

UNM Engineering

Building on Greatness

Message from the Dean



Perhaps the most obvious change for the School has been the completion of remodel of the Farris Engineering Center. The \$26 million project was completed just in time for the spring semester.

Improving our reputation with peers and prospective students is one of my key goals, so I was pleased to learn that the School of Engineering is now ranked No. 83 in the *U.S. News & World Report* 2019 Best Graduate Schools rankings for engineering. The School increased from No. 99, and while there are a lot of factors involved in rankings, I feel encouraged

that we are beginning to move the needle in an upward direction. Read more about our other progress on Page 12.

Student success is also very important to the success of our School. In addition to amazing student-led projects like the Formula SAE car and Solar Splash, students are raising the bar all the time, such as the students who recently won prestigious National Science Foundation graduate student awards (see Achievements on Page 15).

We also have made strides in economic development. We are now members of both Albuquerque Economic Development and the New Mexico Technology Council, and this spring, we and the Air Force Research Laboratory were awarded \$6.7 million to focus on manufacturing techniques of the future. It is our hope that this will establish Albuquerque as a hub for the aerospace industry and will attract and host a variety of aerospace companies (see Page 11).

Our School is more than a century old, and it continues to evolve to meet the changing needs of students and employers. One sign of evolution came this spring, when the Department of Civil Engineering became the Department of Civil, Construction and Environmental Engineering. The name change was made to help in the recruitment of students who are interested in pursuing degrees with a strong emphasis on environmental and construction engineering, as well as the recruitment of faculty members in these key areas.

This has been an exciting year to be dean, and I have no doubt that the coming year will bring many more opportunities to grow and enhance the School.

WELCOME TO THE 2018 issue of *UNM Engineering*. Perhaps the most obvious change for the School has been the completion of the remodel of the Farris Engineering Center. The \$26 million project was completed just in time for the spring semester. The building features many modern enhancements, including large-screen monitors for presentations, additional collaboration and study spaces for students, and a beautiful view of our city. The building is a tangible symbol of our progress into the future. Read more about the new building starting on Page 2.

Also, we received a generous donation from the estate of one of our alumni, Dana C. Wood, that will go toward enhancing our reputation in three areas. The \$3 million gift, the largest in the School's history, will

Christos Christodoulou
Jim and Ellen King Dean of Engineering and Computing

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On the cover
Farris Engineering Center impresses with its new looks

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Building on Greatness

FARRIS ENGINEERING CENTER BEGINS A NEW ERA FOR THE SCHOOL OF ENGINEERING

Early in 2018, a fixture on the engineering campus of UNM reopened to students, faculty and staff, unveiling a bright, modern learning and research space.

The \$25.5 million Farris Engineering Center renovation had been in the planning stages for years, and was completed after 18 months, just in time for the spring semester.

The renovated building houses the staff and student offices, computer labs, server rooms, conference rooms, and event space for the School of Engineering departments of Chemical and Biological Engineering, Computer Science and Nuclear Engineering.

In addition to the approximately 67,000 square feet of existing space, the renovation added 9,959 gross square feet by stepping out the first and second floors to align with the third floor. The building features LED lighting throughout, as well as high-efficiency mechanical and electrical equipment that achieves more than a 50 percent reduction in energy use.

Upon entering the Farris Engineering Center, the most notable difference is the natural light that was almost nonexistent in the original 1967 building. Electrochromic glazing wraps the building envelope and electronically darkens and lightens to manage solar radiation without impeding the vast views of the campus and the surrounding city of Albuquerque.

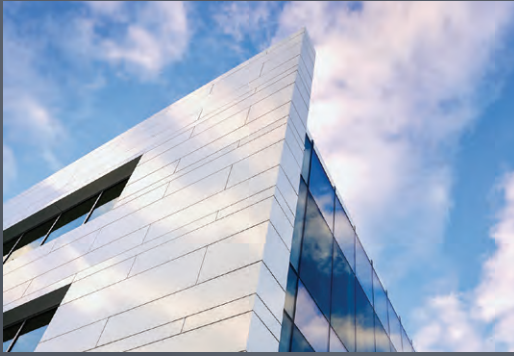
This high-tech glazing is the first of its kind on the UNM campus, making for an energy-efficient and comfortable interior environment.

LEGACY FUNDS THE FUTURE

The building was also built with the future in mind. There is about 25,000 square feet of space in the basement to house future labs and offices, part of which is expected to be transformed into a student innovation space that will provide a dedicated space for various hands-on student projects.

One use for basement space will be a new facility for the UNM Formula Society of Automotive Engineers (FSAE) program. In spring 2018, the estate of Dana C. Wood, an alumnus of the School of Engineering, donated \$1.5 million toward a 7,000-square-foot space on the ground





The Farris ribbon-cutting ceremony and celebration in March 2018 featured many University and local dignitaries.

PROJECT FACTS

- | Renovation of approximately 67,000 square feet of existing space, with an additional 10,000 square feet added on the first floor.
- | Nearly 25,000 square feet of “shell space” in the basement for future labs and offices.
- | Efficient LED lighting throughout the facility.
- | New high-efficiency mechanical and electrical equipment achieves more than a 50 percent reduction in energy use.
- | Architect: RMKM Architecture, P.C.
- | Contractor: Bradbury Stamm

floor of Farris that will be dedicated to the program. Currently, the space for the car is located in the basement of the Mechanical Engineering Building, and the team has long since outgrown the space.

