RESEARCH

MIZZOU ENGINEER

ENGINEERING FOR THE ADVANCEMENT OF HUMANITY

FALL 2007 VOLUME 6 NUMBER 2
UNIVERSITY OF MISSOURI-COLUMBIA
COLLEGE OF ENGINEERING

MIZZOU ENGINEER

Engineering for the advancement of humanity

Editor: Janice Wiese-Fales
E-mail: UMCEngrDev@missouri.edu
Web: www.engineering.missouri.edu

Advancement Office:
Engineering Advancement
University of Missouri–Columbia
W1006 Thomas and Nell Lafferre Hall
Columbia, MO 65211-2200
Telephone: (573) 884-4948
E-mail: UMCEngrDev@missouri.edu
Web: www.missouri.engineering.edu

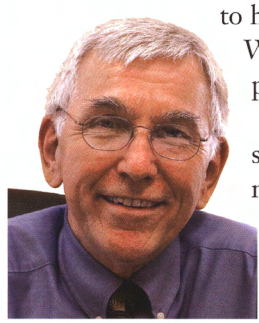
MIZZOU ENGINEER is a triennial alumni magazine. It is our intent to capture moments in time that communicate glimpses of the past, present and future of the MU College of Engineering. We hope it also renews old acquaintances and friendships, spawns volunteerism and encourages philanthropy.

Questions, comments and suggestions for future articles are welcome. Please send comments to the Engineering Advancement Office at UMCEngrDev@missouri.edu

This magazine is funded by the Mizzou Engineering Office of Advancement.

Dear Alumni and Friends of Mizzou Engineering,

Research is booming at the University of Missouri–Columbia's College of Engineering. So great is our faculty-researcher success and growth that we have had to add staff to help process awards. We couldn't be more pleased.



To call attention to some of the college's many accomplishments, this issue of Mizzou Engineering is dedicated to a few current research projects, as well as highlighting members of our effective and flourishing faculty.

As with much of what engineers across the country are involved in, the news briefs and stories in this issue profile projects in the offing that address and inform everyday human questions and dilemmas.

By the very nature of the research being done, three of the main features in this issue are set to directly impact public policy. From statewide railroad and national bridge maintenance to guidelines for environmentally sound development practices aimed at sustaining a small town's quality of life, our engineers crunch science and the numbers to come up with solutions.

Also featured is promising research targeted at unmasking the cause of Alzheimer's disease, a progressive, degenerative brain disease that currently affects the lives of four million Americans and those who care for and about them.

And finally, past and present National Science Foundation CAREER award winners and their varying research projects are profiled, as are new faculty we are pleased to welcome to the Mizzou Engineering family.

I hope you enjoy reading about some of the work that is being done here and that you will continue to follow and support us in future successful ventures.

Sam Kiger

Sam Kiger, Associate Dean for Research

Letter to the Editor

Editor:

I found the Summer 2007 issue of Mizzou Engineer especially interesting and well edited.

First, I am a fan of promoting women in engineering. Your coverage is excellent. My first major encounter with women in the engineering work force was in 1942 at the Naval Air Training Center in Pensacola, Fl. I was a parachute officer and one day received 15 women parachute riggers trained at the naval facility in Philadelphia, Pa. They were very professional and performed well above expectations.

My next exposure was when I became active with the Michigan Society of Professional Engineers (MSPE). I had many opportunities as state president and national director to encourage women to become involved in leadership roles. In 1976 I retired from Whirlpool and immediately became the Executive Vice President of MSPE. I had the opportunity to bring one women engineer through the ranks to become MSPE's first women president. I found that women involved with the leadership of Society of Women Engineers were outstanding in all respects.

We are gradually dispelling the troubling reality that too many women are being discouraged from considering engineering as a profession. My experience and observations tell me women excel in their performance of engineering assignments.

The 1958 class feature, while long after my graduation in 1940, brought back memories of several professors, namely Dr. Mendell P. Weinbach — his daughter was a high school classmate of mine at Hickman High School — Dr. Ralph "Doc" Scorah, and Harry Ruby, whose daughter and son were also high school classmates. Dean Harry Curtis was also mentioned. He was Dean during my time.

My fondest memory was the summer I took the five-hour electrical class. First lecture at 8 a.m. with assignment for the 11 a.m. lecture. Lab was four afternoons a week from 1 p.m. to 4 p.m. My favorite professor was Prof. Mac Jones in the Ag Engineering Dept. He was my professor for my design project and was a great mentor.

I have difficulty in identifying the greatest achievement in my career. I had four very successful careers with adequate recognition in each. I expect my 15 years as MSPE's executive was the most productive. I was active in establishing an engineering scholarship trust which today is worth a quarter of a million dollars, administrating some 35 high school scholarships a year. I was also accepted as a member of Michigan's Engineering Dean's Council whose membership consisted of the deans of the state's 14 engineering schools.

My advice to today's engineering students is to get involved in engineering societies and activities to gain leadership experience and to concentrate on developing communications skills.

Harry Ball, AgE '40

MIZZOU ENGINEER
fall 2007
volume 6 number 2

Features

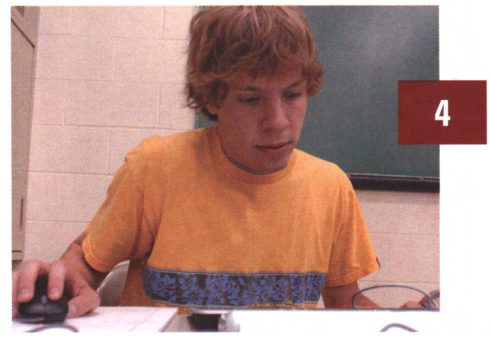
4 Nondestructive Evaluation
Glenn Washer, a civil and environmental engineering assistant professor, has gained a reputation as one of the country's leading experts in the field of nondestructive evaluation of bridges and more.

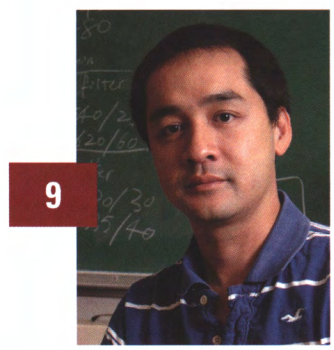
6 Pacific Ring Initiative
Kate Trauth, a civil and environmental engineering associate professor, is working with others toward proactively sustaining the quality of life in the face of development as the City of St. Louis stretches out toward the town of Pacific, just 30 miles away.

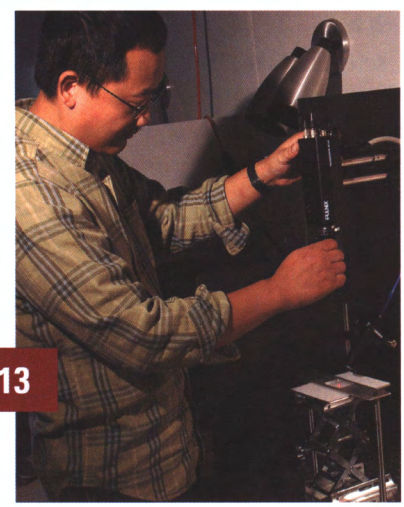
9 Looking for Answers: Alzheimer's Disease
James Lee, a biological engineering assistant professor, conducts research to unravel secrets behind the mechanisms of Alzheimer's disease.

10 On-Time Trains
Jim Noble, an industrial and manufacturing systems associate professor, worked with MoDOT to recommend solutions to improve the on-time performance of Missouri's Amtrak trains.

13 NSF CAREER Awards
A look at the present and past Mizzou Engineering recipients of the National Science Foundation's prestigious CAREER research awards.





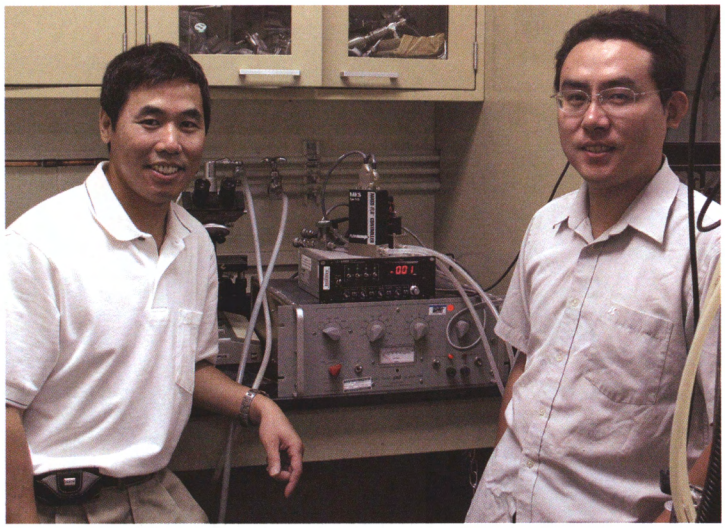


Of Note

2 Mizzou Engineers
16 New Faculty
20 Nanotechnology Initiative

Photos top to bottom: Graduate student Frank Blum works with Ramen spectroscopy of carbon fibers in Glenn Washer's lab. (Photo by L.G. Patterson); Natural beauty in the Pacific Ring (Photo by Aslan Aslan); James Lee (Photo by L.G. Patterson); Amtrak passenger train crossing an unnamed bridge 1.5 miles west of Jefferson City (Photo courtesy of MoDOT); 2007 CAREER award recipient Gary Yao in his lab (Photo by L.G. Patterson)

COVER: Sensors to be used on a bridge model as part of Civil Engineering Assistant Professor Glenn Washer's nondestructive bridge evaluation. (Photo by L.G. Patterson)



MIZZOU ENGINEERING assistant professors Qingsong Yu, left, and Hao Li are working to miniaturize the plasma source system pictured here to power a plasma dental tool they are developing for dental clinic use.
Photo by Vicki Hodder

Painless dentistry

Quinsong Yu and Hao Li, assistant professors in mechanical and aerospace engineering, are leading a multi-campus university research team that has received a National Science Foundation grant to lay the theoretical foundation for a plasma dental device the researchers are developing.

