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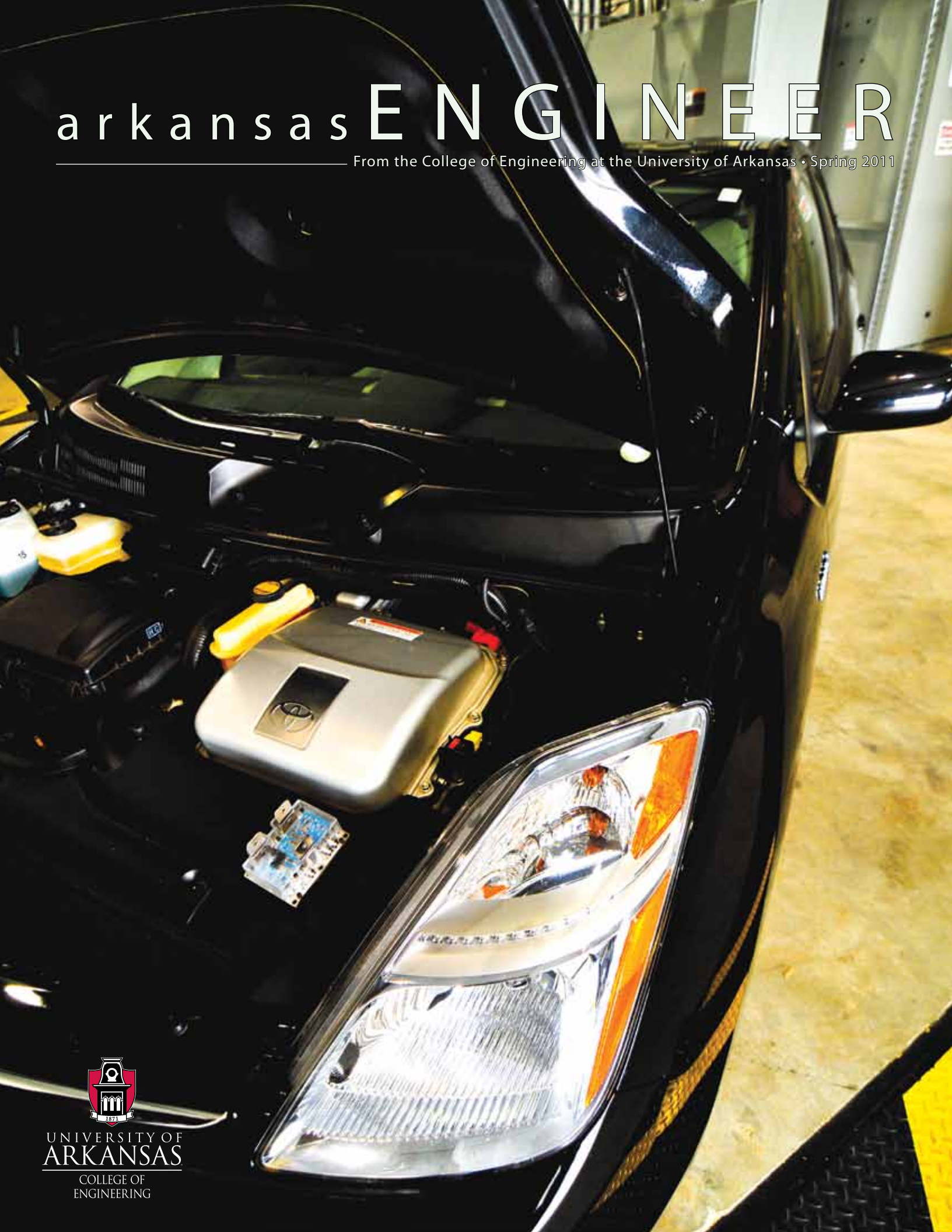

UNIVERSITY OF ARKANSAS
COLLEGE OF ENGINEERING

IN EVERY ISSUE

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Daily, we are bombarded with messages about the economic, social and technical challenges America must overcome to meet its citizens' needs and maintain its leadership in the global economy. The National Science Foundation predicts the demand for new science and engineering professionals will increase by 51% in the next decade. If our talent pool does not increase as well, our country will not be able to meet this demand, and American industry will find itself unequipped to thrive in the changing global society.

In response to the urgent calls for action to address these issues, the College of Engineering has committed itself to increasing the number of students entering and graduating from engineering disciplines. For the third consecutive year we have welcomed our largest-ever freshman class. There are currently 2,059 undergraduate students in the College of Engineering and 920 graduate students. We are rising to meet the challenge of producing more engineers while maintaining the high standards set for our students.

Our goal is to attract the best students in the state and in the country, and to give them the best education and training in the vital field of engineering. In fact, the University of Arkansas College of Engineering's undergraduate program was ranked in the top 100 programs among the nation's doctoral-granting institutions in the recently released 2011 edition of *America's Best Colleges*, published by *U.S. News and World Report*.

This progress reflects a great deal of work by our outstanding faculty and students and a strong effort by our alumni to provide the college with the resources we need. We plan to continue building a nationally recognized program and demonstrating that the University of Arkansas College of Engineering is an amazing place to be at this exceptional time in history!

All the Best,
Ashok Saxena

Ashok Saxena

Dean of Engineering
Irma F. and Raymond F. Giffels Endowed Chair in Engineering

College of Engineering

The U of A Elevated to Highest Carnegie Classification Among Universities, Colleges

The University of Arkansas has been elevated to the highest possible classification by the Carnegie Foundation for the Advancement of Teaching during its recent reclassification of the nation's 4,633 universities and colleges. The University of Arkansas is one of just 108 schools with this distinction.

Since their initial publication in 1973, the Carnegie classifications have been widely accepted as the standard categorization of accredited U.S. universities and colleges. The classifications are based on a range of quantitative data related to the number and nature of doctoral degrees awarded annually, the amount of research grants and activity occurring, and other measures of scholarly productivity.