The Wood gift is part of a \$3 million gift from Wood's estate, which is the largest cash gift in the School of Engineering's history.

In addition to revamping the Farris space, \$500,000 of the gift will go toward the Department of Civil, Construction and Environmental Engineering to upgrade a 4,600-square-foot structures and materials lab, located on the ground floor of the Centennial Engineering Center, as well as the civil engineering computer lab. The funds will be used to create state-of-the-art lab spaces in 3D concrete printing and computer-aided design (CAD). The funds will also go toward upgrading the CAD software, which will honor the legacy of Wood's innovation, who was a pioneer in the field of CAD for civil engineering. Finally, \$1 million will create an endowed position within the department. The position and funds will be used for advanced construction and materials technologies, including 3D concrete printing.

Wood, a native of Gallup, New Mexico, received a bachelor's degree in 1977 and a master's degree in 1990, both in civil engineering from UNM. He died after a long battle with cancer in 2013.

Wood's first job out of college was for Bohannon Huston, Inc. His lifelong passion for computers was put to good use when Bohannon Huston started a spinoff company called Diginetics that developed one of the first CAD programs for civil engineering. He helped write the software that was sold to other engineering firms in the United States and eventually rose to lead Diginetics.

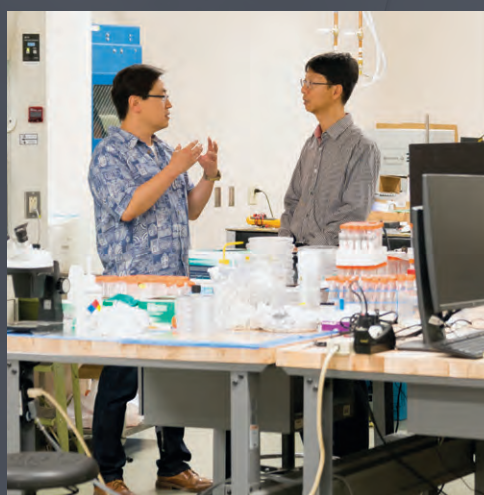
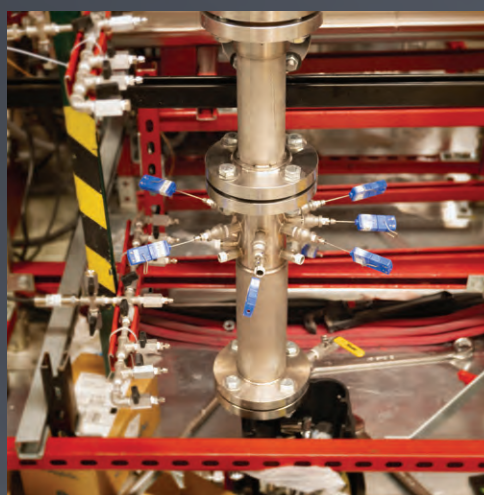
Later, Wood developed a software called PowerMerge, which would sync a user's files on different computers before the Internet and "cloud" were pervasive. He and his associates also launched Leadertech, a company that had offices in Albuquerque and Los Angeles.

Farris Engineering Center's electrochromic glazing lets natural light fill the interior spaces in an energy-efficient manner





Farris Engineering Center's interior has a clean, modern aesthetic.



The scope of the project also included the buildout of multiple laboratory spaces in the basement of the Centennial Engineering Center.





Eirini-Eleni Tsiropoulou, an assistant professor of electrical and computer engineering, is one of the main professors teaching courses in the new Internet of Things online master's degree program in computer engineering.

SCHOOL OF ENGINEERING GROWING ITS ONLINE DEGREE PRESENCE

The School of Engineering has established several all-online graduate degree programs, hoping to tap into a new marketplace of potential students.

The master of construction management program, which has been offered for several years through a combination of online and in-person courses, switched to an all-online format in 2016. The program, which is managed out of the Department of Civil, Construction and Environmental Engineering, is a unique degree that combines business management skills specifically focused on the construction industry. Courses, taught by faculty and industry experts, focus on safety, law, construction documents, equipment, LEED standards, and other topics of interest to working professionals in the construction industry.

"Since taking this program entirely online, we have seen a threefold increase in students enrolled in the program," said Susan Bogus Halter, professor and advisor for the program. "This program has also drawn interest from students working full time, both within and outside of New Mexico."

In the last year, new all-online programs were introduced in the Department of Electrical and Computer Engineering and the Department of Mechanical Engineering.

The Internet of Things computer engineering master's degree program focuses on the growing area of

Internet of Things, which is a collection of physical devices that contain embedded electronics, software, sensors and networking capabilities. These devices collect and exchange data on a massive scale, making it possible to use a smartphone to turn on your lights or your dryer at home, for instance. The 31-credit hour program offers courses in subjects such as machine learning, digital signal processing, cybersecurity, and cloud computing.

The master's in space systems engineering is another new online degree program in the School. The program offers two tracks, one leading to a master's degree in electrical engineering and one to a master's in mechanical engineering. The all-online master's degree program in space systems engineering is one of the first master's-level space systems engineering programs in the country. The computer engineering program is 31 credit hours, and the mechanical engineering program is 34 credit hours. The degree programs were developed with careers in mind, with input from the Air Force Research Laboratory Space Vehicles Directorate, based in Albuquerque, to provide graduates with the advanced skills to further their career in the space systems industry.