"Plasma treatment would be a painless, nondestructive and tissue-saving way to care for and treat cavities because it relies on chemical reactions instead of heat or mechanical interactions," Yu said. "And the chemical bonding between teeth and fillings that the plasma treatment would create would be much stronger than you currently get with drills or laser techniques."

Yu and Los Alamos National Laboratory scientist Yixiang Duan already have filed two U.S. patent applications for the plasma tool, which can change the surface chemistry of its target. While plasma devices are widely used in materials science and engineering, the team's "brush" is unique not only in its shape, but in its ability to operate in open air — rather than in a vacuum — and at near-room temperatures, Yu said.

The MU researchers are working on the three-year NSF project with Yong Wang, an oral biology associate professor in the University of Missouri-Kansas City's dentistry school.

Wang said the plasma tool the team envisions would be faster and treatment would be less expensive. It would also operate without the vibrations and the noise of a drill.

Honored by IEEE

Mizzou Engineering Professor Jim Keller traveled to London in July to receive the 2007 Fuzzy Systems Pioneer Award from Professor Vincenzo Piuri, president of the Institute of Electrical and Electronics Engineers' (IEEE) Computational Intelligence Society. The IEEE–sponsored award recognizes Keller's groundbreaking work in developing more intelligent computers.

Micro device and nanotechnology to treat cancer and HIV

Using nanotechnology, engineering researchers at the University of Missouri–Columbia have developed a small but powerful device capable of enhancing the delivery of drugs to treat life-threatening illnesses.

The state-of-the art device has numerous capabilities for destroying tumors, kidney stones and ulcers, and treating cancer and HIV. Nanotechnology works with microscopic particles that are about one-millionth the size of a strand of hair. Mizzou's device, at one cubic inch in size, is now in the testing phase and is far smaller than similar delivery systems designed by other researchers.

Shubhra Gangopadhyay, an electrical and computer engineering professor in the College of Engineering and co-director of the MU Center for Nano/Micro Systems and Nanotechnology, led the effort.

By incorporating microchip-based technology with nanotechnology, Gangopadhyay fuses both technologies to trigger a reaction resulting in supersonic shockwaves. For medical purposes, those shockwaves, along with nanoparticles, propagate into the body to make infected cells permeable for drug interaction. The device allows for a non-invasive procedure that utilizes the body's pores as entry points.

Similar to other nano/micro-scale devices by Gangopadhyay, this one also operates on a "dual-use" platform, and additionally powers alternative energy and munitions systems for the U.S. military.

Seeking environmental guidelines

As the nanotechnology revolution builds, Mizzou Engineering and federal researchers are joining forces to identify some guidelines for safely assimilating the tiny nanoparticles into the environment.

Baolin Deng, a civil and environmental engineering associate professor, and Hao Li, a mechanical and aerospace engineering assistant professor,

are part of a team that has received an Environmental Protection Agency grant to research how carbon–based nanoparticles affect aquatic life. Working with the U.S. Geological Survey, they will try to determine if the heavy metals used to make the nanomaterials or the small particles alone are toxic to aquatic life — and, if so, at what levels.

Carbon–based nanomaterials are under particular scrutiny because they can be forged into particles many times stronger than steel and are good conductors of electricity, making them potential building blocks for next–generation electronics.

The potential for such widespread use is prompting the Mizzou research team to focus on how those nanoparticles may affect mussels, worms and shrimp–like creatures called amphipods that live in stream sediment.

Deng hopes to establish some parameters for the environmentally safe use of carbon–based nanomaterials.

Engineers lend expertise to earthquake victims

Thousands of earthquake survivors have been living in makeshift shelters since a magnitude 8.0 quake struck central Peru's coast on Aug. 15, killing more than 500 people and reducing houses in the cities of Pisco, Ica and Chincha to rubble.

In October, Mizzou Engineering Assistant Professor Brent Rosenblad led a team of researchers to help Peruvian officials identify safe sites on which to rebuild.

"They need to rebuild their cities, but they don't want to put structures on unstable ground," said Rosenblad, who specializes in earthquake engineering.

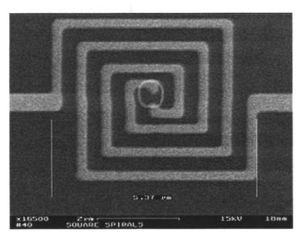
Mizzou Engineering is coming to Peru's aid under a cooperative agreement finalized last May between the MU Civil and Environmental Department and the Centro Regional de Sismologia para America del Sur (CERESIS), a South American organization focused on earthquake issues. Geotechnical doctoral students Jianhua Li and Daniel Huaco Jr., and Jim Bay, a Utah State University geotechnical associate professor, accompanied Rosenblad on the two-week trip.

Rosenblad used a soil measurement technique he utilizes in his research of soil deposits in southeastern Missouri's New Madrid seismic zone. Rather than drilling holes to determine the soil's stiffness, Rosenblad places seismic sensors in selected sites and then drops a heavy weight to create surface waves that can be recorded and analyzed to determine the stiffness of the soil.

Pinhero receives Nano50 awards

Traditional solar cells are expensive to manufacture and convert only a small fraction of the light that hits them. The Department of Energy reported in its online publication, "DOE Pulse," that researchers at the Idaho National Laboratory are designing an alternative — nanoscale antennas that capture infrared energy from the sun.

The antennas are made by stamping



tiny square spirals of conducting metal onto a sheet of plastic. The flexible, inexpensive circuitry resonates when infrared light hits it. The more efficient technology was developed by Patrick Pinhero, now an associate professor of chemical engineering at MU, and Dale Kotter and Steven Novack of INL. Pinhero served as materials lead on the project which was awarded two Nano50 awards in June.

To lead conference

Mechanical and Aerospace Engineering Professor and Department Chair, Robert D. Tzou, will chair the first American Society

of Mechanical Engineer's (ASME) international conference on micro/nanoscale heat transfer. The conference will be held in Taiwan in January 2008. More than 250 papers are anticipated from 12 countries around the world

Work of professor emeritus recognized

In the June issue of "Current," an electronic publication of the National Science Foundation, Henry Lui, a MU Civil and Environmental Engineering professor emeritus, was recognized for his research in the development of bricks made from fly ash. Fly ash products consist of fine ash particles captured as waste from coal-fired power plants. The story stated that the new bricks might revolutionize the construction industry.

"Manufacturing clay brick requires kilns fired to high temperatures," said Lui in the article. "That wastes energy, pollutes air, and generates greenhouse gases that contribute to global warming. In contrast, fly ash bricks are manufactured at room temperature. They conserve energy, cost less to manufacture, and don't contribute to air pollution or global warming."

The "green" bricks can be colorized and shaped to closely mimic red clay bricks and may actually exceed them in construction material standards.

The Nondestructive Evaluator

by Jan Wiese-Fales

Civil Engineering graduate students Kathy Masterson and Caleb Phillips flank Assistant Professor Glenn Washer with a bridge frame constructed to model the performance of sensors in nondestructive evaluation techniques.

Photo by L.G. Patterson

REINFORCED CONCRETE, first invented in the mid-nineteenth century, combines the bendable strength of steel with the compressional strength of concrete. Wedded together, the pair offers a perfect bridge-building material that will support both its own weight and the weight of the traffic that travels from one end of its span to the other.

Enter the forces of nature. Besides the beating bridges take from traffic, fluctuating temperatures, high winds, excessive rain, and subsequent flooding all take their toll on the structures that are necessary to get us from here to there.

"Visual evaluation done at two-year intervals is the traditional method for bridge inspection," said Glenn Washer, an assistant professor in civil and environmental engineering in the University of Missouri–Columbia's College of Engineering. "Two years is a long period of time between inspections, so using sensors to monitor bridge performance makes sense. But it's difficult to find the right application."

For the past decade and a half, Washer has made a search for the right application the primary focus of his career. His quest, beginning at the Federal Highway Administration as a research engineer, and now as a faculty researcher at Mizzou Engineering, has earned him recognition as one of the nation's leading experts in the field of nondestructive evaluation of bridges. As such, the MU News Bureau sent out a national "for expert comment" media advisory quoting Washer the morning after the I-35 bridge over the Mississippi River collapsed last August.

As of Oct. 1, the advisory had generated 299 "hits," which means that nearly three hundred television, radio or print outlets had used or quoted the information. News Bureau Senior Information Officer Kevin Carlson said it was easily one of the most successful releases the office had ever done. Washer appeared on the NBC Today Show and had to turn down a number of national appearance requests due to time constraints.

On behalf of the American Society of Civil Engineers, Washer traveled to Washington, D.C. in late October to provide expert testimony at congressional hearings on nondestructive evaluation of highway bridges.