The University of Arkansas' new category is RU/VH, which is defined as a doctoral-granting, research university with very high levels of research activity. Prior to 2011, the university was categorized as RU/H, the second-highest of the Carnegie Foundation's 33 categories. The elevation to the highest classification was primarily a result of sustained increases in the number and diversity of doctoral degrees awarded and in research grants and contracts received.

University of Arkansas Chancellor G. David Gearhart said that the new Carnegie classification "is a reflection of the university's transformation as a truly world-class institution.

"It documents our advancement as a nationally and internationally influential research university," he said. "We have reached this top status as a result of the innovation, productivity and successful collaboration of our university's faculty, students and staff."

Record Number Receive Fellowships

Six University of Arkansas College of Engineering graduates won National Science Foundation Graduate Research Fellowships for this academic year, and four more received honorable mentions.

The graduate fellowship program is one of the National Science Foundation's oldest and most highly competitive, offering support for graduate study in all scientific disciplines. NSF graduate fellows are expected to pursue lifelong careers marked by significant contributions to research, teaching and industrial applications in science, mathematics and engineering.

College Ranked Among Top in Nation

The College of Engineering's undergraduate program was ranked in the top 100 programs among the nation's doctoral-granting institutions in the 2011 edition of *America's Best Colleges*, published by *U.S. News and World Report*. Its ranking of 98 is a 4-point jump from the college's 2010 ranking, and the first time the college was ranked in the top 100.

There are 169 undergraduate engineering programs from private and public doctoral-granting institutions included in the survey. The College of Engineering was ranked No. 61 among the public institutions.

In the 2012 edition of *America's Best Graduate Schools, U.S. News and World Report* ranks the College of Engineering graduate program at 107 out of 200 institutions, an improvement of 8 places over the previous year. Within the college, the industrial engineering graduate program is ranked 25th for the second consecutive year and 18th among public institutions. The U.S. News ranking includes a total of 44 institutions in this category, 36 of them public universities.

"We are very pleased to see the reputation and ranking of the College of Engineering continue to improve," said Ashok Saxena, dean of the College of Engineering. "This progress reflects a great deal of work by our outstanding faculty, and a strong effort by the University of Arkansas to provide the college with the resources we need to build a nationally recognized program."

Awards and recognition at the College of Engineering


Ashok Saxena

Ashok Saxena, Distinguished Professor and dean of the College of Engineering, was recently awarded the Wohler Medal by the European Society for Structural Integrity. The Wohler is given biannually to a senior researcher who has made significant contributions to the understanding of fatigue in metals. Saxena is the third U.S. researcher to receive the Wohler Medal.

Saxena was recognized for his research on creep-fatigue interactions, which cause degradation in structural metals used at high temperatures.


Simon Ang

Simon Ang, professor of electrical engineering at the University of Arkansas, has been named a fellow of the Institute of Electrical and Electronics Engineers for his contribution to microelectronic packaging and power electronics education.

In addition to the Institute of Electrical and Electronics Engineers, Ang is a fellow of the Institution of Engineering and Technology, the City and Guilds of London Institute, and the Electrochemical Society. He is the honorary president of Xi'an Aeronautical Polytechnic College in Xi'an, China.


Ronald Rardin

Ronald L. Rardin, Distinguished Professor and the John and Mary Lib White Endowed Systems Integration Chair in Industrial Engineering, has been selected as a fellow of the Institute for Operations Research and the Management Sciences. Rardin is the director of the Center for Innovation in Healthcare Logistics and an award-winning teacher and author. His research and teaching interests center on large-scale optimization modeling and algorithms, including their application in health-care delivery, transportation and logistics and energy planning.


Russell Meller

Russell Meller, the James M. Hefley and Marie G. Hefley Endowed Chair in Logistics and Entrepreneurship in the industrial engineering department of the College of Engineering, has received the prestigious Apple-Reed Award from the Material Handling Education Foundation.

Meller, who is also director of the Center for Excellence in Logistics and Distribution, based at the University of Arkansas, was recognized for his contributions, dedication and service to the material handling logistics field and for his support of the Material Handling Education Foundation.


Micah Hale


Jamie Hestekin

Two faculty members from the College of Engineering at the University of Arkansas are among 53 of the nation's most innovative young engineering educators to be selected to take part in the National Academy of Engineering's second Frontiers of Engineering Education symposium. Micah Hale, associate professor of civil engineering and Jamie Hestekin, assistant professor of chemical engineering were selected as early-career faculty members who are developing and implementing innovative educational approaches in their engineering disciplines. They joined colleagues from around the country Dec. 13-16 in Irvine, Calif. for the event, where they shared ideas and learned from research and best practice in education. Hale and Hestekin were nominated by fellow engineers or deans and chosen from a highly competitive pool of applicants.

Hale is the 2010 recipient of the Charles and Nadine Baum Faculty Teaching Award, the university's most prestigious teaching award.

Hestiken has mentored many award-winning student research projects and won a John A. White Award for Faculty-Student Collaboration for research into creating biofuels from algae.


Kim Needy

Kim Needy, department head for industrial engineering in the College of Engineering, has received her second Bernie Sarchet Award in two years. This year the award came from the American Society for Engineering Management and was presented at the group's recent conference, hosted by the University of Arkansas. The award is the society's highest honor.

"Dr. Needy epitomizes those qualities the members look for in a recipient," said Joette G. Sonnenberg, president of the American Society for Engineering Management.


Chang Nam

Chang S. Nam, assistant professor in the department of industrial engineering, has received a Faculty Early Career Development grant, also known as a CAREER award, from the National Science Foundation. Nam's project is intended to help visually impaired students study science.

He and his research team will design, evaluate and implement a computer learning system that uses the sense of touch, or haptic sense, to enable visually impaired students "feel" scientific concepts through tactile, force and temperature sensations.


Douglas Spearot

Douglas Spearot, assistant professor of mechanical engineering, has received a CAREER award for his work on computational modeling of microstructure evolution during vapor deposition. The $400,997 award will allow him to continue work on a computational model that will help scientists and engineers understand the fundamental nanoscale mechanisms associated with development and evolution of microstructures during vapor deposition, which is a method of depositing thin films onto various surfaces, such as semiconductor wafers, by way of condensation.