All the online graduate degree programs are offered in an accelerated, eight-week format.

To find out more about online offerings in the School of Engineering, visit unmonline.unm.edu.

ON THE PATH TO A REVOLUTION

FACETS SEES PROGRESS ON CHANGING ENGINEERING EDUCATION



The goal was not for the timid. Two years ago, a team from UNM received \$2 million from the National Science Foundation for a revolutionary project that could change the way future students are taught engineering, making it more attractive to groups that are currently underrepresented in the discipline.

“FACETS: Formation of Accomplished Chemical Engineers for Transforming Society” is led by **Abhaya Datye, Sang M. Han, Eva Chi, and Jamie Gomez**, all from UNM’s Department of Chemical and Biological Engineering, and as well as **Vanessa Svihla and Sung (Pil) Kang**, from UNM’s Organization, Information and Learning Sciences (OILS) program. Most of the CBE faculty participate in the program.

The current model of engineering education emphasizes fundamental knowledge, and students do not get to practice engineering until late in the curriculum. As a result, many students drop out because they don’t make the connection between their courses and the work of engineers. To encourage the development of critical thinking and problem-solving skills, the FACETS project is teaching engineering by engaging students in solutions to real-world problems.

FACETS is part of a \$14 million investment by the NSF in the program called RED (short for REvolutionizing Engineering and Computer Science Departments). At UNM, the enormous charge is almost at the halfway point, and the team is reporting success in the classroom. The team has already won numerous awards, including the best paper award at the American Society of Engineering Education national meeting in 2017.

The challenge with this program is taking very technical courses and teaching them in a new way that preserves learning outcomes yet resonates with diverse groups. For instance, in Mass Transfer (CBE 321), students were presented with a “distillation design challenge,” which involved taking alcohol out of alcoholic beverages. Teams of students used the scientific concepts learned in class (as well as new approaches they researched on their own) to develop creative ways to accomplish this

task. But the project was far from just technical. It also involved creating a pitch video to promote each team’s non-alcoholic beverage, writing a script for the video, and presenting their design in class.

“We’re finding it’s not always the ‘best’ students who have the best, most creative solutions,” Chi said. Svihla, who served as a judge for the pitches, agreed, also noting, “the more diverse teams seem to have come up with more creative ideas. And that is part of what this project is about—helping our students bring their diverse experiences and ideas into creative problem solving.” CBE faculty member Canavan agrees that teaching in a new way allows students who may perform lower on more “traditional” measures of learning a way to demonstrate their progress with understanding the material.

THE MORE DIVERSE TEAMS SEEM TO HAVE COME UP WITH MORE CREATIVE IDEAS.

Datye said this project is showing real progress with students, with early outcomes suggesting that developing new ways to teach engineering can encourage new talent. “Often times we pigeonhole students, but we always get surprises.”

Datye said the project has energized faculty. “Faculty are talking about undergraduate education and are enthusiastic about it,” he said. “It gets all faculty involved and proves that they can still be productive researchers while getting involved with students’ education.”

He said the focus for the second half of the grant is to continue to collect more data in the classroom, as well as to track students who have gone through the redesigned courses. “We’d like to see which pathways our students are following and why, after they leave UNM,” he said.

Larger changes will involve possible impacts in the core curriculum for UNM and holding workshops with other institutions to share the findings of how to implement new ways of teaching into the engineering curriculum.

BRIGHT IDEAS

RESEARCHERS TURN DISCOVERIES INTO

What started as a technical engineering problem ended up as a business. Actually, two of them.

Sang M. Han and **Sang Eon Han**, both professors in the Department of Chemical and Biological Engineering at UNM, are leading companies based on innovations created out of their research in response to market needs to make solar panels last longer and achieve building cooling at a fraction of the cost.