Washer has received funding from the National Academy of Sciences (NAS) as well as a number of state highway departments for his work to develop a long-term remote bridge sensor system. "Missouri has been interested in this project all along, and more now after what happened in Minnesota," said Washer.

"The condition assessment of existing structures and components is a rapidly expanding field that cuts across many industries and technical disciplines."

"The general idea that I've worked on since the 1990s involves using a variety of sensors and methods to better understand the condition of bridges, and to better understand bridge behavior," Washer explained.

His current research project involves arraying a variety of tilt sensors around a structure, which can then be read from a remote location. The use of multiple sensors ensures sensor agreement, minimizing the risk of erroneous readings in the event one of them is damaged.

"Another application we're looking at is the use of sensors during extreme weather events. Missouri lost hundreds of bridges when piers were undermined by water in the floods of the 1990s," said Washer.

Cooperating with both the Missouri and Tennessee Departments of Transportation, Washer says that his research team is working on a sensor system that will register changing temperatures at the base of bridge piers as the earth is scoured away by raging floodwaters.

In addition, the national Transportation Pooled Fund — specifically the Departments of Transportation in Missouri, Texas and New York — is supporting Washer's research to detect defects in concrete with infrared thermography.

A concrete test block with defects embedded at different levels within the concrete has been constructed on a nearby test site. An infrared camera trained on the structure will generate thermal images every hour for a year. "We are testing to find out under what conditions — time of day, temperature, weather — the contrasts are optimized," said Washer.

He hopes the data will eventually allow for the development of a handheld thermographic tool that could be used by bridge inspectors in the field.

Washer also works with NASA's technical discipline team on non-destructive inspection for space vehicles and aircraft, and is doing research on the application of Raman spectroscopy as a new nondestructive inspection tool.

"The condition assessment of existing structures and components is a rapidly expanding field that cuts across many industries and technical disciplines," said Washer.

At his current rate, Washer just might have a hand in all of them.

Kate Trauth, associate professor of civil and environmental engineering

Photo by L.G. Patterson

The Pacific Ring: Sustaining quality of life in the face of economic progress

by Jan Wiese-Fales

"It's engineering. It's economics. It's policy and it involves community," Kate Trauth summarized when asked about the Pacific Ring Initiative she and her students are investigating.

Trauth, an associate professor in the University of Missouri College of Engineering's Civil and Environmental Engineering Department, was referring to an Environmental Protection Agency-supported project she was awarded to promote water quality in the face of development in the town of Pacific, Mo., and the surrounding area. The small community located at the base of beautiful, towering St. Peter sandstone bluffs, lies 30 miles southwest of St. Louis and is in the direct path to experience some of that city's growing pains and the associated potential impact to its health and well-being.

In June, the U.S. Census released figures that estimate Pacific has grown 30.6 percent since the results of the 2000 census were tabulated. That makes the cozy little Missouri town nestled next to the Meremac River and the Shaw Nature Reserve the tenth fastest growing city in the St. Louis Metropolitan area.

Such growth can be a blessing to a small community like Pacific, given the economic boost that new jobs and increased tax revenues can generate. However, with a proactive eye to the impact that unplanned growth may have on property values, cultural interests, political issues, and environmental concerns, city residents have gathered together to work toward ensuring that they can sustain their quality of life and perhaps become a national model in doing so.

The Pacific Ring project, which includes the countryside in a seven-mile radius around the city, is an initiative of the nonprofit Magi Foundation Inc., a corporation formed by past University of Missouri Board of Curators President James McHugh, and some of his colleagues. The foundation's role in the project has been to bring university researchers and policy groups together with residents to facilitate sustainable development.

McHugh's interest in Pacific is personal. In 1908, his ancestors built what was then Pacific's largest building, the three-

story McHugh–Dailey Mercantile building, constructed from materials salvaged from dismantled 1904 World's Fair structures. Today the renovated building's first floor houses The Great Pacific Coffee Company where Pacific Ring public meetings are held.

Trauth first learned about the Pacific Ring Initiative when she met McHugh in 2004. When EPA issued a request for research proposals later that year, Trauth and Dr. Tom Johnson, a professor with joint appointments in agricultural economics and the Harry S. Truman School of Public Affairs, and the director of MU's Community Policy Analysis Center, immediately responded.

The proposal was funded under the title, "GIS Land Cover and Economic Analysis Tool to Promote Water Quality Protection for Sustainable Development." The scope of the work is to develop tools to inform community decisions on land development taking water quality into consideration. The proposal also aims to focus positive attention on the economic benefits of adhering to practices that preserve water quality. Though work continues, Trauth's students have completed a land survey and several other components.

The water quality considerations of the project focus on non-point source pollutants, those pollutants that are generated from land surfaces in a watershed and introduced into a stream from storm water runoff. These pollutants account for much of today's water quality problems, even as communities and industries are required to control their discharges that reach streams via pipes. Included are sediment, pesticides, fertilizers, and pollutants associated with urbanization including those generated from construction. Also included is runoff from areas given over to roads, parking lots and rooftops. Termed impervious, these surfaces no longer absorb the rainfall they did as natural areas. Roads and parking lots additionally are coated with petroleum products and heavy metals that can wash into storm water.

Within the seven-mile radius of the Pacific Ring is the near-pristine LaBarque Creek watershed, a perfect place to lay the groundwork for the water quality impact portion of the project.

Melissa Hanna was an undergraduate civil and environmental engineering student at the time the work began. "I was interested in working in hydrology," said Hanna of her connection to the project, "and I asked Dr. Trauth about it."

"My part in the project involved looking at how you could use geographic information system (GIS) applications to see how wide effective stream buffers would need to be in the face of urbanization," Hanna explained.

A successful stream buffer of plants and permeable land will help keep pollutants from entering a stream, will slow down sediment, and soak up excess nutrients. More urbanization often requires a larger buffer. The idea is to make development a partner in sustainability, providing the maximum amount of land for development, but leaving a large enough buffer to sustain water quality.

Using GIS technology, graduate civil and environmental engineering students Aslan Aslan, who prior to attending

Photos by Aslan Aslan and Janggam Adhityawarma

Graduate students Janggam Adhityawarma, left, and Aslan Aslan, right, use geographic imaging system (GIS) technology to compare global positioning system (GPS) coordinates with ground locations, tracking both impervious surfaces, like parking lots, and areas with vegetative cover, including stream buffers in watershed areas.

MU worked as a GIS specialist for the Wildlife Conservation Society, and Janggam Adhityawarma, went out to public areas in Pacific and collected field data regarding the land cover in identifiable locations.

"I am responsible for the land cover map, derived from high-resolution satellite imagery," said Aslan. "Using the global positioning system (GPS) coordinates from ground locations, we could compare exactly what was on the ground to landcover classifications and reanalyze the data to make sure that the map was right." For this project, the students had to either receive permission to enter private property or had to remain in public access areas. "We had to respect land owners' rights," Aslan said about the data collection effort for LaBarque and Brush Creeks he and Adhityawarma conducted.

GIS allows for the analysis of several overlaid layers of images and other data. Hanna looked at land cover from satellite images, as well as a digital elevation model that showed topography, and a soil-type map to predict how much storm water runoff could be absorbed by a given stream buffer.

"I looked at a small section of a stream, about 300 feet — with vast amounts of information — to develop a set of steps that anyone could use in an area for a buffer performance assessment," said Hanna. "Land use maps helped me to differentiate between forest and grassland, to tell if there would be things like large trees that would soak in rain. Then you can predict what else would need to be added to the buffer if something like a parking lot were to be built nearby because there would be a lot more pollutants."

Hanna wrote a paper detailing her work that is in review. "It was so interesting. I am really glad that I got the GIS experience," said Hanna. "I was happy to have the opportunity."

She believes her work on the project helped her land a job with Lutjen, Inc. in Kansas City upon graduating last year, where she specializes in storm water management.

Aslan is continuing with Hanna's work on buffers in the LaBarque watershed. "My background is marine science and I have also worked with wildlife habitat conservation. Now I am in civil engineering. As long as you know the GIS technology, you can apply it anywhere."

Another use for the land cover map is as a data layer for a decision support system that combines biological, cultural and political information layers with more conventional civil engineering-related information. It enables the identification of locations where development would have greater or lesser impact on the overall environment. It is meant to support a collaborative decision-making process between residents and builders and developers. Adhityawarma presented the methodology last summer at the American Society of Civil Engineers Environmental and Water Resources Institute's World Environmental and Water Resources Congress.

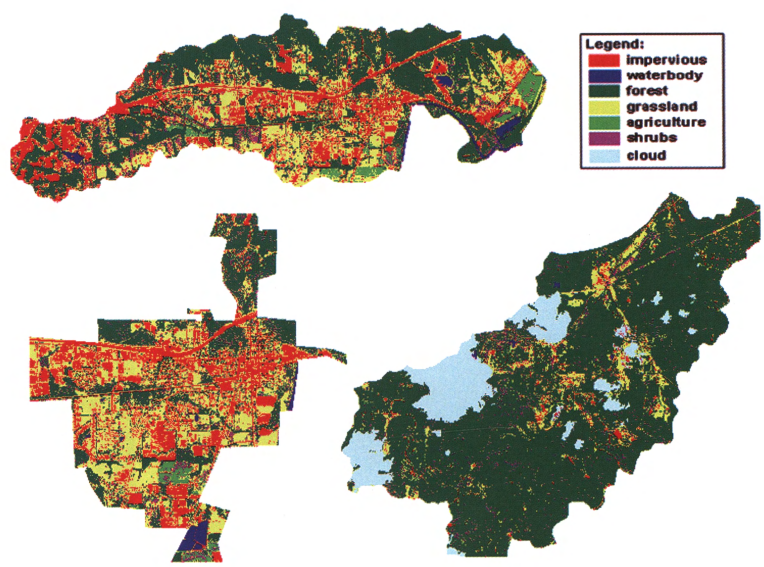
Trauth and Johnson's work on the Pacific Ring project continues. Ongoing efforts include collecting data about infrastructure and economic aspects of the area, such as property and home values.

