ENGINEERING PROFILE

Face to Face with the College of Engineering

Manuel Stuart

Hometown: Prescott, Arkansas

Major: I'm pursuing bachelors' degrees in computer science and Spanish with a minor in information systems.

Graduation: Expected May 2007

Why engineering? My parents gave me an IBM PCjr for Christmas when I was in fourth grade, sparking my interest in technology. During my senior year in high school, I received a New Horizons Scholarship to study information technology. I chose the computer science major in the College of Engineering. By learning both the science and the mechanics of technology, doors have been opened for a wide range of employment opportunities after graduation.

What is a New Horizons Scholarship? These scholarships are awarded to Arkansas high school students who participated in the Environmental and Spatial Technology program, E.A.S.T. Lab, and are interested in information technology. The state and its leading companies sponsor the scholarship, which covers four years tuition at any public university in Arkansas. I was so grateful to receive it. I knew I wanted to come to the U of A, it was clear it was the right place for me, but I did not know how I was going to pay for it. This scholarship was a blessing.

Why the UA: The University of Arkansas was the perfect place for me at the perfect time. I wanted to stay in Arkansas because it's my home state and my family is here. The size of the university and its reputation nationwide were particularly appealing to me. In any engineering field, the quality of your education matters and Arkansas' reputation is growing continuously.

Most memorable moment: There are so many! I spent the summer in Washington D.C. as an intern in Congressman Mike Ross' office, and am now studying in Spain for the second time during my college career. I have created memories here that will last forever – including how to make grilled-cheese sandwiches with an iron.

To contact Manuel Stuart, e-mail him at mstuart@uark.edu. ■

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ARKANSAS INGENUITY

From the College of Engineering at the University of Arkansas • Fall 2006

UNIVERSITY of ARKANSAS 1871

ARKANSAS IS WHERE INNOVATION IS HAPPINING

The College of Engineering at the University of Arkansas is characterized by a commitment to student-centered education that is driven by excellence in research and timely attention to the current needs of industry. In other words, at the College of Engineering, we put ideas to work.

When it comes to student education, "putting ideas to work" has a very literal sense. Each year, dozens of our engineering students take advantage of the college's relationships with industry to accept co-operative education positions that will give them real-world exposure to the workplace. In addition, an increasing number of engineering students choose to complete undergraduate research projects, often with the assistance of Honors College research funding or through the help of State Undergraduate Research Funds. In either case, students come to understand how successful research projects are structured, funded and executed. These are lessons that will come to bear later in their careers, whether they go on to become business managers, project engineers, R&D specialists or career academics.

To advance this tradition of putting engineering ideas to work, plans are now under way to introduce academic "bridges" between the College of Engineering and the Walton College of Business. Coursework and workshops tailored to engineering students will assist them in framing engineering innovation in the context of a real business environment and will give them a set of tools for negotiating – and succeeding in – the world of business.

Engineering education at the University of Arkansas is remarkable also for the extent to which our faculty remain deeply engaged with industry throughout their academic careers. This issue of Arkansas Ingenuity is full of examples of engineering faculty who are not only world-class researchers and educators in their own right, but also entrepreneurial minds bent on bringing innovation from the lab to the factory floor. This propensity for translational research is one of the hallmarks of a great engineering college, and the University of Arkansas is working hard to foster a nurturing environment for engineering entrepreneurial endeavors at every level of the education chain.

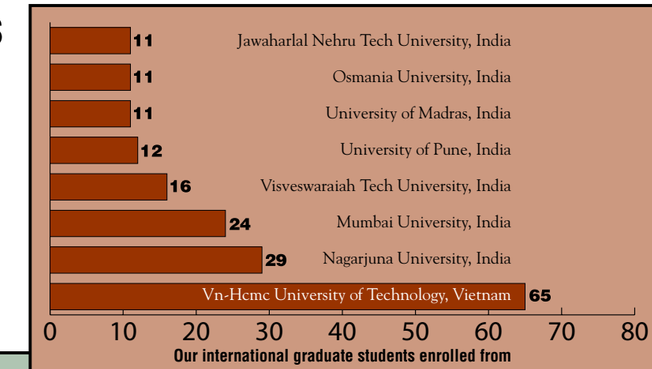
I hope you will enjoy reading about some of the ways in which the College of Engineering continues to make strides in supporting the relationships between engineering innovation, industry applications and economic development for Arkansas and America. As you leaf through these pages, I invite you to take a closer look at the University of Arkansas' College of Engineering and the impressive array of research and teaching opportunities available in our classrooms and labs today. Keep in mind:

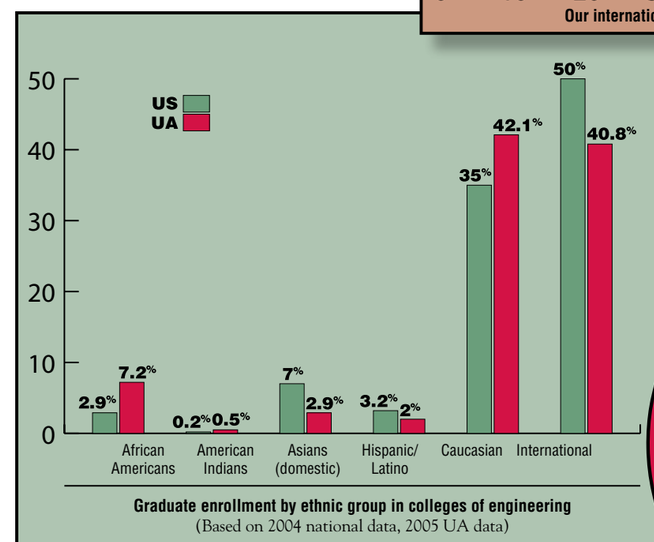
Arkansas is where innovation is happening.

