

ARIZONA ENGINEER

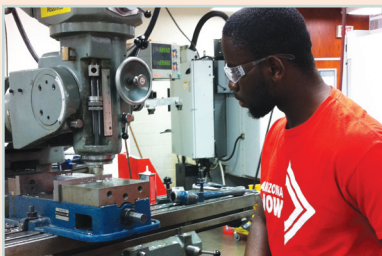
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College machine shop



Luke Adams/Arizona Athletics

Tackling a Growing Crisis—Wearing the No. 81 jersey, Arizona wide receiver David Roberts (BS/AE 2012) tangles with a Trojan in a 2008 game against USC. After a hard tackle, and advice from trainers and doctors, Roberts had to watch the 2010 Arizona vs. USC game from the sidelines. Not all potential concussions are treated as seriously.

Virtual Reality App Targets Concussion Awareness

Engineering and biomedical researchers have designed a virtual reality app promoting concussion awareness to inspire NCAA football players and other athletes to report the real thing.

Sports-related concussions have sparked a national debate, multiple lawsuits and new concussion-management protocols in the NCAA and NFL in the last few years.

Despite all the attention to concussion and its risks, many student-athletes either don't recognize the signs of concussion – or won't report them if they do. But give these players just 10

minutes with an app that puts them on a virtual athletic field and shows them the immediate and delayed side effects of concussion, and it just might change the way they look at head injury.

“The more student-athletes know about concussion and the risks of hiding symptoms, the more confident they’ll be in making the right choices,” said

CONTINUED ON PAGE 10

Well-Prepared Graduates and Market-Ready Products Stimulate Economy

We are attracting Arizona's best students and launching new academic programs and technologies.

You have probably heard it before: Engineering is key to economic growth. Tucson and Arizona, relative to the rest of the nation, have been slow to recover from the Great Recession. With economic growth directly tied to the number of university graduates in a region, it is imperative that the College

continues turning out a large pool of talented engineers in our state.

To that end, it has been an exciting summer and fall.

We are nearing all-time highs for bachelor's and advanced degrees awarded. In August, UA Engineering welcomed 621 new freshmen, a third of them in the Honors College. Undergraduate enrollment has increased by 125 students, and as the University shifts to a new revenue/cost-sharing budget model, higher enrollment means additional resources for the College.

The College just launched an environmental engineering degree program for undergraduates and is building a new program in construction engineering management. At Engineering Design Day in May 2016, seniors well-prepared to join the workforce will present nearly 100 projects – from water reuse systems for manufacturing to heart-rate monitors for athletes.

Our researchers are working with Pima County at the new WEST facility to advance water treatment and recycling systems, and with industry to develop

sustainable mining technologies and life-saving wearable medical devices. Faculty and alumni are moving their inventions to market through local startups and companies in the UA Tech Park.

Industry partnerships, alumni involvement, donor generosity, outstanding students, and faculty and staff dedication play a big role in the successes.

It was a pleasure to see so many of you at Homecoming. A warm welcome to Margie Puerta Edson and Mike McKelvey, who are leading the College's development office and whom many of you met at the Engineers Breakfast and tailgating tent. Margie and Mike have extensive experience in alumni relations and fundraising at the UA and with other organizations. We are fortunate to have them on our team.

We all look forward to connecting with you in the future. Until then, thank you for all of your help and Bear Down!

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2015 Nepal depremi (8) by Hilmi Hacaloglu

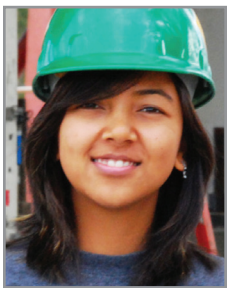
Devastation—The village of Saku, 17 miles from Kathmandu, was flattened by the earthquake. The death toll was at least 250, and 95 percent of all buildings in the historic village were destroyed.

Nepali PhD Student Rebuilds Her City

Barely a week after a 7.8-magnitude earthquake in Nepal killed as many as 9,000 people and leveled countless structures on April 25, a Nepali graduate student in civil engineering at the UA returned to her Himalayan homeland to help rebuild.

“My city is destroyed, but my family is safe,” said Ulina Shakya, a PhD student from Nuwakot District in Nepal, who got word on April 29 that she’d received an internship to put her engineering skills to work helping victims of the quake. Two days later she was bound for Kathmandu.

Shakya’s internship was sponsored by BuildChange, a nonprofit organization that has built and retrofitted structures in Haiti and other seismic hotspots.



Ulina Shakya

She joined an international contingent of engineers in Kathmandu, where their work included inspecting houses so displaced residents could safely return home. Shakya drew upon her professional contacts as a former engineer in the country and on her seismic engineering training at the UA. Fluent in Nepali, she served as a translator for the team. Shakya came to the United States in 2013

specifically to conduct earthquake engineering simulation research with Robert Fleischman, associate professor of civil engineering at the UA.

As soon as he learned of the Nepal disaster, Fleischman was on the phone, finding a way for his Nepali graduate student to return home.



Photo: Laura Lukes

High Flyers—Jeannie Wilkening, left, and fellow student Emil Staemose explore an aircraft cockpit while at the 2011 Joint Science Education Project in Greenland.

Goldwater Scholars Focusing on Imaging and Environment

Two UA Honors College engineering undergraduates – Jeannie Wilkening, a chemical engineering major, and Travis Sawyer, an optical sciences and engineering student – have received the highly competitive Goldwater Scholarship.

The Barry Goldwater Scholarship and Excellence in Education Foundation announced 2015–2016 funding for 260 sophomores and juniors attending institutions across the United States. The scholarship – up to \$7,500 per year – is awarded to students based on academic merit in the science, technology, engineering and mathematics, or STEM, fields.

Wilkening is studying the ways in which humans affect biogeochemical cycles – how water and various other compounds and chemical elements move through the atmosphere, hydrosphere and biosphere. “With so many different environmental issues threatening society, I hope that my work can help make a more sustainable future for everyone,” she said.