"Engineering has so much to offer in the policy arena. We are working to develop methodologies and tools that communities can use as they decide what kind of place they want to be in the future," said Trauth. "We just want to make sure that they understand the impacts of their decisions, in this case with regard to protecting water quality."

"But there are other community issues," continued Trauth, "including economics, which is where the Community Policy Analysis Center comes in with economic modeling and community interactions. You can't tell people what to do, but you can give them the tools to make informed decisions."

This semester, freshman civil engineering student Matthew Wheeler, an MU College of Engineering Discovery Fellow, is working with doctoral candidate Adhityawarma and with Aslan, who is working on his master's degree, to develop a GIS-based process to characterize the impact of land surface, soil and vegetation on the generation of storm water runoff. This data could be used to direct the development of impervious surface limits in locations where the impact of development would be more substantial.

"When we are finished, we will have a set of strategies that any community can use to make informed decisions on development" said Trauth.



GIS images of Brush Creek Watershed, top, the Pacific Region, left, and the LaBarque Watershed.

Uncovering hidden mechanisms in Alzheimer's disease

by Jan Wiese-Fales

"Alzheimer's is a very complex disease," observed James Lee, a University of Missouri–Columbia biological engineering assistant professor, reflecting on the research he is conducting on a form of dementia that has robbed an estimated 26.6 million people worldwide of the spark of mental acuity responsible for their personal identities.

Breakthrough findings from an initial National Institutes of Health research project conducted by Lee and collaborators, Grace Sun, an MU biochemistry professor, and Lee's former doctoral student, Donghui Zhu, were published in the Journal of Neuroscience last year.

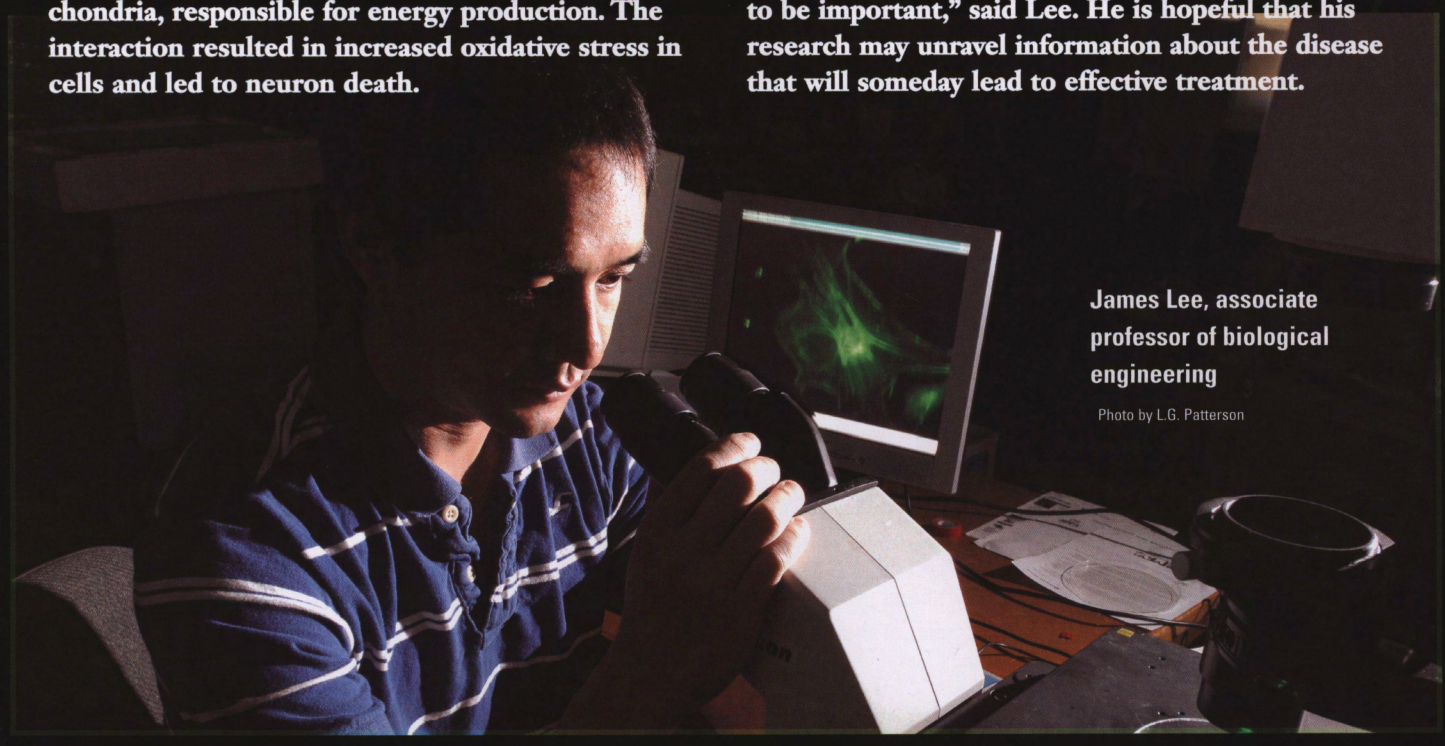
The research team focused on a protein, amyloid-beta peptide, which is present at toxic levels in the brains of those suffering from Alzheimer's. The researchers looked carefully at how A-beta interacted with the cells in the brain known as astrocytes. These cells, vital to the transmission of neural messages, responded to the toxin by activating a critical enzyme — phospholipase A2 — that negatively effected mitochondria, responsible for energy production. The interaction resulted in increased oxidative stress in cells and led to neuron death.

Each reaction is implicated in the responses of the others, so further research is aimed at understanding cause and effect mechanisms that trigger these responses "Whether A-beta is the cause of the disease or is a result of Alzheimer's is still a matter of debate — a 'chicken or the egg' question," Lee said.

Every 72 seconds, another American is diagnosed with Alzheimer's disease. A recent article in the New York Times places the current cost of caring for AD patients at $100 billion a year and goes on to say that by 2050, the number of people in this country suffering from Alzheimer's may reach 16 million.

Recognizing the importance of the research being conducted by Lee and his associates, the National Institutes of Health awarded Lee significant funding to continue his work. Lee also received an Alzheimer Association new investigator research award, one of only a handful awarded worldwide.

"Astrocytes and their interactions with A-beta and phospholipase A2 have been understudied in relation to Alzheimer's, but based on my findings, it seems to be important," said Lee. He is hopeful that his research may unravel information about the disease that will someday lead to effective treatment.