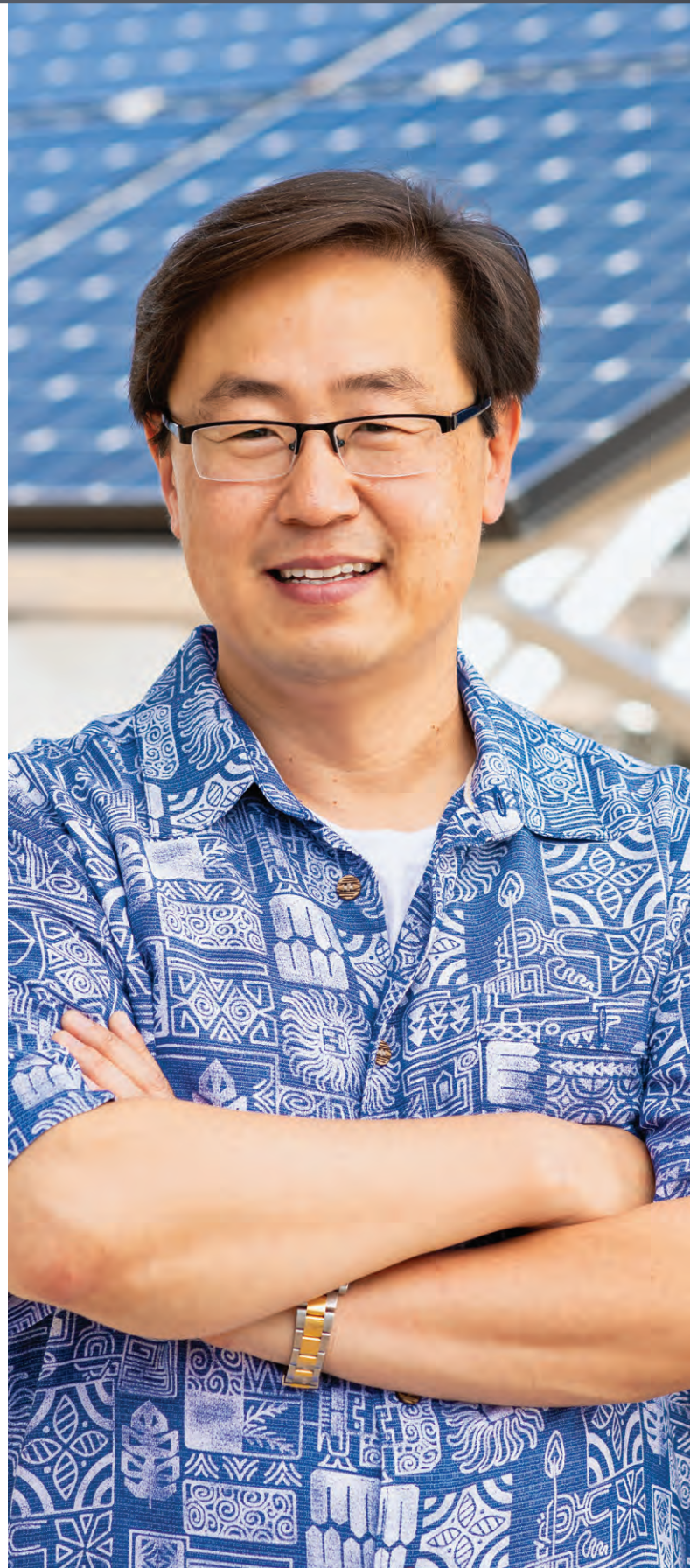
Sang M. Han leads **Osazda Energy, LLC**, and Sang Eon Han leads a related company called **Osazda Materials, Inc.**

The genesis of Osazda Energy came in 2003, when David Wilt, a chief scientist from the Air Force Research Laboratory in Albuquerque, had a problem for which he wanted to develop a solution. Solar cells he was working with for space vehicles were susceptible to cracks, potentially losing power during operation. The semiconductor substrate, or the underlying layer of the solar panel, can crack, and that crack propagates through the metal contact lines, likely leading to power loss.

The problem that Wilt was focusing on was a common one. In fact, the National Renewable Energy Laboratory has recently identified substrate cracking as the No. 1 degradation issue facing photovoltaics.

Luckily, a solution was not far away, thanks to research being conducted at UNM. He soon connected with Sang M. Han, and the technological solution that was developed eventually became a company, Osazda Energy, which is marketing a technology called metal matrix composite metallization.

The idea involves adding low-cost carbon nanotubes to the solar cell metallization process. This process acts as a bridge to fill in the cracks much more effectively than the conventional process. And if cracks do occur and disconnect, this technology bridges or heals cracks effectively. The company, started in 2017, now employs seven people and has undergone Phase 1 of the Air Force Small Business Innovation Research



Sang M. Han
Osazda Energy, LLC

COMPANIES FOCUSED ON MAKING SOLAR CELLS DURABLE AND OUR LIVES COOLER



process and the first round of the Department of Energy DuraMAT program.

The technology of Osazda Materials tackles the problem of expensive air conditioning for buildings. Sang Eon Han created a paint-format substance that is inexpensive and relatively easy to manufacture. This substance, like a “sunscreen,” uses tiny grains of a sand-like substance to scatter the sunlight and passively cools by efficiently losing heat by thermal radiation. The paint-format substance could be applied on building rooftops to keep the inside air well below the ambient temperature without using electricity.

Osazda Materials, launched in 2016, has just Sang Eon Han as chief technology officer, but has plans to further develop the technology and successfully market it for various uses.

Sang M. Han said there are always risks in starting any endeavor, but his advice to other faculty is not to let that keep them from trying. Several years ago, he was involved in another business venture, PD Diagnostics, a medical test diagnostics company. That venture didn’t last, but the lessons learned were valuable, Han said.

“Failure is a must. Do it.”

Sang Eon Han, who is at the beginning of his career, said the technology transfer experience has helped him grow both technically and professionally.

“It was important to get the right mentor in my research,” he said. “His expertise and my expertise are complementary, and we’ve had the opportunity to write many proposals together. It’s been a fun process.”

Though both companies are young, both researchers would like to see their budding companies grow.

The School of Engineering has a long history of transforming technology into business ventures. Since 1999, the School’s research has resulted in hundreds of patents and more than 200 companies.

BIODESIGN COURSE

COMBINES THE ART AND SCIENCE OF
ENGINEERING AND MEDICINE

As our population grows older and lives longer, good medical care will become even more important. But no matter the age of the patient, good medical care relies heavily upon innovative discoveries.