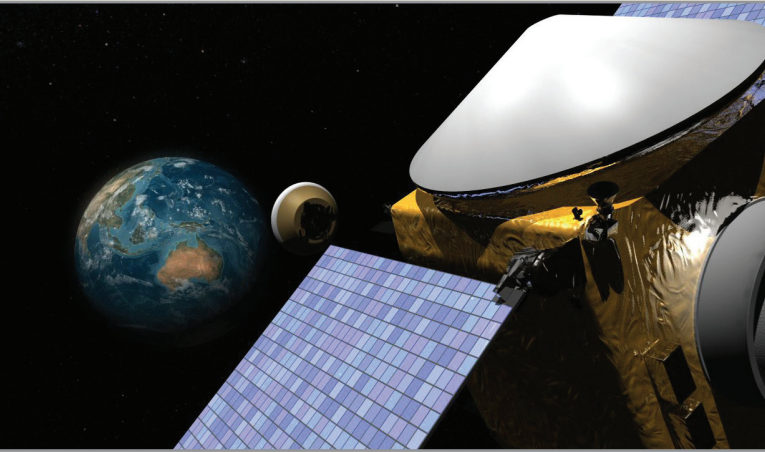
Sawyer is designing visual recognition software that allows scientists to more effectively image in different wavelengths – such as infrared and X-ray – and determine what lies beneath the surface of art materials.

The scholarship will enable him to travel to the Netherlands and continue his research with Robert Erdmann, former UA associate professor of materials science and engineering, applying image-processing to historic artifacts.

“We want to be able to recognize without having to inspect the object ourselves,” said Sawyer.



Travis Sawyer



NASA Goddard Space Flight Center

Space Rock—Artist's concept of the OSIRIS-REx Sample Return Capsule being released for its return to Earth.

Systems Engineering Alum to 'Pilot' OSIRIS-REx Spacecraft

Although it's unmanned, OSIRIS-REx, NASA's spacecraft scheduled to bring back a sample from an asteroid, is not without a pilot.

In fact, it takes nearly a dozen people – all highly skilled and experienced in deep space navigation – to steer the probe to its target, retrieve a sample and ensure its safe return to Earth. One of these people is Daniel Wibben, who graduated from the UA in June with a PhD in systems engineering.



Daniel Wibben

Wibben had not yet defended his dissertation when he was offered a job with KinetX Aerospace, a company based in Tempe, Arizona, that specializes in deep space navigation.

Fascinated by all things related to space, Wibben said he has always been intrigued by “the unknown and the ability to go out there and learn something that no one has seen or learned before.”

“I wanted to work in space (exploration),” he said, “and when you're in the U.S. and want to work in deep space, you want to work with NASA. I'm not aware of any other university where you have the opportunity to work in the heart of a space mission as a student, so once I found out the UA offered that opportunity, I wanted to grasp it.”

As an undergraduate, Wibben volunteered in the Space Systems Engineering Laboratory, or SSEL, led by Roberto Furfaro, an assistant professor of systems engineering in the UA College of Engineering. SSEL was founded in 2010 to provide engineering and science support to the UA's Lunar and Planetary Laboratory in robotic missions for solar systems exploration.

This story, by Daniel Stolte, appears in full in UA News.



Courtesy of Andisheh Ranjbari

Going Places—Andisheh Ranjbari, center, with then executive director of the Arizona Transit Association, Jim Dickey, right, and AzTA president Katrina Heineking at the March 2015 AzTA/DOT conference in Phoenix.

High-Speed Bus Concept Nets PhD Student Public Transit Scholarships

Tucson to Phoenix in 45 minutes? High-Speed Bus Transit, or HSBT, is the brainchild of UA transportation researcher Yi-Chang Chiu, associate professor of civil engineering and engineering mechanics, and his award-winning doctoral student Andisheh Ranjbari.

“I'm super excited about this study,” Ranjbari said. “Every step of it has been very interesting, and it's wonderful to see this idea gradually gaining interest and visibility from Arizona residents and other stakeholders.”

Her excitement is shared by the Arizona Transit Association, which awarded Ranjbari its 2015 Public Transit Scholarship. AzTA also invited her to present her research at its April Conference – held jointly with the Arizona Department of Transportation – where she introduced the Tucson-Phoenix HSBT concept to 50 transportation officials.

“The support from the audience was incredible,” she said. “Many professionals offered pro bono services to help us advance our work.”

Ranjbari earned graduate and undergraduate degrees and worked as a transportation planner in her native Iran before coming to the UA in 2012. She recently received the 2015 Parsons Brinckerhoff-Jim Lammie Scholarship from the American Public Transportation Association. She is the first recipient of the scholarship in Arizona.

“With young people like Andisheh Ranjbari in our state, the future is exceedingly bright,” said Becky Miller, executive director of AzTA, which nominated Ranjbari for the national award.

Grad Students Champion Water Sustainability

Motivated by water shortages in their homelands, Mojtaba Azadi Aghdam and Guangbin Li study water recovery techniques at the UA.

In Mojtaba's native Iran, major lakes are drying up. Like the western United States, Iran is in a long-term drought, and Mojtaba aims to bring his engineering education to bear on the water shortage.

Mojtaba recently won awards from the American Water Works Association, the AZ Water Association, and the Southern Arizona Environmental Management Society. The scholarship trifecta will help him continue his master's work with professor Shane Snyder's research group in the department of chemical and environmental engineering.

"Mojtaba's passion and tenacity for water research are inspiring to all of us," Snyder said. "He has worked diligently at complex engineering challenges; that is, recovery of water from very challenging

matrices such as produced water and membrane brine streams. He certainly deserves the recognition."

Making Water Safe to Drink in China and Beyond

Guangbin Li witnessed the damaging effects of environmental degradation growing up in Inner Mongolia, China.



Guangbin Li

"The incidence and mortality of cancer in my hometown increased rapidly, and many people died from cancer potentially caused by long-term exposure to contaminated water and air," said Li.