James Lee, associate professor of biological engineering

Photo by L.G. Patterson

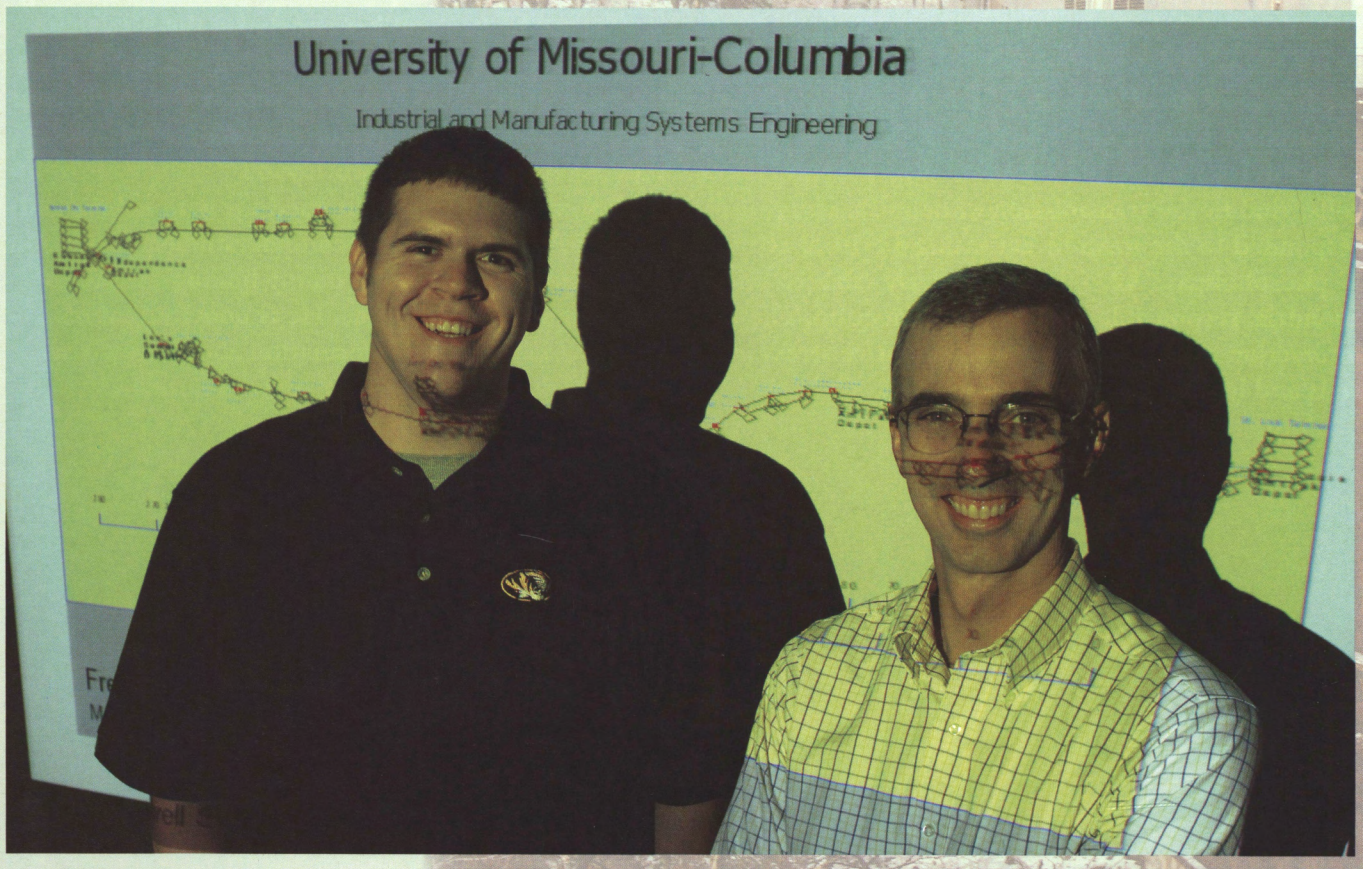
Timely research for on-time trains

by Jan Wiese-Fales

MISSOURI'S FIRST RAILROAD, constructed between 1849 and 1851, consisted of five miles of ties and rails, both hewn from oak. The train that traveled the timber rails relied on horse power and was more of a stagecoach than a train.

Today, the St. Louis and Kansas City rail hubs are the second and third largest in the nation. Only the Chicago hub is larger. According to the Missouri Department of Transportation (MoDOT), 60 percent of all freight to enter the state does so by rail.

Up to 60 freight trains per day make their way along the Union Pacific Railroad line linking the state's largest cities. The tracks also host four Amtrak trains. Amtrak has provided passenger service to Missouri since 1971 when the National Rail Passenger Service Act went into effect. Heavy traffic along the corridor and corresponding maintenance of the tracks has negatively influenced on-time passenger service and also increased freight delays. As the passenger train becomes less punctual, fewer people opt to ride the rails, making the state's considerable subsidy of the service — $7,400,000 in 2007 — a harder sell each year in budget negotiations.



Jim Noble, associate professor of industrial and manufacturing systems, right, with undergraduate student Sean Carr, stand in front of a projected railroad simulation model the pair devised for a study to suggest ways to improve Missouri passenger trains' on-time performances.

Photo by L.G. Patterson • Background images courtesy MoDOT

In order to knowledgeably approach the railroad capacity situation and to make appropriate recommendations for improving the operation of Amtrak, MoDOT awarded a research contract to Mizzou Engineering's Industrial and Manufacturing Systems Engineering Department. Researchers were charged with development of a prioritized list of rail enhancements to increase freight and passenger performance on the Union Pacific line from St. Louis to Kansas City.

"We in Missouri are at a crossroads with our rail system," explained MoDOT's Multimodal Operations Director Brian Weiler in reference to some tough decisions the state legislature will be asked to make in the future. "Up until now we have provided assistance for passenger services, but we are at a point where we need to make a decision about possibly investing in infrastructure for the future."

Jim Noble, industrial and manufacturing systems associate professor and director of the University of Missouri Center for Engineering Logistics and Distribution, acted as principal investigator on the project. He explained that Amtrak punctuality issues are primarily the result of two variables, the first of which is quantity and type of freight being transported over the railroad tracks. "There are over 60 trains per day on the track from Kansas City to St. Louis and they are predominantly transporting coal. Coal is a heavy freight that beats the tracks and moves relatively slowly, causing increased delays as a result of frequent maintenance and congestion," said Noble.

The other variable relates to the fact that while the track between Jefferson City and St. Louis is a double track, except for two bridges, the track that runs between Kansas City and Jefferson City is a single track, but is used bi-directionally by Amtrak. In order to share the track, either the Amtrak train or the freight train, which is often too long to do so, must pull off on a siding — a loop line off of the main rail line — to let the other pass. Additionally, a train with a large load of coal requires a lot of energy to start and stop, further complicating the process.

"A valid simulation model requires careful attention to detail and must be developed based on appropriate assumptions in order to be effective."

Noble used the theory of constraints to determine capacity restrictions and congestion factors on the track. To assist him in the study, he recruited industrial engineering student Sean Carr to be a part of the study team through Mizzou Engineering's undergraduate research honors program.

"Dr. Noble knew that I had entered a couple of simulation competitions with the Institute of Industrial Engineers, the industrial engineering professional society," said Carr explaining the connection.

"In addition to my class work, I spent all summer researching the rail project, sometimes spending 30 hours a week on it," said Carr. "We traveled to visit the train companies to collect data and do interviews. We also took a trip on Amtrak to see how their operations worked."

Noble noted that the data provided by Amtrak for the project was the most usable data he'd received in 15 years of work.

Developing a computer simulation model was a challenge. "A valid simulation model requires careful attention to detail and must be developed based on appropriate assumptions in order to be effective," observed Carr discussing the probability and variance of train traffic on the corridor in the simulation. "The base model, using the data Dr. Noble prepared, was a snapshot view of how the system is working now," he added.

"It was cool the first time I got it going to see all the trains running on the tracks," said Carr of the computer model that can simulate six months of rail operations in ten minutes. "I combined Dr. Noble's Amtrak data with the Union Pacific data within the simulation model to pinpoint problem areas. I could then make slight changes to the base case and rerun it to gauge where changes would make improvements."

"There is a siding every ten miles," said Noble explaining how the Union Pacific tracks are laid out. "We measured how long both Amtrak trains and Union Pacific freight trains were delayed by the interaction between them on the tracks. We looked at it from an overall congestion point of view."

When the pair finished, aided by Charles Nemmers, director of

civil engineering's Transportation Infrastructure Center, graduate students Stella Zhang and Andres Gomez, and consultants from Hanson-Wilson, Inc., they had come up with a total of 15 alternatives. They then ran them through six months of simulated operations to see how each would perform. In the final report presented to MoDOT, nine options were profiled. Selected alternatives were based on the percentage of delay saved to both Union Pacific and to Amtrak measured against the amount of money invested.

Noble's report highlighted three of the alternatives as having excellent return for required investment. Key recommendations include extending a specific siding, joining two additional sidings to create a longer loop, and adding a second line to a specific bridge.

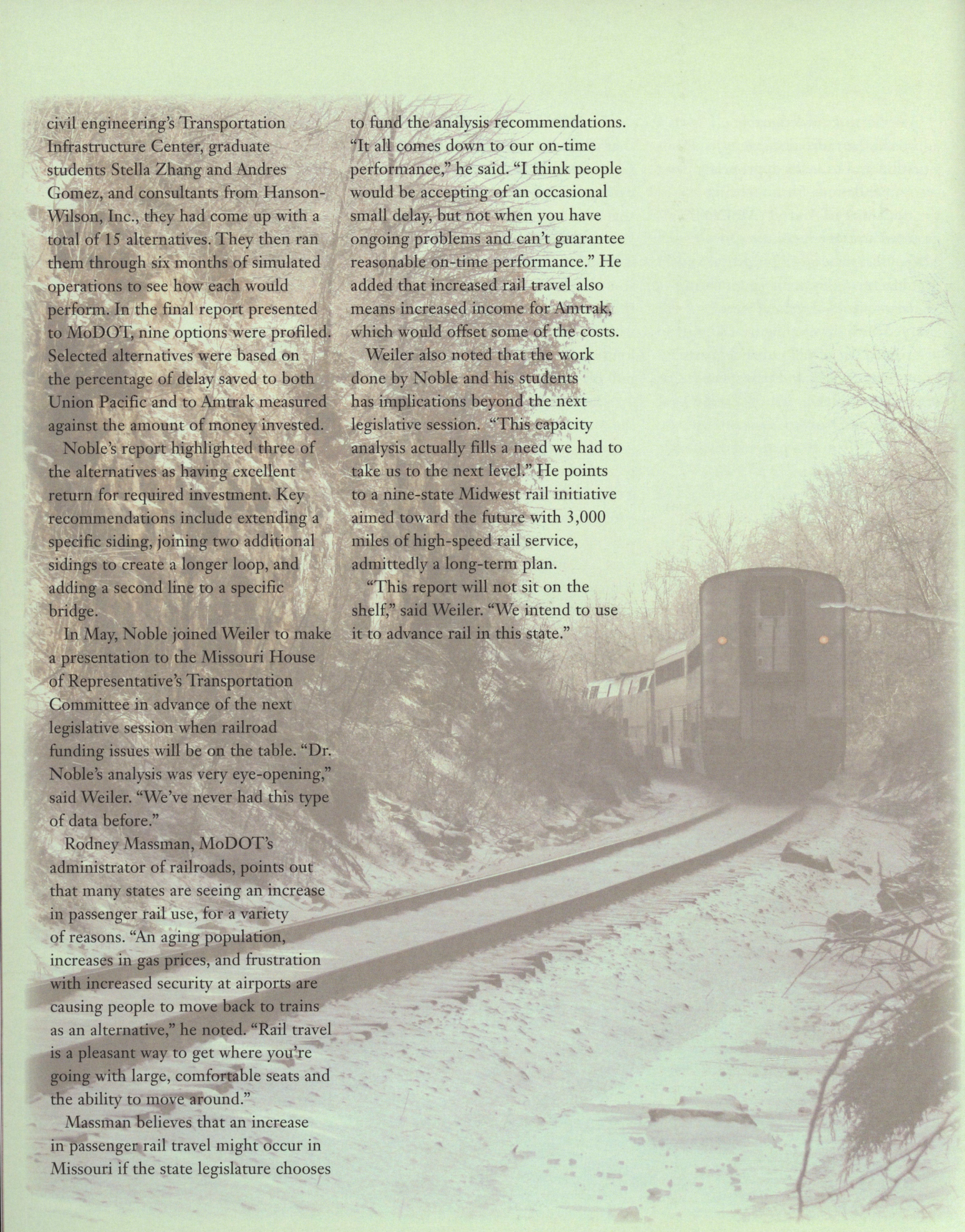
In May, Noble joined Weiler to make a presentation to the Missouri House of Representative's Transportation Committee in advance of the next legislative session when railroad funding issues will be on the table. "Dr. Noble's analysis was very eye-opening," said Weiler. "We've never had this type of data before."