Engineering is known for technological breakthroughs in all fields, and when these are combined with the resources and talent of a medical school, powerful partnerships can be established. At UNM, that partnership has resulted in a course that draws from both engineering and medicine, where the outcomes are discoveries that can help patients.

The graduate-level biodesign course, started in 2016 and directed primarily by **Christina Salas**, an assistant professor with the UNM Department of Orthopaedics & Rehabilitation who also has a faculty appointment in mechanical engineering, is listed in both the School of Engineering and the School of Medicine and is jointly administered by the two schools. Salas said the biodesign course is modeled after a similar program at Stanford University.

THIS COURSE PROVIDES A UNIQUE PERSPECTIVE TO OUR ENGINEERING STUDENTS, BEING ABLE TO SEE PROBLEMS FROM BOTH THE CLINICAL SIDE AND THE ENGINEERING SIDE, AND IN TAKING WHAT THEY LEARN TO CREATE A MARKETABLE DEVICE.

During the semester, students get a crash course in the medical specialty selected for that year — talking to doctors, nurses, and patients and touring important medical facilities to learn about real-life clinical challenges that are waiting on a solution. Salas said students spend two to three weeks in this medical setting, immersing themselves in clinical problems and familiarizing themselves with the medical specialty. Then, supervised by a faculty member from engineering, students break up into teams to research and design a technology that can address a clinical problem in that specialty.



A team of students in the graduate-level biodesign course

At the end of the semester, student teams disclose their technology to the STC, UNM's technology transfer office, submit a provisional patent application to protect their technology, and compete for funding of up to \$50,000 to support fabrication, testing, and commercialization of their new product. The winning team's award is funded by the School of Medicine's Clinical & Translational Science Center and the School of Engineering.

"I've been inspired by the ideas developed by our students," Salas said. "This course provides a unique perspective to our engineering students, being able to see problems from both the clinical side and the engineering side, and in taking what they learn to create a marketable device."

Products developed from UNM's course include a device to reduce hemorrhaging in severe pelvic injuries, a lifting device that allows emergency medical teams to more easily move extremely overweight patients, and a "limitless socket" device that can help amputee patients more quickly be fitted with a prosthetic limb, a process that can often take many months.

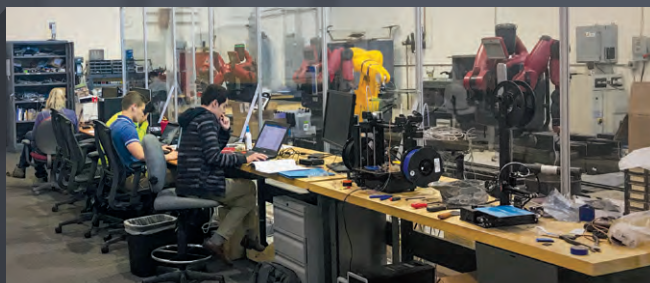
Work on each winning design continues for at least a year after the semester ends, with Salas serving as a mentor resource, she said. After the semester, students can continue to work on their technologies by signing up for an independent study course with their faculty lead.



RESEARCH ROUNDUP

■ UNM, AFRL partner on \$6.7 million center

The University of New Mexico and the Air Force Research Laboratory are partnering on a new center that will focus on agile manufacturing for cost-effective and efficient production of small spacecraft and integrated directed energy systems. The \$6.7 million center, to be built on UNM's south campus, will focus on four areas: multi-material additive manufacturing; machine learning and transfer learning; machine vision and scene decomposition; and advanced manufacturing concepts. The center will create a strategic relationship between UNM and AFRL New Mexico's directed energy and space vehicles directorates in the areas of small satellite technologies and directed energy systems with a focus on advanced manufacturing concepts. AFRL New Mexico has been active in STEM education for more than 20 years and regularly collaborates with other groups to further STEM throughout the state.



Students in the Agile Manufacturing Laboratory

■ Researchers at The University of New Mexico and the School of Engineering are part of a team of scholars looking for more efficient ways to heat, cool and ventilate buildings. The Advanced Research Projects Agency-Energy (ARPA-E) announced \$20 million in funding for 15 projects that will develop a new class of sensor systems to enable significant energy savings via reduced demand for heating and cooling in residential and commercial buildings. Researchers from UNM, along with the Center for Lighting Enabled Systems & Applications (LESA) at Rensselaer Polytechnic Institute, are working to create a low-cost, privacy-preserving sensor technology for counting, locating and tracking occupants in any commercial space. Funding for the entire project, including development and testing, is \$2.375 million over three years.

■ The Department of Energy's National Nuclear Security Administration (DOE/NNSA) has named Cornell University as a Stewardship Science Academic Alliances (SSAA) Center of Excellence program funding recipient for its work in High Energy Density Physics. The Cornell team includes the University of Michigan, UC San Diego, Princeton University, Imperial College (London, UK), Weizmann Institute (Israel), the Lebedev Institute (Moscow, Russia), and The University of New Mexico. The UNM team comprises Professors **Edl Schamiloglu** and **Mark Gilmore** from the Department of Electrical and Computer Engineering.

■ Researchers at Washington State University and The University of New Mexico have created a catalyst capable of reducing pollutants at the lower temperatures expected in advanced engines. Their work, published in the journal *Science*, presents a new way to create a more powerful catalyst while using smaller amounts of platinum, the most expensive component of emission-control catalysts. **Abhaya Datye**, a distinguished professor at UNM's Department of Chemical and Biological Engineering was the study's co-author.