"Water safety is definitely one of the most important things we should care about."

Li, who earned an MS in environmental engineering at UA in 2014 and is pursuing

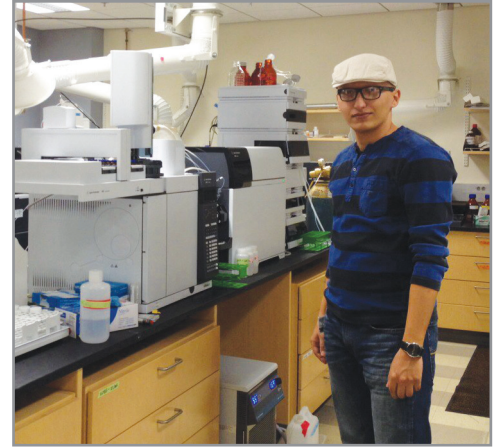


Image: SnyderLab

Water Worker—Mojtaba Azadi Aghdam runs samples on a mass spectrometer in Shane Snyder's lab.

his PhD, studies how biotechnology can be used to remove metals and other hazardous contaminants from water. "My career goal is to become an expert in treating wastewater and remediating contaminated sites, and I hope I can make my own contributions to raising public awareness about environmental protection in China and other developing and underdeveloped countries," said Li.

College Launches New Major: Environmental Engineering

Environmental engineers are in high demand: The U.S. Bureau of Labor Statistics projects a 15 percent increase in employment of environmental engineers between 2012 and 2022.

The University of Arizona has responded by establishing a new Bachelor of Science degree program, which started in fall 2015.

"The very fabric of our nation's economic and environmental sustainability hinges on a precarious balance of water supply reliability and security in the face of climate change and increasing urbanization," said Shane Snyder, professor of chemical and environmental engineering. "This new program will train students for the jobs of the future. It will teach them how to develop and implement sustainable engineering solutions."

The College's well-established graduate programs in environmental engineering are ranked in the top 25 percent by peer institutions, according to *U.S. News & World Report*. Now, undergraduates can fully tap into the expertise of faculty and top-tier research projects in environmental engineering as well as chemical engineering.



Courtesy of EWB-UA

New Environment—Many UA Engineering students are members of Engineers Without Borders, which worked on a sanitation project in the Bolivian Andes in summer 2015. Vicki Karanikola (back row, middle) earned her PhD in environmental engineering at UA and now advises students in the new undergraduate program.

The program is based in the College's department of chemical and environmental engineering, one of only a handful of departments at U.S. universities to integrate these two closely connected fields. "Most environmental engineering programs are housed in civil engineering departments, which emphasize infrastructural challenges," said professor Reyes Sierra, director of the new program.

Water Research Foundation Honors Shane Snyder

The Water Research Foundation presented the 2015 Dr. Pankaj Parekh Research Innovation Award to Shane Snyder, UA professor of chemical engineering. The foundation made the announcement June 8 at the American Water Works Association's annual conference and exhibition in Anaheim, California.



Shane Snyder

Pankaj Parekh, a tireless advocate of water research who dedicated more than 40 years of his life to ensuring safe drinking water and protecting public health.

"I am deeply honored by this award. It is especially meaningful to me as I had the privilege to work with Pankaj, and to become friends through our WRF projects," Snyder said. "Without question, the Water Research Foundation made it possible for us to conduct some of the earliest studies on the fate of emerging contaminants through various water treatment technologies."

For almost two decades, Snyder's research teams have focused on the identification and treatment of emerging water pollutants. He has been involved with WRF for many years, serving as principal or co-principal investigator on seven research projects, and volunteering on numerous other project committees, all aimed at answering questions about exposure, detection and filtration of various chemicals and contaminants in drinking water.

Snyder is currently serving a three-year term on the Safe and Sustainable Water Resources Subcommittee of the U.S. Environmental Protection Agency's Board of Scientific Counselors.

The award honors researchers who have significantly advanced the science of water through WRF-sponsored projects. It is named after

Ricardo Valerdi Earns Top International Cost Estimation Award

People under 40 rarely receive lifetime achievement awards, but UA systems engineer Ricardo Valerdi is a heavy hitter when it comes to scoring accolades.

The associate professor has received the 2015 Frank Freiman Award from the International Cost Estimating and Analysis Association, or ICEAA.

"This is easily the highest honor I have ever received," Valerdi said.

Named for the father of parametrics and founder of the International Society of Parametric Analysts – which later became ICEAA – the Freiman Award is the association's most prestigious honor. It is presented to individuals who have over a lifetime made exceptional contributions to parametric cost estimation, which involves developing predictive models for government and private industry to more accurately determine the costs of equipment and service needs.



Courtesy of Ricardo Valerdi

High Estimation—UA associate professor Ricardo Valerdi, right, with Galorath Inc. president and CEO Dan Galorath, who nominated him for the award, at the June 2015 ICEAA annual conference in San Diego.

Valerdi received the award at the ICEAA annual conference on June 12 in San Diego. At 37, he is the youngest recipient of the award since it was first presented in 1982.

"Both personally and professionally, Ricardo Valerdi's contributions have made him the ideal recipient of the 2015 Frank Freiman award," ICEAA president Brian Glauser said at the conference awards ceremony. "We are honored to have such an outstanding member of the cost community in our membership."

Achintya Haldar Gets Lifetime Award

Civil engineering professor Achintya Haldar received the Society for Reliability and Safety's 2015 Lifetime Achievement Award in recognition of his work in structural reliability.

Haldar got his doctorate in 1976 and his master's in 1973 from the University of Illinois, Urbana-Champaign. He got his bachelor's degree in civil engineering in 1968 from Jadavpur University in Calcutta, now Kolkata, India.

During his 27 years in the College of Engineering, Haldar has received dozens



Photo: Pete Brown

Pioneering Contributor—Civil engineering professor Achintya Haldar shows the medal he received from Jadavpur University in 1968.

of UA awards. In 2012 he was made a distinguished member of the American Society of Civil Engineers.