David Zaharoff

Biomedical engineering professor David Zaharoff has been awarded a Transition Career Development Award by the National Cancer Institute to further his research on Interleukin-12, a powerful cytokine that shows promise for cancer treatment.

This award is given to fewer than 15 investigators nationwide each year. It is the first time the National Cancer Institute has given this type of award in Arkansas, and it is the only Transition Career Development Award from any of the National Institutes of Health to be given to a researcher at the University of Arkansas.


Brady Cox

Brady Cox, assistant professor of civil engineering, has received a CAREER award for his work on non-intrusive subsurface imaging using seismic surface wave methods (SWM). These tests are used to determine the layering and engineering properties of soil under a building site, and they provide information necessary for designing structures to resist earthquake damage. The aim of his research is to quantify the uncertainty involved in these methods and create standards for them, which will hopefully lead to more accurate data and better building practices.


Nilanjan Banerjee

Nilanjan Banerjee, assistant professor of computer science and computer engineering, has received a CAREER award for his project "System Support for Renewable Energy-driven Devices."

Banerjee is developing techniques for designing renewable energy systems. These include small, light-powered devices such as sensors that can read and store medical data, solar-powered disaster relief sensors, which can relay important information to survivors and large systems such as green homes which can monitor energy intake and balance it with the amount of energy used.

Malshe Cited as Nanotech Leader


Ajay Malshe

NanoBusiness Alliance, the top nanotechnology industry organization, has chosen engineering professor and NanoMech, Inc. founder Ajay Malshe as one of the 10 most influential nanotechnology leaders of 2010. This designation affirms the University of Arkansas as a leader in nanotechnology research and development.

Malshe, the Twenty-First Century Endowed Chair in Materials, Manufacturing and Integrated Systems at the University of Arkansas, has directed research projects in nano-materials and manufacturing, micro- and nano-device packaging and integration and surface engineering for advanced manufacturing.

College Names New Director of Communications


Camilla Medders

In December, Camilla Medders was named director of communications for the College of Engineering. Medders received a bachelor's degree in English and a Master of Fine Arts degree in creative writing from the University of Arkansas, and she has had several years of experience as a professional writer.

Enterprise Center Feeds New High-Tech Businesses

Arkansas Gov. Mike Beebe and University of Arkansas Chancellor G. David Gearhart helped dedicate the Enterprise Center, the newest component of the Arkansas Research and Technology Park, during a ceremony on Thursday, Oct. 21.

The University of Arkansas Enterprise Center represents the latest step in the on-going process of taking technology created by university researchers and developing it into commercial businesses that create jobs locally while providing innovative products to the world. The Enterprise Center enables companies that have been nurtured through the Genesis Technology Incubator and the Innovation Center at the Technology Park to move toward commercializing their products.

Four developing businesses are now leasing space in the Enterprise Center: SFC Fluidics, NN Laboratories, NanoMech and Arkansas Power Electronics International.

Student Team Closes NASDAQ Market

Last spring, Silicon Solar Solutions took first place in the Stuart Clark Venture Challenge business plan competition at the University of Manitoba in Canada, winning $15,000 and the invitation to ring the NASDAQ closing bell.

Team members include Douglas Hutchings and Seth Shumate, doctoral students in the College of Engineering, and Stephen Ritterbush and Brent Bertelsen, from the Walton College of Business. Carol Reeves of Walton College is the faculty adviser for the team. Their advisers in electrical engineering are Magda El-Shenawee and Hameed Naseem.

Roper Publishes New Textbook

Keith Roper, associate professor in the department of chemical engineering and Charles W. Oxford Endowed Professorship in Emerging Technologies, recently published the third edition of *Separation Process Principles: Chemical and Biochemical Operations* (John Wiley & Sons Inc., 2010). Roper coauthored the text with J.D. Seader (University of Utah) and Ernest J. Henley (University of Houston).

This new edition replaces a popular second edition of this textbook which sold over 3,000 copies worldwide last year.

Roper's research, funded by National Science Foundation, National Institutes of Health, Environmental Protection Agency, and numerous state and university agencies, has led to more than 31 peer-reviewed publications, 30 invited lectures, one U.S. patent, six patent applications, one viral and three bacterial vaccine products, six process documents, and more than 100 presentations and process equipment designs. His collaborative work to develop alternative energy sources from sunlight has been featured in newspapers, magazines, web pages and was recently highlighted in a National Science Foundation press release.


Images by Jim Gattis

New Building, New Opportunities

The College of Engineering has a new LEED-certified building. Located at the corner of Cato Springs and Razorback Roads, this building will accommodate the needs of approximately 10 faculty and 57 graduate students. The new building has 33,000 square feet of space, including 4,000 feet of laboratory space.

This space will provide new opportunities for collaboration among the different departments in the College of Engineering. One of these projects, the developing Arkansas Circuit Design Center, combines faculty and graduate students from electrical engineering, computer science and computer engineering. This group focuses on research and education in analog, mixed-signal and digital integrated circuit design.


The new building will provide additional lab space for teaching and research.

The college is also working with chemical engineering's newest faculty members, Ranil Wickramasinghe and Xianhong Quian, to develop their research laboratory space in this building.

Wickramasinghe's research focuses on the development of advanced membranes and membrane-based separations for applications in bioseparations, water treatment and biofuels production.

Wickramasinghe's wife, Xianghong Qian, has also been hired by the university to hold the Robert E. Babcock Sr. Professorship in Chemical Engineering. Qian is an expert in computational chemistry with application to converting biomass to biofuels, finding ways to improve water purification and studying the proteins related to Alzheimer's and Parkinson's diseases.

The new building will give these chemical engineers the opportunity to work closely with a biomedical engineering group, who will have labs and office space in the new building. In addition, the building will accommodate graduate classrooms and instructional laboratory activities.