RESEARCH ON THE RISE

As I begin my second year as associate dean for research, I am pleased to report that we have seen an incredible amount of progress in several important areas related to research and reputation of the School.

First, we rose to No. 83 in the *U.S. News & World Report* 2019 Best Graduate Schools rankings for engineering. We were at No. 99 the year before, and our goal is to raise that ranking even higher, since many prospective students, as well as research collaborators, use that to judge the quality of a school.

We also have seen increased research activity within the School during the last year. Research expenditures rose by \$2 million during the last year, from \$32.4 million for fiscal year 2017 to \$34.5 million for fiscal year 2018. The number of proposals submitted by our faculty also rose in the last year, to 358, up from 351 in the previous fiscal year.



Another excellent measure of our productivity is in technology transfer. This summer, UNM was ranked No. 32 in the world for the number of U.S. utility patents received in 2017 for its inventions, according to a report published by the National Academy of Inventors and Intellectual Property Owners Association. Our researchers in the School are extremely active in

UNM was ranked No. 32 in the world for the number of U.S. utility patents received in 2017 for its inventions

inventions and certainly played a big role in this ranking.

I have recently taken on an additional responsibility relating to research for all of UNM, as special assistant to the provost for laboratory relations. I am working as a liaison between UNM and the three New Mexico laboratories and with other national laboratories across the country. One offshoot of that work is gaining

Diane Peebles, who is now serving as a liaison between UNM and Sandia. (See Page 13)

Much of our research in the School is conducted in our research centers. Since they are vital to the research enterprise in the School, it is valuable to provide some basic information about their mission and projects, which runs the gamut from health care to space. Below is a brief summary and contact information for each.

It goes without saying that innovation is a key part of what drives research, so to that end, my title now has “innovation” in it. This is meant to signify that innovation is, and will continue to be, one of our main drivers in the School of Engineering.

Edl Schamiloglu

Associate Dean for Research and Innovation

OUR CENTERS

Center for Biomedical Engineering

The center combines the research of engineers, scientists, and clinicians to pursue world-changing biomedical technology and drive economic development in New Mexico. entrepreneurship.

*Director: Steven Graves
Website: cbme.unm.edu*

COSMIAC

COSMIAC focuses on aerospace-related research. It strives to be the national center of excellence and specialized talent source for developing technical solutions for aerospace and defense applications.

*Director: Craig Kief
Website: cosmiac.org*

Center for Water and the Environment

The center conducts cutting-edge research into technological and engineering-based solutions to problems with water and the environment, with a focus on water availability in arid environments and interactions between water and energy.

*Director: Kerry Howe
Website: cwe.unm.edu*

Q&A WITH DIANE PEEBLES

Strengthening the collaboration between UNM and the national laboratories is a major goal of both the School of Engineering and the university. Starting in spring 2018, Diane Peebles, a longtime Sandia National Laboratories scientist, has been the on-campus liaison for this effort. The work is an offshoot of the Sandia Academic Alliance, of which UNM is a part, along with Georgia Tech, Purdue University, University of Illinois at Urbana-Champaign, and the University of Texas at Austin.

What do you see as your role in this new position?

I serve as the liaison between UNM and Sandia. In this role, I work closely with Carol Adkins, who is the Sandia National Laboratories Campus Executive for UNM. I am also the liaison for New Mexico State University and New Mexico Tech. I steward the relationships with universities for the Academic Alliance program. Some of the goals include refining and implementing



a university engagement strategy, developing an annual plan, developing and managing multi-lateral relationships and establishing a Sandia presence on campus. My work includes making connections between Sandia staff and UNM faculty and students,

helping to develop and maintain collaborations and collaborating with talent development programs at Sandia and UNM.

Are you working with mainly faculty or students?

Most of my time is spent reaching out to university faculty and leadership. However, I am happy to directly interface with students and student organizations. I will have a UNM student working for me who will engage with students and student organizations.

What do you hope to accomplish?

The overarching goals for the Academic Alliance program include solving significant problems Sandia could not address alone, sustaining and enriching the talent pipeline and accelerating the commercialization and adoption of new technologies. I hope to see increased strategic engagements between UNM and Sandia, more joint research proposals submitted, and more joint intellectual property disclosures. I want to increase the visibility of UNM capabilities at Sandia, and Sandia programmatic needs at UNM. I want to help get top-notch students to UNM and keep them in New Mexico through jobs at Sandia. I'd also like to increase and formalize Sandia's joint interactions with UNM, such as adjunct professors.

Where are you located at UNM and what are your on-campus hours?

I have had an office in Centennial Engineering Center's Engineering Student Success Center since early July. I am committed to spending one day each week at UNM. In general, I am in my UNM office on Thursdays, from 8 a.m. - 5 p.m., and available at depeeb1@sandia.gov.

Center for Emerging Energy Technologies

The center's research revolves around the integration of renewable energy systems into the electricity grid, with the goal of helping to guide the transition from a centralized infrastructure to one that is more decentralized, clean and resilient.

Director: Andrea Mammoli
Website: ceet.unm.edu

Manufacturing Training and Technology Center

The Manufacturing Training and Technology Center is a 57,000-square-foot facility located in UNM's Science and Technology Park. Its mission is to support regional workforce, technology, and economic development.