Haldar was an inaugural da Vinci fellow in 2005. He received the 1996 Arizona

Governor's Recognition Award, and in 1984 was one of the first recipients of the Presidential Young Investigator Award made by President Ronald Reagan and the NSF.

Plasma Research Could Make Flight Safer and Reduce Aircraft Emissions

Plasma has generated excitement among aerodynamics researchers for its effects on air flow and its potential for building more agile and fuel-efficient flying machines, ranging from planes, helicopters and drones to rockets and satellites. Assistant professor of aerospace and mechanical engineering Jesse Little is putting plasma's promise to the test.

He received a \$245,000 grant in June 2015 for a project titled "Interaction of Three-Dimensional Unsteady Flows with Aerodynamic Surfaces" from the Defense University Research Instrumentation Program. DURIP is a collaboration of the U.S. Army, Navy and Air Force research divisions.

The grant augments his ongoing plasma aerodynamics work funded with a 2014 Army Research Office Young Investigator Program Award. Little received an earlier YIP Award in 2012 from the Air Force Office of Scientific Research.

Little directs the UA Turbulence and Flow Control Laboratory, where he studies what

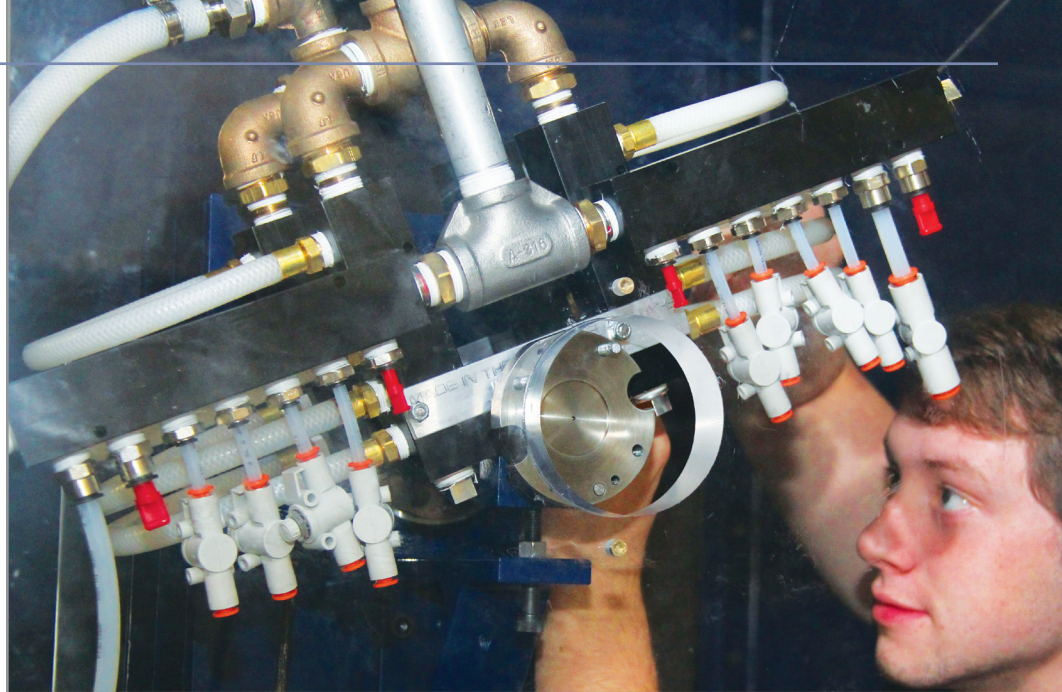


Photo: Pete Brown

Flow State—Aerospace engineering student researcher Ken Decker adjusts a flow-control manifold in the UA College of Engineering's wind tunnel facility, where assistant professor Jesse Little conducts much of his research.

causes turbulence, how it behaves and how it can be controlled.

"As more airplanes, helicopters and drones fly at lower altitude and in urban areas – where air tends to be more unsteady than, say, at 40,000 feet – it becomes even more important to understand turbulent air flows and how they interact with solid surfaces," Little said.

Little is one of many researchers around the globe using active flow control, a technology pioneered by UA aerospace and mechanical engineering professor Israel Wygnanski who, with engineers from Caltech, Boeing and NASA, designed

a smaller, lighter airplane tail using sweeping-jet actuators, which emit tiny bursts of air to disrupt and control air flow.

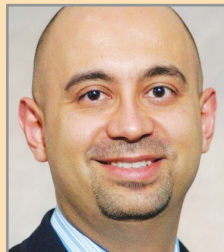
Little's actuators use high voltage to ionize air, producing plasma. Plasma produces thermal energy for some of nature's most spectacular displays: lightning and stars, for example, which can exceed 50,000 degrees Fahrenheit.

The thermal energy from a plasma discharge can interrupt and control air flows to an extraordinary degree – even dissipate shock waves, which has prompted aerodynamics researchers to write of "plasma magic" in their papers.

Doctors to Get Better Access to Biomedical Big Data

The National Institutes of Health has awarded a \$1.3 million grant to researchers at the University of Arizona to develop open-source software that will enable health care professionals and scientists to manage biomedical big data in digital form.

The advanced data compression software for the first time puts digitized biomedical data in a format and size that doctors, pathologists and other health care workers with limited resources and in remote locations will be



Ali Bilgin

able to access, analyze and store. Usable digitized data means quicker second opinions and diagnoses for patients.

"Advances in image compression technology for biomedical big data are essential to advance biomedical diagnostics and research and to save more lives," said Ali Bilgin, UA assistant professor in the departments of electrical and computer engineering and biomedical engineering and

principal investigator of the project. "We are in the middle of a global transition to digitization of biomedical data, and there's a lot of it out there – but in files too large to be transmitted, stored or retrieved."