Johnson Joins Civil Engineering


Michael Johnson

The College of Engineering welcomes new faculty member Michael Johnson this semester. Johnson, who has served as associate vice chancellor of facilities management since 2004, will also join the department of civil engineering.

Johnson has had an extensive career in the U.S. military, retiring as rear admiral in the Civil Engineer Corps in January 2004, after 33 years of service. In February 2010, Johnson was elected to the National Academy of Engineering, one of the highest professional honors accorded an engineer.

College Welcomes Michelle Strong


Michelle Strong

Michelle Strong has been named director of student placement and employer relations for the College of Engineering. In this position, Strong connects students with potential employers. Her responsibilities include career advising, organizing events, and building corporate relationships. As a former senior manager of campus relations for Walmart as well as other positions in academia and industry, Michelle brings plenty of skill and experience to this position.

SURF Awards Support Undergraduate Engineering Research

Sixteen College of Engineering students received Student Undergraduate Research Fellowships in January: Iain Bailey, Rex Bair, Lucas Brown, Allen Busick, Trent Chudej, Chris Dempewolf, Michael Howland, Brady Hurlburt, Hannah Lois Lintag, Nicole Lorenz, Jay Mehta, Hannah Moreland, Luke Osborn, Morgan Race, Francis Sabado, Jimmy Vo and Abigail Washispack.

Individual state awards for the 2010-11 academic year ranged from $1,250 to $2,500 with the university providing matching funds for each student. Faculty mentors received $750 for each of the students they support. Most of the students also applied for and received $750 for travel costs associated with their research (an increase from last year's $400 for travel). The total funds awarded were $284,250.00.

The university's office of nationally competitive awards works in partnership with the Honors College, the office of research support and sponsored programs as well as individual departments in advising students on SURF grants.

The SURF program was created in 1992 with a start-up grant from the National Science Foundation and two years later funding for the fellowships shifted to the state of Arkansas. The fellowship program is designed to provide high-achieving students the funds to conduct in-depth research in various fields while fostering positive relationships between student researchers and faculty mentors.

The SURF program is administered through the Arkansas Department of Higher Education. Most University of Arkansas SURF recipients present their research at the annual Arkansas Undergraduate Research Conference held at Henderson State University in Arkadelphia. A journal of student papers is published from those proceedings.

Colloquium Addresses the Gulf Oil Spill

Cosponsored by the University of Arkansas College of Engineering and Honors College, *The Gulf Oil Spill: Future Safeguards and Damage Assessment* gathered a team of experts in science, engineering, law, history and the oil industry to discuss the world's largest accidental marine oil spill.

Recognizing the expertise offered by alumni and campus professors, Dean Ashok Saxena of the College of Engineering and Honors College Dean Bob McMath decided to organize this event soon after the disaster occurred. Saxena, himself an internationally renowned expert in predicting and preventing structural failures, and McMath, who has studied and taught about the evolving role of the federal government in regulating large industries, acted as moderators. They assembled a crack team of experts offering diverse perspectives and experience, including: Ralph E. Martin, founder of PetroFac Inc., Marty Matlock, professor of biological and agricultural engineering, and Stephen M. Sheppard, professor of law.

"We are lucky to have people on campus and among our alumni who really know what they are talking about, who can shed light on this critical issue," said Saxena.

"The colloquium sparked a substantive discussion on the environmental future for the Gulf area and the best tactics to prevent a future tragedy," McMath said.

A video of the colloquium will air on UATV and is available on the University of Arkansas' YouTube channel: http://www.youtube.com/watch?v=xqM3btVWaqE.

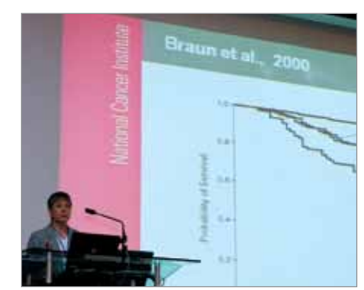
Above: Workshop participants tour one of the labs at the U of A. Below: Tracy Lively, program director of the Cancer Diagnosis Program at the National Cancer Institute, explains NIH funding opportunities.

Breast Cancer Research Workshop Encourages Collaboration

The 2010 Advances in Breast Cancer Research Workshop was held Oct. 26-29 on the University of Arkansas campus. The workshop gathered researchers from radiology, oncology, breast surgery, nuclear medicine, nanotechnology, engineering, biomagnetics, microwave imaging, biochemistry and other fields to discuss new treatments for breast cancer.

Magda El-Shenawee, professor of electrical engineering, was the principal investigator and Carol Gattis, associate dean of the Honors College, was the co-principal investigator.

The idea for the workshop grew out of El-Shenawee's extensive research in the field of breast cancer detection. El-Shenawee has played a major role in several breast cancer research projects over the past few years. She has worked on the development of a microwave-imaging system that will help radiologists distinguish between tumors and benign hard tissue and



a detection system in which sensors read the unique signals released by activity within and around a growing tumor.

El-Shenawee and Gattis received a grant from the National Science Foundation to fund the workshop. Additional cosponsors include the office of the Vice Provost for Research, the College of Engineering, the Honors College, and the Ozark Affiliate of Susan G. Komen for the Cure, which was so pleased with the outcome of the workshop that they have started discussing plans to hold another one.

The conversation and collaboration inspired by the Breast Cancer Research Workshop did not end when the participants returned home. El-Shenawee explained that "because of the overwhelming enthusiasm of the workshop participants, the word got out to other researchers who did not have the chance to participate." In order to share the information gained from the workshop, El-Shenawee was asked to give a 40 minute presentation during a session of the IEEE Radio Wireless Symposium.

"This presentation was an example of sharing and dissemination of technical outcomes of a workshop, something that NSF always encourages investigators to do," El-Shenawee pointed out. "And because of this workshop, I was able to form a team of engineering, science and medical researchers to submit a proposal to NSF for new resources to conduct state-of-the-art research to advance breast cancer. That was one of the goals of the successful workshop".

