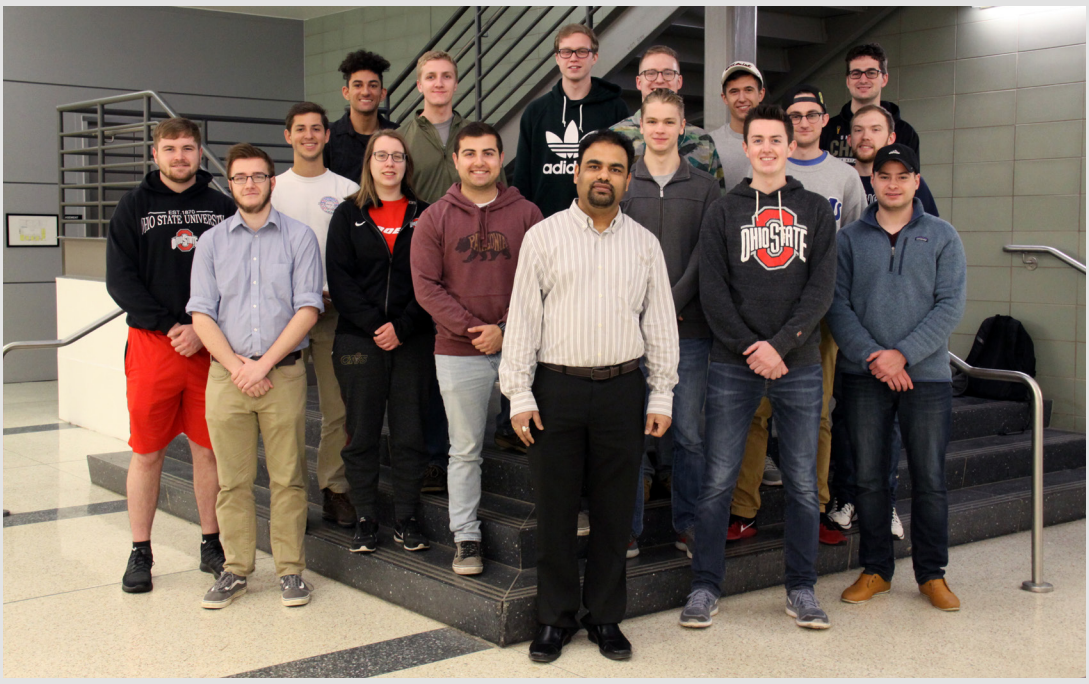
Honda is not only helping prepare future engineers for careers in the transportation industry, but also providing continuous professional development for its own employees through collaborations with Ohio State, according to Wiseman.

Among the additional departmental student-industry ties with Honda is the **Honda Scholars** program.

2017 departmental Honda Scholars:

Emilie Baker
Emily Curtiss
Stan Groszek
Chase Hemmelgarn
Olivia Hemmelgarn
Elizabeth Hyem
Landon Johnson
Ben Kott
Prabhat Kumar
Lincoln Markle
Riley Niekamp
Matthew Rowland
Matthew Riczko
Jarrod Sherrick
David Tobin
Zach Wurzelbacher

honda.osu.edu



Assistant Professor Vaibhav Sinha (center) with members of an undergraduate nuclear engineering class in Scott Laboratory during spring semester 2018.

Sinha coordinates the Minor in Nuclear Engineering program.

PhD student honored with national fellowship

In recognition of academic excellence and science, technology, engineering and math achievements, aerospace engineering PhD student **Braxton Harter** was awarded a 2018 National Defense Science and Engineering (NDSEG) Fellowship Award.

The fellowship lasts for a period of up to three years and covers full tuition and mandatory fees, according to its website. The Department of Defense awards the fellowships as a means of increasing the number of U.S. citizens and nationals trained in science and engineering disciplines of military importance.

Under the guidance of his advisor, Professor James Gregory, Harter plans to focus his research on phenomena related to the aerodynamics of Unmanned Aerial Vehicles (UAVs) in anticipation of their full integration into the National Airspace System. He's enthusiastic about the opportunities the fellowship will bring, which includes a monthly stipend and provides coverage for two trips for training and/or conferences in support of educational initiatives.

International collaboration

RIYA scholars' work adds to the breadth of Ohio State Research

During summer 2017 five students were awarded the annual Research Internship for Young Academics (RIYA) Award.

Established in 2014, the RIYA program connects exceptional Indian mechanical engineering students to groundbreaking research experiences with leading Ohio State faculty and graduate students. Funded by significant support from the Singh Family Fund and other endowments, the program provides the RIYA scholars with an allowance that covers a stipend, housing subsidy and travel to the United States and back to their home county.

The 2017 RIYA scholars, from left to right: Yashraj Gurumukhi, Vishnu Vishal, Shashwat Ranjan Chaurasia, Priy Ranjan and Raunaq Bhirangi.

Professor Emeritus Rajendra Singh developed the RIYA program, in partnership with the Department of Mechanical and Aerospace Engineering, to provide Indian students with access to internationally recognized engineering faculty.

In addition to financial support, the opportunity to be mentored by renowned experts in the field is a key draw for applicants.

"The intent of this unique program is to provide world-class internship opportunities to some of the best undergraduate students in India, while exposing them to modern aspects of mechanical engineering," said Singh. "It is similar to the on-campus honors research program where top undergraduates work with MAE faculty on cutting-edge topics. The program is strictly based on gifts and we thank the donors for making this possible."

He is already seeing a return on investment by way of the innovative research spilling out of the program. Read more: **go.osu.edu/riya17**.

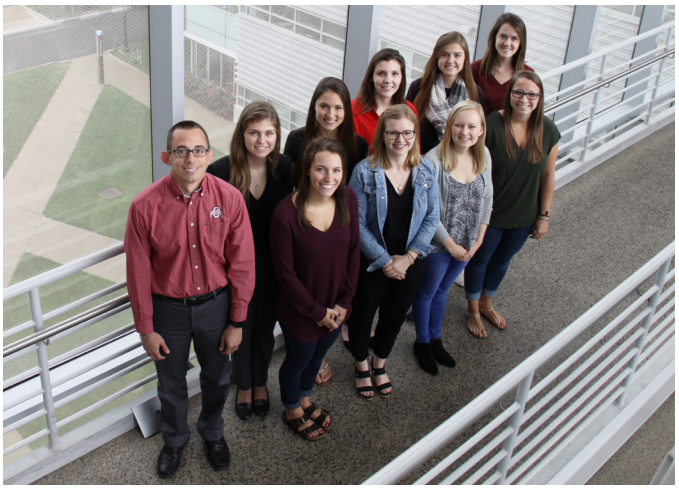
Student research team customizes surgery

Neuromuscular Biomechanics Research Laboratory

Led by Associate Professor **Robert Siston**, the team of graduate and undergraduate student researchers in the department's NeuroMuscular Biomechanics Laboratory (NMBL) sees a future where surgical outcomes far exceed patients' expectations.