The award is one of the first of 15 research projects funded through the NIH Big Data to Knowledge, or BD2K, Initiative, the agency announced in June. The NIH identified data compression as one of the initiative's key focus areas and gave the UA project ("Development of Software and Analysis Methods for Biomedical Big Data in Targeted Areas of High Need") an impact factor of 11, the agency's second-highest possible ranking.

Celebrating Successes, Sharing Lessons Learned

From solving technical problems for the president to increasing STEM opportunities for youth, Homecoming 2015 highlighted the central role that engineers play in building a better world.

Attendees at the UA Engineers Breakfast got the inside story of the problem-plagued HealthCare.gov website from the Microsoft executive whom President Barack Obama tapped to fix it.

“What we do as engineers is becoming more and more essential to how we operate as a nation,” 2015 Engineering Alumnus of the Year Kurt DelBene told nearly 400 alumni, faculty, students and industry partners – from Washington state to Florida – at the Engineering Homecoming’s kickoff event on Oct. 23.

Among those present at the event, which raised funds for student scholarships, were 95 Raytheon engineers and the most senior attendee, Robert “Bob” Hall, 92, who earned a bachelor’s degree in civil engineering in 1949.

Dean Jeff Goldberg celebrated the College’s increase in enrollment, new faculty, and growing portfolio of entrepreneurial Engineering successes. He thanked alumni, donors and industry partners for their support. “All of you in this room are critical to our success,” he said.

Goldberg also introduced a new video on graduate research, which UA President Ann Weaver Hart said “really captures a wonderful spirit of problem solving.”

Engineering Senior Design Day is another example of UA engineers “bringing their knowledge to bear on actual problems, to create a better future,” Hart told the audience. “The spirit of 100 percent engagement that we are pursuing for the entire University is grounded in Engineering.”



From Microsoft Office to Oval Office—College of Engineering Alumnus of the Year and Microsoft vice president of corporate strategy and planning Kurt DelBene takes the stage to deliver the Engineers Breakfast keynote speech, a dark tale of how not to develop a website designed for millions of users. “The world is definitely coming the engineers’ way,” he said.

2015 Homecoming Honorees

Awardees shared their own stories of service in the public and private sectors.

ADVOCACY AWARD

Cathleen Barton

Barton helped build the College’s ENGR 102 High School program and grow its participation in EPICS, Engineering Projects in Community Service. She recently retired after 30 years at Intel, where she managed initiatives to improve student achievement in STEM and increase diversity among young people pursuing STEM education and careers.



Cathleen Barton

PROFESSIONAL ACHIEVEMENT AWARD

Bonnie Curtis

Curtis (BS/ChE 1980) was one of only four women to graduate from UA in 1980 with a bachelor’s degree in chemical engineering. She began working for Procter & Gamble just after graduating, then moved into plant management, and since 2006 has been vice president for global product supply. “My passion is lifting up girls,” said the mother of four children, who, in addition to teaching taekwondo, is a popular speaker on subjects ranging from supply chain management to working motherhood.



Bonnie Curtis

HONORARY ALUMNI AWARD

Ed Biggers

Biggers was recognized for his service on the College’s Industrial Advisory Council. He was a missile officer in the U.S. Air Force before moving to Tucson in 1983 with Hughes Aircraft Company. After 34 years with Hughes, he retired in 1994 as a vice president at Hughes Missile Systems Company (now Raytheon Missile Systems). His philanthropic activities also include serving as a director on the boards of Tucson Airport Authority, Habitat for Humanity and Pusch Ridge Christian Academy.



Ed Biggers



Photo: Pete Brown

ALUMNUS OF THE YEAR

Kurt DelBene • BS/IE 1982

Introducing the keynote speaker and Alumnus of the Year, Kurt DelBene, Dean Jeff Goldberg said, “It’s rare to have an alumnus who has worked on a project that I would dare say everyone in this room has used. How many of you have used Microsoft Office at least once?” Hundreds of hands shot up.

DelBene spoke candidly about leaving his 20-year career at Microsoft to take over the problem-plagued HealthCare.gov website in summer 2013 at President Obama’s request.

Created to implement the Affordable Care Act and run by the Centers for Medicare & Medicaid Services, HealthCare.gov crashed its first day of operation and had a rocky rollout for several months.

DelBene told a cautionary tale about how not to develop a website, citing the rush to meet premature deadlines and inadequate testing as two factors contributing to the crash. Perhaps the greatest flaw, he said, was having IT staff trained to run computer systems – not design websites – develop the new site.

He summarized his efforts to build a more effective and accountable team and a functioning website before leaving the advisory post and returning to Microsoft in spring 2015 as vice president of corporate strategy and planning.

“All across America, systems of this ilk are going to be more and more important and will need experts who can build them, not just operate them,” he said. “So the world is definitely coming the engineers’ way.”

HOMECOMING 101

YOUNG ALUMNI AWARD

Nathan Palmer

Palmer (BS/CEEM 2003, MS/CEEM 2005), a bridge engineer, is engineering manager at Structural Grace in Phoenix. He has advised the civil engineering



Nathan Palmer

and engineering mechanics department as chair of its Alumni and Industry Council. He is a registered professional engineer in

Arizona and Colorado, and a member of the Structural Engineering Institute and past president of the Arizona Bridge Technical Committee of the American Society of Civil Engineers.

Personal Touch

Students met with award winners after the breakfast to have some fun and seek some serious career advice.

“We asked her a ton of questions about our careers,” said Cali Squire who, along with four other chemical engineering students, met with Bonnie Curtis, winner of the Professional Achievement Award. “She was very honest and up-front about the challenges she faced as a working mother trying to advance in a male-dominated industry.” Squire, president of the Engineering Student Council and an Engineering Ambassador, will work at Procter & Gamble after graduating in May 2016.

“The education the College is providing remains pragmatic, intense and



Photo: Pete Brown

Outreach Champ—Procter & Gamble’s Bonnie Curtis addresses the Engineers Breakfast, where she was recognized for her dedication to STEM outreach.

masterful,” Curtis said after the meeting. “I know that each of these students will achieve their goals while making the University proud. Thanks for allowing me to be part of their lives.”