With warm regards,

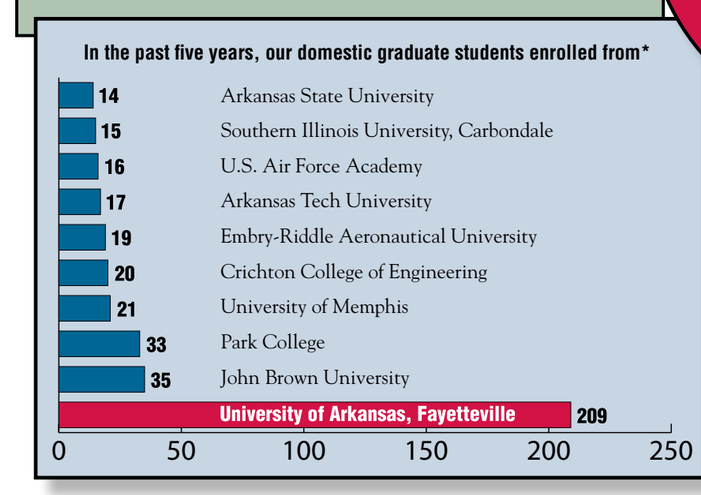
Ashok Saxena
Dean of Engineering
Twenty-First Century Endowed Graduate Research Chair
in Materials Science and Engineering

Where Our Students Come From





Graduate enrollment by ethnic group in colleges of engineering
(Based on 2004 national data, 2005 UA data)



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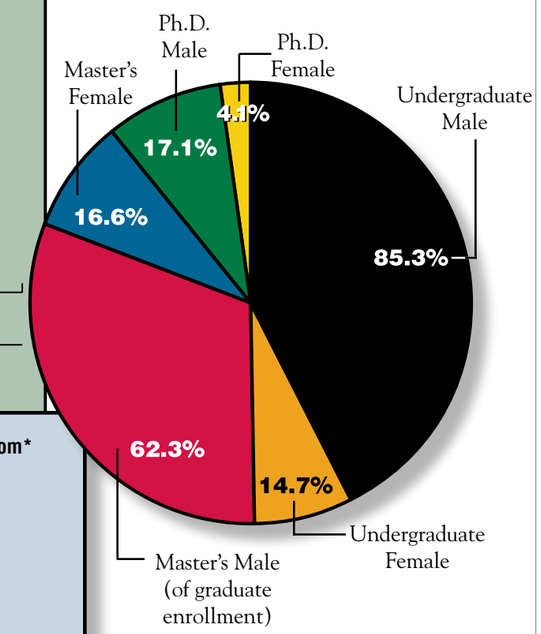

Gender Breakdown of UA Engineering Students
Based on 2005 enrollment data

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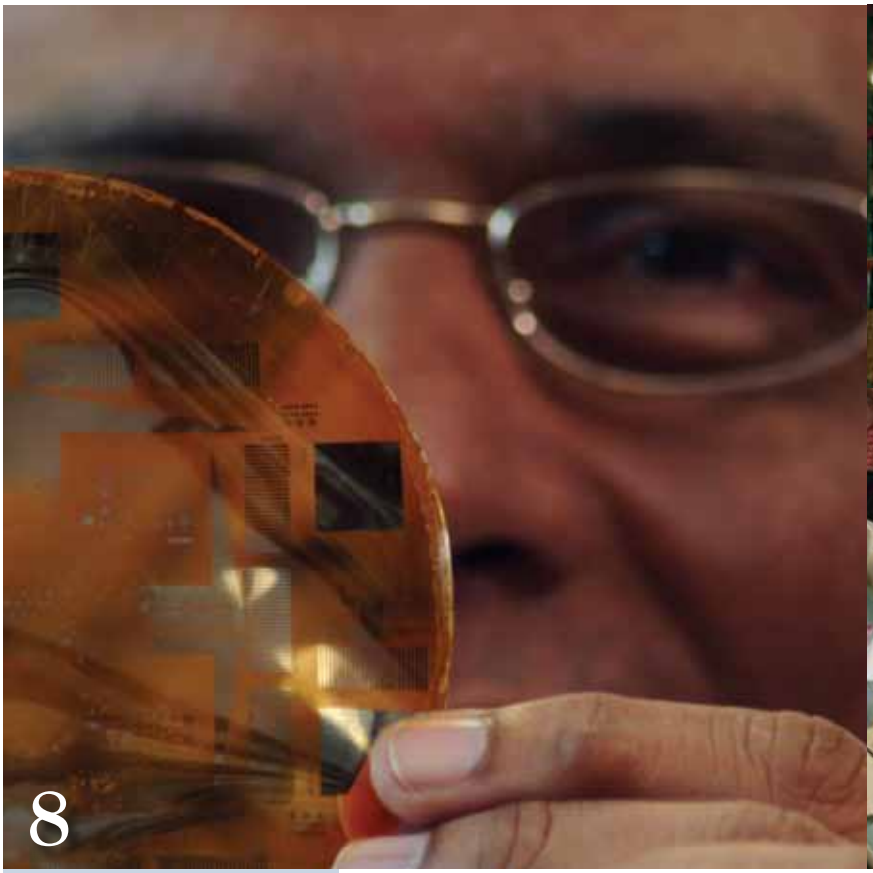

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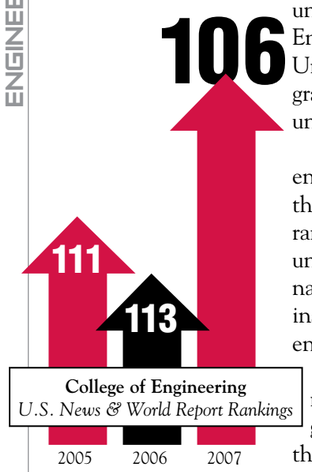
FEATURES

IN EVERY ISSUE

College of Engineering is Moving Up



The rankings for both the graduate and undergraduate programs in the College of Engineering have been released and the University of Arkansas ranks 113th among graduate programs, and 106th in the undergraduate rankings.

Among the public colleges of engineering offering doctoral degrees, the UA's undergraduate program is ranked at 68. There are more than 350 undergraduate engineering programs nationwide, and 181 private and public institutions that grant doctoral degrees in engineering.

While undergraduate programs were not ranked, Industrial Engineering's graduate program was ranked 26th in the nation. Computer Engineering took a 20-point leap over last year's graduate ranking. In the past two years, the graduate programs in Mechanical Engineering has risen 38 positions in the rankings, while Electrical Engineering rose 20 points in the same time frame.

Dean Ashok Saxena took over the helm of the college in 2003 with the expressed goal of raising the perception of the College of Engineering nationwide and moving it into the group of top-ranked schools of engineering in the country.

