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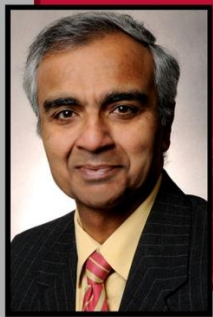
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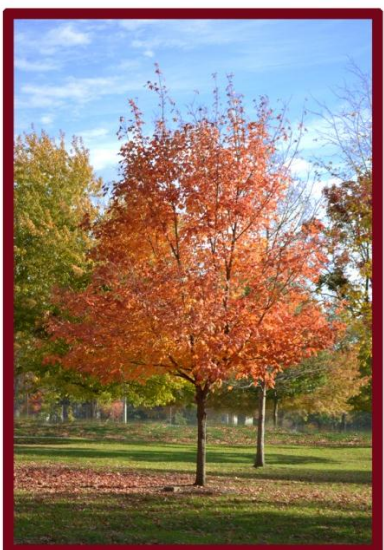


**From the Department Head
Dr. Lalit R. Verma**

Our faculty have been engaged in programmatic realignment to focus our research, teaching and extension programs in designing engineering solutions for sustainable food, water and energy systems. The process started with a summer retreat followed by a series of activities in redefining Biological and Agricultural Engineering at the University of Arkansas. Recently we had six of our alumni provide us feedback on the proposed revisions to the undergraduate program in Biological Engineering. Our new draft mission statement is “To develop and disseminate engineering knowledge to address problems dealing with sustainable food, water and energy systems.”

Fall 2011 brought us a new class of sophomores and record enrollments in our classes. We have a record number of senior design students who will undertake challenging real-world problems under the guidance of their coordinator, Dr. Tom Costello, and other faculty mentors. Our senior teams won top awards for their senior design projects at national competitions. BAE faculty continue to have high productivity and are contributing in research through projects in bioenergy, food safety, water quality, ecological engineering, bio-nanotechnology, remote sensing, biomedical engineering, poultry housing and air quality. We are pleased to welcome Dr. Chris Henry as the Water Management Engineer at the Rice Research and Extension Center in Stuttgart. His programs will address the research and extension needs in water use and efficiency for production agriculture. We also welcome Dr. Jeff Wolchok to the Biomedical Engineering group in our department.

Our faculty continue to address challenges in food, agriculture, water and energy systems in support of the Arkansas agriculture enterprise. Extension projects are addressing challenges in bioenergy, geospatial technologies and manure management for animal agriculture. We look forward to implementing our revamped programs to serve the clientele to address critical challenges in sustainable food, water and energy systems.



Fall 2011 Edition

2011 Extension Awards of Excellence

A watershed modeling program was among the honorees at the 2011 Awards of Excellence given to faculty and staff of the Cooperative Extension Service of the University of Arkansas System Division of Agriculture on Monday, September 12, 2011.

“Each year, we recognize the individuals, teams and programs that set the standard for exceptional extension work,” said Tony Windham, associate vice president-agriculture/extension for the University of Arkansas System Division of Agriculture.

This year’s winner from the department include Dr. Dharmendra Saraswat :

Early Career Award non-classified

Dharmendra Saraswat, extension engineer, earned the award for his outstanding work on ag-related mobile platforms, geographic information systems and remote sensing, as well as mentoring Ph.D. and masters students and his involvement in multi-state collaborations.



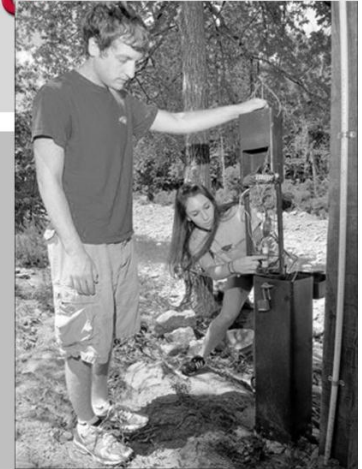
Innovation Award

The innovation award went to Tom Riley, director of the Public Policy Center of the University of Arkansas System Division of Agriculture, and Dr. Dharmendra Saraswat, Assistant Professor/Extension Engineer, for their watershed modeling project. The Arkansas Watershed Prioritization Tool was created to make watershed data more accessible to scientists, administrators and others involved in developing 2011-2016 Arkansas’s nonpoint source pollution management plan.