Winning Formula—In addition to meeting with systems and industrial engineering design seniors, Alumnus of the Year and vintage racecar enthusiast Kurt DelBene and three of his classmates visited the Wildcat Formula Racing team, who treated them to a spin in their Formula One racecar. “We were blown away by the quality of the students,” said DelBene. “It is really great to see that the UA Engineering program is thriving.”

Alumni Take Students Inside Industry

In September 2015, 32 UA College of Engineering students toured Honeywell Aerospace and Boeing Helicopter in the greater Phoenix area on an “industry trek” organized by UA Career Services and the Institute for Career Readiness

and Engagement, a program started last year to increase opportunities in Maricopa County for Wildcats. At Honeywell, students saw 131-9 Auxiliary Power Units assembled for 737s and other narrow-body planes and visited a vibration lab and large altitude chamber. Several UA alumni,

including Honeywell APU director Ron Rich (BS/ME 1982), hosted the tour and answered students’ questions. Next, it was on to Boeing’s Mesa plant to watch final assembly of AH-64E Apache helicopters with Wildcat Danielle Craig (BS/ME 2011) of the rotors design unit.

Inside Job—Students tour Boeing and Honeywell plants in the Phoenix area with Amina Sonnie, back left, UA Career Services liaison for the College of Engineering, and Mary Murphy, front right, director of the Institute for Career Readiness and Engagement, Maricopa County.



Concussion Awareness App

CONTINUED FROM FRONT PAGE

Ricardo Valerdi, associate professor of systems engineering at the University of Arizona College of Engineering. “And the right choice is simple: Don’t play through a suspected concussion.”

Valerdi, with Hirsch Handmaker, MD, and Jonathan Lifshitz at the UA College of Medicine-Phoenix, is building the app for the NCAA Mind Matters Challenge, part of a \$30 million joint initiative with the U.S. Department of Defense to change attitudes and behaviors about concussions among student-athletes and soldiers. The app is designed as an educational tool for athletic training programs.

“The mindset we have to overcome in educating athletes about concussions begins early in their lives,” said Dr. Handmaker, research professor of radiology, whose CACTIS Foundation and Conquering Concussions organizations

Recognizing the Symptoms

During a tackle in 2010, Wildcats wide receiver David Roberts III (BS/AE 2012) had his head driven into the ground. “I couldn’t answer the question my trainer asked me over and over,” Roberts said. “I couldn’t name the president of the United States.”

Roberts said he knew nothing about concussion as a young athlete. “If you got hit playing football, people would



David Roberts

that if he does get hit, he thinks, ‘I know what this is.’”

say, ‘Oh, you just got your bell rung.’ It’s pretty amazing to think a kid might be able to put on a simulator and experience what it feels like to have a concussion, so

work to advance diagnosis, treatment and education on head trauma injuries.

Athletes want to conquer fear and get back in the game to show how tough they are and protect their status on the team. “This mentality, unfortunately, results in underreporting of head blows, which can lead to serious short- and long-term consequences from a second concussion before the brain has been allowed to heal,”

Handmaker said.

The investigators have made it to the second round of the contest, securing \$100,000 to build a prototype and earning a chance to see the app released to athletes. They will now present their prototype to NCAA officials, and the winning approach to concussion education will be made available to some 400,000 NCAA student-athletes.

Building Curiosity into Technology

College of Engineering researchers are working on giving robots the ability to spot the unusual so they can explore other planets or environments on their own instead of merely executing preprogrammed commands.

Unlike conventional planetary rovers, typically cameras on wheels controlled by humans on Earth, these new planetary explorers go about their work autonomously, capable of making decisions on their own.

“In environments where you need a curious explorer with the ability to spot unusual and interesting objects, but you either can’t or don’t want to send humans, you have to rely on robots with a



Wolfgang Fink

built-in sense of curiosity and the ability to make decisions autonomously,” said Wolfgang Fink, who heads the UA’s Visual and Autonomous Exploration Systems Research Laboratory.

“To accomplish this, we have to instill algorithms in the robot that will create ‘excitement’ about an object if it is different from the surrounding environment.”

In other words, the robot has to be able to identify scientifically promising objects without being told by its human controllers back home on Earth where to go and what to look at – just as a human geologist wouldn’t turn over every single rock but would focus on those that stick out from their surroundings.



Image: Wolfgang Fink

Curiouser and Curiouser—Blimps could one day play an important role in selecting interesting objects for closer examination by rovers on the ground or on the surface of lakes on alien planets.

In his lab, Fink and his students experiment with prototypes of land and sea rovers, coffee-table-size boxes mounted on caterpillar tracks and catamaran-like watercraft. The rovers are a long way from being able to survey Mars rocks on their own, but the engineers have equipped them with basic decision-making power. Relying on LIDAR sensors, the rovers use lasers to scan their surroundings for obstacles. They can home in on objects they detect or maneuver around them.

“The rover must be able to find strange things on its own,” Fink said. “Humans are drawn to anything that sticks out from the ordinary like a sore thumb. That’s where curiosity comes into play.”

This story, by Daniel Stolte, appears in full in UA News.

College Faculty Join Federal Initiative to Advance Flexible Hybrid Electronics

Three UA biomedical engineers renowned for developing medical monitoring and diagnostic devices that are portable, practical and precise are participating in the Manufacturing Innovation Institute for Flexible Hybrid Electronics, a major new initiative announced by the White House in August 2015.

College of Engineering researchers Linda Powers, Bijan Najafi and Marvin Slepian join several other UA researchers participating in the program, which will be managed by FlexTech Alliance, a Silicon Valley-based research and trade organization.



Courtesy of Linda Powers

Stretch of Imagination—Linda Powers, shown here in the Arctic with one of her biosensors, is developing portable technology to diagnose blood-borne disease.

FlexTech Alliance has received \$75 million over a five-year period from the U.S. Department of Defense, with matching funds of more than \$96 million in cost-sharing from nonfederal sources, to manage the new institute.