"It is extremely gratifying to see the hard work of our faculty and staff begin to be reflected in the U.S. News and World Report rankings," Saxena said. "The undergraduate program ranking is based solely on peer perception, and slowly we are seeing our peer institutions begin to take notice of the tremendous research and innovation that is going on here at the University of Arkansas."

The College of Engineering as a whole maintained its overall graduate ranking of 113, but Saxena said he is most encouraged by the growth of the departments.

"I am pleased with the progress made by our college in a very short time and even happier that we are getting better each year," Saxena said. "Rankings influence the perception about our quality and are a measure of our success in implementing continuous quality improvement processes that make us truly better at serving each of our constituencies." ■

Stephens Lab Dedicated Sept. 8

The Larry and Gwen Stephens Undergraduate Research Laboratory in Industrial Engineering was dedicated September 8, as faculty, staff and students thanked for Hot Springs couple for their commitment to the College of Engineering.

The lab will provide state-of-the-art hardware and software designed for industrial engineering projects. As many as 12 researchers can be accommodated.

Larry and Gwen Stephens pledged $75,000 to establish the lab and support its upgrade over the years ahead.

"Our family has received so much from the university over the years that it is a real privilege for us to be able to offer something in return," Larry Stephens said. "The education we received, the life-long friendships we made, and the enthusiasm we have for the university makes us feel like we are part of the university. Therefore, our gift is a contribution to our university family."

The Stephens' gift supports the College of Engineering's goal for increasing research opportunities for undergraduate students.

"As we speak with potential students and prospective employers, there is a fervent interest in engineering programs that offer undergraduates opportunities for hands-on

STEPHENS LAB *continued on page 15*

UA Engineer Invents Diaper-Changing Pad, Helping Parents to Avoid Lifting Babies by Feet

University of Arkansas electrical engineering professor Li Cai, frustrated with changing his own child's diaper, created an invention that will help parents – and babies – feel better during the changing process. The patented invention – a simple, easy-to-use diaper-changing pad – helps parents and caregivers change diapers without having to lift babies by their feet, which often causes acid to flow from the stomach into the throat.

"Changing my daughter's diaper had become a really frustrating experience," said Cai, an assistant professor. He said when he'd change his daughter's diaper after meals, pulling her legs into the air would often cause her to spit up.

To prevent this from happening and to make his daughter more comfortable, Cai invented the pad in his home three years ago. He said his mother-in-law helped him with design modifications of a system consisting of a removable pad near the baby's bottom that allowed Cai, his wife and his mother-in-law to remove soiled diapers, wipe the baby's bottom and put on a fresh diaper while the baby lay on her back.

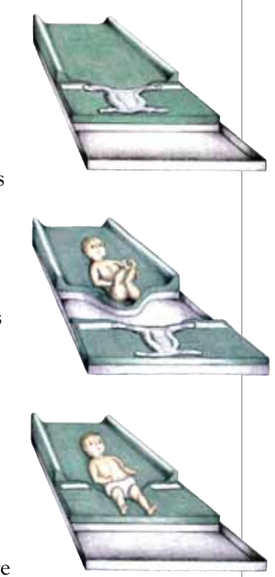
"She was happier because stomach acids weren't rising in her throat," Cai said. "And it was much more convenient to change her."

Cai has joined with three Walton College of Business students to create Contür, a company focused on developing the pad into a commercial product. The group has also worked with an outside retail marketing company and a local prototype design engineer.

The current version – 5 pounds, 36 inches long, 18 inches wide and 8 inches thick – is essentially a large, rectangular tray with two sections, one slightly larger than the other. The bigger section holds a thick piece of memory foam that supports the baby's head and body. A smaller, rectangular tray fits into half of the smaller section. This smaller tray also holds memory foam and supports the baby's legs. A fresh diaper may be attached to this foam. Both pieces of memory foam are covered with a removable, washable cloth.

The small tray functions as a panel that slides back and forth under the baby's legs. A person changing a diaper can slide the panel toward the end of the large tray to have access to the baby's bottom. Then the parent or caregiver simply needs to place a hand on the bottom of the baby's feet and gently push the baby's legs upward. After the baby's bottom is cleaned, the person changing the diaper slides the tray upward – under the baby's legs and bottom – and fastens the diaper.

While the product is tweaked, the Contür team is searching for investors and ways to market the product. With resources in the Sam M. Walton College of Business, Sproles has conducted extensive market research. He and the other Contür members are confident that the product will appeal to parents who are searching for something more sophisticated than a simple, thin pad but not as big and expensive as a large, immobile diaper-changing table. Once the team secures financial backing, they believe they can achieve $3 million in sales within the first year of operation. They expect the retail cost of the changer to be about $48. ■



Electrical Engineering professor Li Cai has developed a diaper changing pad that makes life easier for parents and babies.

Biomass Potential Discussed at Little Rock Conference

The College of Engineering and the University of Arkansas System's Division of Agriculture joined hands August 24-25 to offer a statewide workshop for legislators, the business and manufacturing community, community leaders and interested citizens on the potential for producing energy and value-added products from biomass in Arkansas at the Embassy Suites Hotel in Little Rock.

The workshop drew more than 250 attendants, which included presentations from a range of presenters including First District U.S. Rep. Marion Berry, Cal McCastlain of Patriot Biofuels in Stuttgart, Gary McChesney of Eastman Chemical at Batesville, and Tommy Smith of Potlatch Corporation at Warren. Former U.S. Senator Dale Bumpers delivered the keynote luncheon address.

Attendees ranged from state legislators and community leaders to farmers, investors and engineers.

Major topics for presentations and audience discussion were biomass feedstocks, biodiesel and other biofuels, biorefineries, value-added products, economic development benefits, environmental considerations, business opportunities and state bioenergy policies.

Chemical engineering professors Ed Clausen and Jerry King wrote the proposal for the workshop funding through a U.S. Department of Energy grant from the Southern States Energy Board. Other sponsors of the workshop included Agricultural Council of Arkansas; the Arkansas Department of Economic Development-Arkansas Energy Office; Arkansas Farm Bureau; the College of Engineering,; the Poultry Federation; Division of Agriculture; and Winrock International. ■

In Memoriam: Melvyn Bell

Melvyn Bell, the man who led the campaign for the construction of Bell Engineering Center, died July 8 in Little Rock at age 68. He had been battling cancer.