Rodney Massman, MoDOT's administrator of railroads, points out that many states are seeing an increase in passenger rail use, for a variety of reasons. "An aging population, increases in gas prices, and frustration with increased security at airports are causing people to move back to trains as an alternative," he noted. "Rail travel is a pleasant way to get where you're going with large, comfortable seats and the ability to move around."

Massman believes that an increase in passenger rail travel might occur in Missouri if the state legislature chooses to fund the analysis recommendations. "It all comes down to our on-time performance," he said. "I think people would be accepting of an occasional small delay, but not when you have ongoing problems and can't guarantee reasonable on-time performance." He added that increased rail travel also means increased income for Amtrak, which would offset some of the costs.

Weiler also noted that the work done by Noble and his students has implications beyond the next legislative session. "This capacity analysis actually fills a need we had to take us to the next level." He points to a nine-state Midwest rail initiative aimed toward the future with 3,000 miles of high-speed rail service, admittedly a long-term plan.

"This report will not sit on the shelf," said Weiler. "We intend to use it to advance rail in this state."

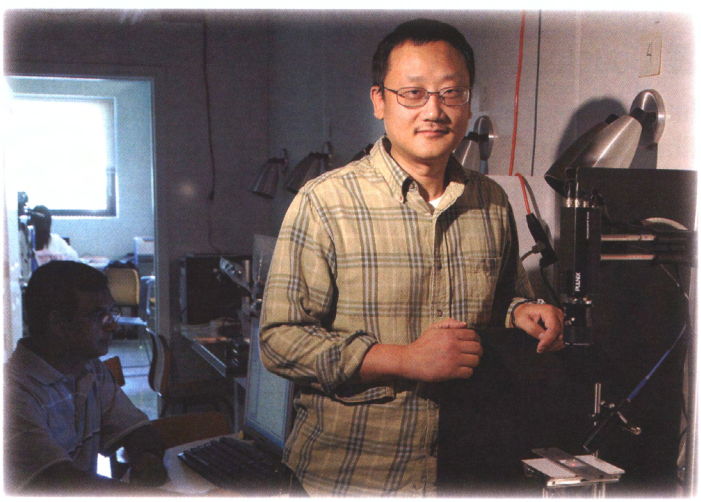


NSF CAREER awards
Prestigious, career-boosting funding for research

THE NATIONAL SCIENCE FOUNDATION'S Faculty Early Career Development Program supports career-development activities of teacher-scholars in fields of science, technology, math and engineering with its highly prestigious CAREER awards. These coveted awards provide researchers with a minimum of $400,000 to support five years of investigation on proposed projects. Awards are made for proposals that most effectively integrate research and education goals of awardees' sponsoring colleges and that demonstrate the connection between the processes of learning and discovery.

This year, a dozen proposals were submitted by Mizzou Engineering assistant professors from various departments by the July 18 deadline. Time will tell.

Gary Yao, assistant professor in the Biological Engineering Department became the latest CAREER recipient, joining eight additional Mizzou Engineering past CAREER awardees, two of whom are in the midst of funded projects, and six who have completed their projects.



■ Gang (Gary) Yao

Light propagation in striated muscle (7/07)

Aided by a hyper-spectral imaging system that uses white light, Gary Yao is examining animal muscle samples. He and his students — shown here with biological engineering graduate student Janaka Ranasinghesagara — initially discovered that sarcomere, striated structural units in skeletal muscles, exhibit unique patterns that can predict what is going on inside the muscle.

"When I searched for a model to help me put our observations into context, none existed," said Yao. "I could see that the result could have significant impact, but it had not been published or reported before our findings."

Yao believes that its uniqueness and its potential as a tool to examine human muscle functions was what made his project attractive to NSF. He also sees application possibilities to predict muscle quality in the meat industry.

The educational component of Yao's CAREER project involves a teaching methodology that will improve a student's learning outcome.

"If students just follow a set of procedures to do homework or lab experiments, teaching is ineffective," said Yao. "I want to teach them the science of thinking behind it, to do something that requires them to re-evaluate their findings and draw scientific conclusions from it."

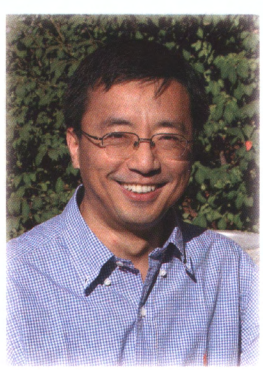
Yao expressed his gratitude to Jinglu Tan, chair of the Biological Engineering Department, for introducing him to this field of study, and to NSF for his CAREER award.

"I have a good feeling about the project," said Yao. "To find something and then to find that it is unique to the scientific literature is exciting. I am very excited."

■ Li-Qun (Andrew) Gu

Single molecule study of oligonucleotide-protein interaction and folding in a nanopore (7/06)

Andrew Gu, an assistant professor in the Biological Engineering Department, received notification of his NSF CAREER award in July of last year. His research project combines nanotechnology and biotechnology to take aim at detecting single molecules of such things as pathogens and toxins in blood samples and in the environment.



Gu and the research scientist Changlu Gao developed a unique technology that Gu is using in his work to fabricate hand-held nanopores – glass nanotubes capable of both ultra-sensitive detection and single cell delivery. The detection process involves attaching minute but durable receptors known as aptamers to the lining of the microscopic tubes that will have a high bonding affinity and specificity to the molecules Gu is attempting to detect.

Gu pointed out that his new biotechnology procedure could be used to detect deadly poisons in the blood or in the environment, naming ricin as an example. "People can synthesize that poisonous protein from castor beans," he explained. "It is second

or third on the EPA's list of biological weapons."

The process also has potential medical applications such as detecting single viral particles of influenza type A or HIV in blood samples.

"There is no specific textbook on single-molecule detection," said Gu about his motivation to develop classes to expose students to this nanotechnology. Now in his third semester, his students work directly in the lab on single-molecule detection experiments with product design as the final examination.

"Ten years ago when I graduated from China and went overseas, there was no conception of this technology," Gu observed about the recent boom in nanobiotechnology research. "It has developed so fast. The good news is that MU Engineering wants to emphasize it. Dalton Cardiovascular Research Center, the College of Engineering, and the Biological Engineering Department have given me a lot of support."

Chi-Ren Shyu, associate professor of computer science, center front, and his research team, clockwise, Jason Green, Jaturon Harnsomburana, Adrian Barb, Nan Zhao, Dayang Hao, and Marc Diblasi.

■ Chi-Ren Shyu

Linking visual phenotypes with genotypes in plants – content management, knowledge sharing and database retrievals (7/05)

Chi-Ren Shyu, the Paul K. and Diane Shumaker associate professor in Computer Science is using his CAREER award to develop and build new non-traditional computational search tools that will link visual features in a plant – its phenotype – to data about the chromosomal regions in the plant's genotype.

Shyu is working with researchers at North Carolina State University and the USDA to study Southern Leaf Blight in maize, a plant pathogen that can reduce North American yields by 40 percent. He is also working with collaborators at MU and Iowa State University to study a rich collection of maize mutants and lesions. When operational, a researcher anywhere will be able to submit an image of a maize mutant to the database to find out which genes or environmental factors are responsible for the visual phenotype.

"I have the opportunity to work with world-class experts on this project from right here on the MU campus," said Shyu. "We are also successful in recruiting top kids from Missouri, as well as overseas."

This visually driven application of bioinformatics is, Shyu admits, a longtime project and has many possibilities beyond the maize documentation but says that the project has collected enough data and developed advance computer algorithms to file a report of the latest results that will be published in the December 2007 issue of the Journal of Bioinformatics and Computational Biology.

The group is also set to build similar databases for soybeans and rice.

Shyu believes that the CAREER award is a good opportunity for junior faculty to take research to the next level and to provide unique opportunities for undergraduate and graduate students to participate in noteworthy projects.

"Every day is a challenge. Every day is fun," said Shyu of his work with the project.

