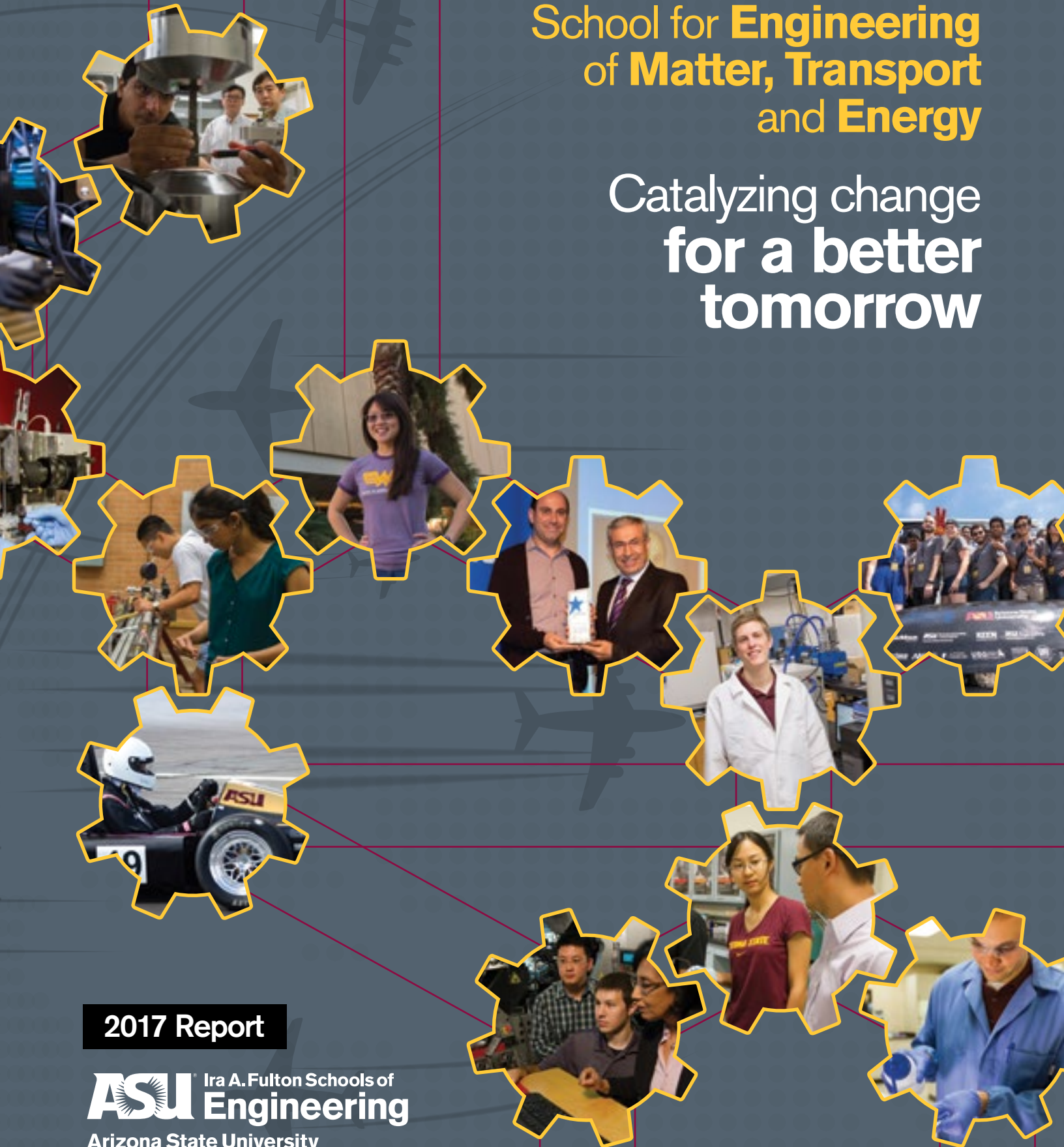


School for **Engineering of Matter, Transport and Energy**

Catalyzing change
**for a better
tomorrow**



2017 Report

ASU Ira A. Fulton Schools of
Engineering
Arizona State University



**Ira A. Fulton
Schools of
Engineering
Arizona State
University**

The Ira A. Fulton Schools of Engineering at Arizona State University offers **25 undergraduate programs and 41 graduate programs in its six schools:**

School of
Biological
and Health
Systems
Engineering

School of
Computing,
Informatics,
and Decision
Systems
Engineering

School of
Electrical,
Computer
and Energy
Engineering

School for
Engineering
of Matter,
Transport and
Energy

School of
Sustainable
Engineering
and the Built
Environment

The
Polytechnic
School

In the U.S., one in 72 graduating undergraduate engineers is a Sun Devil

\$104M

**Research
expenditures
FY2016-2017**

#3

Licenses and Options

Behind only Purdue and Carnegie Mellon

#4

IP Disclosures

Behind only Carnegie Mellon, Caltech and Purdue

19

**NSF CAREER
awardees
in the last
three years**

#4

Startups

Behind only Purdue, Carnegie Mellon and Stanford

Comparative data per \$10 million in research expenditures, based on the Association of University Technology Managers annual report of top national engineering schools.

**Lead institution on two and partner on two
National Science Foundation Engineering Research Centers**



**Lead institution on the Department of
Homeland Security Center of Excellence**



#1 in the U.S. for innovation

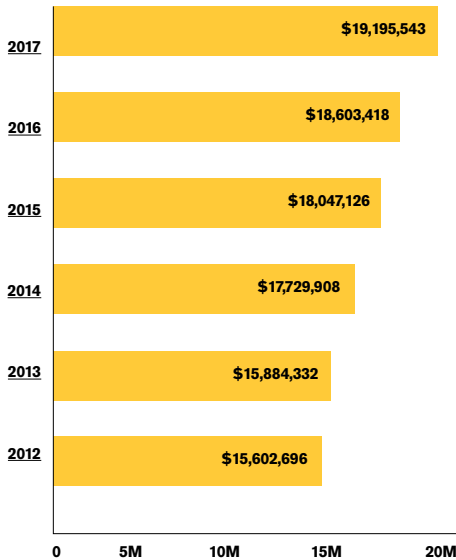
ASU ahead of Stanford and MIT

- U.S. News & World Report 2016, 2017, 2018 and 2019

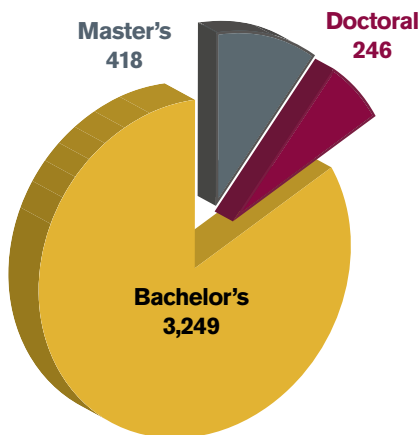


Breaking boundaries to exemplify excellence

Research expenditures



Enrollment



Total 3,913

The School for Engineering of Matter, Transport and Energy

continues to make transformational, technological advancements to elevate Arizona State University's academic enterprise. Our faculty of esteemed engineers, entrepreneurs, scientists and teachers enhance our national reputation for innovation through significant awards and achievements, from honorary doctorates and professional society awards to multiple grants from the U.S. Department of Energy and the Department of Defense.

In addition, our junior faculty won highly competitive and prestigious National Science Foundation Faculty Early Career Development (CAREER) Awards. This year, Jay Oswald and Robert Wang secured CAREER funding to pursue impactful research on the rapid, computer-guided design of better plastics and the creation of phononic materials to manipulate the transmission of sound and heat. Brent Nannenga and Liping Wang received grants from the Air Force Office of Scientific Research Young Investigator Research Program. They were two of 58 scientists and engineers from 41 research institutions in the nation who submitted winning research proposals in 2016.

Our school relies on interdisciplinary leaders who break boundaries to produce research that improves quality of life for all. Professor Yongming Liu directs a five-year project of \$10 million funded by NASA's Aeronautics University Leadership Initiative. Liu's team of experts — including faculty from the Ira A. Fulton Schools of Engineering and collaborators from Vanderbilt University, Southwest Research Institute and Optimal Synthesis Inc. — will improve aviation and drive the future of air traffic management.

The combination of our award-winning faculty, interdisciplinary research and nationally recognized undergraduate and graduate programs — in aerospace engineering, chemical engineering, materials science and engineering, mechanical engineering and solar energy engineering and commercialization —

continues to attract top students from across the country. In 2016, five Flinn Scholars chose to pursue degrees in our school. Also, 21.4 percent of our students are in Barrett, The Honors College.

Our faculty members strive to be at the forefront of every intellectual revolution to match our students' talents and ambition to succeed. They are driven by a sincere commitment to elevate teaching, service and research. Professor Jim Middleton and Professor Kyle Squires, dean of the Fulton Schools, both have received grants from the NSF to improve education in mathematics and engineering.

Our students exemplify excellence and bring in top honors and awards as well. Christopher Balzer, a chemical engineering graduate, is the first student from ASU to receive the prestigious Churchill Scholarship. Balzer and Kaleigh Johnson have also been named Goldwater Scholars in 2016. Many of our talented students also receive graduate research fellowships from NASA, the NSF and the DOE. Our students are also involved in interdisciplinary activities, such as the AZLoop team that competed in the second Hyperloop competition sponsored by SpaceX.

As we move forward, we reflect on the generosity of our donors who help us provide a lasting education with breadth and depth while fueling new thinking, knowledge and technology for challenges being faced by our state, nation and world. We invite you to invest in our school and partner with us as we foster discovery, creativity and innovation — our influence has no boundaries.

Lenore L. Dai

Professor of chemical engineering
 Director of the School for Engineering of Matter, Transport and Energy

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Contributors

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Monique Clement
Ken Fagan
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Terry Grant
Jessica Hochreiter
Joe Kullman
Charrie Larkin
Charlie Leight
Haley MacDonell
Leslie Minton
Scott Seckel
Rose Serago
Nora Skrodenis
Amanda Stoneman
Pete Zrioka

Volunteer

Join us at E2, Homecoming and other events throughout the year. Reconnect with alumni, learn about new research initiatives and meet our outstanding students.



Faculty excellence

Jean **Andino**

Educator of the Year Award in Higher Education, Society of Hispanic Professional Engineers

Panagiotis **Artemiadis**

Fulton Schools Exemplar Faculty

Spring **Berman**

Office of Naval Research Young Investigator Award; Top 5% Teaching Award

Candace **Chan**

Fulton Schools Exemplar Faculty; Scialog Fellow for Advanced Energy Storage

Werner **Dahm**

Top 5% Teaching Award

Erica **Forzani**

Fulton Entrepreneurial Professor

Mary Laura **Lind Thomas**

Industrial & Engineering Chemistry Research Class of Influential Researchers

Yongming **Liu**

NASA Aeronautics University Leadership Initiative

James **Middleton**

Top 5% Teaching Award

Marc **Mignolet**

Fulton Schools Exemplar Faculty

Brent **Nannenga**

Air Force Office of Scientific Research Young Investigator Award

Jay **Oswald**

National Science Foundation Faculty Early Career Development Award (NSF CAREER Award)

Kaushal **Rege**

Fellow, American Institute of Medical and Biological Engineers

Kiran **Solanki**

Fulton Schools Exemplar Faculty

Sefaattin **Tongay**

Top 5% Teaching Award; Scientist of the Year for the Scientific and Technical Research Council of Turkey; Young Scientist Award from the Heroes of Science Association in Turkey; Fulton Outstanding Assistant Professor

Liping **Wang**

Air Force Office of Scientific Research Young Investigator Award

Robert **Wang**

National Science Foundation Faculty Early Career Development Award (NSF CAREER Award)

NSF CAREER Award winners promote research at the frontiers of science and technology while demonstrating community service through scientific leadership, education or community outreach.

Fulton Schools Exemplar Faculty are associate or full professors who have a combination of high research productivity, instructional load, student evaluations and doctoral student mentoring.