Bell, a Little Rock businessman and Fort Smith native, graduated from the University of Arkansas with a degree in engineering in 1960. The majority of his career was spent running a hazardous waste incineration company and he later owned several entertainment spots including Magic Springs Family Theme Park and Belvedere Country Club.

In the spring of 1987, the UA's newest building, grand and modern in its style, was unveiled in honor of Bell's parents, Owen and Hildur Bell. In making the gift, Bell credited his own success to his parents' early guidance and sacrifice.

"My hope is that future generations will not only benefit from this gift but perceive it as a symbol of the virtues for which my parents stood and the love we shared as a family," Bell said during an April 3, 1987 ceremony.

In addition to the College of Engineering, Bell also supported cancer research at the University of Arkansas for Medical Sciences in Little Rock.

He is survived by his son: Eric Bell and his wife Deborah, their daughter Erin Bell of Little Rock, Arkansas; and his daughter Megyn Bell of Fayetteville. ■

Bio-Ag Students Sweep National Design Competition

Two teams of undergraduate students from the Department of Biological and Agricultural Engineering were recognized this summer for designing and building prototypes that could be developed into high-tech, life-saving products.

The teams took first and second place at the Gunlogson Student Design Competition in Portland, Ore., July 10. The event was part of the annual international meeting of the American Society of Agricultural and Biological Engineers. The top three teams from schools nationwide were invited to present their designs. The third team was from The Ohio State University.

The first-place team members – Chase Darr from Alexander, Ark.; Andy Riester from Greenwood, Ark.; and Sterling Powers from El Dorado, Ark. – designed a mobile child's feeding tube device.

The team of Matt Graham from Pinopolis, S.C., and John Leach and James McCarty from Little Rock, Ark., took second place for designing a high-tech device to monitor a football player's body temperature while he's on the field.

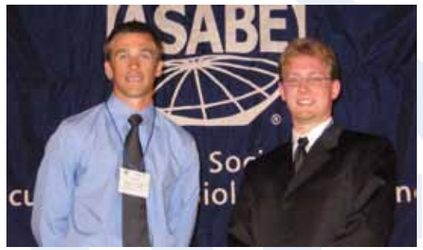
The first place team was inspired by a phone call from an Arkansas mother whose 3-year-old son's medical condition requires him to be attached to an external feeding device that continuously pumps nourishment from a bag directly into his stomach. It's a rare condition, but he is not unique. A small number of children, with various medical problems, must also use an external feeding system.

The current feeding apparatus available to patients, installed on a moveable intravenous pole, is designed primarily for bedside use. It only functions in an upright position, and severely restricts daytime mobility, especially for young children.

Wanting to improve the quality of life for these children, the UA team developed a new feeding system that places the food bag, along with a pump and battery pack, on a vest that the child can wear. The parts are lightweight and distributed evenly in the front and back of the vest to help balance the device.

Andy Reister, Sterling Powers and Chase Darr

The second-place team's design deals with a much more common health problem: heat stress. Football players are especially at risk from high temperatures during the summer months of football practice and early season games.



Matt Graham and John Leach

Heat exhaustion can set in when a person's internal body temperature reaches 100.9 degrees Fahrenheit; if it reaches 104.9 degrees a person can suffer a potentially fatal heat stroke. In the case of football players, the design team realized that if coaches and trainers had the ability to monitor players' body temperatures, the problems from intense heat could be avoided.

The students designed a modified football helmet, embedding the padding with miniature wireless sensors and a transmitter to monitor a player's body temperature on the field. The sensor is positioned to rest against the temporal artery, on either side of the forehead, to register the core body temperature.

The biological and agricultural engineering department is multidisciplinary with professors and researchers contributing from the College of Engineering, the Division of Agriculture and the Dale Bumpers College of Agricultural, Food and Life Sciences. ■

Who's No. 1?

Arkansas Wins on Home Waters

The University of Arkansas solar boat team took the title of world champions at Solar Splash 2006 June 25 at Lake Fayetteville.

This is the second time the Arkansas team has carried home the championship, but the first time in the 13-year history of the intercollegiate solar boat competition that the team has raced on home turf.

In 2002, the University of Arkansas solar boat team was named world champion at Solar Splash. In the past two years of competition, the team has finished second place overall.

Fifteen teams from the United States, Canada and Puerto Rico competed over a four-day period in areas such as speed and endurance. Cedarville University of Ohio finished second in the competition, with the U.S. Naval Academy team finishing third.

"We were very happy with the championship title, but we were most proud to co-host such a successful event with the city of Fayetteville," said Alan Mantooth, UA electrical engineering professor and one of the advisers for the team. "The students from all the teams had a good time, and the people from the community who came out to watch really responded well."

The solar boat competition was presented by the College of Engineering and the city of Fayetteville.

The city of Fayetteville agreed to close down the lake for the week-long event and also provided funding and staff support to help promote and greet visitors on site.

Fayetteville Mayor Dan Coody even came out for the competition and was given a short tour on the Arkansas boat.

Each boat was required to operate on a combination of natural and stored solar power. UA mechanical and electrical engineering students worked together to build Arkansas' competition boat and prepare it for competition.

Roy McCann, another electrical engineering professor who worked with the UA team to prepare for the competition, said it was gratifying to see the Arkansas team members work together and all of the teams work together to improve their boats and performance for the competition.

This year, the Arkansas boat had a new design, which helped with both speed and endurance, team co-captain Zac Pianalto said. Pianalto graduated in May with a degree in mechanical engineering.

During the five-day event, teams participated in five on-the-water competitive events. On-site competitions also included visual displays and workmanship.

The team participants and the Solar Splash administrative staff said they really liked the Lake Fayetteville venue for the competition. Mechanical engineering professor Bill Springer said Solar Splash 2007 was already slated for Lake Fayetteville and now officials have agreed to hold the competition there through 2010. ■

SOLAR SPLASH

Fayetteville, AR

Finding space for efficiency

Russ Meller's Design Helps Distributors Find Products Easily for Faster Delivery

By Matt McGowan

The Internet and shift toward a service economy has led to an intense examination of logistics and supply-chain management: Customers order products online, and they expect to receive their items as soon as possible. Smart companies know that if they want to be competitive, they must change the way they store and distribute goods. In this new environment, warehouses – now referred to as distribution centers – have become more than a place to store extra product; they are an essential part of the supply and distribution chain.