By leveraging mechanical engineering principles, the team aims to optimize the functional outcomes of surgical interventions such as total knee replacement surgery. While their main focus is the treatment of knee osteoarthritis, their overarching goal is to provide a scientific basis to treat a variety of human movement disorders. Informing physical therapy and the design of assistive devices, such as braces and orthotics, is one of the lab's thrusts.

Currently, the lab team is pioneering a new approach for computer-assisted total knee replacement, where surgeons use specialized equipment to make measurements inside of the operating room and use computer simulations to estimate how muscles are used to walk, climb stairs and get out of a chair after surgery. The NMBL's comprehensive approach "represents the first effort to parameterize key aspects of this surgical technique and objectively relate intra-operative measurements to post-operative outcomes," said Siston.



Back row: Professor Robert Siston, Maria Hessin, Brooke Delventhal, Alivia Lahr, Kaden Zachmann, Rebekah Koehn; front row: Liz Leszcz, Rachel Hall, Anna Lee, Megan Hughe

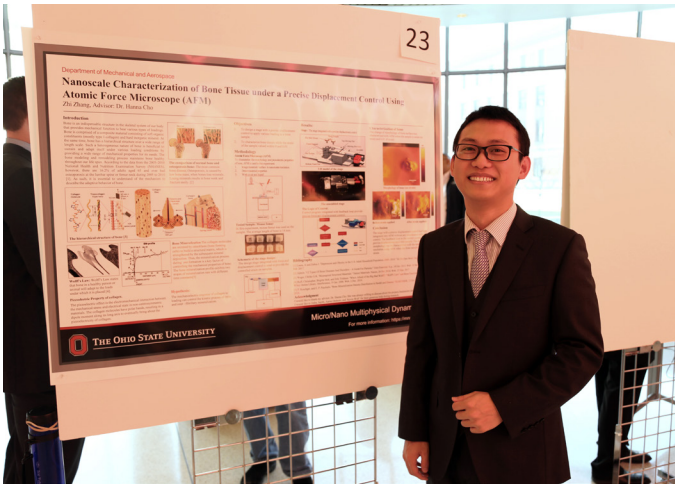
Undergraduate Research Program

Students in the department have the opportunity to participate in the Undergraduate Research Program. This structured program results in an undergraduate thesis, including an oral defense, and focuses on a research project completed with a faculty member.

The technical and professional skills learned during the program complement classwork and offer participants experiences above the traditional curriculum. Students interested in pursuing a graduate degree can especially benefit from the mentorship and experience learned through undergraduate research.

"The transferrable skills gained by students in the program are essential to students entering today's field of engineering, whether that's continuing to graduate school or entering the industry," said **Robert Siston**, faculty director of the program.

The concentration taught is very unique to the department. "Not only do students complete a research project, but they also take specific coursework that introduces them to the various aspects of research," Siston continued.



Zhi Zhang with his mechanical engineering project poster at the 8th Annual Engineering & Architecture Undergraduate Research Forum.

A variety of majors represented among the students allows for communication skills to be refined and developed. "By the end of the program, the students really take ownership of their education within the cohort," described Siston.

Awards ceremony honors outstanding students, faculty and alumni

The Department of Mechanical and Aerospace Engineering recognized high-achieving students and alumni on April 20, at its annual Honors & Awards Banquet. Citations were presented to representatives from each of the department's three programs—mechanical, aeronautical and astronautical, and nuclear engineering.

Stillman Robinson Lifetime Achievement Award

honoring lifetime career distinction

Graduating from Ohio State in 1954 with a degree in mechanical engineering and also in accounting, **Max Holzer** has distinguished himself with numerous contributions in business and to the community.

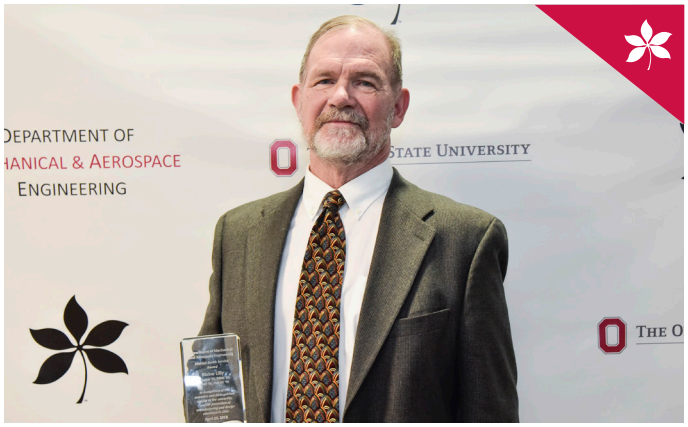
Holzer's accomplishments include founding over 10 companies and organizations. Among those most notable are Holzer-Wollam Realtors, which Holzer built from 25 sales associates to 400 sales associates from 1969 to 1989. His robust resume also includes founding Lincoln Electric, Inc. in 1970, with an annual construction volume of $50M.

His service extends to presiding over—and, in many cases, establishing—a number of local, domestic and international organizations. These include a significant number of realty associations, as well as Ohio Easter Seal Rehabilitation Center, Columbus Neighborhood Housing Partnership, Global Emergency Medical Services, Inc. and Inmate Services, Inc.

Civic activities highlight Holzer's sustaining support of Ohio State. He served as chairman of the Executive Committee of The Ohio State University College of Engineering "Committee of 100" from 1982 to 1988. And, he has received the college's Meritorious Service Award and the university's Outstanding Alumni Award, among many other esteemed recognitions.

Marion Smith Service Award

recognizing service to community, university and/or society



Blaine Lilly has been a facet of the Department of Mechanical and Aerospace Engineering for multiple decades. In addition to serving as a professor and Associate Chair for Undergraduate Education, he is most known for his dedicated promotion of education on many platforms.

Lilly is not only an academician, but he has also tirelessly served on countless committees, both as member and chair, has advised over 60 students and is a fellow of the American Society of Mechanical Engineers. His extensive service focuses on improving manufacturing education throughout the state, involving many community colleges, technical institutes and industrial partners. Lilly has also led efforts to form a new bachelor degree in applied engineering to be offered by Ohio State's regional campuses to meet the needs of Ohio's manufacturers.

Furthermore, in 2012 Lilly developed and introduced a comprehensive sophomore-level experiential learning course in the department.

Lilly graduated with a degree in mechanical engineering from the department twice—with his bachelor's degree in 1983 and master's degree in 1986. He completed his PhD in the Department of Industrial and Systems Engineering and another bachelor's degree—in English—also from Ohio State.