Director: John Wood
Website: mfg.unm.edu

Institute for Space and Nuclear Power Studies

The institute focuses on space power and propulsion technologies and related fields. It offers educational and professional training and conducts research in many fields of space nuclear power and space systems technology.

Director: Mohamed El-Genk
Website: isnps.unm.edu

Resilience Institute

The UNM Resilience Institute focuses on finding interdisciplinary, engineering- and scientific-based solutions to making our communities and world resilient to natural disasters, climate change, and challenges posed by water resources, transportation and other factors.

Director: Mahmoud Reda Taha
Website: res-ins.unm.edu

Transitions *Keeping up with the people in the School of Engineering*



Edl Schamiloglu



Christina Salas



Yu-Lin Shen



David Ackley



Wei (Wennie) Shu

New faculty

The School of Engineering welcomed several new faculty in 2018:

Civil, Construction and Environmental Engineering

Kenneth R. Cooper, lecturer, and **Nicholas Ferenchak**, assistant professor. Cooper earned his master's in construction management from Western Carolina University. Ferenchak specializes in sustainable and resilient transportation systems via bicycle and pedestrian safety.

Computer Science

Marina Kogan, assistant professor; **Soraya Abad-Mota**, lecturer; and **Jedidiah McClurg**, assistant professor. Kogan specializes in crisis informatics, social computing, and network science; Abad-Mota specializes in databases; and McClurg specializes in programming languages and verification.

Electrical and Computer Engineering

Ali Bidram, assistant professor; **Xiang Sun**, assistant professor; **Jose Luis Palacios**, lecturer. Bidram focuses on power systems; Sun specializes in Internet of Things, big data and cloud computing; and Palacios specializes in Markov chains and mathematical chemistry.

Mechanical Engineering

Sakineh Chabi, assistant professor; **Matthias Pleil**, lecturer. Chabi's research is on the electrochemical study of 3D graphene composites, and Pleil specializes in applied physics.

Nuclear Engineering

Christopher Perfetti, assistant professor. He specializes in Monte Carlo methods development, and sensitivity and uncertainty analysis.

Leadership

Edl Schamiloglu, associate dean for research and innovation in the School of Engineering and a distinguished professor of electrical and computer engineering, has been selected as the special assistant to the provost for laboratory relations, effective July 1. His role will be to coordinate the University's efforts with the national laboratories in order to maximize collaboration.

Christina Salas, an assistant professor in the Department of Orthopaedics and Rehabilitation in the School of Medicine, has been selected by Dean Christos Christodoulou to serve as the special assistant to the dean for Health Science Center relations. Salas also holds joint appointments in the Department of Civil, Construction and Environmental Engineering, as well as the Department of Mechanical Engineering.

Yu-Lin Shen, who had been serving as interim chair of the Department of Mechanical Engineering since 2016, was named to chair of the department, effective July 1.

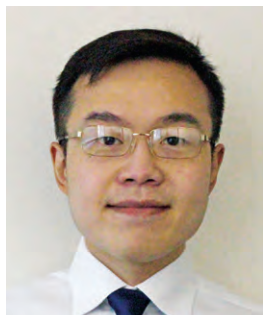
Retiring faculty

David Ackley, professor of computer science, and **Wei (Wennie) Shu**, professor of electrical and computer engineering.

Achievements *Giving kudos to our faculty and students*



C. Jeffrey Brinker



Zhen Peng



Mehran Tehrani



Maria Kelly



Judith Brewer

Faculty

C. Jeffrey Brinker, a Distinguished Professor and Regents' Professor in the Department of Chemical and Biological Engineering, was elected a Fellow of the American Academy of Arts and Sciences.

Zhen Peng, assistant professor of electrical and computer engineering, is the recipient of a National Science Foundation CAREER Award for a project titled "Physics-Oriented Statistical Wave Analysis Integrating Order and Chaos."

Plamen B. Atanasov, Distinguished Professor of Chemical and Biological Engineering and Director of the UNM Center for Micro-Engineered Materials, was named a 2017 Fellow of the National Academy of Inventors.

Mehran Tehrani, assistant professor of mechanical engineering, was been awarded the 2018 Office of Naval Research Young Investigator Award.

Sang M. Han, Regents Professor of chemical and biological engineering, and electrical and computer engineering, received the 2018 STC.UNM Innovation Fellow Award.

Sang Eon Han, assistant professor in the Department of Chemical and Biological Engineering, received the Korean Institute of Chemical Engineers President Young Investigator Award.

Heather Canavan, associate professor of chemical and biological engineering, was selected as a 2018 AVS Fellow.

Students

Maria Kelly, who earned her bachelor's in chemical and biological engineering in May, received UNM's 2018 Clauve Outstanding Senior Award.

Five students from the School of Engineering were selected to receive National Science Foundation Graduate Research Fellowships for 2018. Martinez is a graduate of mechanical engineering, and the rest of the recipients are from chemical and biological engineering:

Sarah Blair, who is a graduate student at Stanford University

Tybur Quinton Casuse, who is continuing graduate studies at UNM

Danielle D. Harrier, who is a graduate student at the University of Illinois, Urbana-Champaign

Adam David Quintana, who is continuing graduate studies at UNM

Jaylene Reyanne Martinez is a graduate student at the University of Colorado-Boulder

Judith Brewer, a junior in electrical engineering at UNM, was awarded the Air Force Research Laboratory (AFRL) Outstanding Scholar Award. Brewer was one of only 6 out of 177 summer scholars at AFRL who received the award at the Kirtland Air Force Base location and was the only female.