■ Douglas Smith

Integration of product and process design for short fiber reinforced polymer composites (8/02)

Doug Smith, an associate professor in the Mechanical and Aerospace Engineering Department, focused his CAREER research on integrating product and process design for molded polymer composite products. These composites gain strength and rigidity with the addition of short fibers and are widely used in the production of products with detailed geometrical features.

Smith and his graduate students specifically looked at the flow of fiber-reinforced polymers as they were injected into molds. During the manufacturing process, the polymer melt flow causes fibers to orient themselves in specific ways, though not always in a direction that will add the desired strength to the product. Their work involved developing computer methods that may be used to design processes which cause the fibers to orient themselves into a strengthening alignment.

"Certainly, CAREER grants add funding to do some novel research, but just as important, the projects translate into quality experiences for graduate students and lay the groundwork for future research by adding legitimacy to the careers of all those involved with the project," said Smith.

■ Sanjeev Khanna

Innovative research and teaching in modern welded structures engineering and design (1-01)

Sanjeev Khanna is an associate professor in the Mechanical and Aerospace Engineering Department. With his CAREER award, he was able to study the durability of spot welds in steel and aluminum sheet metal structures and to develop a welding engineering course, one of only two being offered in engineering colleges in the country.

Fully 80 percent of spot welds are used in the auto industry. The Auto Steel Partnership (ASP), which is a consortium of the big three of this country's automobile manufacturers and several steel manufacturers, matched NSF funding for Khanna's work examining the durability of spot-welded joints with an emphasis on residual stress created within the weld when it is manufactured. The ASP and Ford Motor Co. have used the project's findings.

"The NSF grant was very beneficial to me. It gave me a start and the automobile industry has continued to fund my research group," said Khanna. "In addition, one of my master's students was hired by Ford, and another recently contacted me to say that he had been hired by the Federal Aviation Administration to study life expectancy of aging aircrafts."

■ J. Erik Loehr

Stabilization of earth slopes using reticulated in-situ reinforcement (6/01)

J. Erik Loehr is the James C. Dowell associate professor in the Department of Civil and Environmental Engineering and the interim director of research for the college of engineering. His CAREER award allowed him to study ways to stabilize landslides in a laboratory setting.

Loehr and his graduate and undergraduate assistants worked to develop a better understanding of existing systems with an eye to new cost-effective designs and innovative installation methods and materials for slope stabilization. They designed, built, and calibrated a one-of-a-kind large-scale landslide simulator to evaluate their models.

"We produced a lot of data," said Loehr, "some of which we are still working to publish. It's difficult to get funding for five-year projects, so CAREER grants let you do things that you would otherwise not be able to accomplish. It allows you to focus on the research instead of where the money will come from."

■ Baolin Deng

Integrating research and education on arsenic removal from drinking water (9/01)

Baolin Deng is the C.W. LaPierre associate professor in Civil and Environmental Engineering. His CAREER project was aimed at finding methods to treat drinking water for arsenic contaminants, which occur naturally in ground water in many parts of this country and around the world.

The Environmental Protection Agency recently revised the acceptable level of arsenic in drinking water from 50 parts per billion to just 10 parts per billion, making new efficient technologies and absorbents of utmost importance.

Equally important to Deng is educating others, especially children, about water quality issues.

"I had other grants before my CAREER grant," said Deng, "but they were research only. This grant had a more intellectual element because of the educational aspects. It forced me to think of the broader impact of the research."

■ Zehn Chen

A computer test-bed for first principle simulation of blast-resistant structures (4/99)

Zhen Chen is the C.W. La Pierre professor in the Civil and Environmental Engineering Department. Seeking ways to proactively respond to threats of terrorism, Chen's CAREER award was used to develop a computerized test-bed to simulate structural failure responses under blast and impact loads. With the use of the Material Point Method, coupled wave, diffusion, and instantaneous phenomena could be simulated in a single computational domain.

"A CAREER award offers a great opportunity to grow professionally, and is also a good way to foster educational programs. At the time of my award, we were offered the chance to find additional funding from private industry in the form of matching grants, so it also offered a chance to work directly with businesses and agencies in the field."

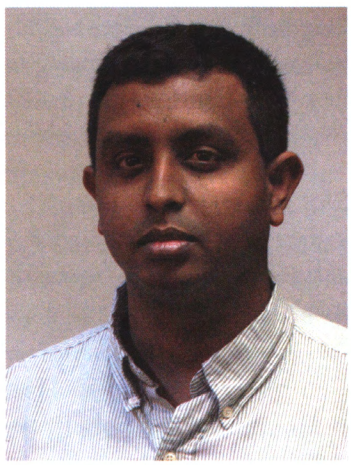
■ Yunxin Zhao

Adaptive and robust automatic speech recognition in human-computer interaction (9/96)

With her CAREER award, Yunxin Zhao, a professor in the Computer Science Department, conducted research on speaker and environment adaptive techniques for automatic speech recognition. This technology allowed a speech recognition system trained in a quiet environment from one set of speakers to also work well in a noisy environment, with interferences, and with new speakers.

The award facilitated her subsequent research on intelligent hearing aid design based on algorithms of speech-interference separation, and on automatic captioning for telemedicine based on real-time large vocabulary conversational speech recognition. Currently she is continuing and expanding research activities along these same lines.

Biological Engineering Department



Shramik Sengupta

Office: 252 Agricultural Engineering Building
Phone: 573-882-1115
E-mail: SengupatS@missouri.edu

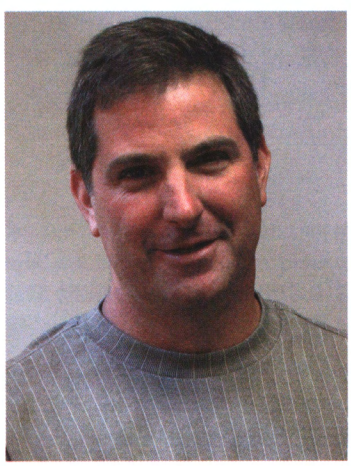
Education: Ph.D. from the University of Minnesota, M.S. from the University of Colorado at Boulder, and a Bachelor's of Technology from the Indian Institute of Technology in Kharagupur, India. Postdoctoral training at the Center for Microfluidics and Medical Diagnostics at the University of Notre Dame

Research Focus:

- Nano and micofluidic systems for bio-diagnostics

Shramik Sengupta is an assistant professor in the Biological Engineering Department at the University of Missouri–Columbia. His research is currently focused on the rapid detection of Johne's disease in cattle, a disease that costs Americans $1.5 billion annually. Johne's takes up to 45 days to detect, during which time a diseased animal may infect others. Sengupta is working to use microfluidic applications to develop a small chip capable of diagnosing the disease in much less time. He is collaborating with Bill Fales, a professor of veterinary pathology in the College of Veterinary Medicine, on the project. He is also collaborating on projects aimed at rapidly estimating the antibiotic susceptibility profile of various pathogens and the targeted detection of pathogens in clinical, food or environmental research samples.

Chemical Engineering Department



Patrick Pinhero

Office: W2017 Lafferre Hall
Phone: 573-882-7319
E-mail: PinheroP@missouri.edu

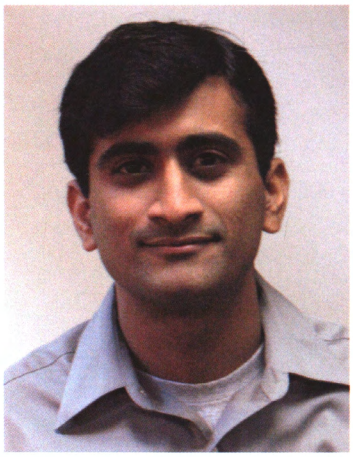
Education: Ph.D. from the University of Notre Dame and B.S. from Creighton University in Omaha, Nebraska. Postdoctoral work at the Ames Laboratory at Iowa State University

Research Focus:

- Environmental degradation of materials in nuclear reactor systems
- Synthesis and characterization of nanoscale materials
- Fundamental surface chemistry of corrosion and oxidation

Patrick Pinhero is an associate professor in the Chemical Engineering Department at the University of Missouri–Columbia. Before joining the staff at MU, Pinhero worked in the Materials Department of the Idaho National Laboratory where he conducted research in the areas of biocorrosion, electrochemistry, nanoscience, catalysis, and the development of neutron absorbing alloys. Most recently he was the materials technical group leader for a large program that was awarded a pair of 2007 Nano50 awards. Prior to pursuing a doctorate, he worked as a staff scientist with S-CUBED Laboratories of La Jolla, Cal. Pinhero has authored or co-authored more than 40 technical publications and a book chapter.