E.G. Bailey Entrepreneurship Award

celebrating successful inventions

Joel Hiltner established and is the engineering and managing partner of Hiltner Combustion Systems, a state-of-the-art engine test and development center. He has also served as a visiting researcher at a number of international institutions.

Hiltner's achievements include serving as a primary researcher on a European Union-funded project aimed at minimizing emissions from pulse combustors for stationary applications. In that role he designed and fabricated an optical test combustor, as well as conducted detailed chemical kinetic and fluid dynamic modeling. Additionally, he has worked with the automotive industry, including Ford of Australia and GM Holden, to develop an engine test cell for future research and student instruction. There he created web-enabled course content to allow distance learning by students worldwide through RMIT University in Australia.

Hiltner is a three-time mechanical engineering alumnus of the department. He earned his bachelor's degree in 1992, master's in 1993 and doctoral degree 1997.

Rudolph Edse Award in Space Engineering

honoring excellence

Ann Over is a 1983 alumna of the department, earning her bachelor's degree in aerospace engineering. She is currently deputy manager engineer at NASA Glenn Research Center in Cleveland, Ohio.

Over's career with NASA has spanned nearly 35 years, beginning in 1983. Significant contributions to the field include working on the Space Shuttle Centaur project, where she helped create trajectories to Jupiter and Venus; managing development of two flights of large combustion science research facilities on space shuttles, including the last flight of Columbia; and serving as project manager for the SCAN Testbed project launched by Japan to the International Space Station in 2012.

Since 2016 she has been responsible for the European Service Module Integration Office, helping NASA return humans to the moon and send them to Mars. Orion will be the most advanced spacecraft ever designed, carrying astronauts farther into space than ever before. The challenges include propulsion, power, structures, thermal, cost, schedule and risk management.

Alan Gregory Loofbourrow Business Achievement Award

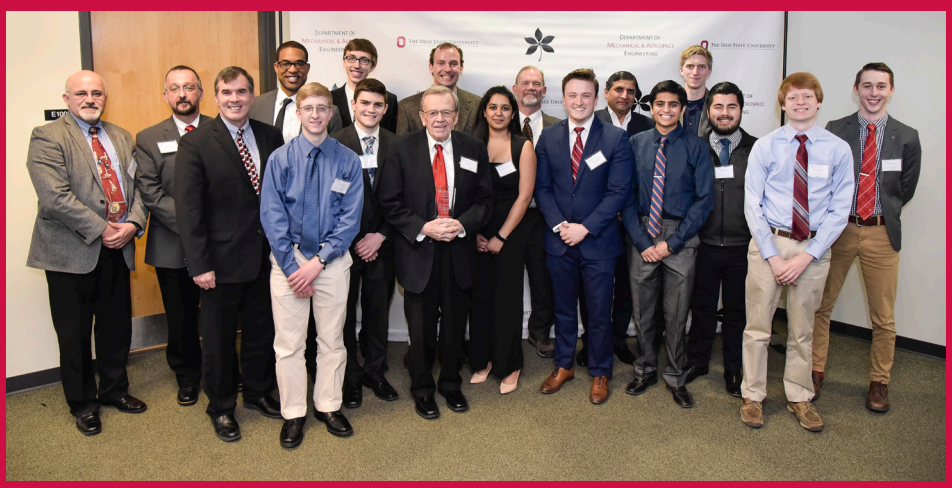
recognizing career success

Having worked for over 34 years at Fiat Chrysler Automotive, **Ron Reese** is currently a senior technical fellow, the highest position at Chrysler for the technical career path.

Reese's long and successful career has allowed him to work on various aspects of engine and vehicle development, including the combustion system, thermal management, aftertreatment, calibration, fuels and computational modeling. Through these varied experiences he has honed his expertise and command over a wide range of engine technologies and their complex interactions as a system. Reese is recognized for leading a number of projects, most notably with the U.S. Department of Energy.

Aside from his numerous career highlights, the hallmark of Reese's achievements is his willingness to publish the non-proprietary components of his research and development work. He is also highly respected as a mentor for university students and new engineers.

Reese graduated from The Ohio State University in 1984, earning a bachelor's degree in mechanical engineering.



Honorees at the 2018 Honors & Awards Banquet held in Scott Laboratory. Back row: Abdi Khodadoust, Ron Reese, Cullen Buie, Andrew Sabovik, Ben Tedrick, Blaine Lilly, Satish Nair, Daniel Richie. Front row: Wes Hines, Ted Sender, Peter Vuyk, Max Holzer, Kreteeka Chaudury, Matthew Burns, Madhav Shah, Wilson Flores, Michael Lloyd, Peter Bonavita.

Thomas French Achievement Award

celebrating educators

Nair (left) and Hines.

Serving a long career at the University of Tennessee, Knoxville, **Wes Hines** has risen from assistant professor to department head.

Hines is as a member of many distinguished boards, including at peer universities and a national laboratory. He has been recognized with numerous awards and other achievements, and has been named a Fellow of the American Nuclear Society.

A two-time graduate of Ohio State's Nuclear Engineering Program, Hines earned his master's degree in 1992 and PhD in 1994. He also earned an MBA from Ohio State and his bachelor degree from Ohio University.

Satish Nair currently leads University of Missouri-Columbia's pioneering Center for Computational Neurobiology, while holding the distinction of Robert Buescher Professor of Electrical and Computer Engineering.

In addition to developing both undergraduate and graduate courses, he also led the effort to create an undergraduate interdisciplinary minor in computational neurobiology. He teaches professional development courses and mentors K-12 students.

Nair graduated from the department with his master's degree in mechanical engineering in 1984 and his PhD in 1988. His bachelor's degree is from Indian Institute of Technology, Kanpur.

Garvin L. Von Eschen Award

honoring leadership in aerospace engineering

Abdi Khodadoust has worked at Boeing since 1994 and currently serves as team leader for the Advanced Aerodynamic Design Group in the Research & Technology Division. There he leads a team of 20 scientists and engineers, with a strong focus on aerodynamic improvements and breakthroughs for concepts ranging from subsonic and transonic, to supersonic and hypersonic flight regimes.

Khodadoust is also the Boeing Program Manager for Basic and Applied Aerospace Research and Technology, where he is responsible for conduct of research and development. This five-year program is a key vehicle for technology development and maturation with NASA in areas of fundamental aeronautics, integrated systems, air traffic management, aviation safety and space exploration technologies.

In addition to his vast leadership roles at Boeing, Khodadoust is appointed as a visiting faculty at California Institute of Technology. He is a member, twice serving as conference organizer, of the American Institute of Aeronautics and Astronautics.

The department honors the accomplishments of this aeronautical and astronautical graduate, who earned his bachelor's degree in 1984 and his master's degree in 1987. After this, he completed his PhD at University of Illinois.