Jean **Andino**

Andino, an associate professor of chemical engineering, won the 2017 Educator of the Year Award in Higher Education by the Society of Hispanic Professional Engineers. She is committed to increasing the persistence of Latinx students in STEM disciplines.

"I believe it is critically important to diversify the engineering profession," says Andino, who has become a constant presence in helping students become professional engineers and pursue graduate school.



A portrait of Jay Oswald, a man with short brown hair, wearing a blue button-down shirt and a grey blazer. He is looking slightly to the right of the camera. In the background, there are framed certificates on a wall and a computer monitor displaying data.

Jay Oswald

Jay Oswald, an associate professor of aerospace and mechanical engineering, is supporting fundamental research on how materials structures at the molecular scale affect macroscopic physical properties of semi-crystalline plastics. This is part of a five-year, \$500,000 National Science Foundation Early Career Development Award.

The goal of Oswald's research is to **foster innovation in plastics manufacturing and shorten what is typically a 10 to 20-year development cycle for materials.**

Oswald's interdisciplinary research group will develop new, computationally efficient models to advance the capabilities of plastics. These improved models will be relevant to many practical engineering problems, such as making cars safer or refining protective gear for police and military forces.

Oswald will combine polymer science research with educational and outreach efforts to maintain a pipeline of highly trained engineers and scientists for the plastics industry. ■

NSF CAREER Award winner



A photograph of Robert Wang, an associate professor, in a laboratory setting. He is wearing a dark blue polo shirt with the SEMTE logo and glasses. Behind him are shelves with various lab supplies and equipment. The text 'Robert Wang' is overlaid on the left side of the image.

Robert Wang

Technological control over sound and heat has lagged far behind light. Robert Wang, an associate professor of aerospace and mechanical engineering, wants to **bridge this gap by creating new, high-frequency phononic crystals.**

Researchers make phononic crystals with a periodic assembly of alternating hard and soft materials. These structures manipulate sound in kilohertz frequencies with millimeter-scale objects. Creating these structures for heat is challenging because it requires assembly with nanometer-scale objects.

In order to access this nanometer-scale assembly system, Wang uses colloidal nanocrystals, which spontaneously assemble into special structures called superlattices. These superlattices naturally possess the periodic, alternating hard and soft materials that phononic crystals require in three dimensions.

Wang earned a five-year, \$562,500 National Science Foundation Early Career Development Award for his innovative use of colloidal nanocrystals to address challenges in the phononic crystal community. ■

NSF CAREER Award winner

A portrait of Panagiotis Artemiadis, a man with short brown hair, wearing a dark blue polo shirt. He is looking directly at the camera with a neutral expression. The background is a laboratory or workshop with various pieces of equipment, including a person in a teal shirt and patterned shorts standing near a metal frame.

Panagiotis Artemiadis

Panagiotis Artemiadis, an associate professor of aerospace and mechanical engineering, is a leader in robotics. His research seeks to **improve quality of life by developing and controlling autonomous systems** that physically and cognitively interact with humans.

The National Science Foundation recently awarded Artemiadis and two other scientists a \$1 million grant to develop and test a smart robotic ankle capable of walking on several surfaces.

This project will complement Artemiadis' research on robotic devices that assist and augment human capabilities as well as provide motor rehabilitation therapy to impaired individuals.

Artemiadis serves as the founder and director of the Human-Oriented Robotics and Control Laboratory. Recently, he was promoted to associate professor with tenure and received the Fulton Schools Exemplar Faculty Award for his research productivity, classroom instruction and doctoral mentoring. ■

Fulton Schools Exemplar Faculty





Candace Chan

Candace Chan, an associate professor of materials science and engineering, focuses on **laying the scientific foundations for developing batteries and solar devices** for the next generation.

She received a 2016 National Science Foundation Early Career Development Award to research a ceramic replacement to the flammable liquid electrolytes currently used in batteries. As society relies on lithium ion batteries for small, portable electronics, it has become increasingly important to find alternative materials.

Chan's research involves finding more stable, solid materials that are engineered to maintain high ionic conductivity for batteries so the lithium ions can travel more efficiently between the electrodes. This will improve safety characteristics to avoid batteries overheating and catching fire.

Recently, Chan was recognized as a Fulton Schools Exemplar Faculty for her dedication to research excellence in nanostructured materials for various applications, classroom instruction and doctoral mentoring. ■

Fulton Schools Exemplar Faculty

A portrait of Marc Mignolet, a man with white hair and glasses, wearing a light blue shirt and a patterned tie. He is smiling and looking slightly to the right. The background is a bookshelf filled with books. A white text box is overlaid on the bottom right of the image, containing his name and a bio. A dark blue banner at the bottom right of the text box contains the text 'Fulton Schools Exemplar Faculty'.

Marc Mignolet

Marc Mignolet, a professor of aerospace and mechanical engineering, is involved in three Air Force-funded projects in his primary area of expertise — the structural dynamics of aircraft.

One project through the Collaborative Center for Structural Sciences focuses on developing **new computational methods to predict the behavior of hypersonic vehicles**, such as airplanes, missiles and spacecraft. These vehicles fly at about five to seven times the speed of sound in air, which cause large deformations and affect aerodynamics and heating.

A second project, funded by a Multi-University Research Initiative grant, analyzes uncertain structures in hypersonic vehicles that result from manufacturing variability, lack of adequate material properties or geometry and unresolved physics to extend mathematical methods for more accurate predictions of behavior.

Mignolet's experiences in collaborative research combined with graduate student mentoring and serving as a graduate program chair in aerospace and mechanical engineering has earned him the Fulton Schools Exemplar Faculty title. ■

Fulton Schools Exemplar Faculty





Kiran Solanki

Kiran Solanki, an associate professor of aerospace and mechanical engineering, recently won a grant from the National Science Foundation to research nanocrystalline alloys in metallic materials. This will help **enhance rotating machinery and engine components** critical to the transportation, defense and energy sectors.

Solanki and colleagues from the Army Research Laboratory and the University of North Texas created an innovative process to stabilize metals at the nano level. *Nature*, the highly recognized peer-reviewed journal, published

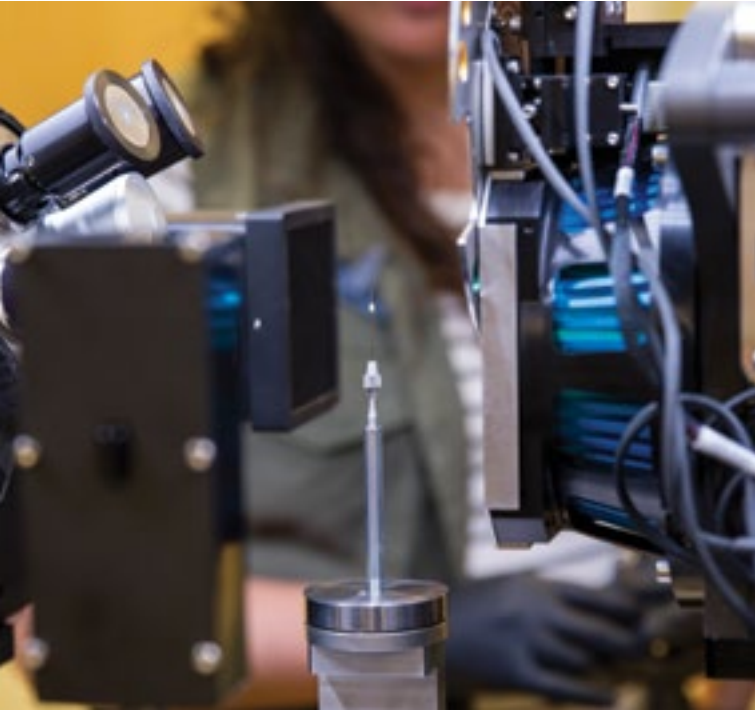
the results. Supported by a \$635,000 grant from the Office of Naval Research, Solanki is also working with collaborators to improve the performance and safety of the U.S. Navy's aging fleets to limit costs associated with corrosion. His team is studying joint degradation behavior by combining electrochemical and materials/mechanical concepts.

Solanki has co-authored 50 journal articles, four book chapters and 35 conference proceedings. His research productivity and doctoral mentoring have earned him the Fulton Schools Exemplar Faculty title. ■

Fulton Schools Exemplar Faculty

Our interdisciplinary leaders catalyze change

Our innovative and transformative faculty define the quality, success and reputation of our school. They strive to be at the forefront of every intellectual revolution and produce research that improves quality of life for all. This past year, we welcomed six new faculty to join our community of esteemed engineers, entrepreneurs, scientists and teachers who continuously push boundaries to elicit meaningful change.



**Kumar
Ankit**



Assistant Professor
PhD, Karlsruhe Institute of
Technology
Materials science and engineering

**Jeonglae
Kim**



Assistant Professor
PhD, University of Illinois at
Urbana-Champaign
*Aerospace and mechanical
engineering*

**Christopher
Muhich**



Assistant Professor
PhD, University of
Colorado Boulder
Chemical engineering

**Raghavendra
Murthy**



Lecturer
PhD, Arizona State University
*Aerospace and mechanical
engineering*

**Arul
Varman**



Assistant Professor
PhD, Washington
University in St. Louis
Chemical engineering

**Houlong
Zhuang**



Assistant Professor
PhD, Cornell University
*Aerospace and mechanical
engineering*



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 PhD, University of Wisconsin-Madison
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Professor, Associate Director
 PhD, Cornell University
Materials science and engineering

Jean Andino
Associate Professor
 PhD, California Institute of Technology
Chemical engineering

Kumar Ankit
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 PhD, Karlsruhe Institute of Technology
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 PhD, National Technical University of Athens
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Spring Berman
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 PhD, University of Pennsylvania
Aerospace and mechanical engineering

Luis Bocanegra
Professor of Practice
 PhD, West Virginia University
Aerospace and mechanical engineering

Veronica Burrows
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 PhD, Princeton University
Chemical engineering

Ronald Calhoun
Associate Professor
 PhD, Stanford University
Aerospace and mechanical engineering

Elizabeth Cantwell
Vice President for Research Development, Professor of Practice
 PhD, University of California, Berkeley
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Candace Chan
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 PhD, Stanford University
Materials science and engineering

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Aerospace and mechanical engineering

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Materials science and engineering

Kangping Chen
Associate Professor
 PhD, University of Minnesota
Aerospace and mechanical engineering

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Chemical engineering

Shuguang Deng
Professor
 PhD, University of Cincinnati
Chemical engineering

Sandwip Dey
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Materials science and engineering

Heather Emady
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Chemical engineering

Erica Forzani
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 PhD, Cordoba National University
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Julianne Holloway
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Arul Varman
Assistant Professor
 PhD, Washington University in St. Louis
Chemical engineering

Liping Wang
Associate Professor
 PhD, Georgia Institute of Technology
Aerospace and mechanical engineering