3 at UA design warning device

Students' project gives flood alert



Sitting beneath the canopy of a winged elm tree at Devil's Den State Park is a metal box that contains a device designed to warn campers that nearby Lee Creek is rising to a dangerous level. "If the system works correctly, there's nobody here when it's flooding," said Tom Costello, an associate professor of biological and agricultural engineering at the University of Arkansas in Fayetteville.

Costello teaches the senior design course for biological engineering students at the Fayetteville campus, and last August he asked his students to devise an inexpensive, practical way to detect rising water in low-lying campgrounds.

A tragic Arkansas flood influenced his request, Costello said. On June 11, 2010, heavy rain triggered a flash flood that rushed into Albert Pike Recreational Area in the Ouachita National Forest, killing 20 people.

The Little Missouri River rose quickly in the night and surrounded sleeping campers. The water consumed people camping in Loops C and D.

"Last summer, it was fresh in my mind," he said. "To wake up in the middle of a nightmare ... it's intended for night," he said, standing near the invention at Devil's Den on Tuesday.

Three students — Zach Callaway, Danielle Frechette and Clark Trapp — responded to Costello's request. They created an apparatus for less than \$500 that includes battery-operated sensors that are placed at a specified height to detect rising water.

"When they're both submerged, the siren goes off," Callaway said, holding up the unit. As he pulled on some wires, the alarm began sounding.

"It actually turned out better than I thought it would," he said.

Park Superintendent Monte Fuller said the siren went off May 23 when persistent heavy rain caused the creek to rush into Campground A. The students had installed the warning system at the campground just a few weeks earlier.

Fuller said he checked the campground but didn't know if anyone heard the alarm and left. Fuller was encouraged when the research team approached him during the 2010-11 school year about installing the system.

"I said, 'Great, it would be a wonderful thing to have here,'" he said.

Devil's Den was selected as a park site in the Lee Creek Valley in the 1930's by the Civilian Conservation Corps. The park's campsites, which are spaced along the valley, have proven to be susceptible to flooding in recent years.

In April 2004, 9 inches of rain that fell over two days caused the largest flood in the park's 72-year history. Nobody was injured, but when Lee Creek spilled over its banks, it destroyed a section of Campground A and cracked the park's 70-year-old dam.



Zach Callaway, Clark Trapp and Danielle Frechette

A similar storm April 25 bloated the creek from its normal width of 15 yards to about 80 yards, again flooding campgrounds and destroying sections of Campground A. Then, on May 23, 4 inches of rain fell in the park in 90 minutes, Fuller said.

"Same scenario," he said. "Same amount of damage. We had two 100-year-floods in a month." No one was injured in either of the recent floods. The system is designed to be used at any campsite that has a risk of flooding, and the students can provide a list of parts for campsites that wish to reproduce their system.

"I'm really proud that we actually got it implemented," Frechette said. Costello supervised the effort with Brian Haggard, an associate professor of biological and agricultural engineering who also directs the Arkansas Water Resources Center.

For the project, the students won Best Student Presentation at the annual conference of the National Hydrologic Warning Council, held in May in San Diego. The council is a nonprofit organization that seeks to provide "timely, quality hydrologic information to protect lives, property, and the environment," according to its website: hydrologicwarning.org.

Branam, Chris. "3 at UA Design Warning Device-Students' Project Gives Flood Alert." Arkansas Democrat-Gazette 22 June 2011: Northwest Arkansas 1. Print.



Student Selected for 2012 Ivanhoe Foundation Scholarship

Mr. Gurdeep Singh, a master's student in the department of Biological and Agricultural Engineering, has been selected for 2012 Ivanhoe Foundation Fellowship. The award recognizes promising research in the area of water resources and carries a cash award of \$5,000, to be used at awardee's discretion. Gurdeep is advised by Dr. Dharmendra Saraswat, Assistant Professor/Extension Engineer-Geospatial Technologies.