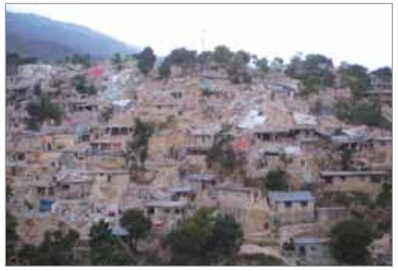
Haiti Then . . .

by Matt McGowan

Seismic Impact Provides Hard Data

Brady Cox, assistant professor of civil engineering, was in his lab on the evening of Jan. 12, 2010 when he received an e-mail from U.S. Geological Survey containing seismic data collected from the earthquake in Haiti.

"I always look at the most basic information first – magnitude, depth of the hypocenter and distance from the epicenter to the nearest city," he said. "When these basic facts sank in – and knowing that Haiti was an impoverished country with many poorly constructed or un-engineered buildings – I knew it would be bad, very bad."



Three weeks later, Cox traveled to Haiti with nine other members of Geo-engineering Extreme Events Reconnaissance (GEER), an organization funded by the National Science Foundation to conduct reconnaissance efforts of extreme events such as earthquakes, tsunamis and hurricanes.

In Haiti, Cox and his GEER colleagues documented the geotechnical and structural impact of the earthquake by mapping and surveying damaged areas. They examined damage patterns, port facilities and coastal infrastructure. Specifically, the researchers studied examples of liquefaction – solid ground turning into liquid – lateral spreading, surface faulting, coastal uplift, road-fill performance and landslides.

As an expert in soil dynamics, earthquake loading and nondestructive material characterization using stress waves, Cox contributed to several of these areas, although he focused on damage patterns, the category with the greatest impact on human life.

Considering the basic information – poor building construction, magnitude, proximity of epicenter to population center, depth of the hypocenter – it is easy to understand why so many buildings collapsed and so many people died. Simply put, the Haiti earthquake was a powerful and shallow event less than 20 miles from a major city. But this understanding is superficial. Almost every expert will argue that the destruction did not have to be so extreme, and lives could have been spared. While emphasizing that he is not a structural engineer, Cox said that most failed buildings he observed in Port-au-Prince did not appear to have features required in the building code.

It takes money to build to code, which is something the Haitian government will have to contend with, but Cox's work will enable the country to make informed choices when rebuilding.

With information supplied by multi-channel analysis tests and shear-wave velocity profiles, Cox has developed what he calls a "seismic micro-zonation" of Port-au-Prince. The system will provide specific and detailed recommendations for seismic design of structures on a site-by-site or tract-by-tract basis throughout the entire city. The recommendations will be based on site classifications – A for "hard rock" through F for "liquefiable" soils – and other profiles specified in the International Building Code.

"The classifications correspond to design features that must be included to resist forces in an earthquake," Cox says. "Haiti can use the system to determine structural design parameters based on soil conditions."

Cox returned to Haiti in April of 2010 to perform more tests aimed at understanding the complex damage patterns around Port-au-Prince. In November, the team returned to Haiti a third time to train local engineers, government workers and non-governmental organizations on how to use the microzonation map to ensure that Haiti will be rebuilt safely.

Cox will continue going wherever GEER sends him. The research, he says, is meaningful on a personal level.

"I love my work, but if it saves even one life in future earthquakes, it will be even more gratifying," he said.

Families get clean water from a well in the tent village.

. . . And Haiti Now

Engineering Students Travel to Haiti for the Anniversary of the Earthquake

Alex Jackson, an undergraduate in the civil engineering department, traveled to Haiti in January, along with Adrian Beirise, Brendan Ho, Holly Jackson and Jonathan Powell, all current or former University of Arkansas students. This trip was a follow-up to a longer trip that Alex made this past summer, when he visited a tent city outside Port-au-Prince.

On his first trip, in June and July of 2010, Alex got an inside look at the ways civil engineers can help people survive a crisis like the Haitian earthquake. He observed the efforts to maintain sanitary conditions, control erosion and flooding, and restore vegetation in the tent city, which houses around 50,000 people. He also accompanied engineers as they inspected buildings in the area to determine which were stable enough to be inhabited, and learned about the efforts to restore damaged roads.

Alex Jackson (second from left) and Jonathan Powell (far right) with Patrick and Francois, two of the Haitians from the tent village.

Most importantly, the trip gave Alex a chance to observe first-hand how people survive under difficult circumstances. “It moved my heart to care about people who don’t have things I take for granted every day,” he said. “This experience gave me a profound gratefulness for what I have, and a desire to go out and do something.”

When Alex returned to Haiti in January, he observed both challenges and signs of hope in the tent city. Hurricane Tomas hit the area in November, creating setbacks for both the people in the city and the aid organizations that were operating in the area. In addition, a cholera epidemic was raging, and Alex and his classmates had to be careful about their sanitation and eating habits.

In spite of these challenges, Alex reported, positive things were happening in the tent city. A project had been started to move rubble out of the city, and this had provided work for the city-dwellers, in addition to improving conditions. Other programs were helping people find jobs and relocate to permanent homes.

Alex could see improvements in the lives of the friends he had made on his earlier trip, as well. One man, who had lost his wife and two of his children in the earthquake, was now working at a church and coping well with his losses. Another man, who grew up on the street and dealt drugs for a living before the earthquake, had found work and become a father. “He really stepped up and became a great father,” Alex remembered. “His family is really happy.”

Although he was encouraged by the progress he saw, Alex knows Haiti has a long journey ahead of it. A year after the earthquake, many buildings were still in ruin. Alex has hope for the Haitian people, who have been protesting against government corruption and demanding fair elections.

On the anniversary of the earthquake, Alex got to observe the strong community bonds that have survived in spite of the country’s many challenges. “I got to see people come together to encourage each other and celebrate being alive,” he said.

On his second trip, Alex got some experience in logistical engineering as he helped set up for a large concert. The headliner, a Haitian band called Alabanza, drew a crowd of 100,000 people, and Alex got to learn about the complicated process of organizing a big event in a foreign country: gathering supplies, navigating politics and customs, and doing business with the local people.