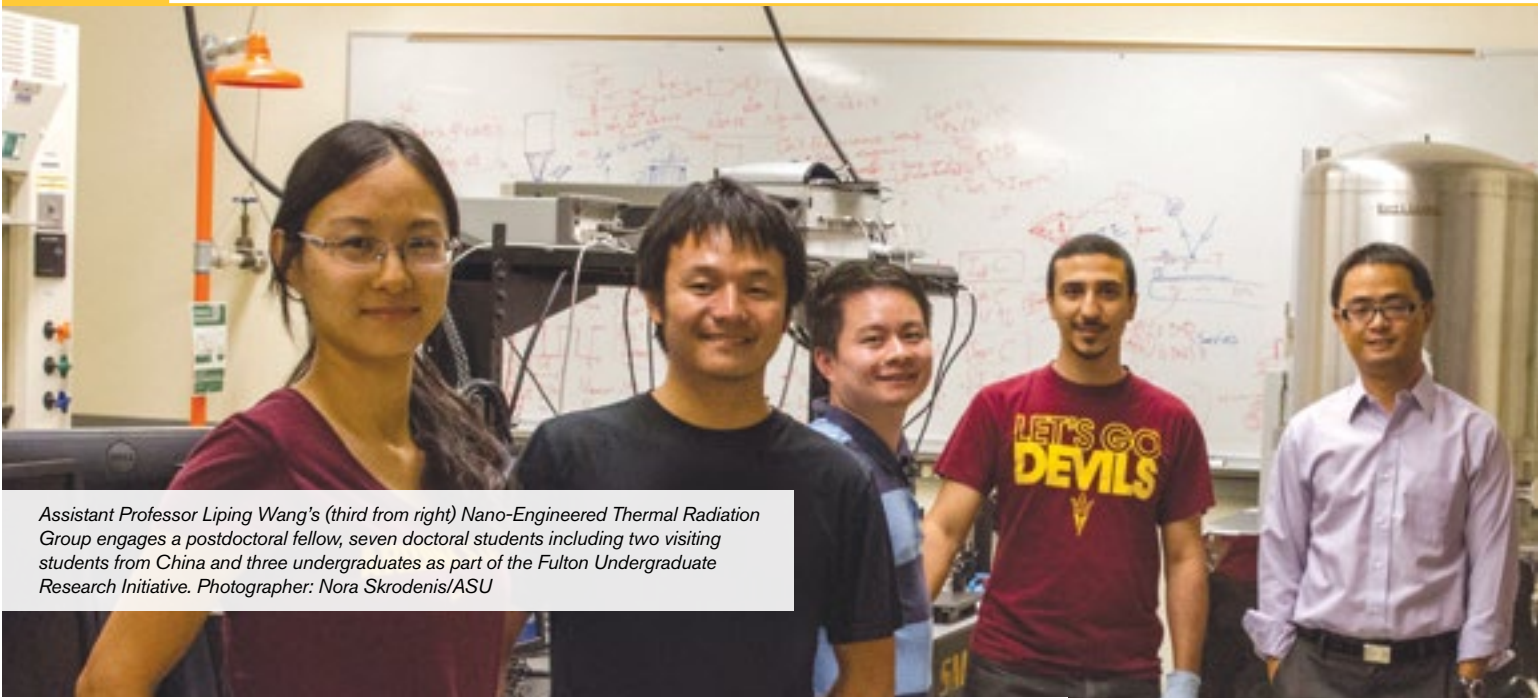
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Sze Zheng Yong
Assistant Professor
 PhD, Massachusetts Institute of Technology
Aerospace and mechanical engineering

Houlong Zhuang
Assistant Professor
 PhD, Cornell University
Aerospace and mechanical engineering



Assistant Professor Liping Wang's (third from right) Nano-Engineered Thermal Radiation Group engages a postdoctoral fellow, seven doctoral students including two visiting students from China and three undergraduates as part of the Fulton Undergraduate Research Initiative. Photographer: Nora Skrodenis/ASU

Addressing an urgent need for high-efficiency, renewable energy

Liping Wang, an associate professor of aerospace and mechanical engineering, imagines an energy sector enhanced by greater control over thermal radiation.

He is designing and constructing a host of custom electromagnetic materials to make it possible.

Wang's endeavor is supported by a Young Investigator Award from the Air Force Office of Scientific Research, totaling \$360,000 over three years.

Game-changing

Thermal radiation refers to the transfer of energy through electromagnetic waves between objects. Improving thermal radiation and its transport boasts improvements in energy harvesting, as well as thermal management, imaging and sensing — all of which are essential in addressing the world's urgent need for high-efficiency renewable energy sources and energy-saving materials.

Currently, in thermophotovoltaic systems (systems that convert thermal energy to power), efficiency is very low. These systems commonly suffer from a loss of heat — known as waste heat — rather than using that heat to generate additional electricity.

A solution to the problem lies in designing emitters and receivers made of materials that are near-perfectly efficient in their absorption of sunlight, meaning materials can selectively control thermal radiation and enhance radiative transport. By extension, this research could help create solar cells that produce more energy, more efficiently.

Wang is developing game-changing nanoengineered materials that are nanowire-based metamaterials.

These manufactured metamaterials are electromagnetic structures deliberately engineered to offer a range of unique electromagnetic properties, which are much more difficult, if not impossible, to achieve in naturally occurring materials or composites.

"These metamaterials would provide much more flexibility and tunability in materials designed to achieve the best system performance," says Wang.

During the thermal radiation process, Wang's nanowire metamaterials can interact with both the electric and magnetic fields, which allows for improved control of light propagation, absorption and emission with "both hands" of the wave. This can lead to greater energy efficiency and power input by improving the conversion of thermal energy into electricity.

"We aim to engineer these novel materials for developing high-efficiency renewable energy sources, recuperating waste heat, facilitating thermal managements and mitigating climate change," says Wang.

Wasted energy

About 60 percent of the total energy that is produced in U.S. is wasted in the form of heat during production, transportation and storage.

"Recycling of such a huge amount of waste heat with highly efficient energy-conversion devices will undoubtedly reduce the amount of fuel consumption and greenhouse gas emission by up to 30 percent," says Wang. ■





Shaking up the world of proteins with engineering

Proteins, as Brent Nannenga describes them, are “little machines inside life that make things happen.”

They play many critical roles in all living organisms, acting as the building materials for cells, antibodies that guard against infection and disease, and messengers that ferry information between cells, tissues and organs.

Complex in nature, proteins are composed of amino acids strung together that fold into intricate three-dimensional structures. These structures — tangled tubes, spherical bundles, recurring spirals folded into themselves and more — determine what exactly the proteins do.

Nannenga has embarked on two ambitious projects to expand our knowledge of these structures and put it to use. Using his engineering background coupled with experience in structural biology, he aims to leverage the roles of existing proteins for new purposes as well as designing and constructing new proteins with novel properties and functions.

As a recipient of the 2017 Air Force Office of Scientific Research Young Investigator Award, Nannenga is using directed protein synthesis to create inorganic nanomaterials in a more precise and environmentally friendly manner with the added benefit of adding specific functions to the crafted nanomaterials.

Nanomaterials — materials with internal or surface structures in the nanoscale that possess unique optical, mechanical or electronic properties — are used for specialized coatings, enhancements in electronics and even hold promise for use in smart pharmaceuticals and drug delivery systems.

The physical and chemical techniques employed for the fabrication of these tiny, desirable materials are costly, requiring toxic compounds and high temperatures. Conversely, biological creation simply requires water, salt proteins and room temperature, says Nannenga.



Brent Nannenga

Through this natural approach, there is the possibility of dropping the engineered proteins into cells and transforming that cell into a nanomaterial factory.

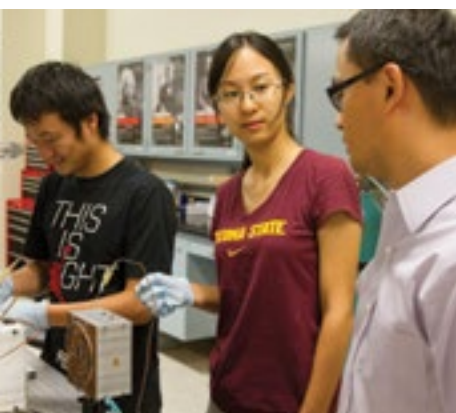
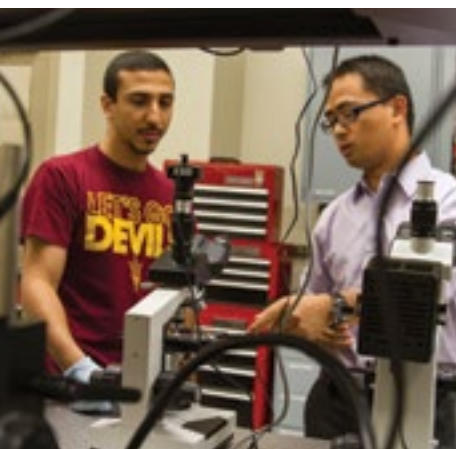
“Biology in general is just very good at organizing things very specifically and precisely,” he adds. “The promise of using protein-driven nanomaterial synthesis is environmentally friendly and has the potential to be very specific and directed and controllable.”

Conversely, Nannenga has received a five-year, \$1.5 million research project grant from the National Institutes of Health to focus on developing and refining tools to characterize the structure of the G-protein, an important protein responsible for a range of physiological responses.

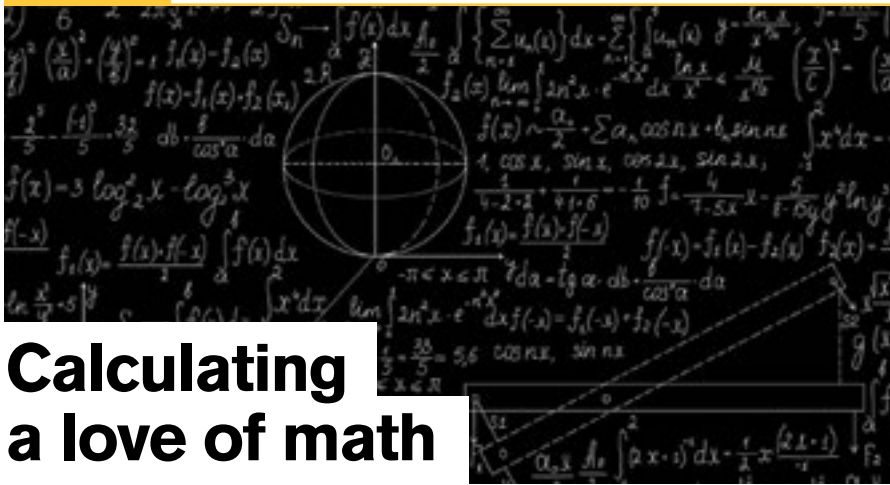
G-protein-coupled receptors, also known as GPCRs, are integral in many biological processes. They act as mailboxes for cells, taking in signals and mediating physiological responses to hormones, neurotransmitters and environmental stimulants.

Because GPCRs regulate so many processes within our bodies, they are targeted by drugs that treat everything from hypertension and asthma to allergies and acid reflux.

Nannenga has partnered with collaborator Wei Liu, a structural biologist in ASU’s School of Molecular Sciences, to fully map the structure of GPCRs using an electron crystallography technique. This has the potential to open a new frontier of pharmaceuticals and additional protein characterization. ■



Research



Calculating a love of math

Do you like math? Your decision rides on your experiences in the classroom.

"Mathematics itself is fairly neutral," says Jim Middleton, a professor of aerospace and mechanical engineering. "There is no reason to either love or hate mathematics outside the experiences we have in and out of school along with the cultural attitudes."

When students' enjoyment and understanding of math falters, so do the possibilities of STEM courses and career paths that require higher math in those students' futures.

To keep math and STEM careers a possibility for all students, Middleton and Amanda Jansen, a professor of mathematics education at the University of Delaware, are studying what contributes to positive student engagement and therefore effective learning.

"These dynamics are not well understood, and as a consequence, mathematics curriculum and instruction in the U.S. is not serving the majority of students well," Middleton says.

This ASU-UD team is the first to research moment-to-moment experiences of high school students studying mathematics over time as part of their three-year, \$1.3 million National Science Foundation-funded study.

"We recognized a lack of research that could address, methodologically, how to investigate students' experiences in the moment to understand the nature of their engagement with mathematics in a way that could reveal more general trends," Jansen says.

By understanding these processes, they plan to help teachers to encourage more students to engage deeply, work hard, persist and become more mathematically capable.

Engagement = interactions + strategies + tools + organization

"The need for mathematics competencies is so dire, research needs to focus on areas that show the most promise of making positive change in students' lives," Middleton says.

Engagement-related variables, such as interest and usefulness, are the strongest predictors of learning, and the most effective place to make a positive change is in the classroom.

Determining whether students will like or dislike math comes down to the classroom climate. Each classroom has a unique personality based on its students, curricula, strategies for thinking about difficult problems and cultural attitudes that create a set of constraints on what is possible for students.

"The big problem is we do not know what teaching strategies and classroom organization patterns impact learners in ways that encourage long-term, positive engagement," Middleton says.

Middleton and Jansen plan to take into account different classroom climates and their differences in engagement and mathematical performance to create effective professional development for teachers.