Ralph Boyer Young Achiever Award

recognizing professional success

Dedicated to furthering the field of mechanical engineering, **Cullen Buie** is currently appointed as associate professor at Massachusetts Institute of Technology. He is also designated as the Esther and Harold E. Edgerton Career Development Professor.

Buie's lengthy list of publications, conference proceedings, conference and invited presentations and intellectual property make him a standout among the department's young alumni. He has received numerous awards and honors, including the DARPA Young Faculty Award and NSF CAREER Award. Additional leadership and service experience features his extensive work supporting conference organization and beyond.

The impressive record of Buie's contributions to the field centers on his research interests: microfluidic tools for genetic transformation in synthetic biology, dynamic interactions between fluids and porous media and low cost energy storage systems.

Graduating with the distinction of magna cum laude, Buie earned his bachelor's degree in mechanical engineering from Ohio State in 2003. He went on to earn his master's degree and PhD from Stanford University.

Teaching Awards

Left to right: Babayemi, Richie and Burns

The **Mechanical and Aerospace Engineering Graduate Teaching Associate (GTA) Award** and **Undergraduate Teaching Associate Award** are intended to recognize exceptional teaching provided by a graduate teaching associate and undergraduate teaching associate in mechanical or aerospace engineering.

This year's GTA Awardee for Mechanical Engineering was **Emmanuel Babayemi**, and the GTA Awardee for Aerospace Engineering was **Daniel Richie**. The Undergraduate Teaching Associate Award for Mechanical Engineering was **Matthew Burns**.

Rob Wolf Outstanding Senior Award

The **Rob Wolf Outstanding Senior Award** is presented to a mechanical engineering student in memory of Rob Wolf, a 1997 graduate. The award recognizes students who excel academically while actively participating in department, college, university and community organizations. Finalists for 2018 were **Rachel Knapp** and **Derek Hilfer**.

This year's award was presented to **Kreteeka Chaudhury**, who is completing the department's BS to MS degree, a minor in Entrepreneurship and Innovation and the Honors Research Distinction. She is an international student and the first person in her family to pursue higher education, coming from a community where education abroad is still taboo for women.

Student Awards

Outstanding Leadership and Research Award: **Peter Vuyk**
Outstanding Leadership Award: **Ben Tedrick**

Top Academic Awards

Mechanical Engineering
- Sophomore: **Hannah Barnes**
- Juniors: **Michael Lloyd** and **Ted Sender**
- Seniors: **Clint Teece** and **Peter Bonavita**

Aerospace Engineering
- Sophomore: **Andrew Sabovik**
- Junior: **Madhav Shah**
- Seniors: **Lucas Mairalo-Cruz** and **Byung Joon Ahn**

Outstanding Senior in Aeronautical and Astronautical Engineering Award: **Wilson Flores**

SUBMIT A NOMINATION!

Know an outstanding graduate in mechanical engineering, aerospace engineering, nuclear engineering or engineering mechanics?

Consider nominating an alumnus for an award! Nominations for 2019 will be accepted through February.

VISIT
go.osu.edu/MAEalumni

CLASS NOTES

1960s

Michael W. Preis ('69 BS) finished seventh in his division at the 2017 World Snowshoe Championship.

1970s

William R. Simpson ('73 MS, '78 PHD)

received the 2017 Best Paper Award from the International Conference on Computer Science and Applications for his paper entitled "Enterprise Level Security: Insider Threat Counter-Claims".

1980s

Steve Arndt ('81 BS, '84 MS, '10

PHD) Department of Mechanical and Aerospace Engineering External Advisory Board member Steven Arndt, PE was awarded the United States Nuclear Regulatory Commission's (NRC) Distinguished Service Award in 2017.

1990s

Jacob Thomas ('91 BS) is a chief executive officer in the Carlstar Group LLC.

Lee Schroeder ('91 BS, '93 MS) earned a master's of engineering in acoustics from Penn State University and is the staff transducer engineer at Ultra Electronics - USSI.

J. Jay Updegraff ('94 MS) has completed his first year as a FedEx Express First Officer flying the MD-11 aircraft.

2000s

Kapil Nandwana ('09 MS) is a senior stress analyst at Ellis and Watts Global Industries in Batavia, Ohio.

2010s

Yi Xie ('16 PHD) has been named

Idaho National Laboratory's inaugural Glenn T. Seaborg Distinguished Postdoctoral Associate.

To submit your exciting alumni news for inclusion in next year's *Alumni Exchange*, please visit **osu.edu/alumni/news/alumnews/**.

Out-of-this-world alumnus recognized for innovation

Aerospace engineering alumnus **Mike Snyder** ('09 BS, '11 MS) is known as a pioneer in 3D printing in space. His innovation has led him to receive The Ohio State University Alumni Association's William Oxley Thompson Award.

The annual award is presented to young alumni who have demonstrated distinctive achievement in a career, civic involvement or both.

In 2010, while still a student in the Department of Mechanical and Aerospace Engineering, Snyder co-founded Made In Space, a space-based manufacturing company supporting life and work in space. Specializing in the development of additive manufacturing technology for use in zero-gravity, the company boasts the first 3D printer to operate in space, as well as the two 3D printers on the International Space Station.

Alumni Association President and CEO Jim Smith, Mike Snyder, and Kristin Watt, chair, Board of Directors

Snyder received the award at the Alumni Association's annual awards ceremony on September 21, 2018. Read more about Snyder's extraordinary work with Made In Space: **go.osu.edu/MAEsnyder**.

Buckeyes for life: Over 22 alumni and their grandchildren participated in the College of Engineering's inaugural Grandparents Day! in August. Groups visiting the Robert O. Webster Machine Shop tried their skill at making paperweights.

Collaborative success

Alumni and faculty co-author paper honored by Society of Tribologists and Lubrication Engineers

A peer-reviewed paper led by authors from the Department of Mechanical and Aerospace Engineering received recognition from the Society of Tribologists and Lubrication Engineers (STLE) at its annual meeting on May 20. The group earned the society's 2018 Wilbur Deutsch Memorial award, for most outstanding technical paper written on the practical aspects of lubrication published by the society in the year preceding the annual meeting.

The paper—"Development and Validation of an Automotive Axle Power Loss Model"—was published in the society's peer-reviewed journal, *Tribology Transactions*.

Research Assistant Professor **David Talbot** ('05 BS, '07 MS, '12 PHD) was lead author, with co-authors **Ahmet Kahraman**, Wright State University's Sheng Li, and General Motors' Avinash Singh and Hai Xu.

Michael Anderson, president of STLE, Singh, Li, Xu and Talbot with their trophies

The external authors are also all associated with the department's Gear and Power Transmission Research Laboratory. **Sheng Li** ('08 MS, '09 PHD), **Avinash Singh** ('92 MS, '97 PHD) and **Hai Xu** ('05 MS, PHD) each worked as a graduate research assistant in the lab during their time at Ohio State.