ALUMNUS USES HIS EXPERIENCE TO BUILD A NEW KIND OF COMPANY

Chicago native David Lesser's career is an embodiment of the maxim, "the whole is greater than the sum of its parts."

Lesser, who received a bachelor's degree in nuclear engineering from UNM in 1998, is president and CEO of Chicago-based Nexum, Inc., an IT security firm he built from the ground up. The company, founded in 2002, has 99 employees and \$125 million in annual revenue.

He was able to find this success not using one specific experience or skillset, but many, including time in the military, his time at UNM, and his time in the industry.

Lesser came to UNM as a nontraditional student, having served as a nuclear electrician's mate in the U.S. Navy, and found himself right at home in the Albuquerque campus. The nuclear engineering facilities manager Ken Carpenter and some of Lesser's classmates had also served in the Navy in similar roles.

After graduating, he worked for a few years for the School of Engineering dean's office as an IT systems administrator before moving to another position in Chicago.

It was at that next job where Lesser discovered a passion for putting all of his past experiences to work to form a new kind of IT company.

"I didn't respect how they were treating employees and clients. They didn't share their knowledge, and it created a very parasitic relationship," he said. "I saw the writing on the wall, and I knew I had to go out on my own."

Lesser's company, formed in 2002, took a 180-degree turn from that philosophy.

"We take products and wrap knowledge around them, which is very empowering for our clients," he said. "Our

Nuclear engineering and IT both have to do with systems analysis

motto is, 'Do what's best for the client and success will follow.' "

He says his nuclear engineering background is very applicable to the field of IT.

"Nuclear engineering and IT both have to do with systems analysis," he said.

Lesser is most proud of his employees. In an industry that typically has high turnover, his company has almost none. He manages his company with a military-like discipline and precision, fitting of his background in the Navy and in engineering, but says people are always first. While Lesser doesn't have children of his own, he regards all his employees and their families as his extended family.

Lesser says that the human resources aspect of running his business has been the most challenging — finding the right fit of people for the job to make sure both the team and clients are happy. The company's ability to do this well has led to its low turnover.

Headquartered in Chicago, Nexum has grown to have many locations, with local sales and engineering presence throughout the United States, and major offices in New Mexico, Illinois, Ohio, New Hampshire, New York, and Kentucky.

Lesser spends his free time staying current in the field of technology, and by bicycling, cooking, growing orchids, and gardening.

FIVE
FOR

Mark Stone

Though he grew up in landlocked Nebraska, Mark Stone, an associate professor in the Department of Civil, Construction and Environmental Engineering, has devoted his career to studying water. He was awarded a National Science Foundation CAREER Award in 2014, and one of his latest projects is an NSF-funded study to investigate the impacts of climate change and other stressors (such as hydropower and mining) on headwater watersheds and headwater-dependent communities. This study has the goal of improving the resilience of headwater-dependent communities across the Americas to disturbances such as droughts and wildfires.

What got you interested in water research?

I grew up on our family farm in northeast Nebraska, very near the Missouri River. Some of my fondest childhood memories are of building tiny dams in the nearby creek and enjoying time with friends and family at the river. I was fortunate to have an amazing science teacher at my small high school who provided mentoring to engage students in research. Through that experience, I was exposed to the water resources programs at the University of Nebraska. Once I discovered I could have a career working on water research, there was no looking back.

What do you see as the greatest challenge to water resources?

Climate change is creating countless challenges with respect to managing water resources and protecting communities from natural disasters. Last year's Atlantic hurricane season and wildfires in the American west are a few vivid examples of this challenge. New Mexico is extremely vulnerable to these changes as our snowpack dwindles in the upper Rio Grande and Colorado River watersheds. My research is focused on improving understanding of these risks and developing mitigation strategies for communities.

How do you see water challenges improving or evolving?

The water resources field is rapidly evolving with the advancement of environmental sensors, remote sensing, and supercomputing. These innovations are improving our ability to describe and predict water supplies, flood risks, and even water-related conflicts. The focus now is on connecting these innovations to pressing water resources challenges to make the results actionable for water resources managers.


What is the best piece of career advice you've received?

My Ph.D. advisor instilled in me the attitude of not fearing failure and of relentlessly pursuing solutions to the problems that I find important. That perspective has helped me stay focused on the issues that I see as critical for addressing social and environmental challenges.

What are your hobbies?

I'm an avid rafter. I'm also an enthusiastic home brewer, and I've been involved with brewing at the commercial scale as well. Currently, I'm collaborating with a renowned Belgian brewery to research the impacts of climate change on the traditional brewing process.

A mile above and beyond Silicon Valley.



On a mile-high mesa between blue skies and watermelon mountains, The University of New Mexico offers far more than any engineering student could ever expect. Students are immersed in hands-on learning experiences, both tested in the lab and proven in the field. The people here solve complex problems with their unique perspectives. No matter what you're looking to make for your future, create yours at UNM.

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