Gathering data to learn what best engages students

"Our work has a 'rubber hits the road' practicality... We are focusing on understanding and then changing the learning experiences of students to be more effective, inclusive and personally satisfying," Middleton says.

This is the first time secondary math classrooms will be studied so continuously at scale.

Middleton and Jansen will mine the real experiences and interactions of more than 5,000 high school freshmen and sophomores in Arizona and Delaware. They will look at data collected over two years to see what makes for a successful classroom engagement experience. ■

Advancing first-generation college student success

Since 2011, enrollment of first-generation college students in the Fulton Schools has grown more than 150 percent, bringing new ideas, perspectives and experiences into engineering education.

With the support of a two-year, \$300,000 grant from the National Science Foundation, the Fulton Schools is looking to change that pattern by developing and adapting a suite of support systems and introductory programs to ensure first-generation student success and broaden participation of underrepresented groups in engineering.

Fulton Schools Dean and Professor Kyle Squires serves as the principal investigator on the effort, called Engineers from Day One. Co-PIs include Vice President of Industry Partnerships at Maricopa Community Colleges Maria Reyes, Director of the Fulton Schools Career Center Robin Hammond, Vice Dean of Academic and Student Affairs and



A group of first-generation students pose for a photo during their FSE 100 class. Photographer: Jessica Hochreiter/ASU

Professor Jim Collofello and Tooker Professor and Assistant Dean of Engineering Education Tirupalavanam Ganesh.

"Inclusion is inherent to the DNA of ASU, and we're very pleased to receive support from the National Science Foundation to continue the important work of drawing engineers from all backgrounds," says Squires.

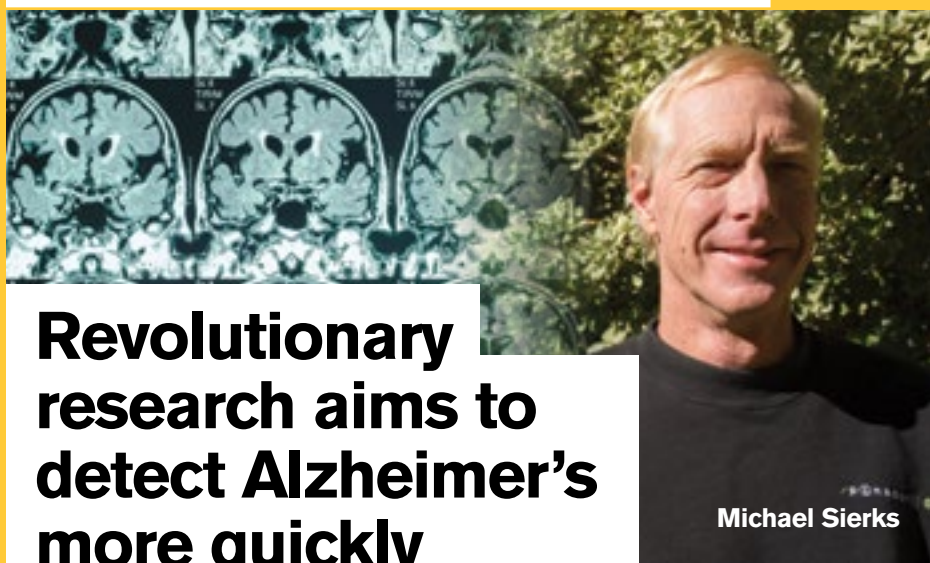
ASU is one of 27 institutions to receive such an award — part of the Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science, known as the INCLUDES program.

ASU is not embarking on this ambitious program alone. Engineers from Day One involves a range of partners, including the Maricopa Community Colleges; K-12 school districts of Chandler, Mesa, Phoenix, Tempe and Tolleson; and industry partners Honeywell, Intel and Texas Instruments. The Helios Education Foundation will serve an advisory role.

Engineers from Day One involves 500 high school students, 100 community college students working toward associate degrees and 200 ASU students enrolled in a four-year engineering program. The project focuses on developing engineering awareness and an identity tied to the discipline, as well as contextualizing engineering's personal and social relevance.

"Inclusion and access are the two hallmarks of what ASU does," says Ganesh. "We pride ourselves on how many students we include and how we help them be successful with high-quality education. But it's not enough to include them, we also have to help them become successful."

Through advancing the success and persistence of first-generation students, researchers engaged in the study hope to create a model for use elsewhere. The combined effort could serve as a resource for the expansion of the programs, systems and mechanisms of Engineers from Day One to include individuals from all walks of life in engineering. ■



Revolutionary research aims to detect Alzheimer's more quickly

Michael Sierks

A much simpler blood test spots signs of the disease as many as seven years prior to symptoms.

Currently, there is no single, accepted test to diagnose Alzheimer's disease. The neurodegenerative disease is generally identified by a combination of symptoms, cognitive analysis and brain imaging, but can only be conclusively diagnosed through a biopsy or autopsy of brain tissue.

Michael Sierks, a professor of chemical engineering, looks to change this issue.

Instead of looking for the characteristic plaques and tangles that plague a brain affected by Alzheimer's disease, he is searching through a patient's blood for variants of the proteins that cause the telltale signs of the disease.

Plaques form between nerve cells due to accumulation and aggregation of beta amyloid, a protein that does not aggregate in a healthy brain. Likewise, neurofibrillary tangles — twisted fibers found in brain cells — are comprised mostly of a protein called tau. Tau is a key component of microtubules, which transport nutrients and other vital substances around the neurons in healthy brains. In a brain affected by Alzheimer's, however, the tau protein aggregates, causing the microtubules to collapse and tangle.

While both beta amyloid and tau are normally present in healthy people, the presence of specific disease-related variants of the proteins can signal a neurodegenerative disease. These combinations, or protein variants, can be measured as biomarkers in a patient's blood.

With the support of a five-year, \$1.7 million award from the National Institutes of Health,

Sierks hopes to turn the current method of diagnosis on its head. Instead of relying on symptoms and brain imaging to diagnose the disease, he hopes to develop a much simpler test based on disease pathology.

"What we are hoping to do is test your blood and tell you if you have Alzheimer's disease or another neurodegenerative disease pre-symptomatically," says Sierks.

The protein variants he is looking for aid in this approach, as they show up very early — as many as seven years prior to symptoms associated with Alzheimer's disease. Sierks likens it to catching a flu virus in its early stages — it may have begun replicating, but the virus has not yet taken hold and the carrier is not sneezing or coughing.

Sierks is not only looking to diagnose neurodegenerative diseases earlier, but also put a fine point on which disease it is, as many of these diseases share symptoms.

"What we are realizing is neurodegenerative diseases are more like a spectrum, a rainbow of linked disorders," says Sierks. "They are caused by misprocessing and misfolding of protein variants."

Sierks is currently collaborating with Dr. Richard Caselli, a neurologist with Mayo Clinic Scottsdale on the research, testing the blood of Caselli's patients, all with various stages of Alzheimer's disease.

"I really think we are on the right track — every sample we analyze is very clearly diseased or not," says Sierks.

Though staging and diagnosing neurodegenerative diseases is only half the battle. Sierks is in the early stages of establishing a company to explore therapy and treatment technology that can be derived from the cutting-edge diagnostic tools he is building. ■





Promising potential treatment for autism

The key to fighting autism might lie not in the mind, but in the gut.

A team led by ASU researchers is taking a novel approach in the search for effective autism treatments by focusing on improving the gut microbiome through fecal microbial transplants.

Fecal microbial transplants involve the transfer of live gut bacteria from a healthy donor to a recipient.

The team — including collaborators from Northern Arizona University, Ohio State University and the University of Minnesota — completed a study involving 18 participants with autism spectrum disorders who ranged in age from 7 to 16 years old. The results were recently published in *Microbiome*.

Participants underwent a 10-week treatment program involving antibiotics, a bowel cleanse and daily fecal microbial transplants over eight weeks. The treatment program showed long-term benefits, including an average 80 percent improvement of gastrointestinal symptoms associated with autism spectrum disorders and 20-25 percent improvement in autism behaviors, including improved social skills and better sleep habits.

“The results are very compelling,” says James Adams, ASU President’s Professor of materials science and engineering and one of the team leaders. “We completed a Phase 1 trial demonstrating safety and efficacy but recommending such treatment and bringing it to market requires Phase 2 and Phase 3 trials.”

The ASU team is led by Adams, Rosa Krajmalnik-Brown and Dae-Wook Kang. Krajmalnik-Brown and Kang are researchers at Biodesign Swette Center for Environmental Biotechnology. ■

Designing a new class of 2D materials

Sefaattin Tongay, an assistant professor of materials science and engineering, has earned a 2016 Young Scientist Award from the Heroes of Science Association (Bilim Kahramanlari Derneği) in Turkey.

A selection committee composed of university presidents, deans, professors and other leading academics chose Tongay based on the societal impact of his scientific discoveries, his educational contributions to ASU and the originality of his research at the intersection of photonics, wearable materials and technology.

Tongay’s research group is designing a new class of 2D materials that can outperform traditional materials to address challenges in energy, flexible electronics and photovoltaics, photonics and optics.

Improving 2D materials’ distinctive properties could lead to improvements in lighting technologies such as light-emitting diodes (LEDs), as well as batteries, cell phones, flexible electronics, biosensors and the photovoltaic cells used to convert sunlight into energy.

Tongay’s research imagines a future where clothes have embedded solar batteries, devices can replicate an artificial photosynthesis and electronic circuits can be twistable and foldable.

Tongay was born and raised in Berlin but is a Turkish citizen and his family is from Izmir, Turkey. He was the only award recipient who represents a university outside of Turkey.

He said receiving the award despite working overseas came as a real surprise.

“It made me realize my native country has high hopes for me and many researchers recognize my ASU team’s highly innovative work,” says Tongay. “It was an honor to represent ASU from thousands of miles away.” ■



Sefaattin Tongay (left) poses with the president of Bahcesehir University at the Heroes of Science Association’s award ceremony. Photographer: Özlem Mutlu Doğan



Associate professor Kiran Solanki (left) and doctoral student Mansa Rajagopalan work on a new process to stabilize metals at the nano level. Photographer: Jessica Hochreiter/ASU

Creating faster, more efficient turbines

A new process to stabilize metals at the nano level has the potential to create faster, more efficient turbines, feasibly improving everything from war planes to dams to ship engines.

A team of researchers including scientists from ASU created a process that resulted in a super-strong nanocrystalline alloy, which resists deformation over long-term use.

A paper about the breakthrough, which has tremendous implications for the

aerospace, naval, civilian infrastructure and energy sectors, was published in the highly recognized peer-reviewed journal *Nature*.

"This process is revolutionary," says Kiran Solanki, an associate professor of aerospace and mechanical engineering.

For the past half century, researchers have been working to make stronger materials. An aircraft flies by its engine. To make an aircraft fly faster, the engine turbines need to spin faster, or to produce more revolutions per minute. Nanocrystalline alloys are super-strong, but when engines run fast and hot, eventually the metal becomes deformed over time, or "creeps." But the new process results in an alloy that resists deformation.

The process, invented by Solanki and colleagues at the Army Research Laboratory and the University of North Texas, stabilized a copper alloy at a micro level.

"These materials can last in high temperatures," Solanki says. "If they last longer, and the temperature is high, every increment improves the efficiency of the engine."

Using the new process, operating temperatures can be increased, fuel efficiency boosted and the machine's carbon footprint reduced. While no one uses copper for load-bearing applications like aircraft, "this technology can apply to many other materials," Solanki says. "Anything where you have a power conversion."

Advances in materials nanotechnology — manipulating matter on an atomic or molecular scale — made the process possible.

"For the last 20 years they thought this would never work," Solanki says.

The rate at which creep occurred in the alloy was six to eight orders of magnitude lower than in most other nanocrystalline metals — a spectacular improvement in durability.

"Now the question is, can we take this process and apply it to other materials?" Solanki says. ■

A five-year project, led by Yongming Liu, focuses on safely integrating the complex data sources that are driving the future of air traffic management systems. Graphic created by Pete Zrioka and Rose Serago/ASU

Improving next-generation air traffic control with \$10M from NASA

ASU is set to play a role in improving safe and efficient air travel across the country's blue — perhaps bluest in Arizona — sky.