Back at the University of Arkansas, Alex plans to continue studying sustainability and appropriate technology, and after graduating, he hopes to work for a non-governmental organization or an engineering company based in the developing world.

Engineering Researchers Partner With TOYOTA

By Matt McGowan and Camilla Medders

DOE grant will further work toward a more efficient electric charger

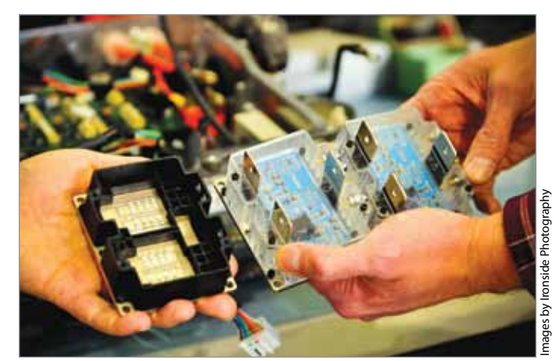
A $3.9 million award from the U.S. Department of Energy will allow electrical engineering researchers at the University of Arkansas to continue contributing to the development of a compact and highly efficient silicon-carbide charger for hybrid electric vehicles. The benefits of the project extend beyond vehicles into other areas, such as wind and solar power, and could lead to reduced energy consumption in the United States.

The grant is part of the DOE's Advanced Research Projects Agency-Energy (ARPA-E) program and will benefit a collaborative partnership that includes five private and public entities – the University of Arkansas' National Center for Reliable Electric Power Transmission; Arkansas Power Electronics, International, Inc. (APEI); Oak Ridge National Laboratory; Cree, Inc.; and Toyota Motor Engineering & Manufacturing North America, Inc. Arkansas Power Electronics International, the overall leader of the project, is a private partner of the National Center for Reliable Electric Power Transmission.

The result of this project, which could be incorporated into the Toyota Prius as early as 2014, will be a smaller and more robust power module for the car. While current Priuses are hybrid vehicles, running on a combination of electricity and gasoline, future models will be plug-in hybrids, getting most of their power from an electric battery and using gasoline as a back-up.

The silicon-carbide charger that is being developed by this team can withstand higher temperatures and will be more efficient than previous silicon chargers. Without the need for its own cooling system, this power module will take less energy to run and be less vulnerable to malfunctions.

"We are excited to be part of this important project," said Alan Mantooth, professor and director the university's National Center for Reliable Electric Power Transmission. "I am confident that this effort will lead to



Images by Ironside Photography

Opposite page: The current model of the Toyota Prius is a gas/electric hybrid and uses a separate cooling system for the charger. Left: Professor Alan Mantooth and Alex Lostetter, president and CEO of APEI. Right: Future Prius models will be powered by three small chargers, which will look similar to these devices.

U of A students Caleb Gutshall, Paul Shepherd, and Mihir Mudholkar.

breakthroughs in efficiency, size and weight reduction, and overall improved vehicle performance. Together we are creating the next generation of charging electronics for electric vehicles."

Under Mantooth's direction, the Arkansas researchers will develop basic semiconductor device models that will enable other researchers to design integrated circuitry. The work will help engineers simulate circuits on computers to verify functionality before committing to fabrication. As part of the overall project, university researchers will also design key components of the charging circuitry.

"We are thrilled at the opportunity to collaborate with our partners on a project that will accelerate innovation in clean energy technologies for our future," said Serdar Yonak, Toyota's U.S. power electronics research and development manager. "The award was highly competitive, and we look forward to delivering on the challenges in this groundbreaking project."

"APEI, Inc. is extremely excited about the opportunity to lead this effort to develop a highly-efficient, silicon carbide-based battery charger for next generation plug-in electric vehicles," said Ty McNutt, director of business development for the Fayetteville company.

"This technology will help reduce energy consumption in everyday applications, such as personal vehicles. In addition, it will reduce the strain on the nation's power grid as electric vehicles become prevalent, while helping to decrease the nation's carbon footprint. Equally as important, the engineering and manufacturing jobs created by this award will remain in America."

The National Center for Reliable Electric Power Transmission is one of only a few university-based research centers chosen by the DOE to investigate electronic systems to make the nation's power grid more reliable and efficient. Five years ago, the DOE funded the center because of the university's research expertise in advanced power electronics and longtime investigation of silicon carbide, a semiconducting material that is more durable and faster than materials currently used in the power grid. Electrical engineering researchers at the university have developed and packaged silicon-carbide systems for more than a decade and recently won an R&D 100 Award, in collaboration with Arkansas Power Electronics International Inc., for the first 250-degree Celsius-capable power module rated at 1,200 volts and 150 amperes.

Worry-Free Giving

How to Make a Charitable Contribution Even If Money Is Tight

Feeling a bit … uncertain? Even if you're still doing well, working hard, taking care of your family and enjoying life's pleasures, the present economic climate has probably shaken your confidence. You want to continue giving to the University of Arkansas, but you have a lower risk tolerance and want to keep a bit more cash on hand. That's understandable. Fortunately, there are ways to support us without interrupting your current lifestyle.

Why Should I Give Right Now?
That's a great question. To learn the answer, first consider your goals in supporting our work. These questions will help you think about what you would like to achieve.

Would you like to …
- Help sustain the university during this critical time period?
- Have control over where your assets go and how they are used?
- Feel confident about your estate plans?
- Set up a secure income stream?
- Increase your charitable donation deductions?
- Reduce estate taxes?

If you answered yes to any of these questions, then you've answered the question why should I give right now? Depending on the charitable giving plan you choose, you can receive these benefits and more.

How Can I Make Sure a Gift Will Fit My Needs?
Making a gift in your estate plan not only allows you to maintain your standard of living, but it also can increase your sense of security. Here are a few of the many options available. Each plan should be tailored to your own circumstances. We can help you explore which plan best fits your needs.