“This partnership will increase our ability to bring flexible, stretchable electronics applications to reality, especially in the area of biomedical sensors,” said College of Engineering Dean Jeff Goldberg.

Powers, professor of biomedical engineering and electrical and computer engineering, was one of the primary participants in the University’s contribution to the alliance formation and was among UA researchers who attended the White House announcement of the institute at NASA’s Ames Research Center in California.

“This is one of the most exciting research and development opportunities in the world right now. It is an unprecedented opportunity both to train students and to contribute to a high-tech society for the betterment of all,” she said.

Wearable Sensors, Virtual Reality Give Seniors a New Lease on Life

It is many senior citizens' greatest fear: losing their balance and falling. Their fears are well grounded. The U.S. Centers for Disease Control reports that over a third of adults 65 and older fall every year. The consequences are often devastating: crushing fractures, head injuries, excessive bleeding, institutionalization, and death.

The race is on to develop technology and treatments for preventing falls, and researchers at the University of Arizona, with a number of devices nearing commercialization, are at the forefront of creating devices that reduce risk of falling and increase quality of life for older adults with balance and mobility problem.

"Methods for predicting and preventing falls in older adults have been subjective and impractical," said Bijan Najafi, director of the UA Interdisciplinary Consortium on Advanced Motion Performance, or iCAMP, and professor of biomedical engineering and surgery. "They include patient self-reporting, visual observations by clinicians, and testing in gait labs that mobility-impaired individuals must regularly visit."

University of Arizona iCAMP researchers are testing sensor-based wearable devices that gather precise and objective information on mobility, balance and gait and transmit that data in real time to health care providers. The lightweight, easy-to-use devices detect patterns of activity that may lead to falls and help doctors treat patients who are at risk of falling.

Najafi is one of seven UA researchers participating in a new \$75 million federally funded project to establish a Flexible Hybrid Electronics Manufacturing Innovation Institute, where



Photo: AHSC

Research in Motion—Bijan Najafi, left, and Dr. David G. Armstrong are helping to keep millions of older adults on their feet.

manufacturing flexible medical monitoring devices will be one of the priorities.

Najafi and colleagues have taken their biosensors a step further, creating virtual reality balance training games that boost confidence and improve balance in older adults, particularly those with diabetic peripheral neuropathy.

Up to half of older adults with diabetes experience peripheral neuropathy, which causes loss of sensation in the lower limbs. This makes walking difficult and may result in patients overlooking sores on their feet, which can become infected and require amputation. Diabetic-related amputations are a worldwide epidemic, numbering some 90,000 each year in the United States alone.

Building Materials That Nature Cannot Provide

Hao Xin, a professor in electrical and computer engineering who heads the Millimeter Wave Circuits and Antennas Laboratory at the UA's College of Engineering, is harnessing the possibilities of 3-D printing to create materials and structures that not too long ago would have been written off as science fiction.

"By using 3-D printing and new design approaches, we are able to come up with components such as antennas, wave guides, lenses and holographic devices that are better than existing technology and haven't



Hao Xin

have to overcome ever greater challenges in designing and building the components that make them work.

Some applications require the invention of new materials. Some require new ways of manufacturing. And some require both. Xin's group is one of the first to adopt 3-D

been possible to make before," he said. As computers, communication devices and other IT applications get smaller and can do ever more amazing things, engineers

printing approaches to make so-called metamaterials, engineered materials with properties not found in nature. Unlike conventional materials such as metals or plastics, metamaterials consist of assemblies of elements made from conventional materials, usually in repeating patterns. Their special properties arise not so much from the properties of their ingredients, but from the shape, geometry and orientation of their subunits. They can be designed to affect electromagnetic waves, sound and even the shockwaves of an earthquake in ways that would be impossible to achieve with traditional materials.

This story, by Daniel Stolte, appears in full in UA News.

Practical Tool Gift Injects Power into Machine Shop

Thanks to a donation of machining tools from Sturm, Ruger & Co., College of Engineering students are designing and building more finely tuned projects.

“I am so glad to hear about this donation,” said aerospace engineering student Rolland Prempeh. “The machine shop is the heartbeat of our department. Everyone comes down to the shop to work on projects and learn from the staff.”

The company gave \$200,000 worth of unused surplus machining tools from its factory in Prescott, Arizona, to the AME Instrument Shop, a vital training ground for UA Engineering students.

“We get about 200 undergraduate students working in the AME machine shop each year. That’s a lot of people – most of them inexperienced – working with tools that can be used only a certain number of times before they get dull, lose their precision and break apart,” said shop manager Joe Hartley, who earned a BS in mechanical engineering at the UA in 1992.



Photo: Jill Goetz

Tooling Up—Aerospace engineering student Rolland Prempeh works on a mill in the AME machine shop to perfect a component for his Senior Design project.

“This donation has increased the dollar value of our tooling tenfold and will extend our tooling capacity for several years. We are grateful for this most practical contribution to student learning.”

UA Names Gary Harper Top Alumni Achiever

The Alumni Achievement Award, the highest honor the UA Alumni Association bestows, is given only to alumni who have attained prominence in their field, with demonstrated service to the institution.

This year, the award went to utility executive Gary Harper (BS/ME 1971).

Harper represents the essence of the prestigious award, said Melinda Burke, president of the UA Alumni Association.

Harper has served on the UA Foundation board of



Photo: Jacob Chinn

Gary Harper

directors and the Eller College national board of advisers, and is an active volunteer and supporter of the College. He is a life member of the American Society of Mechanical Engineers, past president of the UAAA’s Phoenix chapter, and a member of the Phoenix

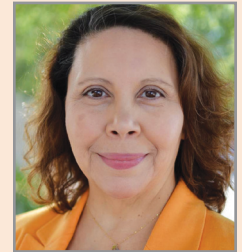
Engineering Alumni Council, the Old Main Society, the UA President’s Club, the Wildcat Club and the Wildcat for Life Leadership Council.