ASU is among five university research teams that were funded by NASA's Aeronautics University Leadership Initiative to explore a novel idea to improve aviation. A five-year project, led by Yongming Liu, focuses on safely integrating the complex data sources that are driving the future of air traffic management systems.

The award-winning \$10 million project focuses on safely integrating the complex data sources that are driving the future of air traffic management systems.

Liu, the lead project investigator, is directing a diverse, multidisciplinary team that includes several faculty in ASU's Fulton Schools, as well as collaborators from Vanderbilt University, Southwest Research Institute and Optimal Synthesis Inc. Liu is a professor of aerospace and mechanical engineering.

NASA expects the awards to "spur the nation's leading universities to take a larger leadership role in advancing the revolutionary ideas needed to transform aviation and further advance U.S. global leadership in the aviation community," says Jaiwon Shin, NASA's associate administrator for aeronautics, in a press release.

Managing the interplay of data sources

ASU's project surrounds what Liu refers to as the next-generation National Airspace System, known as NextGen NAS.

The National Airspace System covers the airspace, navigation facilities and airports of the U.S. along with its associated information, regulations, policies, personnel and equipment.

"NAS is in the process of undergoing a change from radar-based technology to surveillance systems-based operations within the next 10 years," Liu says.

This is due to a multitude of new and existing aviation data sources becoming available, such as the use of voice and data communications, live weather forecasting, aircraft health data and GPS technology.

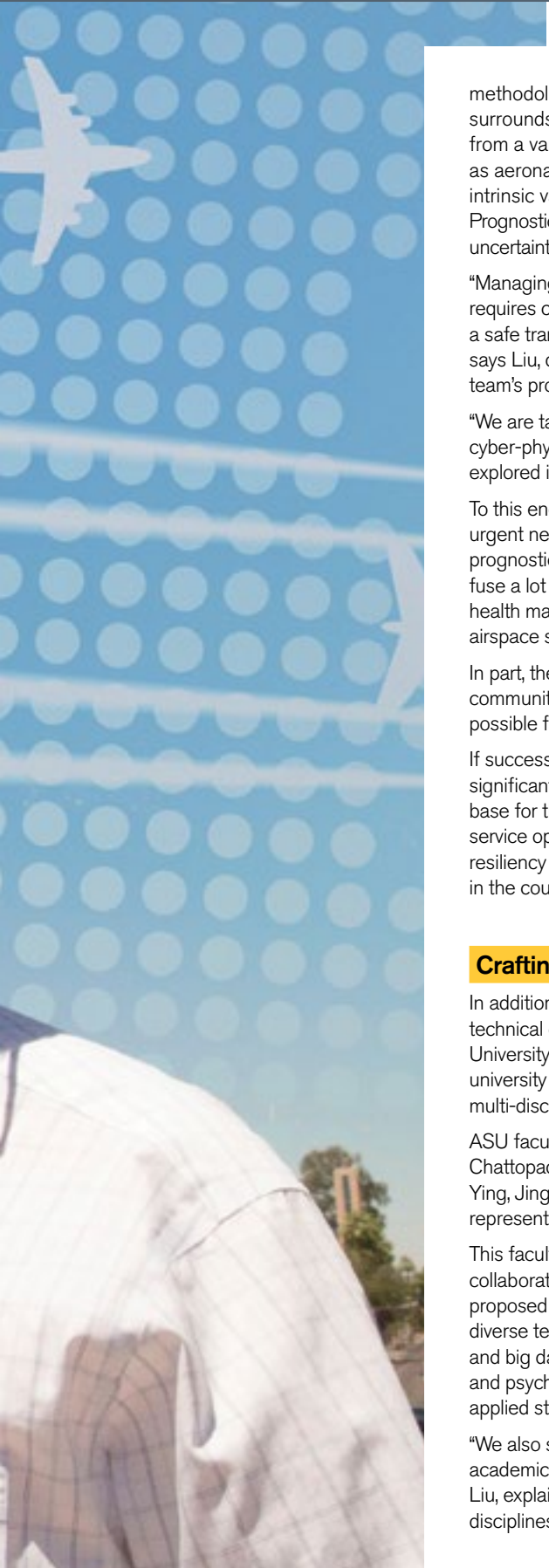
The availability of new technology and data sources promise the possibility of reducing aviation gridlock in the sky and at airports, cutting weather-related delays, and enabling air traffic controllers and pilots to see the same real-time display of air traffic for the first time.

Additionally, modernizing the nation's complex air transportation system will lead to more efficient fuel usage by airlines, reduced aircraft emissions and increased access to airports by the general aviation community.

However, Liu and his collaborators foresee a problem with the integration of the enormous amount of information associated with the move toward NextGen NAS.

"The myriad of information offered by various data sources requires appropriate representation and proper fusion





methodologies,” Liu says. “A critical issue surrounds the huge uncertainties arising from a variety of information sources such as aeronautical instrumentation, environment, intrinsic variabilities and human factors. Prognostics for the NAS must consider the uncertainties inherent in the system.”

“Managing the interplay of these data sources requires complex system modeling to ensure a safe transition to NextGen NAS operations,” says Liu, describing the drive behind his team’s proposal.

“We are talking about a super complex human-cyber-physical system that has never been fully explored in the past.”

To this end, the team is addressing the urgent need to develop a system-wide prognostics framework — a way to successfully fuse a lot of information — for the proactive health management of the nation’s evolving airspace system.

In part, their contributions will allow the aviation community to simulate, test and interrogate possible failure modes within the data sources.

If successful, the proposed research will significantly advance the existing knowledge-base for the safety of future national air traffic service operations — enhancing the system resiliency and safety of the future of air travel in the country.

Crafting a diverse team

In addition to tackling a compelling technical challenge, another goal of NASA’s University Leadership Initiative is to support university researchers who lead diverse, multi-disciplinary teams.

ASU faculty working on the project include Aditi Chattopadhyay, Nancy Cooke, Pingbo Tang, Lei Ying, Jingrui He and Mary Niemczyk — who represent five of the six Fulton Schools.

This faculty mix, along with additional collaborators from Vanderbilt, is integral to the proposed project. Liu says “it requires a very diverse team” ranging from structural engineers and big data analysts, to image processors and psychologists, to computer scientists and applied statisticians.

“We also seek for a smooth transition from academic research to field applications,” says Liu, explaining the importance of various disciplines as well as the involvement of the

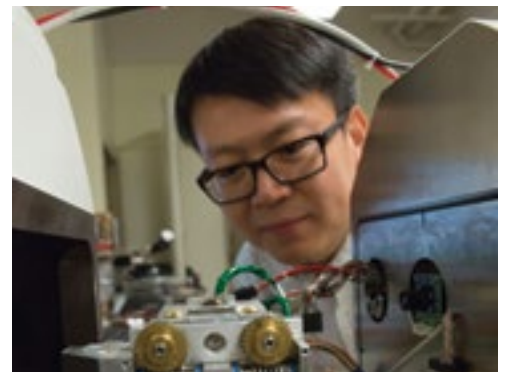
Southwest Research Institute and Optimal Synthesis Inc.

“The team is incredibly well-positioned to advance the state-of-the-art,” says Kyle Squires, dean of the Fulton Schools.

Squires said the team’s success in winning this award “highlights a key strength of the Fulton Schools: the ability of our faculty to assemble into strong multi-disciplinary teams that award sponsors recognized as providing the novel, differentiated expertise crucial to addressing their challenges.”

In addition, the ASU-led team will partner with University Leadership Initiative award recipients — selected from among 83 initial proposals and 20 final proposals — from the University of South Carolina, Texas A&M Engineering Experiment Station, the University of Tennessee, Knoxville and Ohio State University.

“We are excited our team was successful in convincing NASA that a multidisciplinary information fusion is valuable to the future of their missions and in ensuring aviation safety,” Liu says. ■





high-tech, “hands-on” additive manufacturing training modules and certifications using industry-relevant tools at ASU’s Flexible Electronics and Display Center and ASU’s Additive Manufacturing Facility; establishing internships, co-ops and apprenticeships settings; and creating certification programs in partnership with the Maricopa County Community College District.

In total, more than 750 students are expected to participate in one or more components of this project over the two-year grant period. ■

ASU President Michael Crow (second from left) accepts a \$2 million check to kick off a medical technology workforce development initiation. Photographer: Charlie Larkin/ASU

Spurring workforce development on a grand scale

The ASU Foundation will accept a \$2 million grant from the Maricopa County Industrial Development Authority to fund a new workforce development project to accelerate innovation and entrepreneurship in Maricopa County.

Greg Raupp, professor of chemical engineering and director of ASU’s MacroTechnology Works, will lead the project to prepare existing, emerging and future members of Maricopa County’s workforce for jobs in the growing fields of medical electronic technology (MedTech) and additive manufacturing.

MedTech covers a wide array of fields, ranging from human health diagnostic technology, flexible electronics for implantable and wearable applications to big data analytics and decision-making algorithms — all areas of expertise within the Fulton Schools.

“This investment will help us bring together experts from academic, industrial and entrepreneurial settings to spur workforce development on a grand scale,” says Kyle Squires, dean of the Fulton Schools. “This cross-disciplinary training program shares the Fulton Schools’ expertise, infrastructure and resources while promoting economic growth in Maricopa County.”

Wearable electronics and handheld portable devices that provide on-demand diagnostic information for patients and their health care providers only represent the beginning of what is possible using MedTech, and why it is important to have a highly skilled workforce that can meet these demands.

MedTech combines biotechnology, nano/micro-technology, information technology and cognitive sciences to deliver health care solutions that have a profound positive impact on individual and public health. Additive manufacturing, the process by which many of these health care solutions will come to life, is particularly useful for rapid prototyping and low-volume parts manufacturing.

Other components of the workforce development project include developing

Fighting off troublesome frost and ice

Cold temperatures are a nagging threat to the performance of aircraft, ships, turbines, engines and other machines and technologies.

Konrad Rykaczewski, an assistant professor of aerospace and mechanical engineering, has been working on alternatives to conventional, time-consuming and expensive chemical, mechanical and thermal methods of preventing ice and frost buildup.

His solution involves developing nano-engineered surfaces with properties that enable them to repel water, but also prevent nucleation of frost, thus also keeping all possible forms of ice from building up.

Nucleation is a physical process in which a change of state — for example, from liquid to solid — occurs in a substance around certain focal points, known as nuclei.

Rykaczewski’s progress is detailed in an article on the research and tech news website Nanowerk. The article is based on a paper by Rykaczewski and doctoral student Xiaoda Sun published recently in the American Chemical Society journal ACS Nano.

The Nanowerk article describes in detail their work on a novel method involving designs for coatings that prevent frost nucleation by altering water vapor concentration in the air just above the coating. This is in contrast to the traditional approach of inhibiting nucleation that relies on increasing energetic barriers with hydrophobic coatings.

Rykaczewski and Sun theoretically and experimentally demonstrated that optimizing their bi-layer coatings with nanoscale features can prevent frost from forming in temperatures as low as -40 degrees Celsius.

Rykaczewski has also been applying aspects of this research to biological studies sponsored by the Biomimicry Center at ASU in collaboration with the Desert Botanical Gardens in Phoenix.

Those studies include an examination of the water storage and collection abilities of cacti and a search for effective ways to solve the difficult problem of washing aphids off of kale. ■



Konrad Rykaczewski

Deploying advanced materials for economic security and human well-being

Suppose you want to build something. You will need to choose the best materials for the job.

How do you find the right material? Generally, it takes a lot of trial and error — a time-consuming and expensive process. Although you will probably find a material, it might not be the best one.

That is why a group of researchers at ASU is working to flip the process on its head. Instead of making a material and finding out what it can do, they are starting from the end — deciding what properties a material should have and designing it to have those traits.

“We already have performance in mind. So, we need to ask ourselves, what are the things you can change, what can you play with to give you this performance? The thing we play with is the material microstructure,” says Yang Jiao, an assistant professor of materials science and engineering.