Civil and Environmental Engineering Department



Praveen Edara

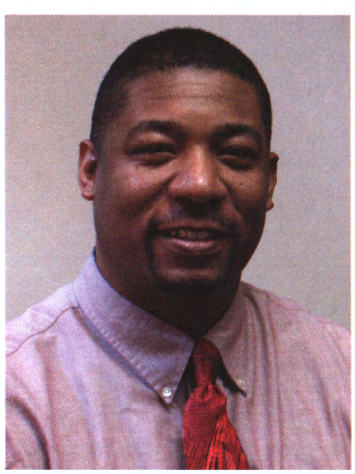
Office: E3502 Thomas and Nell Lafferre Hall
Phone: 573-882-1900
E-mail: EdaraP@missouri.edu

Education: Ph.D. from Virginia Polytechnic Institute and State University in Blacksburg, Virginia, and Bachelor's of Technology from the Indian Institute of Technology in Madras, India

Research Focus:
- Transportation
- Traffic safety

Praveen Edara is an assistant professor in the Civil and Environmental Engineering Department at the University of Missouri–Columbia. He is working as an investigator on three Missouri Department of Transportation work zone projects. One is focused on work zone speed limits, and another is aimed at developing zone capacity guidelines. The third project involves an analysis of the effectiveness of varying patterns on truck-mounted attenuators, also called crash cushions. TMAs are used to reduce the severity of rear-end collisions in highway work zones. Prior to coming to MU, Edara served as an associate research scientist in system operations and traffic engineering for the Virginia Department of Transportation, and is still involved in studies of traffic control for hurricane evacuation and optimal placement of traffic point detectors on Virginia freeways. He has also worked as a research contractor for the Turner-Fairbank Highway Research Center of the Federal Highway Administration in McLean, Virginia.

Civil and Environmental Engineering Department



Enos C. Inniss

Office: 103 Engineering Building North
Phone: 573-882-2041
E-mail: InnissE@missouri.edu

Education: Ph.D. University of Notre Dame and B.S. from Texas A & M University

Research Focus:
- Biological remediation of recalcitrant compounds
- Periodically operated water treatment processes
- Water reuse considerations

Enos C. Inniss is an assistant professor in the Department of Civil and Environmental Engineering at the University of Missouri–Columbia. Inniss' research focus is on water quality and reuse considerations, and previous experiences include a familiarity with the design, building and operation of sequencing batch reactors (SBRs), and periodic operation of systems between anaerobic and aerobic conditions. Before coming to Mizzou Engineering, he served as an assistant professor at the University of Texas at San Antonio and as a member of the Center for Water Research. He continues to work on developing improved process control strategies for efficient wastewater treatment operation and to explore opportunities for water reuse applications with a strong interest in industry/university partnerships.

Civil and Environmental Engineering Department

Sarah Orton

Office: E2503 Thomas and Nell Lafferre Hall
Phone: 573-884-5089
E-mail: OrtonS@missouri.edu

Education: Ph.D. from University of Texas at Austin, M.S. from University of Illinois Urbana–Champaign, and B.S. from University of Texas at Austin

Research Focus:
- Reinforced concrete structures
- Structural retrofit, rehabilitation, and repair
- Extreme events on structures (earthquake, blast, etc.)
- Innovative structural materials

Sarah Orton is an assistant professor in the Civil and Environmental Engineering Department. She has done research with fiber-reinforced polymers for the strengthening of vulnerable reinforced concrete structures. She is interested in investigating the use and design of innovative materials, such as polymers, in strengthening structures, including blast resistant applications. One strengthening concept she plans to continue investigating is the design consideration of fiber anchors used to strengthen structures.

Computer Science Department

Jianlin Cheng

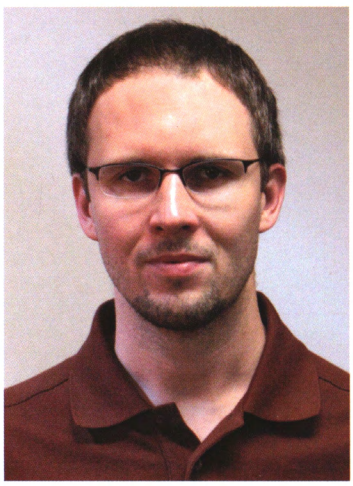
Office: 109 Engineering Building West
Phone: 573-882-7306
E-mail: ChengJi@missouri.edu

Education: Ph.D. from University of California Irvine, M.S. from Utah State University, and B.S. from Huazhong University of Science and Technology in China

Research Focus:
- Bioinformatics and systems biology
- Machine learning and data mining

Jianlin Cheng is an assistant professor in the Department of Computer Science at the University of Missouri-Columbia. Cheng and colleagues are working to develop bioinformatics algorithms and tools for structural genomics, proteomics and systems biology. Cheng's current focus is the prediction of protein structure, function and interaction. Cheng serves as an editorial board member for the "Journal of Computational Intelligence in Bioinformatics and Systems Biology." In addition, he served as a program committee member of 2007 IEEE Symposium on Bioinformatics and Bioengineering, the 2007 IEEE International Conference on Bioinformatics and Biomedicine, and the 2007 International Conference on Bioinformatics and Computational Biology.

Computer Science Department



Dmitry Korkin

Office: 207 Engineering Building West
Phone: 573-882-4762
E-mail: KorkinD@missouri.edu

Education: Ph.D. from University of New Brunswick in Fredericton, Canada and M.S. and B.S. from Moscow State University in Russia. He did postdoctoral work at Rockefeller University in New York and at the University of California in San Francisco.

Research Focus:
- Structural bioinformatics
- Computational biology
- Machine learning
- Pattern recognition

Dmitry Korkin is an assistant professor in the Computer Science Department and Informatics Institute at the University of Missouri–Columbia. His research focus is the development of new computational methods to study structure, function and evolution of macromolecular assemblies, as well as application of the methods to specific biological systems. His research in the areas of machine learning and pattern recognition involves development of a formalism for structure based object representation and inductive learning.

Electrical and Computer Engineering Department

Tony Han

Office: 311 Engineering Building West
Phone: 573-882-6630
E-mail: HanTx@missouri.edu

Education: Ph.D. University of Illinois at Urbana–Champaign, M.S. from the University of Rhode Island in Kingston, Rhode Island, M.S. and B.S from the Institute of Information Science at Beijing Jiaotong University in Beijing, China.

Research Focus:
- Computer vision: human detection, tracking, and activity recognition
- Statistical learning
- Multimedia image/signal/video processing

Tony Han is an assistant professor in the Electrical and Computer Engineering Department. As a Ph.D. candidate at the University of Illinois at Urbana–Champaign, he was affiliated with the Image Formation and Processing Group and the Beckman Institute for Advanced Science and Technologies.

Photo by Jennie Forbes

Mizzou Engineering nanotechnology initiative

MIZZOU ENGINEERING Dean, Jim Thompson, led a day long workshop on Sept. 13 to create a public-private sector partnership that would build a new center for nanotechnology entrepreneurship. More than 200 business, federal and state government representatives met with MU faculty and administrators to come up with a nationally competitive framework for the center.

"The extraordinary industry participation in this workshop shows the high level of interest and commitment in moving this research commercialization project forward," Thompson said.

Speaking at the conference was Missouri's senior senator, Kit Bond, shown here accepting a tee-shirt from Shubhra Gangopadhyay, a Mizzou Engineering electrical and computer engineering professor and co-director of the MU Center for Nano/Micro Systems and Nanotechnology.

Research being conducted by the university's engineering, agricultural, medical, physics and chemistry faculty members will form the nucleus of the new consortium.

"We want to build a nanotechnology hub in which our faculty and industry will work side by side to bring our research products to market," said Sam Kiger, the College of Engineering's associate dean for research.

You can make this MAYTAG TIGER WASHER YOURS!

Designed and donated by Jude Yahn BSME '89

Proceeds to the Engineering and MU Alumni Association Scholarship Funds

PLACE YOUR BID ON E-BAY BETWEEN DECEMBER 3 AND DECEMBER 14, 2007

During the time Jude Yahn BSME '89 was employed at Whirlpool Corporation in Tulsa, Okla., the Whirlpool's recently acquired Maytag Company sponsored a "Bling My Washer" contest to celebrate its 50-year anniversary. Each division held a contest to decide who would "bling" the washing machine shell and submit it to the national competition.

Yahn's sketch won the Tulsa division contest, and he spent 20-plus hours working to decorate the machine you see here. The Tiger Washer was sent to Whirlpool corporate headquarters in Benton Harbor, Mich. for the final review and finished in second place.

Jude Yahn now works as engineering manager for Tulsa Winch Group. He and his wife Erica and have two children, Ayden and Taryn. Yahn is an active member of the MU Tulsa Alumni Group and will serve as president in 2008.

CEOs! Share Your Stories!

We keep saying that more men and women engineering graduates end up as CEOs than graduates in any other profession. Rather than just saying so, we'd like to tell your stories. If you or someone you know made it to the top, please share your information with us on the form to the right, through the mail at the address listed, or e-mail umcengrdev@missouri.edu, and watch for the story in an upcoming issue of Mizzou Engineer.

News from Mizzou Engineers

Share your personal and professional news with us. Mail this form to:

Jan Wiese-Fales, Editor
Mizzou Engineering
University of Missouri–Columbia
W1006 Lafferre Hall
Columbia, MO 65211

or e-mail: **UmcEngrDev@missouri.edu**

Name_____

Maiden Name_____

Spouse's Name_____

Class Year_____Spouse Class Year (i/a)_____

Discipline (AgE, BE, ChE, CEE, CS, ECE, EE, IE, IMSE, MAE)_____

Home Address_____

City_____

State_____Zip _____

E-mail_____

Here's my news: _____

RECRUITMENT

Please send information about Mizzou College of Engineering to:

Name _____

Address_____

City_____

State_____Zip _____

Currently Attending:_____

_____Year in School:_____

Photo courtesy MIZZOU Publications

Mizzou
ENGINEERING

University of Missouri-Columbia
Engineering Advancement Office
W1006 Thomas and Nell Lafferre Hall
Columbia, MO 65211-2200

Return Service Requested