If you want to make sure you take care of everyone you love, look into these options:

Use your will or living trust:
These documents clearly communicate your intentions for how you would like to provide for your loved ones and favorite causes. You can make a bequest of a specific item, an amount of money or a percentage of your estate. You can also make your gift contingent upon certain events, such as your spouse predeceasing you. Contact us or go to http://plannedgiving.uark.edu for our official bequest language.
How you benefit: Putting all of your wishes in writing reduces the risk of misunderstandings among your loved ones and relieves your worry about providing for the people and causes that benefit from your care. You can feel secure knowing you will maintain control of your assets until after your lifetime and that your bequests are revocable so you can change your mind at any time. Also, structuring your assets correctly can allow them to bypass probate and, with charitable bequests, eliminate estate taxes.

If you would like to receive a fixed, steady stream of income:

Set up a charitable gift annuity (CGA):
If you would like a consistent income stream, you can set up a CGA with the University of Arkansas Foundation. In exchange for a gift of cash or publicly traded securities, you will receive fixed payments quarterly for the rest of your lifetime, and, if you desire, the rest of one other person's life as well.
How you benefit: This strategy provides you with an immediate income tax deduction and tax-favored, stable payments. It also reduces future estate taxes while helping us in the future.

Form a charitable remainder annuity trust (CRAT):
By putting assets into a CRAT, you and other beneficiaries can receive fixed income for the rest of your lives. Anything left in the trust after payouts are complete goes to the University of Arkansas unit or program you wish to support.
How you benefit: A CRAT provides an immediate income tax deduction, helps avoid up-front capital gains taxes and reduces future estate taxes payable – plus it makes an eventual gift to support our mission.

If you would like to make a gift without affecting your lifestyle:

Designate IRA assets:
If you're at least 70 ½ years old, you can make tax-free charitable gifts of $100,000 or less from your IRA directly to the University of Arkansas Foundation through 2011. Another smart strategy is to name us as the beneficiary of your IRA, which gives you flexibility.
How you benefit: If you choose to use your IRA to support our mission today, you can feel good knowing that you are making an immediate impact. Leaving part or all of your IRA to the university after your lifetime dramatically increases tax efficiencies. Naming us as a beneficiary can eliminate income and estate taxes that can consume up to 65 percent of your IRA.

Designate your life insurance
You have two worry-free options to leverage life insurance policies. First, you can name the university as the recipient of the policy's death benefit. Or, you could sign over ownership of the policy to us right now.
How you benefit: If you choose to name the university as your beneficiary at death, you retain full control over the policy during your life and can easily change your mind at any time. If you sign over ownership of the policy to us right now, you receive an income tax deduction equal to the policy's fair market value or the total premiums paid, whichever is lower.

If you have included the University of Arkansas in your estate planning we would love the opportunity to thank you. You may use the "Record of Estate Intention" form at http://plannedgiving.uark.edu to notify us of your gift and designate its use here at the university. Please know that your gift will be held in strictest confidence should you desire anonymity.

We Can Help
All these options allow you to meet your charitable goals and provide for those who depend on your care. Right now is the perfect time to plan your giving so your wishes come to pass and you maximize the impact of your resources. Contact Jim Harris with any question you may have.

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Fred Sexton Becomes Institute of Electrical and Electronics Engineers Fellow

Fred Sexton, who received his Master of Science in electrical engineering from the University of Arkansas in 1978, is a 2011 IEEE Fellow. Sexton was chosen for this honor based on his work in the field of radiation effects on integrated circuits. These effects, which can be caused by a single cosmic ray striking a microelectronic device, can corrupt data and even cause failure of the device.

Sexton has held several positions in IEEE. He is a member of the Plasma Sciences Society and was the chair of the 2005 Radiation Effects Conference. He has also been a guest editor of *Transactions on Nuclear Science*, a journal of the IEEE Nuclear and Plasma Sciences Society.

After receiving his master's degree, Sexton went to work at Sandia Labs in Albuquerque, New Mexico, where he has been ever since. His career started in the field of solar cell development, then moved to radiation-hardened microelectronic technologies, where he became the lead technology developer. As soon as Sexton entered the work force, he realized how valuable his engineering education was. "When I got to Sandia after graduating from the U of A," he remembered, "it was clear that I had a strong enough education to compete with peers from any university in the country."

Sexton has good memories of his time at the College of Engineering. "The professors were very accessible, very interested in the students and dedicated to the students. That's something that's worth retaining and sustaining," he said.

Honorarium for Dedicated Leadership and Outstanding Character

In 2008, civil engineering alumni Meagan Berlau, Trent Ellis and Adam White began providing scholarships for junior or senior civil engineering majors who demonstrate leadership skills in academic and extracurricular areas. The Honorarium for Dedicated Leadership and Outstanding Character, currently an annual award of $1500, targets outstanding students who consistently foster companionship among students and faculty, both in and out of the classroom.


Trent Ellis, Meagan Berlau and Adam White

Berlau is currently a field engineer for Burns and McDonnell in San Diego. Ellis is a graduate research assistant at the University of Texas, and White is a project engineer at Garver, LLC. Here is what they said about their motivations for creating the scholarship.

"The department of civil engineering was always willing to sponsor events that provided scholastic growth and professional development. Field trips, conferences around the country, and design competitions with neighboring universities were as much a part of our education as lab reports and finals. That is all in addition to the selfless efforts of Admiral Buffington, who always drew upon his vast professional experience and industry relationships to help us find scholarships, internships, and jobs for after graduation.

"The professors' doors were always open, and they always had our best interests in mind. The department staff was also always there to lend a hand or to provide resources for projects and student activities.

"It's sad to admit that those days are now behind us, but it is refreshing to think of the many young people for whom higher education still lies ahead. The Honorarium for Dedicated Leadership and Outstanding Character is intended to give future civil engineering students a chance to take full advantage of the same opportunities that we had. We look forward to building upon this scholarship as we pursue our professional careers."

In Memorium


Ralph E. Martin

Ralph E. Martin, a 1958 graduate of the University of Arkansas College of Engineering, and long-time benefactor of the university, passed away February 19, 2011, in Tyler, Texas. For many years, Martin strongly supported the chemical engineering department, the college and the university overall. In 2005, he made a gift of $5 million to the university to endow the Ralph E. Martin Department of Chemical Engineering.