Russell Meller, professor of industrial engineering and director of the Center for Engineering Logistics and Distribution, housed at the University of Arkansas, has found a way make distribution centers more efficient. By helping companies retrieve products from warehouse shelves faster, the discovery will contribute significantly to the distribution process, which means customers will receive items quicker.

"Our results suggest that for unit-load warehouses, radically new designs could lead to faster retrieval rates and significantly reduced costs for operating distribution centers," Meller said.

Meller and Kevin Gue, engineering professor at Auburn University, studied configurations of racks within warehouses and found that despite the increasing demand for more efficient and rapid distribution of products, conventional designs of distribution centers have not changed. Even worse, the conventional designs constrain productivity, Meller said. Specifically, he and Gue discovered that two unspoken design assumptions, neither of which is necessary from a construction point of view, limit efficiency and productivity because they require workers to travel longer distances and less-direct routes to retrieve products from racks and deliver them to designated pickup-and-deposit points.

"For many years, companies treated warehouses almost exclusively as cost centers," Meller said. "This led to restrictive design rules that focused on storage density to maximize utilization of space. Unfortunately, designing a storage area exclusively to maximize storage density ignores the operational cost of retrieving items from the space."

The restrictive, conventional design is a system of parallel "picking" aisles that, depending on the size of the distribution center, are sometimes separated by one or more cross aisles. Within this configuration, the unquestioned design assumptions are:

- that cross aisles are straight and must meet picking aisles only at right angles.
- that picking aisles are straight and are oriented in the same direction.

Meller and Gue challenged these assumptions and developed two alternative designs that accept lower overall density of storage space but improve order-picking response times.

A traditional warehouse with 21 picking aisles has no cross aisles, while the researchers' "Optimal Cross Aisle" model inserts two diagonal cross aisles that originate at the same pickup-and-deposit point. Viewed from above, the two diagonal cross aisles make a "V" in roughly one-half of the total space occupied by picking aisles and rack rows. This simple modification gives workers – a forklift driver, for example – a "straight-line advantage" when traveling to and from some of the pick locations. Meller and Gue tested this design and discovered that it reduced picking costs by 11.2 percent when compared to the traditional design. Meller emphasized that the Optimal Cross Aisle model had the same total length and capacity as the traditional design, although the facility with the cross aisle would have to be about 3 percent larger.

"The main insight behind this design is that a cross aisle that cuts diagonally across the picking aisles affords an advantage in that it allows pickers to get to many of the picking locations more quickly via a more direct route," said Gue.

For their second alternative design, Meller and Gue kept the V-shaped diagonal cross aisles and added vertical picking aisles. Viewed from above, the V-shaped cross aisles extend from the bottom to the top of the entire space allotted to picking aisles and rack rows. Horizontal rows of picking aisles occupy the two sections outside the diagonal, V-shaped cross rows. With this design, the researchers added vertical lines of picking aisles on the inside the cross rows.

The researchers call this model "Fishbone Aisles." The vertical picking rows combined with the V-shaped, diagonal cross rows led to even more dramatic savings. Meller said tests revealed that the cost to make a pick in the 21-aisle warehouse is 20.4 percent lower than in an equivalent traditional warehouse with the same total length of picking aisles.

"Fishbone picking aisles allow pickers to closely approximate direct 'travel-by-flight' to the pickup-and-deposit point," Gue said.

To prove this, Meller and Gue computed the expected retrieval time in an imaginary warehouse in which workers could theoretically travel "as the crow flies" to every pallet location. They found that the imaginary warehouse, which is impossible to achieve, would deliver a 23.5 percent reduction in costs when compared to the traditional warehouse design.

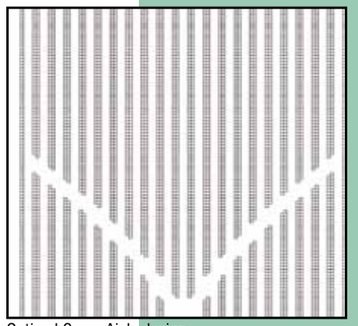
"We're comfortable saying that although the fishbone design may not be the best possible design, it garners nearly all of the possible improvement," said Meller.

The research findings will be published in Progress in Material Handling Research: 2006. The researchers have applied for patents for the design models and are talking to major retailers about implementing the designs in distribution centers.

"Our approach recognizes the emerging role of distribution centers in industry," Meller said. "A properly designed distribution center can provide a competitive advantage to firms in retail and industrial distribution."

In addition to his position as professor of industrial engineering and director of the Center of Engineering Logistics and Distribution, Meller is holder of the Hefley Professorship of Logistics and Entrepreneurship in the College of Engineering. ■

Traditional warehouse design



Optimal Cross Aisle design

Fishbone Aisles design

Engineering The Human Condition

Biomedical engineering researcher is using nanotechnology to solve some of medicine's most perplexing challenges.

By RITTA M. BASU

Vijay Varadan's mind carries and creates enough ideas to fill volumes.

Talk to the UA distinguished professor of electrical engineering one day and he will show you how his nanotechnology research is paving the way for an end to the devastating effects of Parkinson's disease. You might even see a video demonstrating the miraculous effects of his discovery.

Within a few minutes the Twenty-First Century Endowed Chair in Nano and Bio Technology and Medicine might be talking about how the same technology could be used to place a tiny biosensor into a soldier's vest to sense overheating or biological and chemical hazards.

The next day Varadan's creative and ever-active mind may be focused on his research for using nanostructures to monitor patient's heart conditions remotely.

"A cardiologist in a metropolitan clinic can see the blood pressure and heart rate of a heart patient in a remote area by simply putting one of these biosensors inside the pocket of a shirt," Varadan says, holding up a shiny flexible device no larger than the tip of a finely manicured fingernail.

His latest research involves inserting such a device inside the heart stent of a cardiac patient to effectively measure blood flow and oxygen levels within the heart and to administer medication over a period of years.

If you think these ideas sound far fetched, think again.

Varadan, who came to the University of Arkansas from Penn State University, has secured more than $11 million in funding for his research since joining the faculty in 2005. In addition, he has about $6.4 million in research funding currently pending. Some of the sponsors of his medical research have included international companies such as NeoPharma Industries headquartered in Abu Dhabi in the United Arab Emirates.