Scientists can figure out the microstructure of a material that already exists. Jiao develops computer simulations to analyze microstructure and determine what properties it will have.

What he cannot do, yet, is go in reverse. The computer simulation can say, “This structure will give you this property, and that structure will give you that property.” But it does not explain why. Researchers do not know what specific characteristics of a structure cause it to have the properties it does.

This is where experience from Jiao's colleagues, Yi “Max” Ren and Yongming Liu, comes into play.

Ren, an assistant professor who studies design optimization, is developing software to help the computer identify which features of a microstructure are important to specific properties. He is drawing on

deep learning technologies, a branch of artificial intelligence in which software learns to recognize patterns.

“We want the machine to learn by itself what structural features influence a material property,” he says.

The computer will analyze images of different microstructures pixel by pixel. Pulling data from Jiao's simulations, the software will look for patterns in the images that correlate with specific properties.

Once the team has identified the best structure, they will need to produce a sample of the material and test it in the lab. Liu is an expert in mechanical structures who works with a variety of tools to test and image materials.

One major challenge the team faces is it may not be possible to reproduce the ideal microstructure using current manufacturing techniques.

“It is probably not possible at this stage to reproduce the design exactly,” Jiao says. “We can produce something similar and do the testing. We need to come up with a microstructure with a certain tolerance of uncertainty.”

Although computational materials design is fairly new, it is a hot topic nationwide, spurred by the federal Materials Genome Initiative. The multi-agency initiative supports institutions in discovering, manufacturing and deploying advanced materials for economic security and human well-being.

ASU's work is supported through a National Science Foundation Early-Concept Grant for Exploratory Research, which funds early-stage work on potentially transformative ideas.

“There is a growing interest in this area because people realize it will change how materials will be developed. It saves a lot of time and money. It will also bring a lot of benefit to fundamental physics and mathematics,” Liu says. ■

Scholarship recipients for 2017

Emily Agostino

Mechanical engineering
SMECA Scholarship

Dylan Arnest

Mechanical engineering
Orbital Sciences Corporation —
Women in STEM Scholarship

Destiny Barajas

Aerospace engineering
(*aeronautics*)
Nellie 'Jean' Randle Scholarship

Javier Barraza

Chemical engineering
Hermens Family Engineering
Scholarship

Ryan Bernaud

Mechanical engineering
Blowers Engineering Scholarship

Hailey Boshell

Mechanical engineering
(*computational mechanics*)
Boeing Scholarship

Tracey Bovee

Materials science and engineering
Ed Denison Memorial Technology
Award, Fulton Engineering
(General) Scholarship

Kimberly Bui

Mechanical engineering
Richard R. Simari Memorial
Scholarship

Mitzi Campos

Mechanical engineering
M. M. Lowry Memorial Scholarship

Armando Cardenas

Materials science and engineering
Fulton Engineering (General)
Scholarship, Ira A. Fulton Schools
of Engineering Alumni Continuing
Student Scholarship

Neil Carroll

Mechanical engineering
Spring '17 CIRC/METS
Scholars Program

Jennifer Conner

Materials science and engineering
Craig and Barbara Barrett
Scholarship, Fulton Engineering
(General) Scholarship

Dylan DeBruin

Chemical engineering
W. L. Gore 4+1 Applied Project
Scholarship

Morgan Delgado

Chemical engineering
Stephanie A. Lahti Memorial
Scholarship in Chemical Engineering

Megan Dieu

Chemical engineering
Fulton Schools Study Abroad
Scholarship (spring-summer '17)

Kolbe Dumas

Mechanical engineering
Tempe Union High School
District Scholarship

Nicolas Gomez

Mechanical engineering
Spring '17 CIRC/METS
Scholars Program

Austin Goodrich

Mechanical engineering
(*computational mechanics*)
Scholarship for Merit in
Aerospace and Mechanical

Jacob Graber

Materials science and
engineering, PhD
Fulton Fellowship

Kenneth Greason

Mechanical engineering
W. L. Gore 4+1 Applied Project
Scholarship

Jack Griffin

Aerospace engineering
(*aeronautics*)
Tempe Union High School
District Scholarship

Sue Han

Chemical engineering
Samuel E. Craig Memorial
Scholarship, Tom and JoAnn
Prescott New American
University Scholarship

Daniel Hawkins

Mechanical engineering
Spring '17 CIRC/METS
Scholars Program

Anna Hu

Mechanical engineering
Boeing Scholarship

Ryian Hunter

Aerospace engineering
(*aeronautics*)
Blowers Engineering Scholarship

Aidan Jacobs

Mechanical engineering
SMECA Scholarship

Hope Jehng

Chemical engineering
Elyse and Paul Johnson Maroon and
Gold Leaders Scholarship (NAMU)

Jennifer Jones

Mechanical engineering
LaVeda Huitt Carpenter Native
American Scholarship Initiative

Arminta Claire Jordan

Mechanical engineering
Fulton Schools Study Abroad
Scholarship (spring-summer '17)

Alvina Kam

Chemical engineering
Fulton Schools Study Abroad
Scholarship (spring-summer '17)

Jazmin Kianpour

Mechanical engineering
(*energy and environment*)
Boeing Scholarship, Marilyn and
James A. Schmidlin New
American University Scholarship,
SMECA Scholarship

Ryan Kiracofe

Mechanical engineering
ASQ Ted Thal American Society
for Quality Scholarship

Ashley Koss

Mechanical engineering
Bill and Corinne Hochgraef
Scholarship

Michael Kuntz

Mechanical engineering
Edward E. Francisco Jr.
Scholarship

Yau-Fung Lam

Aerospace engineering
(*aeronautics*)
Dr. James W. Turnbow
Memorial Scholarship

Ashley Lear

Chemical engineering
Spring '17 CIRC/METS
Scholars Program

Tonya Lee

Chemical engineering
Spring '17 CIRC/METS
Scholars Program

Wendy Lin

Chemical Engineering, PhD
Fulton Fellowship

Thomas Little

Materials science and engineering
Fulton Engineering
(General) Scholarship

Nikki Lopez

Mechanical engineering
Spring '17 CIRC/METS
Scholars Program

John Lyle

Aerospace engineering
(*aeronautics*)
SMECA Scholarship

Cameron Mcallister

Chemical engineering
Fulton Schools Study Abroad
Scholarship (spring-summer '17)

Tyler McDaniel

Mechanical engineering
Blowers Engineering Scholarship

Sean McIntyre

Chemical engineering
Blowers Engineering Scholarship

Matthew Meyer

Aerospace engineering
(*aeronautics*)
Tempe Union High School District
Scholarship

Corey Miles

Chemical engineering
Michael J. Konen Engineering
Scholarship

Jack Miller

Aerospace engineering
(*aeronautics*)
Srinivasan Iyer Family New American
University Scholarship

Juan Morales

Mechanical engineering
Tempe Union High School District
Scholarship

Philip Mulford

Aerospace engineering
(*aeronautics*)
Fulton Schools Study Abroad
Scholarship (spring-summer '17)

Brittany Nez

Aerospace engineering
(*aeronautics*)
LaVeda Huitt Carpenter Native
American Scholarship Initiative

Alexander Nie

Mechanical engineering
Marilyn and James A. Schmidlin New
American University Scholarship

Emily Nugent

Chemical engineering
IM Flash Technologies Industrial
Scholarship

Parker **Olszak**
Mechanical engineering
Charles Lemon Memorial Scholarship

Dylan **Ottney**
Aerospace engineering (aeronautics)
Dr. Lee P. Thompson Memorial Scholarship

Andrew **Peavler**
Mechanical engineering
SMECA Scholarship

Lucas **Petersen**
Mechanical engineering
Peter Stein Measurement Engineering Scholarship

Preston **Pierce**
Mechanical engineering
Srinivasan Iyer Family New American University Scholarship

Dominic **Podzemny**
Mechanical engineering (energy and environment)
W. L. Gore 4+1 Applied Project Scholarship

Emiliano **Quinones Yumbla**
Mechanical engineering, PhD
Fulton Fellowship

Wei **Wei Robinson**
Chemical engineering
IM Flash Technologies Industrial Scholarship

Javier **Romero**
Mechanical engineering
Tempe Union High School District Scholarship

Jacob **Schichtel**
Mechanical engineering
Peter Stein Measurement Engineering Scholarship

Diana **Serban**
Chemical engineering
Spring '17 CIRC/METS Scholars Program

Adam **Shipitofsky**
Mechanical engineering
Charles Lemon Memorial Scholarship

Levi **Silverthorne**
Aerospace engineering (aeronautics)
Dr. James W. Turnbow Memorial Scholarship

Travis **Skinner**
Mechanical engineering
Dr. Lee P. Thompson Memorial Scholarship

Cameron **Starostecki**
Mechanical engineering
Marilyn and James A. Schmidlin New American University Scholarship

Elias **Sugarman**
Materials science and engineering
Fulton Engineering (General) Scholarship

Vaasavi **Sundar**
Mechanical engineering
W. L. Gore 4+1 Applied Project Scholarship

Doni **Tapederi**
Mechanical engineering
Theodore Allen Memorial Scholarship

Philip **Thomas**
Aerospace engineering (aeronautics)
Fulton Schools Study Abroad Scholarship (spring-summer '17)

John **Tindell**
Chemical engineering
W. L. Gore 4+1 Applied Project Scholarship

Tanguy **Toulouse**
Aerospace engineering (aeronautics)
Blowers Engineering Scholarship

Eric **Trinh**
Chemical engineering
Fulton Schools Study Abroad Scholarship (spring-summer '17)

Andres **Valenzuela**
Chemical engineering
Hermens Family Engineering Scholarship

Bryan **Vo**
Aerospace engineering (aeronautics)
Boeing Scholarship

Steven **Wilson**
Aerospace engineering (aeronautics)
Spring '17 CIRC/METS Scholars Program

Benjamin **Winsryg**
Aerospace engineering (aeronautics)
Blowers Engineering Scholarship

Alexander **York**
Mechanical engineering
SMECA Scholarship

Nathanael **Zuniga**
Mechanical engineering
Kenneth R. and Kathryn Geiser Memorial Scholarship

Outstanding and distinguished graduates

Fall 2016

Outstanding Graduates

Ian **Mcfate**
Aerospace engineering

Andrew **Perez**
Mechanical engineering

Fall 2016

Impact Awards

Peter **Harper**
Mechanical engineering

Alexander **Kim**
Mechanical engineering

Sara **Mantlik**
Mechanical engineering

Fall 2016

Dean's Dissertation Award

Yue **Yang**
Mechanical engineering

Spring 2017

Outstanding Graduates

Kaleigh **Johnson**
Chemical engineering;
Fulton Schools; SEMTE

Nathan **London**
Materials science and engineering

Joshua **Oremland**
Aerospace engineering

Sandy **Polus**
Mechanical engineering

Spring 2017

Impact Awards

Troy **Buhr**
Mechanical engineering

Melby Ann **Thelakkaden**
Materials science and engineering

Fall 2017

Outstanding Graduates

Brittany **Nez**
Aerospace engineering (aeronautics)

Travis **Skinner**
Mechanical engineering

Fall 2017

Impact Award

Gnyanesh **Trivedi**
Mechanical engineering

Building momentum for a bold future

Our students are **powered by donor generosity**. Philanthropy keeps a great education within reach and strengthens our learning community, building a diverse population of bright students and advancing the pipeline of engineering talent. Our students are **better poised to lead revolutions in science and engineering** as the next generation of engineers — all thanks to our cherished donors.

Your investments are truly invaluable.

ASU's first Churchill Scholarship awarded to chemical engineer

Christopher Balzer became the first student from ASU to ever receive the prestigious Churchill Scholarship.

Since 1963, the Churchill Scholarship has been awarded to exceptional science and engineering students to fund graduate studies at the University of Cambridge.

Balzer graduated with a bachelor's degree in chemical engineering from the Fulton Schools in May 2017. In October, he traveled to the United Kingdom to pursue his master's degree in advanced chemical engineering.