College honors exceptional alumni

21st annual awards celebration

On November 2, the College of Engineering honored 15 high-achieving alumni during the Excellence in Engineering and Architecture Awards event. Among those, four were graduates of the Department of Mechanical and Aerospace Engineering.

Benjamin G. Lamme Meritorious Achievement Medal

John D. Anderson ('66 PhD, AAE)

The Benjamin G. Lamme Meritorious Achievement Medal was awarded to University of Maryland Professor Emeritus **John D. Anderson Jr.**, who has had a sustained impact on aerospace engineering education. He is the author of 11 undergraduate and graduate textbooks, which are considered the universal standard in aerospace education. Anderson is currently the curator for aerodynamics at the Smithsonian Institution's National Air and Space Museum.

Texnikoi Outstanding Alumni Award

Cullen Buie ('03 BS, ME)

One of the two alumni selected to receive the Texnikoi Outstanding Alumni Award was **Cullen Buie**. He is an associate professor of mechanical engineering at Massachusetts Institute of Technology, specializing in flow physics at the microscale for applications in materials science and applied biosciences. He is also the co-founder of Kytopen Corp., which is developing platforms to accelerate the discovery and manufacturing of cell therapies.

Distinguished Alumni Award

for Entrepreneurship and Innovation

Dennis A. Guenther ('71 MS, '74 PhD, ME)

Dennis A. Guenther is a mechanical engineer with S-E-A, Ltd and professor emeritus of mechanical engineering at Ohio State. Working at S-E-A since its inception in 1970, he helped establish and grow the company's mechanical and biomechanical team. In the early nineties, Guenther started the vehicle dynamics division, building high-tech testing equipment for automotive manufacturers worldwide.

Distinguished Alumni Award

for Entrepreneurship and Innovation

Kevin Hrusovsky ('83 BS, ME)

With more than 25 years of experience, **Kevin Hrusovsky** has dedicated his career to advancing the science of precision health. Currently, he is chief executive officer and executive chairman of Quanterix. Hrusovsky founded the Powering Precision Health Summit, the nation's first summit dedicated to bringing the world's leading physicians.

Alumni awardees with Dean David B. Williams, front left.

Growing up in a rural South African village, alumna **Margaret Mkhosi** never imagined that she'd become an engineer—let alone the first female nuclear engineer in her homeland.

Breaking barriers

Growing up in a rural South African village, alumna Margaret Mkhosi never imagined that she'd become an engineer—let alone the first female nuclear engineer in her homeland. Today she leads the National Nuclear Regulator's Center for Nuclear Safety and Security in South Africa and mentors other women so they too can be successful in STEM.

The farm where Mkhosi was born was so remote they didn't even have a radio station to listen to. The middle and high schools lacked critical resources like computers and labs.

Professional careers in the village were limited, Mkhosi said. So she earned a bachelor's in education and taught first at a high school and later at North-West University. In 1998, she began a master's program in physics at the university's urging. They wanted to add the first female physics lecturer to their ranks and Mkhosi was the most qualified.

During the Physics Society's educational tour in Cape Town, Mkhosi made life-changing visits to a nuclear power plant and a research laboratory focused on nuclear science and radiation medicine for cancer treatment.

Although there weren't any nuclear engineering programs offered in South Africa at that time, Mkhosi vowed that if she ever got the chance, she would do whatever necessary to enter that field.

Her chance came in 2000 when she applied and was selected to pursue doctoral studies in nuclear engineering at Ohio State through the Tertiary Education Linkages Project supported by the U.S. Agency for International Development and United Negro College Fund.

In 2007, Mkhosi became the third woman to earn a PhD in nuclear engineering at Ohio State.

Applying her skills at home

After completing one year of postdoctoral research, Mkhosi returned home early because the country needed her expertise. She began working for the Pebble Bed Modular Reactor, as a senior nuclear engineering analyst.

As she ascended in her career in South Africa, Mkhosi discovered a passion for shaping new initiatives.

At the Technology Innovation Agency she managed programs that help researchers and innovators develop their ideas into products that could eventually be commercialized. She also established the Youth Technology Innovation Fund, which is geared toward innovators age 30 or younger.

Today as the inaugural director of the Center for Nuclear Safety and Security, Mkhosi leads efforts to create a pipeline of trained talent who can support the National Nuclear Regulator and the nuclear sector.

The advanced training she received as a Buckeye continues to be relevant in her work at the center. "The training that I received, the interaction with the professors and advice from my academic advisor and thesis supervisor Rich Denning, is handy, even now," Mkhosi said.

Achieving her dream wasn't easy, she shared. There were those who told her she couldn't succeed, but she didn't listen.

Showing others the way

Inspired by those barriers, she vowed to help other women succeed as well. Mkhosi mentors women of all ages, from girls in her home village to work colleagues.

She's active in Women in Nuclear Global, a worldwide association for professional women working in nuclear energy, and Women in Nuclear South Africa, where she served two terms as president. She is now the Women in Nuclear Global Executive for Africa Region, providing mentorship to the women across the continent.

Mkhosi also launched Charity at Home, an initiative that aims to get kids excited about STEM fields so they understand the role these fields play in everyday life.

Her advice to the young women she works with reflects her own secret to success.

"When there's an opportunity that someone is giving you, work hard and do everything with diligence and integrity," Mkhosi said. "If you work hard, and have integrity and self-motivation, you will be able to achieve your goals, because the results don't lie."

Excerpt reprinted with permission from Candi Clevenger, College of Engineering.

NIH grant awarded to Song, Prakash and Castro

Three department labs will study blood vessel structure and function

Research by a team of engineers from The Ohio State University Department of Mechanical and Aerospace Engineering aims to establish a fundamental understanding of blood vessel permeability, which could ultimately improve ways to limit excessive blood vessel growth during disease progression.

Co-led by mechanical engineering Assistant Professor Jonathan Song and mechanical engineering Associate Professors Shaurya Prakash and Carlos Castro, the researchers were awarded a $1.7 million grant from the National Institutes of Health (NIH) to investigate the biomechanical mechanisms that control the remodeling of blood vessels.

"To me," said Song, "this project represents an ideal collaboration that both leverages and aligns the respective strengths of our labs toward addressing very important questions in biomedical science."

Many diseases of the body involve the excessive growth of blood vessels, called pathological angiogenesis. It is believed that such growth is initially triggered by fluid forces—in this case leakage of blood plasma across the wall of the blood vessel. The target of this research is to establish an awareness of the role of endothelial cells—the cells of the blood vessel walls—in order to provide baseline knowledge for developing strategies for controlling the pathological angiogenesis.