His most recent funding, which is still working its way through the lengthy steps of final approval, comes in the form of a $5 million grant from the Nizam's Institute of Medical Sciences, a highly prestigious government-funded medical research university in Hyderabad, India. The grant will allow for about 1,000 test surgeries to be performed on volunteer patients in India using a prototype of the nanostructured heart stent. The prototypes are now under construction.

Thus far, the wireless nanodevices are only approved for testing in India. However, if testing is successful there, Varadan can seek FDA approval in the United States for testing and introduction into the domestic medical community.

It takes an engineer

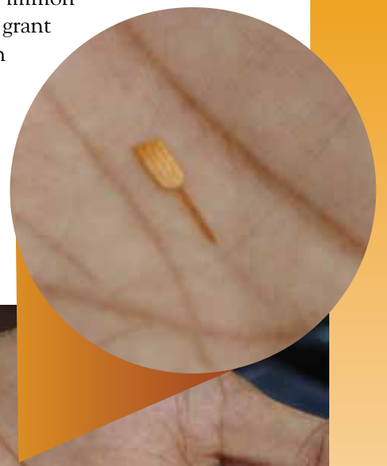
While studying medicine at Penn State, where he still holds a post in the medical school, Varadan sought ways to incorporate his expertise in nanotechnology with the treatment and monitoring people with depilating diseases such as Parkinson's, diabetes, and heart diseases.

"Less than 5 percent of engineers pursue a career in medicine, yet all the medical equipment is created by engineers," said Varadan, who also holds an appointment as professor of neurosurgery at the University of Arkansas for Medical Sciences in Little Rock. "I've been thinking for a long time, what can I do as an engineer to improve the well-being of humans. Nanotechnology needs to be used in medicine and that is what I am doing."

Varadan has also been awarded a $5 million research contract from NeoPharma Industries in Abu Dhabi for developing implantable sensors for treatment of neurological disorders and for monitoring diabetes – a disease that is being detected in epidemic proportions worldwide.

Varadan has also been awarded two other grants totaling a little more than $1 million from the government of India. One grant was for the development of a carbon nanosensor and wireless device for monitoring brain activity.

In addition to his work in the medical arena, Varadan also serves as director of the High-Density Electronics Center at the UA. He was awarded a $2.6 million contract from Engineering System



Research scientist Jining Xie, right, and electrical engineering professor Vijay Varadan examine nanotube samples at the Nanomaterials Research Laboratory located at the Engineering Research Center in Fayetteville.

Solutions Inc. in Frederick, Maryland to study the development of nanomaterial-based batteries and fuel cells with higher power density and electrochemical efficiency at a reasonable cost.

Bringing home the money

Varadan's arrival at the UA has had a huge impact on the number of research dollars the College of Engineering is realizing. UA College of Engineering researchers secured $22 million in research dollars for fiscal year 2006 – Varadan brought in $11.6 million of that amount. In fiscal year 2005, the College of Engineering's research expenditures totaled over $19 million.

Engineering Dean Ashok Saxena said, "Professor Varadan is a fine example of the type of scholars that we have been able to attract to Arkansas as part of the Campaign for the 21st Century. In a very short time, less than two years, he has built one of the best facilities for biosensors research in the country, attracted large amounts of research support from non-traditional sources that open future doors for the university, and has used the financial support to build an outstanding group of researchers here at the Fayetteville campus and also at UAMS." Varadan's fellow researchers include research faculty, postdoctoral fellows, master's and Ph.D. students and undergraduate students. Not to mention, Varadan has collaborative projects ongoing with researchers around the country and the globe.

"To top it all, two new companies have located in the GENESIS technology incubator that will be leveraging the intellectual property generated from Professor Varadan's research and will contribute significantly to the economic development of the region," Saxena said. "His research is cutting-edge, exciting, highly relevant for improving the quality of life of humans and for the economic development of the state. Most of all, it has tremendous educational value that will have continued benefits for Arkansans for a long time into the future." ■

Education and Engineering Join Hands to Promote Science Excellence

By RITTA M. BASU

Thirty local teachers went back to school this summer to conduct experiments they took back to their classrooms in hopes of boosting interest and test scores in science.

The course for middle and junior high school teachers was a joint effort of the College of Engineering and the College of Education and Health Professions and was part of a three-year program intended to boost teachers' knowledge and students' subsequent science test scores.

Shannon Davis, director of research in the College of Education and Health Professions, was primarily principal investigator for the program, which was funded by the Arkansas Department of Education.

The project examines the premise that hands-on experiments have proven to be more effective than other methods in teaching children from low-income backgrounds and children learning to speak English, Davis said. Teachers take a two-week summer science course at the university for three years, and Davis will analyze data after each year to see whether teachers' content knowledge increased and their students' test scores improved. Teachers from the Rogers, Prairie Grove, Gentry, West Fork, Springdale and Siloam Springs school districts participated this first summer.

Ed Clausen, professor of chemical engineering, and Carol Gattis, director of recruiting, retention and diversity for the College of Engineering, served as co-investigators on the grant. Charlotte Earwood, director of the Northwest Arkansas Education Renewal Zone based in the College of Education and Health Professions, assisted with recruiting teachers for the project.

Working with Clausen, teachers conducted a variety of science experiments – they learned to make ethanol, to make a battery with fruits and vegetables, test acidity levels for many kitchen items and many other simple experiments. They received the equipment they would need to conduct these simple experiments in their classrooms.

Each day, participants were introduced to a new experiment, learn the background of the science and then had time to discuss how to implement the experiments at their schools, Clausen said. Teachers, who received a stipend for attending, worked in groups according to the grade they teach.

"A follow-up component allows teachers to provide feedback and presenters to offer further advice on implementing the experiments in the classroom," Davis said. "A web site describes additional experiments and an e-mail discussion group allows teachers to trade information about how experiments are working in their classes and give presenters the opportunity to respond." ■

Campaign Philanthropists Recognized

Following the conclusion of the successful Campaign for the Twenty-First Century, colleges and schools across campus took time to celebrate the many examples of remarkable generosity from alumni and friends of the University of Arkansas. This was particularly true for the College of Engineering, which raised more than $70 million in endowed and non-endowed funds to help support the growth and development of the college in years to come.