Scholars are chosen based on outstanding academic achievement, personal qualities and a demonstrated interest in research.

The Churchill Scholarship was established to honor Winston Churchill's vision of U.S.-U.K. scientific exchange with the goal of advancing science and technology and helping ensure the prosperity and security of both nations.

Balzer, a student in Barrett, The Honors College at ASU, says he first heard about the opportunity from the Office of National Scholarship Advisement at Barrett. ASU has been participating in the scholarship program run by the Churchill Foundation for only the past four years.

"I am the first but definitely not the last," Balzer says of receiving the scholarship. "It is an honor to be first, considering some of the great scholars who have applied from ASU in the past few years. Someone had to be first, and I am happy I get the chance to represent ASU at Cambridge."

A component of the scholarship revolves around research, which Balzer is no stranger to as a three-semester participant in the Fulton Undergraduate Research Initiative. At Cambridge, he plans to work with professor David Fairen-Jimenez, who heads the university's Advanced Materials Research Group. Balzer wants to contribute to

ongoing work with modeling metal-organic frameworks for carbon capture.

"While alternative technologies are developing, carbon-capture technology can be implemented into current systems to 'stop the bleeding' in a way," says Balzer.

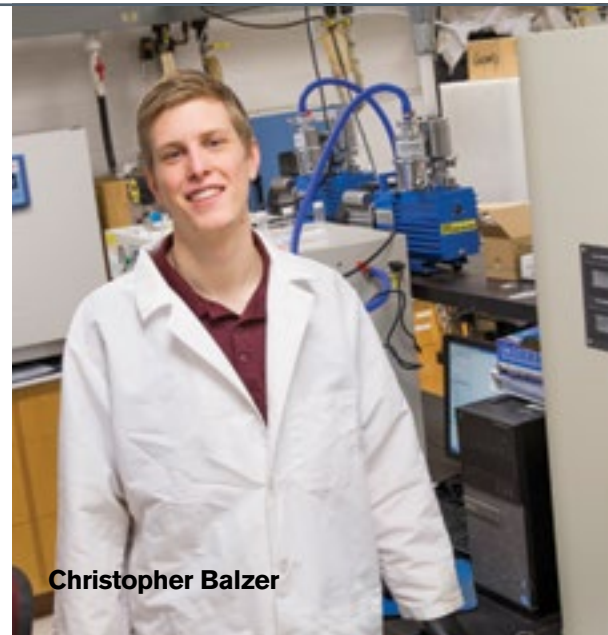
Balzer's graduate research aligns closely with his undergraduate research under Bin Mu, an assistant professor of chemical engineering. In fact, Balzer credits his extensive experience under Mu as a factor in his success.

"It is clear that my research experience in Dr. Bin Mu's lab has put me in the position to be competitive for a program like this," he says. "I've had incredible support along the way, especially from doctoral student Mitchell Armstrong and Dr. Mu. They've trusted me to take on my own projects and work on a lot of different projects. Not many undergraduates get the chance to present at several conferences, be a part of publications early on and even first-author a publication. I would not have been able to do any of that without their help."

Balzer also credits support from internal ASU scholarships, as well as the Goldwater Scholarship for allowing him to focus on his research and studies. Balzer was one of three ASU engineering students to receive the Goldwater Scholarship in 2016, which recognizes excellence in science, math and engineering.

Balzer is interested to see the difference in curriculum at Cambridge.

"While the core classes in the program are mostly the same as they would be in the U.S., some of the electives focus more on the managerial and business aspects of chemical engineering, which is something you do not really see in U.S. graduate programs," he says. "I am excited to get a new perspective from the classes as well as from the diverse instructors and students at Cambridge."



Christopher Balzer

Balzer is also excited to study and live in the United Kingdom.

"I have never studied abroad before," says Balzer. "With the breaks between terms being so long, I plan to travel to some of the countries I have always wanted to go to — mostly to see historical sites and museums that I am interested in."

After completing his studies at Cambridge, Balzer plans on pursuing his doctoral degree at Cal Tech. ■

2016-2017 Freshman Flinn Scholars

The Flinn Scholarship Program provides an unparalleled package for undergraduate study at an Arizona public university for approximately 20 of Arizona's highest-achieving high school seniors each year.

Martin Blair
Mechanical engineering
Phoenix Union Bioscience High School

Cameron Carver
Mechanical engineering
Sabino High School in Tucson

Maeve Kennedy
Chemical engineering
Westwood High School

Ivette Montes Parra
Mechanical engineering
Westwood High School

Yisha Ng
Aerospace engineering
Flagstaff High School

Accomplished triathlete and budding engineer has sights set on excellence

The Sun Devil women's triathlon team started off their inaugural season in 2016 by winning a national championship. One of their newest members looks slated to follow that performance by winning right out of the gate, both in the classroom and on the field.

Freshman triathlete Rebecca Naughton, 18, has been racing competitively for six years. Cycling is her strongest event. Her weakest event is swimming.



Rebecca Naughton

"It is a different kind of challenge," she says. "I am going to be spending a lot of time in the pool."

Naughton was a letter winner in swimming, cross country and track in high school in Des Moines, Iowa. Coming into college, she had won two duathlon national championships, was named 2014 Duathlete of the Year and was a three-time member of Team USA at both world triathlon and duathlon championships. Outside of athletics, Naughton was a member of the National Honor Society and was on the Presidential Honor Roll every semester.

At ASU, she is majoring in mechanical engineering. When told about everything engineering students have the opportunity to build (spacecraft, race cars, off-road buggies, Hyperloop) and asked what she would like to build, Naughton says "a plane, a rocket or a bike." ■



AZLoop team places among top at Hyperloop competition

AZLoop — a team made up of students from ASU, Embry-Riddle Aeronautical University and Northern Arizona University — finished in the top eight at the second Hyperloop competition sponsored by SpaceX.

The Hyperloop is a high-speed mode of transportation envisioned by entrepreneur and SpaceX founder Elon Musk. If it comes to fruition, the result will be a pod traveling through a vacuum tube, without friction, at speeds up to 700 mph. A trip from Los Angeles to San Francisco would take 35 minutes to travel the 350-mile distance.

The AZLoop team ended up with a total of 88 points, tying up with the top teams, all of whom had pods in competition last year. With the knowledge their pod is able to compete at the highest levels, AZLoop is champing at the bit for the next competition.



Kyle Squires, dean of the Ira A. Fulton Schools of Engineering, praised the AZLoop's hard work.

"What they created was indeed an engineering feat, and the passion, energy, drive and commitment put forth by everyone was amazing," Squires says. "My hope is that this experience empowers and inspires these students and others to continue to push the limits on innovation." ■

The AZLoop team is one of 20 teams worldwide to make the cut for the 2018 SpaceX Hyperloop Pod Competition, which took place on July 22. The competition focused on a single criterion — maximum speed. Additionally, all Pods had to be self-propelled.

The team consisted of 62 (and counting) graduate and undergraduate students majoring in engineering, physics, mathematics, design and business.

Hassan Almousa, Alex Crawley and Jasmine Dibazar, undergraduate students in materials science and engineering, participated in the AZLoop team as part of their capstone class. They were responsible for designing a lightweight chassis in line with the AZLoop regulations.

Top photo: AZLoop team members pose with the pod for a group photo during the final round of the SpaceX Hyperloop Pod Competition on the SpaceX facilities in Hawthorne, California. Photographer: Charlie Leight/ASU

Bottom photo: The AZLoop competition pod sits on the 150-foot test track on the Polytechnic campus lab. Photographer: Ken Fagan/ASU



Recent grad seeks to make a difference through solar energy

While Brigitte Lim was working on her applied project to promote employment in her home country of the Philippines through solar energy, she stumbled upon an opportunity to amplify her project's reach.

Lim, a recent graduate of the professional science master's program in solar energy engineering and commercialization, heard about the Geneva Challenge: Advancing Development Goals international contest. The competition's theme was solving challenges of employment.

As it was a group competition for graduate students, Lim reached out to former colleagues Anna Gabrielle Alejo, a graduate student at the Columbia University Teacher's College; Jerome Bactol, a candidate for a master's in community development at the University of the Philippines; and Jose Eos Trinidad, a recent graduate who studied social sciences at the University of Chicago.

They created Solar N3E: Solar Network for Energy Education and Employment, a social enterprise to expand employment opportunities in the Philippines through the solar industry.

The project's goal is to minimize in-work poverty, urban unemployment and the number of youths who are not in school, employment or training. Solar N3E will help marginalized community members get the training they need to find employment in the nation's growing solar energy industry.

After all their hard work, they didn't make it to the semifinal round of Geneva Challenge. However, the team won the United Nations' Sustainable Development Solutions Network (SDSN) Youth Prize.

The Geneva Challenge partnered with the UN SDSN Youth Prize to award a special prize to three additional Geneva Challenge teams for the first time in 2017.

The Solar N3E project joined two other international teams' projects to solve employment challenges in North and South Africa that were recognized as part of the new prize.

After graduating, Lim will return home and begin working as a business developer at Japan Solar.

"I think working with Japan Solar is not bad for trying to implement my idea because having this job helps me interact with competitors and the customers the solar industry serves," Lim says. "I can immerse myself in the local industry, which makes the plan more feasible." ■

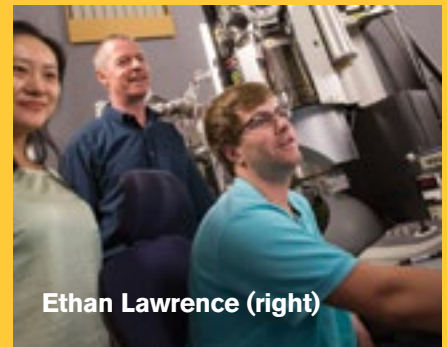
Student helps found Microscopy Society of America Student Council

Ethan Lawrence, a materials science and engineering doctoral student, studies the behavior of materials at the molecular level.

Yet some of the most important things he's learned are macro: networking and organizing is how you get things done, and research means nothing if you cannot communicate it.

A fourth-year doctoral student, Lawrence is a research assistant in the Electron Microscopy for Energy and the Environment Research Group. He and doctoral students from universities across the country have founded the Microscopy Society of America Student Council. The council is helping build a community among the upcoming researchers who are the profession's future leaders, he said.

"One of the most important things I have learned is that networking is how you get just about anything done, whether it be funding for a grant or a finding job or research collaborators," Lawrence says. "You can be the best scientist in the world, but if you can't make connections, your work will suffer."



Ethan Lawrence (right)

Professor Peter Crozier is director of the Electron Microscopy for Energy and the Environment Research Group and Lawrence's advisor. He said starting and running an organization develops important skills.

"It is a great opportunity for students to learn about how to get things done," Crozier says.

Crozier explained his philosophy as a graduate advisor is to expose students to the management side of research — leading a team, assembling resources, etc. — and the creativity of uncovering new knowledge. ■

Working on the technology of tomorrow at NASA

Two engineering students with stars in their eyes spent the summer living the ultimate space lover's dream: an internship at NASA's Jet Propulsion Laboratory.

They built parts that will fly to Mars, glimpsed the goals and tech of tomorrow's missions, celebrated the 40th anniversary of the Voyager mission, and viewed the solar eclipse from the Pasadena, California, campus with thousands of others working to take humanity into the solar system.

Nathan Barba, a mechanical engineering major, and Robert "RJ" Amzler, an aerospace engineering major, spent months at the birthplace of NASA. JPL is the leading U.S. center for robotic exploration of the solar system, carrying out planetary, Earth science and space-based astronomy missions.

Amzler worked on engineering the bit carousel subsystem for the Mars 2020 Rover, which moves samples in and out of the rover. Interns normally do not work on flight design. Even though Amzler hasn't finished earning his bachelor's degree, he has now worked on four missions that will fly.

A lot of people were working on the Europa mission. The mission is being planned for launch in the 2020s, arriving in the Jupiter system after a journey of several years to investigate the habitability of Jupiter's icy moon Europa.

Barba has always wanted to work at JPL. He did not know anyone there, but he attended its open house every summer and networked. He met his mentor, who sponsored his 14-week internship this year.