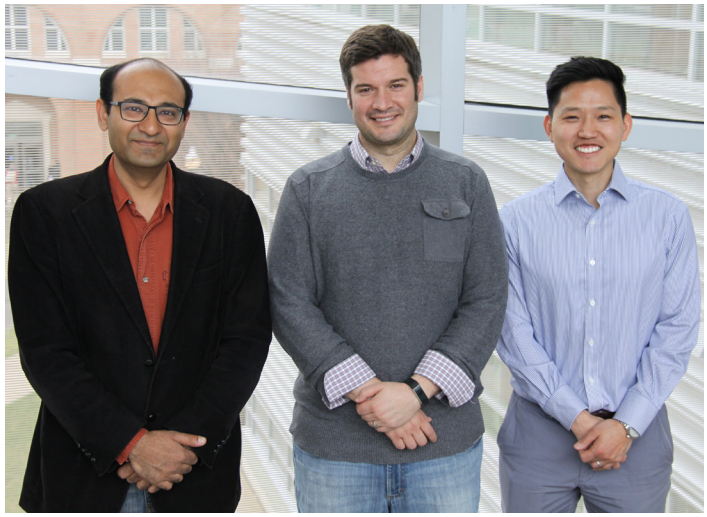
Castro describes the significance of the group's studies. "This interdisciplinary collaboration brings a unique integration of nanomechanical devices with microscale systems for mimicking biological environments to study fundamental aspects of vascular function and investigate life-saving technologies and procedures to address some of today's most prevalent pathologies," he says.

During the four-year project the research team will accurately engineer in vitro platforms to systematically study and develop a comprehensive model of the fluid forces impacting vascular remodeling and permeability, including blood vessel architecture. Completion of these studies will help establish a new standard for controlling angiogenesis, which will benefit the treatment of vascular diseases.

A unique feature of this NIH grant combines the researchers' three complementary areas of expertise. "I am excited to work on this interdisciplinary project that brings together diverse intellectual capabilities," says Prakash.

Prakash's expertise in the project focuses on nanofluidics and electron microscopy, while Song leads in areas related to microfluidics and angiogenesis and Castro brings his knowledge of DNA nanotechnology and nanoscale force spectroscopy.

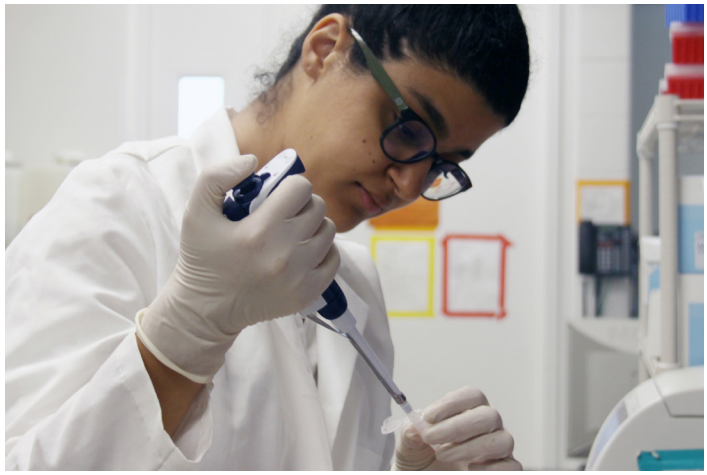
"Research reported in this publication was supported by the National Heart, Lung, And Blood Institute of the National Institutes of Health under Award Number R01HL141941. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health."

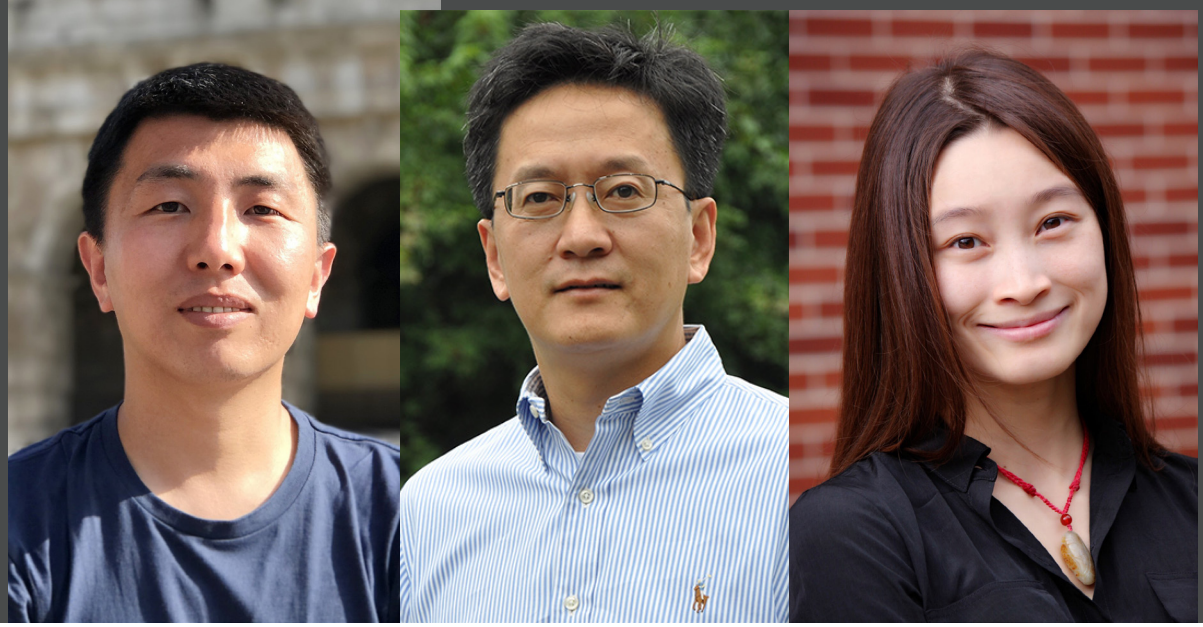


Prakash, Castro and Song

> **"To me, this project represents an ideal collaboration that both leverages and aligns the respective strengths of our labs toward addressing very important questions in biomedical science."**
>
> JONATHAN SONG
> *Assistant Professor*

Below, graduate student Melika Shahhosseini in the lab





Ayonga Hereid, Dean Wang and Ruike Zhao are new faculty members in the Department of Mechanical and Aerospace Engineering.

New faculty join the department

Assistant Professor **Ayonga Hereid**, joining the mechanical engineering faculty, focuses his on work on legged robots. His research interests are hybrid dynamical systems, motion planning and numerical optimization, and exoskeletons.

Associate Professor **Dean Wang** leads research in nuclear reactor design, modeling and simulation, systems and safety. He joins the Nuclear Engineering Program and is interested in solving time-dependent problems in nuclear reactor systems.

Assistant Professor **Ruike Zhao** is a member of the department's mechanical engineering faculty. Her research focuses on bioengineering; design, materials and manufacturing; and micro- and nanotechnology.