Chancellor John White and his wife, Mary Lib; Charles D. Morgan and his wife, Susie; and Rodger S. Kline.

One of the most powerful legacies from the campaign, which ended in June 2005, was the creation of 24 endowed professorships and chairs for the faculty of the College of Engineering. These new endowments represent critical opportunities for the college as we strive to compete as a nationally-recognized, student-centered research institution. Specifically, endowed professorships and chairs enable our departments to attract top academic talent to the University of Arkansas, and also provide critical tools to retain outstanding faculty already here at the College. Together the college now has a total of 27 endowed positions.

Engineering Dean Ashok Saxena and Vice Chancellor for Advancement Dave Gearhart hosted a private dinner at University House honoring three individuals whose contributions to the campaign helped to define that effort as truly "an historic event of epic proportions," as one campaign announcement described the drive. Chancellor John White (BSIE `62) and his wife, Mary Lib; Charles D. Morgan (BSEE `66) and his wife, Susie; and Rodger S. Kline (BSEE `66) were each presented with a university scene chair.

In his remarks during the presentation ceremony, Saxena took time to point out how these landmark gifts will ultimately benefit a community far beyond the College of Engineering alone. "By focusing on creating a knowledge-based economy in this state, we can offer the people of Arkansas a better life. We can offer our students better opportunities; and we can offer them an incentive to stay home – here in the state they love. The College of Engineering is uniquely poised – through outstanding teaching, cutting-edge research and dedicated service – to help the University and the state create a true research and development culture. And these gifts, as well as every gift to the campaign, are truly turning that dream into reality."

Saxena and Provost Bob Smith also hosted a recognition luncheon for three additional alumni who made extraordinary contributions to engineering during the campaign in the form of endowed professorships. Ansel Condray (BSCHE `64) and his wife, Virginia (BSE `64); Jim Hefley (BSIE `61) and his wife, Marie; and Jim Womble (BSCE `66) and his wife, Patti, were each honored for the role they played in providing unprecedented support to their alma mater. Each couple was presented with a Philanthropic Leadership Medallion, the University of Arkansas' official form of public recognition for those who have demonstrated extraordinary commitment by creating endowed professorships. ■

Richard Cassady Wins Charles and Nadine Baum Faculty Teaching Award for 2006

C. Richard Cassady, associate professor and holder of the John L. Imhoff Chair in Industrial Engineering, received the most prestigious teaching award at the University of Arkansas: the Charles and Nadine Baum Faculty Teaching Award for 2006. The award includes a $5,000 stipend.

Cassady is a native of Martinsville, Va. He earned his BS, MA and Ph.D degrees in Industrial and Systems Engineering from Virginia Tech. He joined the university in 2000 as an assistant professor in industrial engineering, earned tenure as an associate professor in 2004, and was named to the John L. Imhoff chair in 2006. Cassady was named Faculty Member of the Year for 2004-2005 by the Arkansas Academy of Industrial Engineering; Outstanding Researcher in the Department of Industrial Engineering the same year; and in 2005 received the first Imhoff Outstanding Teacher Award, for the College of Engineering. In all he has received more than a half dozen teaching awards and several more research awards so far in his career at the university.

C. Richard Cassady

In his letter informing Cassady of the award, Bob Smith, provost and vice chancellor for academic affairs wrote, "You have truly found the keys to active engagement and learning and our students and our University have been the beneficiaries of your extraordinary creativity and dedication."

Cassady's primary research interests are in repairable systems modeling, which involves applying probability, optimization, simulation and statistics to problems related to evaluating, improving or optimizing the performance of repairable equipment. He also conducts research in the areas of reliability engineering, statistical quality control, logistics systems modeling and sports applications of operations research. ■

STEPHENS LAB *continued from page 2*

research with Ph.D. researchers and professors," said Ashok Saxena, dean of the College of Engineering.

Larry Stephens is a 1958 UA industrial engineering graduate. He is vice chairman of Mid-South Engineering Co. in Hot Springs, a forest products consulting firm he helped found in 1969. He has worked in the forest products field for nearly 50 years.

With professional licenses and registrations in eight states, Larry Stephens was a founding member and initial president of the Arkansas Academy of Industrial Engineers and has served on the UA College of Engineering Advisory Council since 1992.

He is a past board member of the Arkansas Society of Professional Engineers, currently serves on the Levi Hospital Board and is actively involved in the Hot Springs and Garland County community. He is also and a member of the 2010 Commission and worked with the College of Engineering on the Campaign for the 21st Century.

Gwen Stephens joins her husband of 44 years as a lifetime member of the Arkansas Alumni Association, the Chancellor's Society and the UA Legislative Network.

"We both believe in the university mission established by John White and the Council of Trustees," Larry Stephens said. "We also support the goals and leadership of the dean of engineering and industrial engineering department. After discussing the departmental needs with John English, it was an easy decision to make this gift during the Campaign for the 21st Century." ■

Professors Named Twenty-First Century Chairs


Alan Mantooth


Ajay P. Malshe

Two UA College of Engineering professors have been appointed to 21st Century Chairs and are well on their way to making a name for the college, the University of Arkansas and the engineering profession as a whole.

Alan Mantooth, professor of electrical engineering, has been named to the Twenty-First Century Chair in Mixed-Signal Integrated Circuit Design and Computer-Aided Design at the University of Arkansas. Mantooth is director of the National Center for Reliable Electrical Power Transmission, a U of A center for advanced power electronics research. He is also chief scientist and co-founder of Lynguent Inc., an electronic design automation company based in Portland, Ore., that focuses on analog and mixed-signal modeling and collaborative design tools.

This Twenty-First Century Chair was established to provide leadership in the area of hardware and software design, creating a crossover between electrical engineering, device physics and computer engineering. In his role as chair, Mantooth will attract and support research and create stimulus for integrated circuit design and manufacturing, and software design cottage industries.

"I am both humbled and excited at the opportunities that the chair position affords our mixed-signal electronics program. These chair funds will be used to attract, support and impact the lives of students, so that through our scholarly contributions the UA's international reputation as a top-flight engineering school can continue to grow year after year," Mantooth said.

Mantooth holds bachelor's and master's degrees in electrical engineering from the University of Arkansas College of Engineering, and a doctoral degree from the Georgia Institute of Technology. He has received several teaching, research, and service awards since joining the University of Arkansas from industry in 1998. In 2002, he was named to the Georgia Tech Council of Outstanding Engineering Alumni and in 2006 was inducted into the Arkansas Academy of Electrical Engineers.