Barba got to sample a variety of projects. He worked in mission formulation, JPL's wish list for future missions.

He worked on a lander for an ocean planet. He helped engineer a sample collecting subsystem called an adaptive caching assembly. He worked on the science for a future mission. He also engineered parts on the Mars helicopter.

It is easy to get star-struck at a place like JPL, so stay focused on execution, "but don't forget to take it all in and live in the moment," Barba says. ■



DNA clustering research earns AIChE poster award

Anikki Giessler, a chemical engineering student, shared her research at the American Institute of Chemical Engineers poster sessions in 2017. With one year of presentation experience under her belt, she took home one of the poster session awards.

Months prior, Giessler brainstormed with her research partner Gabe Salmon on what to showcase. She submitted her poster to the "Separations" category for a second year, highlighting research completed under Alexandra Ros, an associate professor at ASU's School of Molecular Sciences.

After consolidating her ideas and creating the poster, she traveled to Minneapolis for the American Institute of Chemical Engineers Conference, which was held Oct. 29–Nov. 3, 2017.

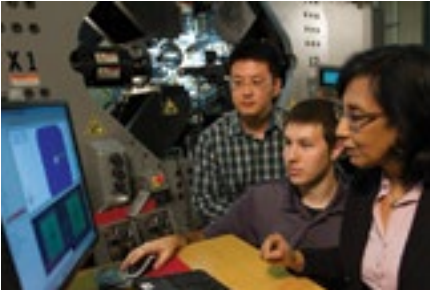
Her poster, titled "Dielectrophoretic Response of Condensed DNA Clusters in AC Fields," had two main goals. The first was to investigate DNA clustering behaviors at low frequency

AC conditions, and the second was to look into the size, electrokinetic mobility and dielectrophoretic effects of DNA clusters. By observing these clusters, they could potentially lead to improved sorting efficiency, and therefore separate larger DNA fragments for new and emerging next-generation sequencing.

This year, the competition included 400 different posters. Giessler presented alongside other competitors in a two-hour poster session so she could meet with judges, who looked for the presenter's knowledge of the field, their ability to visually and orally present the data and their understanding of the data and its significance. Winning the AIChE poster session award meant excelling in all three categories.

Giessler's winning poster concluded that work on the topic she presented is ongoing. In the future, her research group hopes to automate tracking techniques to accelerate the determination of the electrokinetic mobility of DNA clusters, which has so far only been done manually using imaging software. Additionally, they continue to investigate how ionic strength impacts DNA clustering behavior.

"In my last semester here at ASU, I am working on finishing a publication of this research under Dr. Ros," Giessler says. "I have also just finished applying to a few doctoral programs where I hope to continue research on microfluidics." ■



Aerospace engineering

Degrees offered: BSE, MS, PhD

The aerospace engineering curriculum focuses on technological areas critical to the design and development of aerospace vehicles and systems. The aeronautics concentration emphasizes engineering and the design of aircraft, helicopters, missiles and other vehicles that fly through the atmosphere.



Chemical engineering

Degrees offered: BSE, MS, PhD

The undergraduate and graduate programs in chemical engineering focus on the study of matter and energy and their transformation into forms useful for society. Chemical engineers use chemistry, physics, mathematics and engineering to convert raw materials or chemicals into more useful or valuable forms. They develop and produce a diverse range of products, including high-performance materials for aerospace, automotive, biomedical, electronic and environmental applications.



Materials science and engineering

Degrees offered: BSE, MS, PhD

The Master of Science in materials science and engineering is available on the Tempe campus or online through ASU Online.

Materials science and engineering mixes chemistry and physics to understand the structure and properties of materials that comprise the world. Materials engineers are responsible for designing and developing advanced materials for a wide variety of engineering applications. Students learn about the design of materials and how to process them to improve their structure, properties and performance.



Mechanical engineering

Degrees offered: BSE, MS, PhD

Mechanical engineering encompasses a vast multitude of applications from the efficient conversion and transmission of energy and power to the design and implementation of nanoscale devices. Mechanical engineers design and develop products in all sectors of society, and they collaborate with other engineers and designers to produce systems and components for a large variety of applications.



Solar energy engineering and commercialization

Degrees offered: PSM

The professional science master's program in solar energy engineering and commercialization is a relatively new type of graduate program aimed at students who desire both technical and nontechnical aspects to their graduate education. The program offers advanced, interdisciplinary education in solar energy technologies along with the business/policy/nontechnical aspects necessary for successful development and commercialization.

Professor's dedication remembered in scholarship

Ted Allen was known for his commitment during 23 years as a professor of mechanical engineering.

Sidney Allen remembers when her late husband Theodore "Ted" Allen Jr. would run into former students, some of whom he had not seen in as long as a decade, and "he would still remember everything about them."

She recalls Ted Allen's "nine o'clock rule" during his teaching days in the Fulton Schools. "Ted would give out our home phone number to his students and they could call him any time before 9 p.m.," she says.

Students called frequently, and Sidney Allen would often find her husband on the phone helping students with homework.

During his 23 years as a professor of mechanical engineering at ASU, from 1959 to 1982, Ted Allen became known as an especially dedicated teacher who took personal interest in his students' success. Sidney Allen attributes his success as a teacher to his ability to "relate to people whether he met them working on a farm or studying at a university."

Ted Allen received the ASU Alumni Association's Distinguished Teaching Award for inspirational teaching and guidance in 1981.

To honor Ted Allen's exemplary dedication, Sidney Allen and friends gave a gift to the university in 1993 to establish the Theodore Allen Memorial Scholarship for engineering students, and she increased the original endowment with a planned gift in 2012.

"This was something I really wanted to do because Ted Allen was so passionate about teaching and about the engineering program," she says.

One engineering student receives the Theodore Allen Memorial Scholarship award each academic year. Meeting the winner at the annual scholarship reception and talking about Ted Allen "is a big thing for me," Sidney Allen says.

Both she and Ted Allen grew up in Texas. She was "a ranch girl" near the small town of Chillicothe and earned a degree in library science in 1945 from the Texas State College for Women, now Texas Woman's University.

Ted Allen grew up in San Antonio and earned a bachelor's and master's degree in mechanical engineering at Texas A&M University. After graduation, he was a faculty member at the University of Houston prior to coming to ASU, where he joined the dean of the engineering college at the time, Lee P. Thompson. Ted Allen studied under Thompson at Texas A&M.

Ted Allen's college studies were interrupted while he served in the U.S. Air Force during World War II as a navigator of a B25 aircraft. He frequently flew over the Himalaya Mountains and around China, Burma and India.

Those places remained special to him throughout his life, Sidney Allen says. She recalls he formed close friendships with a number of students from the countries where he spent time during the war. He also became a collector of Asian and Tibetan books and coins and loved talking to students about the history and culture of that part of the world.

She and Ted Allen met during the war, on a blind date in Roswell, New Mexico, where she worked as a high school librarian. They married in 1947.

Away from the classroom, her husband "wasn't the typical mechanical engineer who liked to tinker with automobiles," she says. "He liked to spend his free time shopping around at coin collector shops or bookstores." After the move to Arizona, Sidney Allen spent her time becoming "a professional volunteer."

An avid gardener, she has volunteered at Phoenix's popular Desert Botanical Garden for more than four decades, logging about 8,000 service hours over the years.

She became the botanical garden's "unofficial desert tortoise expert," an interest reflected at her home where 17 tortoises and turtles roam amid her desert garden. She also volunteered as a docent at the Scottsdale Historical Museum.

"I love working with plants, but more than anything else I love working with people," she says.

Sidney Allen believes Ted Allen would have said the same about the reason he loved his profession. When asked what he would have wanted to be remembered for, she answers, simply "being a teacher."

Among Ted Allen's close and long-time colleagues was Dan Jankowski, who taught engineering at ASU for 40 years. They first met in 1964 when Jankowski interviewed for a faculty position at the university. From then on, Ted Allen provided him "support, advice and friendship" for decades, Jankowski says.

When Ted Allen suffered a heart attack, Jankowski took over one of his classes.

"That experience taught me a lot about how much his students cared for him and appreciated his approach to teaching engineering," Jankowski recalls.

The gift of the Allen scholarship, Sidney Allen says, is a way Ted Allen can be remembered for the passion and commitment he brought to his profession, and a way for ASU to honor his legacy of sharing by giving the gift of opportunity to young aspiring engineers. ■

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We believe engineering is more than a discipline — it is a mindset, a way of looking at the world to determine how challenges can be met most efficiently, sustainably, safely and in cost-effective ways to maximize impact and benefit those we serve. As a partner in our mission, you will help support our diverse faculty and students as they find innovative and entrepreneurial solutions to pressing concerns.

To make a donation of any amount, please call **Margo Burdick**, our school's director of development, at **480-727-7099**. You can also mail your gift to Ira A. Fulton Schools of Engineering Attn: Margo Burdick, P.O. Box 879309, Tempe, AZ 85287-9309.

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Thank you.

Thank you for being the invisible strength behind our endeavors

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Robert **Alford**

Academic Success Specialist

Shahriar **Anwar**

Research Specialist

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Ebony **Baker**

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Susan **Baldi**

Business Ops Specialist Sr.

**Staff Excellence Award Recipient*

**IMPACT Award Nominee*

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Academic Success Specialist

**IMPACT Award Recipient*

Leonard **Bucholz**

Shop Manager

Jessica **Caruthers**

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Program Coordinator

Karen **Dada**

Program Manager

Danielle **Daley**

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Department HR Specialist Sr.

Amber **Hall**

Research Advancement Admin Sr.

Kelley **Hall**

Research Advancement Admin Sr.

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Academic Success Specialist

Richard **Hanley**

Engineer Associate

Kara **Hjelmstad**

Research/Lab Assistant

Jarrett **Johnson**

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Dallas **Kingsbury**

Laboratory Manager

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Leonardo **Leon**

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Research Advancement Admin.

Christine **Quintero**

Academic Success Specialist

Stacie **Rancano**

Academic Success Specialist

Shabnam **Rezai**

Academic Success Specialist

Cara **Rickard**

Assistant to Director

**IMPACT Award Nominee*

Wesley **Scruggs**

Business Operations Specialist

Lexi **Schulla**

Academic Success Specialist

Bruce **Steele**

Laboratory Manager

Molly **Swindler**

Research Advancement Specialist

Albert **Thompson III**

Tech Support Analyst Senior

**IMPACT Award Nominee*

Dave **Vega**

Academic Success Specialist

Tiffany **Wingerson**

Academic Success Specialist

**Staff Excellence Award Recipient*

**IMPACT Award Nominee*



Staff praised for stellar contributions

The School for Engineering of Matter, Transport and Energy created the Staff Excellence Awards to recognize exceptional employees who go above and beyond in making contributions to the school. This year, the leadership committee honored Tiffany Wingerson (left), April MacCleary (center) and Susan Baldi (left) for their unparalleled productivity and excellent customer service. Baldi's nominations praised her as "one of the most efficient, productive and innovative" team members. MacCleary's peers recognized her as an invaluable asset whose "performance and customer service are truly exceptional." Colleagues, faculty and students commended Wingerson for pulling double-duty in her contributions to the school while maintaining a stellar level of professionalism and integrity. Each of these individuals have made a profound impact on the school and its community through leadership and a service-oriented mindset.



Andrea Brown honored for remarkable advising efforts

Andrea Brown, an academic success specialist, received an IMPACT Award for utilizing her strong technological skill set to identify systematic problems and develop online resources to make information more accessible for students and more efficient for advising teams. She also had three presentation proposals accepted in the last year. Brown was promoted into a position encompassing undergraduate and graduate advising as well as developing accelerated 4+1 programs. This accomplishment is noteworthy because Brown has only been in academic advising for three years. Before coming to ASU, she spent more than five years in financial aid. There was a steep learning curve, but she embraced the challenge by gaining an in-depth knowledge of undergraduate and graduate advising curriculum, process and policies. She has impacted the school, the Fulton Schools and the university significantly.

School for **Engineering** of **Matter, Transport** and **Energy**

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