"Ralph Martin was instrumental to the advancement of the College of Engineering," said Chancellor G. David Gearhart. "He had a substantial impact on the university not only through financial contributions but through his companionship and loyalty. The campus community has lost a special friend and alumnus."

Creating endowments for faculty and student support, Martin's gift has been used in many ways to enhance the efforts of faculty and to provide opportunities to students that they would not have otherwise had — both now and in the future.

Alumnus Supports New Research Opportunities


Karl Schubert

Karl Schubert, who received his bachelor's degree in chemical engineering from the University of Arkansas in 1975 and his PhD in 1982, is working on a project that will benefit not only researchers and students at the University of Arkansas, but the state as a whole.

Schubert would like to establish an applied research institute that would serve the University of Arkansas system. This institute would enable researchers to see their projects all the way to commercialization by helping them get patents, establish start-ups or find corporate investment.

Schubert described the benefits of his proposal, saying,

"The objective of the Arkansas Applied Research Institute is to fill the gap between great ideas and innovations and the ability to commercialize them. Commercialization brings jobs to Arkansas, and with those jobs comes an improvement in the tax base, economic development and additional business opportunities. The Institute would also provide employment for researchers, graduate students and program managers, and research opportunities for undergraduate students. With the intellectual property leveraged, it could improve the stature of the participating research institutions in the state. And last but not least, it provides an incentive for the various research institutions in Arkansas and beyond to work together to improve the quality of research and technology in both Arkansas and the country as a whole."

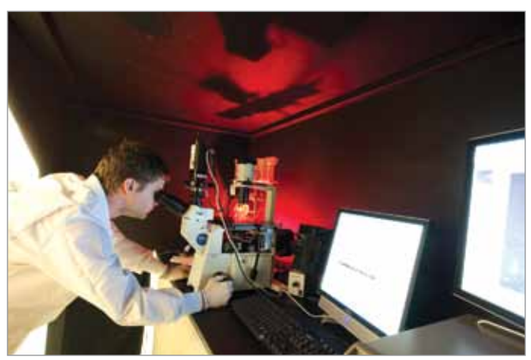
Alumnus Selected as President of National Group

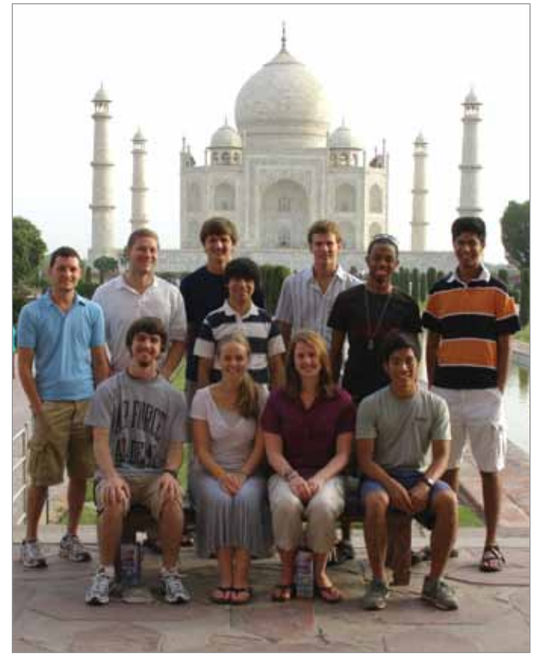

Smith Reed

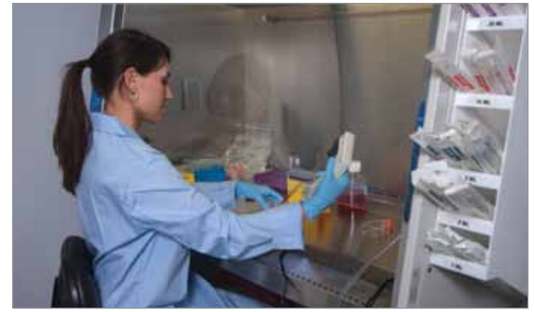
E. Smith Reed, P.E., of Hanover, NH, was sworn in as President of the National Academy of Forensic Engineers at their January meeting in Tucson, Arizona. The academy, formally affiliated with the National Society of Professional Engineers, was established to serve the public through elevating standards and ethics and by advancing the skill and art of engineering investigation, analysis and judgment in judicial proceedings. The academy serves senior engineering practitioners who have attained substantial experience and recognition in the field of forensic engineering.

Reed, who received his bachelor's degree in mechanical engineering from the U of A in 1968, is a professional engineer licensed in five states and a board certified diplomat in forensic engineering with the firm Reed Engineering Consultants, Inc. of Hanover, New Hampshire. With 26 years of industry experience, he consults on a national basis in the fields of design, test, manufacture, quality control, service, maintenance, operation and user interface of machines and related products. Reed has testified in court cases as an engineering expert more than 130 times.

Clockwise from top left: Anoop N. Samant, post-doctoral fellow, preparing a setup for laser materials processing; Mohammed Chowdhury, mechanical engineering graduate student, working in one of the clean rooms at HIDEC; Muhammad Pervej Jahan, research associate, setting up a scanning tunneling microscope; Jeremy W. Wasson, industrial engineering student, working with a SCARA robotic arm; Andreas Haukas, biomedical engineering graduate student, working on tissue engineering and regenerative medicine; chemical engineering students Elizabeth Crowder and Daniel Mishkin doing research on water quality.







Top right and top left: In the Global India program, students get to experience Indian culture while learning about globalization. Above: Students hiked to a water fall while on a study abroad trip in Belize. Left: biological engineering student Danielle Frechette, doing research on biofuels. Bottom left: Assistant professor Jamie Hestekin and chemical engineering student Ali McAtee, researching the use of algae for butanol production. Bottom right: the 2010 Baja SAE team, showing off the vehicles they designed and built.

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