UNIVERSITY OF
ARKANSAS

BAEG

LifeLine

FALL 2011



Student selected for internship with the International Children's Heart Foundation



Current U of A Biological Engineering student Chris McDaniel recently completed a summer internship with International Children's Heart Foundation located in Memphis, TN. The foundation's website notes that "The mission of the International Children's Heart Foundation (ICHF) is to bring the skills, technology, and knowledge to diagnose and care for the children with congenital heart disease to developing countries that request our help. ICHF does this regardless of country of origin, race, religion or gender."

Chris explains, "The International Children's Heart Foundation strives to correct this unfortunate situation by providing direct care to as many children as possible in the short term (usually two week trips). They also send medications, surgical supplies and diagnostic equipment to medical facilities in developing countries. Also by training the surgeons and medical staff, they hope to one day provide care for their own people. The focus is not necessarily primarily on the 20-30 or so children operated on during each 2 week trip, but on preparing the local staff to be able to maintain a pediatric surgical unit without our help."

Throughout Chris's internship, he had the opportunity to assist in surgeries, complete inventory on medical supplies, learn about the procedures used to correct heart defects, and interview families of heart surgery patients.

For more information about ICHF, go to www.babyheart.org

New *BAEG* Faculty & Staff



Dr. Chris Henry
Assistant Professor



Jerry Jackson
Research Field Technician



James McCarty
Program Associate



Megan Hughes
Administrative Specialist III



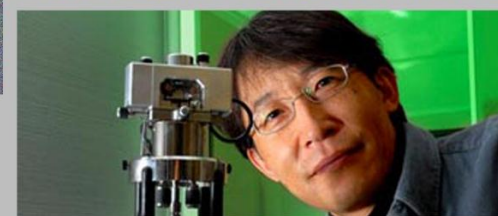
Dr. Jeff Wolchok
Assistant Professor

Dr. Jin-Woo Kim

Professor of Biological and Agricultural Engineering

Dr. Jin-Woo Kim, professor of biological engineering, has taught at the University of Arkansas since 2001.

Kim entered the world of science and engineering because to him, it had more options than other fields. “Science and engineering has a practical sense of application and basic.”



My education

After earning a bachelor’s of science in Chemical and Biological Engineering from Seoul National University in Korea, Kim returned to college to earn a bachelor’s in Microbiology, this time at the University of Iowa. “I just liked biology, but people told me you’re crazy for getting a second bachelor’s degree,” he said. He continued his study in Biology and earned a Masters in Biology from the University of Wisconsin. Kim realized the background of Engineering and Biology “would be logical way to go forward for a career.”

“That’s why I earned my PhD from Texas A & M in Biological Engineering, I finally found what I like to do.” He followed the accomplishment of earning a doctorate in Biological and Agricultural Engineering from Texas A & M with completing two years Post Doc in Chemical and Biochemical Engineering at the University of Iowa.

“My time at Texas A & M gave me a critical opportunity to learn to be a researcher, which was what I liked to do,” Kim said. “I have an enormous debt of gratitude to my advisors, Drs. Cady Engler and James Wild.” For his complete, comprehensive education, he said, “I thank my parents because they believed in me, spoiled me by giving me the opportunity.” A challenging task, he said, because his parents “did not have tons of money.”

University of Arkansas Experience

Kim was a Post-Doctoral Fellow at the University of Iowa, but the University of Arkansas was where he officially began his first full-time teaching job.

Kim was attracted to the unique engineering community at the University of Arkansas because “the number of faculty was small,” he said. “When I got here, it was less established, less traditional and I enjoyed the cultural aspect of the college.”

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Dr. Lalit Verma, Biological and Agricultural Engineering Department Head, began his work at the University of Arkansas in 2000, just a year before Kim joined.

“Dr. Verma tried to transform the vision and the leadership here. That’s what triggered my decision at the time,” he said. “I wanted to be at a place people would work together, share visions, and create lots of opportunity.” “University of Arkansas was the right place.” Besides the excellent members of faculty in the department, he found long-lasting colleagues and friends at UA, Drs. Russell Deaton, Steve Tung and Joshua Sakon, and at our sister university, UAMS, Dr. Vladimir Zharov. “Without them, I don’t think that I can be what I am now.”