In 2003, he received the Alumni Association’s Bear Down Award for meritorious service on behalf of the UA.

College Appoints New Senior Development Team

The College of Engineering has added two senior directors to its development team. Margie Puerta Edson and Mike McKelvey began their new positions on June 15 and together bring nearly a half-century of fund-raising experience to the College.

Most recently, Edson was director of development for the UA’s Evelyn F. McKnight Brain Institute, and McKelvey was a director of regional development at the University of Arizona Foundation.



Margie Puerta Edson

“This is an exciting time to be joining the College of Engineering,” Edson said. “The College is well positioned with a solid alumni base, distinguished faculty and a dynamic vision for the future.”



Mike McKelvey

McKelvey shares Edson’s enthusiastic outlook for the College. “The College of Engineering is poised for

unprecedented engagement with its alumni and corporate partners,” he said. “This will attract transformational contributions of time, expertise and financial resources.”

“I am extremely pleased to bring Mike and Margie to the team, and I know our alumni will enjoy working with them,” said College of Engineering Dean Jeff Goldberg. “Our plan is to make stronger connections with alumni and industry partners and grow the College.”

“Margie and Mike have the necessary experience to lead and strengthen our development efforts,” Goldberg said.



Photo courtesy of Wolfgang Golser

Heads Up—Wolfgang Golser stands in front of a few of the 887 monolithic statues known as moai found on Rapa Nui (aka Easter Island and Isla de Pascua), a Chilean island in the southeastern Pacific Ocean. During his 2013 trip he also climbed the Villarrica volcano on the Chilean mainland.

Wolfgang Golser BS/Engr. Physics 1986

After graduation and a short stint as research assistant in the UA department of radiation oncology, Wolfgang Golser worked in Los Angeles for about 10 years, first as instrumentation engineer at Allied Signal Aerospace, then as applications and field service engineer at Diagnostic Products Corp. He returned to the UA in 1997 as research specialist in the department of speech, language and hearing sciences, and in 2005 became senior research specialist at the Arizona Genomics Institute in the School of Plant Sciences. He has traveled the world extensively and now works on engineering and ecology projects at the National Ecological Observatory Network in Boulder, Colorado.

Quent Augspurger BS/ME 1960

The homeowners association for Quent Augspurger's Scottsdale,

Arizona, home refused to allow him to build a greenhouse for his orchids, so he designed a "solar energy device" instead. Arizona law states that HOAs cannot stop homeowners installing solar energy devices, so the HOA had to back down. His device was a greenhouse with moveable louvers that collected sunlight to heat water and provide radiant heat – it also just happened to be an ideal, and controllable, environment for growing orchids. Operating the louvers simultaneously was the project's main engineering



Photo courtesy of Quent Augspurger

Sprocket Science—Quent Augspurger's invention to circumvent HOA rules now has its own patent.

challenge, said Augspurger. The final design used helical chain sprockets with the chain pulled by a linear actuator controlled by a microcomputer with a time-of-day positioning program. "After the usual startup modifications, the louver system has been running reliably for seven years," said Augspurger. With the help of his late friend, classmate and patent attorney Greg Nelson, he filed for a patent on the solar greenhouse and after waiting over three years received U.S. patent 8,915,015. "The heart of this patent is the helical sprocket, which is anticipating a multitude of mechanical applications," he said. Augspurger founded consulting firm Augspurger Komm Engineering 40 years ago, and married Nolya 47 years ago. They have seven children between them. Email him at naugspurger@cox.net.

Dana (Herrmann) Bjornsen BS/SE 1985

After 10 years as an IBM systems engineer, Dana Bjornsen stepped out of the professional world to raise a family. Her daughter, Anna, made news in May 2015 as the millionth passenger on Tucson's Sun Link streetcar. Surrounded by media, Tucson Mayor Jonathan Rothschild greeted Anna with a bag of prizes as she stepped aboard the streetcar on her way to class. "I've never met a mayor before," said a surprised Anna. Dana says she is a "systems engineer by training, professional organizer by brain wiring," and when she is not working for a law firm as



Photo courtesy of Dana Bjornsen

A Streetcar Named Surprise—Sun Link employees and members of the press surround Anna Bjornsen, Dana Bjornsen's daughter, as she boards the Tucson streetcar as its millionth passenger. Like mother like daughter, Anna is a Wildcat: BA/Spanish, class of 2016.

a part-time office manager, she assumes her alter ego: Clutter Chick. She launched Clutter Chick in 2007 (clutter-chick.com) to work with individuals and businesses throughout the Phoenix Metropolitan area, "helping to clear their clutter and restore their motivation and peace of mind."

Chris Klineburger BS/ME 1951

Chris Klineburger's autobiography, *Gamemasters of the World*, tells how he was raised in the Bisbee, Arizona, area during the Great Depression, joined the Navy in World War II, and worked his way through the University of Arizona with his own taxidermy business. The book covers his short engineering career at Boeing in Seattle, working on B-52 bombers, and tells how he and his two brothers began their lifelong careers in sport hunting. They took over a well-established taxidermy studio, Jonas Brothers of Seattle, and expanded their business into Alaska and Africa. In 300,000

GAMEMASTERS of the WORLD

A Chronicle of Sport Hunting and Consecration



Chris R. Klineburger

Photo courtesy of Chris Klineburger

words and 660 photos, Klineburger's book documents how he devoted his life to the outdoors and pioneered many wildlife programs, along the way living with Eskimos and trekking across Afghanistan, Mongolia, Nepal, China and the Soviet Union. His wildlife conservation and hunting achievements have earned him numerous honors, including induction into the Mountain Hunter Hall of Fame and the Safari Club International Hunting Hall of Fame. He has donated many specimens to the International Wildlife Museum in Tucson, Arizona. He spends winters in Las Vegas and summers in the Seattle area, and says he is happy to sign copies of his book (gamemastersoftheworld.com).



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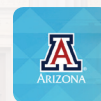
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