Faculty recognized for outstanding teaching, graduate student support and service

During its spring 2018 board meeting held on April 20, the External Advisory Board recognized faculty **Sandra Metzler**, **Mo Samimy** and **Cliff Whitfield** for their exemplary teaching, graduate student support and service, respectively.

"We are very grateful to have so many faculty members in the department who enrich our student experience," said Department Chair Vish Subramaniam. "Sandra, Mo and Cliff represent the best of what our faculty bring to the department every day. Teaching, mentoring and supporting students and providing service to higher education are at the heart of what it means to be a professor."

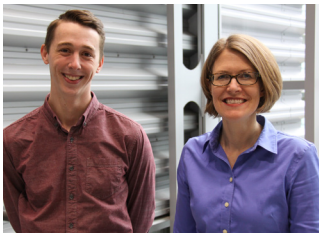
Assistant Professor of Practice Sandra Metzler received the 2018 Michael J. Moran Excellence in Teaching Award for her exceptional dedication to teaching undergraduate students.

The 2018 Distinguished Graduate Faculty Award was presented to Professor Mo Samimy in recognition of his exceptional support and guidance to graduate students.

Left to right, Samimy, Metzler and Whitfield

In addition to the long-standing teaching and student support awards, 2018 saw the inaugural presentation of the Service to Mechanical and Aerospace Engineering Award. The first awardee was Assistant Professor of Practice Cliff Whitfield, who received the citation based on his contributions of service to the department over the past year.

Student-Faculty Research Fellowship

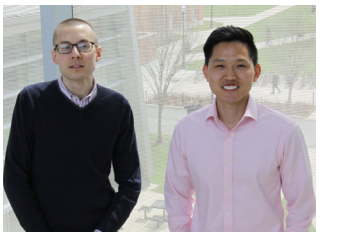


Associate Professor **Rebecca Dupaix** *(right in photo)* and mechanical engineering graduate student **Peter Bonavita** received a 2018 Southwestern Ohio Council for Higher Education fellowship award to support research in aerospace technology.

The program—Air Force Research Laboratory (AFRL)/Dayton Area Graduate Studies Institute (DAGSI) Ohio Student-Faculty Research Fellowship—is funded primarily by the Ohio Board of Regents. It supports graduate science and engineering students and faculty who conduct research in areas targeted by the AFRL at Wright Patterson Air Force Base.

Dupaix and Bonavita's project will develop simulations to investigate thermal effects in electrical circuits in order to better predict the heat output of various circuitry components during operation. This will ultimately enable thermal management to be an integral part of the increasingly-complex design process.

NSF CAREER Award

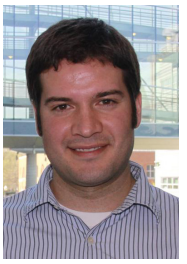


Assistant Professors **Ryan L. Harne** *(left in photo)* and **Jonathan Song** have individually been awarded the prestigious National Science Foundation (NSF) Faculty Early Career Development (CAREER) Award. According to the NSF, the awards are given in support of early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization.

Harne, who joined Ohio State in 2015 and is director of the department's Laboratory of Sound and Vibration Research, will be awarded $500,000 over five years. He received the award for his proposal entitled "Adaptive Origami Structures for Acoustic Wave Guiding."

Song's proposal, "Probing the Physiochemical Regulators of Tumor Stroma Interactions Using Microfluidic Biomimicry," has been awarded just over $546,000 over five years. Song has been with the university since 2014 and is director of the Microsystems for Mechanobiology and Medicine Laboratory.

Fulbright U.S. scholar grant



Carlos Castro, associate professor of mechanical engineering, was the recipient of a prestigious U.S. Fulbright Scholar Grant provided by the U.S. Department of State.

Castro traveled to Dublin, Ireland during summer 2018, where he was affiliated with the Advanced Materials and BioEngineering Research (AMBER) Centre and the Royal College of Surgeons in Ireland. The title of Castro's research was "Multiscale targeted delivery of DNA origami nanodevices," and the overall goal was to establish methods for the targeted delivery of DNA nanodevices to cells or tissues by incorporating the devices into biomaterials that can safely be injected into biological systems.

"The outstanding scientific and collaborative environment of AMBER Centre, the Royal College of Surgeons in Ireland and Trinity College Dublin allowed me not only to forge invaluable connections, but also helped me take our research on nanodevices and nano robotics in a new direction of biomaterials integration, which I think will be an exciting approach to realize biomedical applications," said Castro.

GPPS Lifetime Achievement Award

The Global Power & Propulsion Society (GPPS) selected Professor Emeritus **Michael Dunn** as recipient of the 2018 GPPS Lifetime Achievement Award.

This annual award is given in recognition of outstanding technical and professional contributions to industry, and as recognition of the hard work and extraordinary contributions to research carried out within the engineering community. According to GPPS, the award is one in a series designed to recognize excellence and achievement in specific and general fields of power and propulsion. Dunn received the award at a ceremony held during the May 2018 Global Power & Propulsion Forum in Montreal.

GPPS is a volunteer-led international community and forum for rotating machinery professionals in industry and academia. The society's aim is to provide an environment for professionals to meet and exchange results and ideas, with specific focus on power generation and propulsion systems.

College of Engineering faculty awards ceremony

The College of Engineering annually honors faculty members for outstanding teaching and research. The 2018 awardees were recognized on April 26 at the 21st annual Distinguished Faculty Awards. Four faculty from the Department of Mechanical and Aerospace Engineering were recognized.

Lumley Interdisciplinary Research Awards - *recognizes interdisciplinary research accomplishments of the college's faculty and research staff*

Jen-Ping Chen, MAE (left) and Han-Wei Shen, CSE, were recognized for their collaborative research focused on feature extraction, uncertainty data modeling and input/output optimization.

Junmin Wang, MAE (right); Xiaorui Wang, ECE; **Haijun Su, MAE**; and Richard Jagacinski, psychology, College of Arts & Sciences, were recognized for their research focused on cyber-human-physical systems, with an emphasis on enhancing the driving safety of individual vehicle driver-pairs.

Lumley Research Awards - *honors exceptional activity and success in pursuing new knowledge of a fundamental or applied nature*

Individual department honorees for 2018 were **Soheil Soghrati** (left) and **Vishnu Sundaresan**.

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REUNION/ HOMECOMING WEEKEND

Stay tuned for the 2019 Reunion/Homecoming Weekend dates.