In his extensive educational experience, Kim said that the level of student involvement is higher at the University of Arkansas than at other universities.

“We have more to offer, particularly in our department,” he said. “Students are not just in teacher-student relationship, they’re more family-like relationships. They engage faculty more than in lecture. Even more so for undergraduate and graduate students that I attract to my lab.”

“That doesn’t usually happen in larger schools.” Even in universities of roughly the same size, such as the University of Iowa, Kim had a different faculty-student interaction.

Current research

Dr. Kim’s research interests are in Bio/Nano Technology. “Merging bio-technology and nano-technology is very intriguing,” he said. He is particularly interested in biologically driven self-organizations of nano-size materials and their biological and biomedical applications. “We’re engineering a structure from very tiny molecules, using self-assembly process to enable it for a specific shape and function.”

“To realize it, ‘control’ is the key,” he said. “When merging DNA technology and nano-technology, the control can be achieved. This allows me to make what I like to make.” “We had quite a bit of progress and a paper was recently out” about controlling the number, placement and orientation of DNA on a nano-size particle. “This will allow greater control over the ultimate shape and function of the structures that we build.” His work with Dr. Deaton was featured as the “hot paper” and “back cover” in the Sept. 19, 2011 issue of *Angewandte Chemie International Edition*, the weekly, scientific journal of the German Chemical Society.

In Kim’s research, he also develops unique nanoparticles and their ensembles by a more “sustainable” and environmentally “green” way, and uses them to image and treat tumors and infections. The particles and ensembles that better respond the Near-Infrared (NIR) radiation are his prime interests.

“To achieve non-invasive detection and treatment, strong absorptions of contrast agents in the NIR rays with maximum light penetration is very important,” Kim said. Our biotissue is near transparent to the NIR. That property enables the NIR-based technology non-invasive. When shooting with NIR rays, “Our tissue cells don’t register it and it doesn’t damage normal cells. Only the targeted bad cells show up,” he said.

Recently, Kim developed a special contrast-imaging agent, named “Golden Nanotube”, with enhanced absorption of NIR radiation. “Golden nanotubes require extremely low NIR laser-energy levels for detection,” he said. “Our technology offers a very efficient way to detect and treat tumors non-invasively. From this, many, many ‘good’ things would happen.” This cutting-edge research with Dr. Zharov was featured twice in the October and November 2009 issues of *Nature Nanotechnology*, the monthly, scientific journal of Nature Publishing Group. Kim is actively involved with IEEE and has chaired several conferences in biology and medicine. For the IEEE International Conference on Nano/Molecular Medicine and Engineering (IEEE-NANOMED), “I am a Steering Committee of the conference. Also I was Program Chair in that conference last year and serve as General co-Chair for the conference this year,” he said. He holds several journal editorial board memberships and a guest editorship for *Nanomedicine: Nanotechnology, Biology and Medicine* journal by Elsevier.

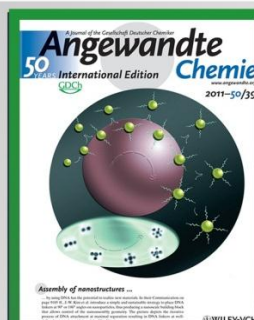
Nanotechnology, Biology and Medicine journal by Elsevier.

When he’s not in the lab or classroom, Kim uses his time to hike, go to the lake or the park with his family and their two dogs.

For more information about his research, visit his website for links to his research publications.

Guest Editor: *Nanomedicine: NBM* (Elsevier)
<http://www.nanomedjournal.com/>

General co-Chair, IEEE-NANOMED 2011
<http://ieee-nanomed-biotronics2011.org/>



Dr. Kim recently published an article spotlighting his research in the September issue of *Angewandte Chemie International Edition*, titled “DNA-Linked Nanoparticle Building Blocks for Programmable Matter”. This work was the result of his collaborative efforts with Dr. Russell Deaton and his Post Doc, Dr. Jeong-Hwan Kim. The article was not only selected as a “HOT PAPER” by the editors of the journal, but also featured as a “BACK COVER” of the journal issue.