Under Mantooth's direction, the Mixed-Signal Computer-Aided Design Laboratory has collaborated with universities in Japan, England and the United States on electronics projects for space applications targeted to upcoming Lunar and Martian missions.

Ajay P. Malshe, professor of mechanical engineering, has been named to hold the Twenty-First Century Chair of Materials, Manufacturing and Integrated Systems at the University of Arkansas.

Malshe is the director of the Materials and Manufacturing Research Laboratories at the university. He is also an adjunct faculty member in the electrical engineering department and the microelectronics/photonics graduate program due to his extensive work in the area of integration of nano- and microdevices, primarily in the High Density Electronics Center. He is a co-founder and chief technology officer for two high-tech companies, NanoMech and OMNIPak.

The mission of Malshe's program is "research inspired by discovery and innovation via integration of student-centered educational programs, addressing problems of national and global interest, serving industries and communities."

Malshe has multiple international and national awards for technology used in nanoparticle composite coatings.

His nanomanufacturing science and engineering and micro- and nanopackaging efforts offer interdisciplinary students and industries a unique opportunity to bring new advanced products to the global market.

Malshe said, "The resources made available through this prestigious honor will create opportunities to think beyond this decade and derive strategies for achieving log-term national and international leadership in key areas such as nano and nanobiotechnologies, and advanced materials, manufacturing and related integrated system products." ■

Engineering Leaders Recognized at 2006 Alumni Banquet

The Fayetteville Town Center was ablaze with candlelight and colorful evening gowns for the 2006 Engineering Alumni Awards Banquet.

The Engineering Hall of Fame Award, the highest honor given to alumni of the University of Arkansas' College of Engineering, was conferred to Bill Cravens (`56 BSIE) in recognition of his accomplishments in the finance and telecommunications industries. As a long-time friend of the Cravens family, Chancellor John White personally related Cravens' many professional and personal accomplishments to the banquet attendees, thanking him for his years of quiet and unassuming service to the College and to the University. Alongside Dean Ashok Saxena at the podium were the attending members of the Arkansas Engineering Hall of Fame, each of whom welcomed Cravens into their group by turn with a handshake and a special word of congratulations.

But it wasn't only those with awards who were announced at this year's gala. In fact, each banquet guest was given a special welcome courtesy of RFID technology embedded in his or her program for the evening. As each guest passed through the entryway to the banquet hall, a special RFID reader registered their name, degree and year of graduation and posted this information on the video screens at the head of the room for all to see. In this way, each guest was personally "announced" as he or she entered the hall. The RFID reader technology was provided as a gift by Enterprise Information Systems, Inc., of Austin, Texas. EIS chose to sponsor the event in this way to help showcase the College of Engineering's growing prominence in the field of RFID technology and to highlight EIS' role in supporting student education in RFID design. Significantly, the technology used at the banquet was designed and implemented by an undergraduate class in RFID led by Nebil Buyurgan, assistant professor in industrial engineering. ■

Distinguished Alumni Award Recipients

The 2006 Alumni Awards Banquet recognized the significant achievements of numerous outstanding alumni.

Bami Bastani, BSEE '76
President and Chief Executive Officer
ANADIGICS, Inc.
Warren, New Jersey

Robert A. Davidson, BSIE '70; MBA '72
President and Chief Executive Officer
Arkansas Best Corporation
Fort Smith, Arkansas

Kenneth W. "Bill" Keltner, BSIE '59
General Manager Arkansas, retired
Southwestern Bell Telephone Company
Little Rock, Arkansas

James E. Stice, BSChE '49
Professor, retired
University of Texas, Austin
Austin, Texas

Charles E. Yates, BSCE '60
Vice President, International Operations
Division, retired
AT&T
Austin, Texas

David O. Watts, MSME '61
D. O. Watts Company, President, retired
Tulsa, Oklahoma

J. Randy Young, BSAGE '71; MSENE '75
Executive Director
Arkansas Natural Resources Commission
Little Rock, Arkansas

Young Alumni Award Recipients

Pictured left to right are, Christopher Knight, Alex Lostetter, Jerry Newton, Jeremy Webb, Scott Mills and Matthew Romine.

Christopher D. Baltz, BSIE '88
Senior Vice President
Yield Management and Strategic Development
ABF Freight System, Inc.
Fort Smith, Arkansas

Scott Mills, BSCSE '94
Cofounder
IFWORLD Inc.
Fayetteville, Arkansas

Brock Hoskins, PE, BSCE '89
Vice President and Senior Project Manager
Garver Engineers, Inc.
Fayetteville, Arkansas

Jerry D. Newton, BSME '95
Manager
Manufacturing and Product Support
John Deere Russian Operations
Moscow, Russian Federation

Christopher S. Knight, BSChE '94; MSChE '95
Strategic Supply Associate
Albermarle Corporation
Baton Rouge, Louisiana

Matthew Romine, BSCSE '95; MSE '99
Cofounder
IFWORLD Inc.
Fayetteville, Arkansas

Alexander B. Lostetter, Ph.D. '03
President
Arkansas Power Electronics International, Inc.
Fayetteville, Arkansas

Jeremy Webb, BSCSE '97
Cofounder
IFWORLD Inc.
Fayetteville, Arkansas

◀ This year's Engineering Expo drew hundreds of students to the halls of Bell Engineering Center to talk with and discuss potential job opportunities with the more than 75 companies represented. Employers appeared eager to talk with UA engineering students about potential future employment, as a number of students walked away with on-the-spot job interviews.

▲ A steel structure constructed as a service project by members of the Chi Epsilon outside Bell Engineering Center was dedicated in early April. Kevin Hall, head of the Department of Civil Engineering, presided over the dedication.

▶ Melissa Tooley, center, is congratulated by Arkansas Highway and Transportation Commissioner Jonathan Barnett and Arkansas Highway and Transportation Department Director Dan Flowers, upon her departure as director of the Mack-Blackwell Rural Transportation Center. Tooley served as director of the center for seven years. Jack Buffington, research professor of civil engineering, is now acting director for the MBTC. Heather Nachtmann, associate professor of industrial engineering at the UA, has been appointed as associate director for the center.