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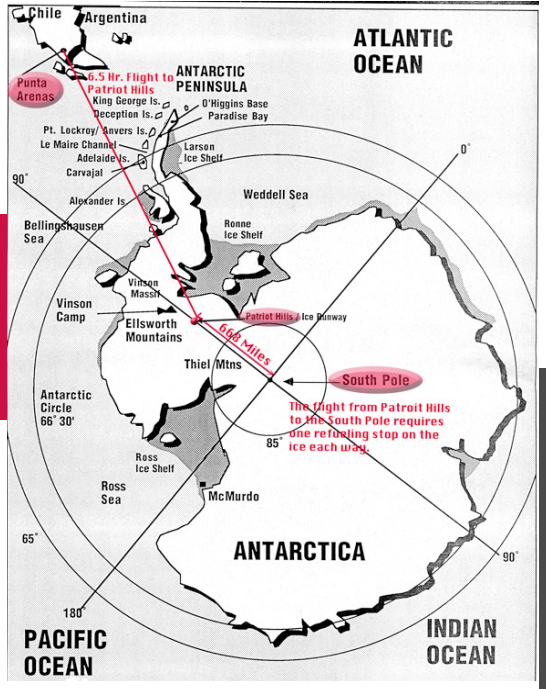
Alumnus Bob Bero describes his chance opportunity for a trip to the South Pole and how it impacted his life



Lessons from an Antarctic adventure

Huge. Quiet. Beautiful. These were the thoughts of mechanical engineering alumnus **Bob Bero** (BS '66, MS ISE '69) as he deplaned in Antarctica.

It was January 1996—summer in the Southern Hemisphere—and Bero had just taken a six-hour flight from Punta Arenas, Chile to Patriot Hills, Antarctica on a C-130 supply aircraft with very basic passenger accommodations.

"Landing was a drama," Bero enthusiastically recounted. "The plane had to do a wheel landing on a hard ice sheet with no boundary markings in a 40 mph cross wind."

The novice explorer was en route to meet his son, a researcher assigned to a long-term project at Amundsen-Scott South Pole Station. "My son, Chris, graduated from Ohio Wesleyan University and took a number of astronomy courses at Ohio State," said Bero. "As he was preparing to leave for Antarctica, I got it into my head that I wanted to go to the South Pole to visit him."

That fleeting thought had become reality after some quick research led him to locate an Antarctic adventure camp 660 miles from the South Pole. He confirmed that the organization could fly him the rest of the way to where his son was stationed, and the adventure began.

Chris (left) and Bob Bero

After the dramatic landing in the C-130, Bero spent a few days—24 hours of sunlight each—at the camp before it was time to take another flight to the South Pole. Another thrilling landing—this time in a much smaller de Havilland Canada DHC-6 Twin Otter aircraft—then Bero stepped onto the frozen otherworld near the South Pole. There he met his son and saw first-hand the remarkable work being done under such extreme conditions.

"I felt well prepared to understand most of the sophisticated research being carried out at the South Pole, because of my mechanical engineering background and the modern physics courses at Ohio State," he said.

"Just to build and run a research facility at the end of the earth with temperatures that drop to eighty degrees below zero in the winter is an impressive engineering feat."

After wrapping up the visit to his son's research labs, there was one more experience awaiting Bero: an impromptu mountain climb. Having returned to the adventure camp, he met a group of professional mountain climbers ready to set out on a day trip to scale a nearby mountaintop, its craggy head sticking out above the snow- and ice-filled valleys.

"The footing was a little challenging and the wind was blowing about 40 mph again," said Bero. "I had to hang on tight." But the impressive view—and ability to check off "climb a mountain" from his bucket list—was worth it. "The view was absolutely spectacular."

At the end of his adventure, Bero returned home exhilarated. Now, over 20 years later, the lessons learned on that trip still impact him.

"I had never really imagined myself in Antarctica or thought about what a trip there would involve," he said. "But my son heading off for his great adventure struck me that this was a once-in-a-lifetime opportunity for me to experience a great adventure. The adrenaline started to flow and pushed me ahead to get all the preparation done on a tight schedule."

For anyone facing the unknown, whether it be heading off to college, graduating or embarking on a career change, Bero's words of wisdom can ring true.

"When faced with a large and important decision, a passion for the opportunity and experience should be the driving force to work through all the obstacles and risks involved in making a good decision."

"Seek out input from those who have gone ahead of you—chances are, they can offer some advice from experience."

Placing students first

Putting scholars on a clear (and affordable) path to success

Each year, the best and brightest students from across the nation come to The Ohio State University to study with our faculty experts in the Department of Mechanical and Aerospace Engineering. Those students, in turn, conduct groundbreaking research, lead prominent student organizations and develop creative solutions to better our society.

It is our aim to provide department students with a clear and affordable path to the American Dream. As President **Michael V. Drake** stated, "affordable excellence is fundamental to who we are as a land-grant university." We invite you to join us in placing students first by investing in one of the department's priority funds listed below:

- **MAE Scholarship** supports scholarships within the department (**310208**)
- **MAE Priority** provides funding for emerging key areas within the department (**302655**)
- **MAE Curriculum** supports the department chair's curriculum reform project (**313090**)
- **ME Graduate Fellowship Fund** supports mechanical engineering graduate fellowships in the department (**313150**)

"The philanthropy of our alumni in support of our priorities allows us to create new opportunities for students and researchers, while funds directed toward scholarships help ease the financial burdens of high-achieving, deserving students. Our doors on campus are open for you to meet the students you support, to see first-hand some of our initiatives sustained by your generosity."

VISH SUBRAMANIAM
Professor and Department Chair

In memoriam: Professor Margaret Drake

The Department of Mechanical and Aerospace Engineering celebrates the life and contributions of Professor **Margaret Drake**. Known as an ever-curious trailblazer, Drake was a respected educator and a shining example for other women entering the field of engineering. She passed away on October 4, 2018.

Drake graduated with a degree in mechanical engineering from the University of Tennessee, where her family reports she was the first female engineering graduate. After continuing her studies to receive her master's degree, she began her career teaching at J. Sargent Reynolds Community College, Richmond, VA and Virginia Commonwealth University.

Then, with a doctoral degree from the University of Kansas, Drake's next career move in 1979 brought her to The Ohio State University. Here she became an admired professor and a beloved mentor.

For nearly two decades she taught thermodynamics, heat transfer, fluid mechanics, heating, ventilation and air-conditioning, heat exchangers and design at Ohio State. Her service to the university concluded in 2006, yet she continued her passion for sharing knowledge.

Drake's combined love of teaching and travel led her to teach internationally, delivering lectures in Malaysia several times, through a program with Purdue University. During retirement she also traveled extensively with People to People to understand heating and engineering challenges in different parts of the world. She further used her expertise to consult on geothermal heat pump design and installation.

"I had the utmost respect and admiration for Margaret," commented Department Chair Vish Subramaniam. "Especially in being a top-notch engineer and member of our male-dominated faculty. She held her own and taught me and others a great deal."

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Traffic-monitoring drones: Graduate student Ryan Thorpe (left) and Reserach Scientist Matt McCrink perform UAS testing on West Campus. Read about the Route 33 Smart Mobility Corridor project: ***go.osu.edu/AEdrones***.